```
1 # SPM-2: derived normalized T-scores for each case
                                                           1 # SPM-2: derived normalized T-scores for each case
   in standardization sample:
                                                              in standardization sample:
 2 # create raw-to-T lookup tables.
                                                           2 # create raw-to-T lookup tables.
4 suppressMessages(library(here)) # BEST WAY TO SPEC
                                                           4 suppressMessages(library(here)) # BEST WAY TO SPEC
   TEY ETLE PATHS
                                                              TEY ETLE PATHS
5 suppressMessages(suppressWarnings(library(tidyvers
                                                           5 suppressMessages(suppressWarnings(library(tidyvers
6 library(bestNormalize) # NORMALIZATION METHODS
                                                           6 library(bestNormalize) # NORMALIZATION METHODS
 7 suppressMessages(library(psych)) # DESCRIPTIVE TAB
                                                           7 suppressMessages(library(psych)) # DESCRIPTIVE TAB
8 suppressMessages(library(data.table))
                                                           8 suppressMessages(library(data.table))
Q
                                                           9
10 # READ FINALIZED STAND SAMPLE -----
                                                           10 # READ FINALIZED STAND SAMPLE -----
11
                                                           11
12 Child 512 Home <-
                                                           12 Child 512 Home <-
13
    suppressMessages(as_tibble(read_csv(
                                                               suppressMessages(as_tibble(read_csv(
                                                           13
      here("INPUT-FILES/CHILD/ALLDATA-DESAMP-NORMS-I
                                                                  here("INPUT-FILES/CHILD/ALLDATA-DESAMP-NORMS-I
   NPUT/Child-512-Home-allData-desamp.csv")
                                                              NPUT/Child-512-Home-allData-desamp.csv")
15
    ))))
                                                           15
                                                              ))))
16
                                                           16
17 score_names <- c("TOT", "SOC", "VIS", "HEA", "TO
                                                           17 score_names <- c("TOT", "SOC", "VIS", "HEA", "TO
   U", "TS", "BOD", "BAL", "PLA")
                                                              U". "TS". "BOD". "BAL". "PLA")
19 # Check for any dupIDs (anyDuplicated() returns ro
                                                           19 # Check for any dupIDs (anyDuplicated() returns ro
                                                              w number of FIRST dup ID encountered)
   w number of FIRST dup ID encountered)
20 anyDuplicated(Child_512_Home$IDNumber)
                                                           20 anyDuplicated(Child_512_Home$IDNumber)
21
                                                           21
22 # Check for any NAs on IDNumber, returns TRUE if N
                                                           22 # Check for any NAs on IDNumber, returns TRUE if N
23 any(is.na(Child_512_Home$IDNumber))
                                                           23 any(is.na(Child_512_Home$IDNumber))
24
                                                           24
25 # extract cases with Dup ID numbers or NA on IDNum
                                                           25 # extract cases with Dup ID numbers or NA on IDNum
   ber, write out for investigation
                                                              ber, write out for investigation
26 Child_512_Home_dupMissIDs <- Child_512_Home %>%
                                                           26 Child_512_Home_dupMissIDs <- Child_512_Home %>%
27
   mutate(dup = duplicated(IDNumber)) %>%
                                                           27 mutate(dup = duplicated(IDNumber)) %>%
28
   filter(dup == TRUE | is.na(IDNumber)) %>%
                                                           28
                                                              filter(dup == TRUE | is.na(IDNumber)) %>%
29 select(-dup) %>%
                                                              select(-dup) %>%
                                                           29
    write_csv(
                                                               write_csv(
30
                                                           30
      here(
                                                                 here(
31
                                                           31
32
        paste0(
                                                           32
                                                                    paste0(
           'OUTPUT-FILES/CHILD/DUP-IDS/Child-512-Home
                                                                      'OUTPUT-FTLFS/CHTLD/DUP-TDS/Child-512-Home
33
                                                          33
   -dupIDs-missingIDs-',
                                                              -dupIDs-missingIDs-',
         format(Sys.Date(), "%Y-%m-%d"),
                                                                    format(Sys.Date(), "%Y-%m-%d"),
34
                                                           34
           '.csv'
                                                          35
                                                                      '.csv'
35
       )
36
                                                           36
                                                                    )
37
      ),
                                                           37
                                                                  ),
38
       na = 'missing'
                                                           38
                                                                 na = 'missing'
39
                                                           39
40
                                                           40
41 # DETERMINE BEST NORMALIZATION MODEL -----
                                                           41 # DETERMINE BEST NORMALIZATION MODEL -----
42
                                                           42
43 # (NOTE: THIS SECTION SHOULD BE TOGGLED OFF AFTER
                                                           43 # (NOTE: THIS SECTION SHOULD BE TOGGLED OFF AFTER
    SELECTION OF NORMALIZATION
                                                               SELECTION OF NORMALIZATION
44 # MODEL)
                                                           44 # MODEL)
46 # # # create a bestNormalize object to lock down t
                                                           46 # # # create a bestNormalize object to lock down t
   he normalizing function that will be used on repea
                                                              he normalizing function that will be used on repea
   ted runs of the norms.
                                                              ted runs of the norms.
```

47 # TOT_nz_obj <- bestNormalize(Child_512_Home\$TOT_r

47 # TOT_nz_obj <- bestNormalize(Child_512_Home\$TOT_r</pre>

```
aw)
                                                                aw)
48 #
                                                            48 #
49 # # print transformation
                                                            49 # # print transformation
50 # TOT_nz_obj$chosen_transform
                                                            50 # TOT_nz_obj$chosen_transform
                                                            51 #
                                                            52 # # Extract transformation type
52 # # Extract transformation type
53 # chosen_transform <- class(TOT_nz_obj$chosen_tran</pre>
                                                            53 # chosen_transform <- class(TOT_nz_obj$chosen_tran</pre>
   sform)[1]
                                                                sform)[1]
                                                            54 #
55 # # apply the chosen method to create normalized z
                                                            55 # # apply the chosen method to create normalized z
   -scores for each case.
                                                                -scores for each case.
56 # TOT_nz_transform <- eval(as.name(chosen_transfor
                                                            56 # TOT_nz_transform <- eval(as.name(chosen_transfor
   m))(Child_512_Home$TOT_raw)
                                                                m))(Child_512_Home$TOT_raw)
57
                                                            57
58
                                                            58
59 # APPLY SELECTED NORMALIZATION MODEL TO CREATE NOR
                                                            59 # APPLY SELECTED NORMALIZATION MODEL TO CREATE NOR
   MALTZED Z-SCORES -----
                                                                MALIZED Z-SCORES -----
60
                                                            60
61 # Apply a static, repeatable transformation to cre
                                                            61 # Apply a static, repeatable transformation to cre
   ate normalized z-scores for
                                                                ate normalized z-scores for
                                                            62 # each case.
62 # each case.
63
                                                            63
64 # create char vec with names for the nine score tr
                                                            64 # create char vec with names for the nine score tr
   ansformations
                                                                ansformations
65 nz_transform_names <- c(paste0(score_names, '_nz_t
                                                            65 nz_transform_names <- c(paste0(score_names, '_nz_t
   ransform'))
                                                                ransform'))
66
                                                            66
67 # pull nine raw score columns into a list
                                                            67 # pull nine raw score columns into a list
68 raw_score_cols_list <- map(score_names, ~ Child_51
                                                            68 raw_score_cols_list <- map(score_names, ~ Child_51
   2_Home %>%
                                                                2_Home %>%
                                                                              pull(
69
                 pull(
                                                            69
                   !!as.name(paste0(.x, '_raw'))
70
                                                            70
                                                                                !!as.name(paste0(.x, '_raw'))
71
                                                            71
                                                            72 )
72 )
74 # create the nine named objects that contain the n
                                                            74 # create the nine named objects that contain the n
   ormalization for each score
                                                                ormalization for each score
75 # distribution. In this call of `purrr::walk2()`,
                                                            75 # distribution. In this call of `purrr::walk2()`,
    the .f calls assign(), because
                                                                 the .f calls assign(). because
76 # the central purpose of this code is to use assig
                                                            76 # the central purpose of this code is to use assig
   n to create a series of named
                                                                n to create a series of named
77 # objects in the global environment. The `walk` fu
                                                            77 # objects in the global environment. The `walk` fu
   nctions are used when the
                                                                nctions are used when the
78 # output of interest is a side effect. The names f
                                                            78 # output of interest is a side effect. The names f
   or these objects are contained
                                                                or these objects are contained
79 # in the .x argument (a char vec). The data to be
                                                            79 # in the .x argument (a char vec). The data to be
    normalized is in the list of
                                                                 normalized is in the list of
80 # nine raw score columns `raw_score_cols_list`, wh
                                                            80 # nine raw score columns `raw_score_cols_list`, wh
   ich as assigned to the .y
                                                                ich as assigned to the .y
81 # argument of walk2(), using the dot . shorthand.
                                                            81 # argument of walk2(), using the dot . shorthand.
    Within assign(), the value
                                                                 Within assign(), the value
82 # argument allows the selected normalization trans
                                                            82 # argument allows the selected normalization trans
   formation to be applied to the
                                                                formation to be applied to the
83 # .y data.
                                                            83 # .y data.
85 # NOTE: MUST SUBSITUTE NAMED TRANSFORMATION FROM P
                                                            85 # NOTE: MUST SUBSITUTE NAMED TRANSFORMATION FROM P
   REVIOUS STEP IN THIS LINE:
                                                                REVIOUS STEP IN THIS LINE:
86 # value = orderNorm(.y), e.g., value = [SELECTED T
                                                            86 # value = orderNorm(.y), e.g., value = [SELECTED T
   RANSFORMATION](.y),
                                                                RANSFORMATION](.y),
87
                                                            87
88 raw_score_cols_list %>%
                                                            88 raw_score_cols_list %>%
89
    walk2(
                                                            89
                                                                 walk2(
       .x = c(nz_transform_names),
                                                                    .x = c(nz_transform_names),
90
                                            # names to
                                                                assign
   assign
91
       .y = .,
                               # object to be assigned
                                                            91
                                                                    .y = .,
                                                                                           # object to be assigned
92
       .f = \sim assign(x = .x)
                                                            92
                                                                    .f = \sim assign(x = .x)
93
                     value = orderNorm(.y),
                                                            93
                                                                                  value = orderNorm(.y),
```

```
94
                                                              94
                      envir = .GlobalEnv)
                                                                                    envir = .GlobalEnv)
 95
                                                                   )
      )
                                                              95
 96
 97 # Each of the named objects (normalization for eac
                                                              97 # Each of the named objects (normalization for eac
    h score) created in the
                                                                  h score) created in the
98 # previous smippet is a list. Use base::mget to pu
                                                              98 # previous smippet is a list. Use base::mget to pu
    t these named objects into a
                                                                  t these named objects into a
 99 # 'list of lists'. Here, mget takes a single argum
                                                              99 # 'list of lists'. Here, mget takes a single argum
    ent. a char vec holding the
                                                                  ent, a char vec holding the
100 # names of the lists that are to be put into the n
                                                             100 # names of the lists that are to be put into the n
                                                                  ew list `nz_transform_list`
    ew list `nz_transform_list`
101
                                                             101
102 nz_transform_list <- mget(nz_transform_names)</pre>
                                                             102 nz_transform_list <- mget(nz_transform_names)</pre>
                                                             103
104 # Create a char vec containing the names of the ou
                                                             104 # Create a char vec containing the names of the ou
    tput objects for the next
                                                                  tput objects for the next
105 # step. These output objects are single-column nam
                                                             105 # step. These output objects are single-column nam
    ed dfs containing the
                                                                  ed dfs containing the
106 # normalized z scores corresponding to the raw sco
                                                             106 # normalized z scores corresponding to the raw sco
    re for each case. The objects and the single
                                                                  re for each case. The objects and the single
107 # columns within them have the same names
                                                             107 # columns within them have the same names
108 nz_names <- c(paste0(score_names, '_nz'))</pre>
                                                             108 nz_names <- c(paste0(score_names, '_nz'))</pre>
110 # Create nine single-column named dataframes, each
                                                             110 # Create nine single-column named dataframes, each
    containing the normalized z
                                                                  containing the normalized z
111 # scores for each case. The input is the list `nz_
                                                             111 # scores for each case. The input is the list `nz_
    transform_list` containing the
                                                                  transform_list` containing the
112 # nine normalization objects (each itself a list).
                                                             112 # nine normalization objects (each itself a list).
    That input is assigned to the
                                                                  That input is assigned to the
113 # .y argument of `walk2()`, while the names of the
                                                             113 # .y argument of `walk2()`, while the names of the
    output objects `nz_names` are
                                                                  output objects `nz_names` are
114 # assigned to the .x argument. Within assign(), th
                                                             114 \# assigned to the .x argument. Within assign(), th
    e value argument has as its
                                                                  e value argument has as its
115 # innermost function `purrr::pluck()`, which extra
                                                             115 # innermost function `purrr::pluck()`, which extra
    cts an element of a list in
                                                                  cts an element of a list in
116 # the .y input. In this case, what's being extract
                                                             116 # the .y input. In this case, what's being extract
    ed is the `x.t`, the vector of
                                                                  ed is the `x.t`, the vector of
117 # normalized z scores. That vector is wrapped in `
                                                             117 # normalized z scores. That vector is wrapped in `
    data.frame`, to coerce it into
                                                                  data.frame`, to coerce it into
118 # a data frame, which is then wrapped in `setNames
                                                             118 # a data frame, which is then wrapped in `setNames
    `, which names the column of
                                                                  `, which names the column of
119 # the resulting data frame using the variable name
                                                             119 # the resulting data frame using the variable name
    s contained in the \boldsymbol{.}\boldsymbol{x}
                                                                  s contained in the \boldsymbol{.}\boldsymbol{x}
120 # argument.
                                                             120 # argument.
121 nz_transform_list %>%
                                                             121 nz_transform_list %>%
     walk2(
                                                                   walk2(
122
                                                             122
123
        x = c(nz\_names),
                                                             123
                                                                      x = c(nz\_names),
124
        .y = .,
                                                                      .y = .,
125
        f = \sim assign(x = x)
                                                             125
                                                                      .f = \sim assign(x = .x,
126
                       value = setNames(data.frame(pluc
                                                             126
                                                                                    value = setNames(data.frame(pluc
    k(.y, 'x.t')), c(.x)),
                                                                  k(.y, 'x.t')), c(.x)),
127
                       envir = .GlobalEnv)
                                                             127
                                                                                    envir = .GlobalEnv)
128
                                                             128
129
                                                             129
130 # remove the normalization objects, which are no l
                                                             130 # remove the normalization objects, which are no l
    onger needed
                                                                  onger needed
131 rm(list = ls(nz_transform_list))
                                                             131 rm(list = ls(nz_transform_list))
132
                                                             132
133
                                                             133
134 # DERIVE NORMALIZED T-SCORES FOR EACH CASE ---
                                                             134 # DERIVE NORMALIZED T-SCORES FOR EACH CASE ---
135
                                                             135
136 # put the nine single column normalized z-score da
                                                             136 # put the nine single column normalized z-score da
    ta frames into a list
                                                                  ta frames into a list
                                                             137 nz_col_list <- mget(nz_names)</pre>
137 nz_col_list <- mget(nz_names)</pre>
                                                             138
138
```

139 # Next snippet replaces the normalized z-score wit

139 # Next snippet replaces the normalized z-score wit

```
140 # truncates the T-score distribution).
                                                          140 # truncates the T-score distribution).
142 # map2_dfc takes a list of data frames as input, a
                                                          142 # map2_dfc takes a list of data frames as input, a
    nd outputs a single data
                                                               nd outputs a single data
143 # frame, binding the transformed output columns to
                                                          143 # frame, binding the transformed output columns to
    gether. In map2_dfc, the input
                                                               gether. In map2_dfc, the input
144 # list is assigned to the .x argument, and the vec
                                                          144 # list is assigned to the .x argument, and the vec
    tor of score names is assigned
                                                               tor of score names is assigned
145\, # to the .y argument. Note the use of unquoting
                                                          145 # to the .y argument. Note the use of unquoting
     `!!`, `as.name`, and the
                                                                `!!`, `as.name`, and the
146 # specialized equals sign `:=` for NSE (non-standa
                                                          146 # specialized equals sign `:=` for NSE (non-standa
    rd evavluation)
                                                               rd evavluation)
147 NT_cols <- map2_dfc(nz_col_list, score_names, ~
                                                          147 NT_cols <- map2_dfc(nz_col_list, score_names, ~
148 .x %>% mutate(
                                                          148 .x %>% mutate(
    !!as.name(paste0(.y, '_NT')) := round((!!as.name
                                                               !!as.name(paste0(.y, '_NT')) := round((!!as.name
    (paste0(.y, '_nz'))*10)+50)
                                                               (paste0(.y, '_nz'))*10)+50)
150 ) %>% mutate_at(
                                                          150 ) %>% mutate_at(
     vars(paste0(.y, '_NT')), ~ case_when(
                                                                vars(paste0(.y, '_NT')), ~ case_when(
      x < 25 \sim 25
                                                                  x < 40 \sim 40
152
                                                          152
     .x > 75 \sim 75
                                                                .x > 80 \sim 80
153
                                                          153
       TRUE ~ .x
                                                          154
                                                                  TRUE ~ .x
154
155 )
                                                          155
                                                          156 ) %>%
156 ) %>%
157 select(
                                                          157
                                                               select(
158
       paste0(.y, '_NT')
                                                          158
                                                                 paste0(.y, '_NT')
                                                          159
159
     )
                                                                )
160 ) %>%
                                                          160 ) %>%
161 mutate_if(is.numeric, as.integer)
                                                          161
                                                                mutate_if(is.numeric, as.integer)
162
                                                          162
163 # Bind the normalized T-score columns to the table
                                                          163 # Bind the normalized T-score columns to the table
    containing raw scores for
                                                               containing raw scores for
164 # each case.
                                                          164 # each case.
165 Child_512_Home <- Child_512_Home %>% bind_cols(NT_
                                                          165 Child_512_Home <- Child_512_Home %>% bind_cols(NT_
    cols) %>%
                                                               cols) %>%
166 mutate(clin_status = 'typ',
                                                          166
                                                               mutate(clin_status = 'typ',
            clin_dx = NA) %>%
                                                          167
                                                                       clin_dx = NA) %>%
168
     select(IDNumber, Age, age_range, Gender:Region,
                                                          168
                                                               select(IDNumber, Age, age_range, Gender:Region,
                                                                data, clin_status, clin_dx, everything())
     data, clin_status, clin_dx, everything())
169
                                                          169
170 # write T-scores per case table to .csv
                                                          170 # write T-scores per case table to .csv
171 write_csv(Child_512_Home, here(
                                                          171 write_csv(Child_512_Home, here(
172
                                                          172
    'OUTPUT-FILES/CHILD/T-SCORES-PER-CASE/Child-512-Ho
                                                               'OUTPUT-FILES/NORMS-OUTPUT-4080T/Child-512-Home-T-
                                                               Scores-per-case-4080T.csv'
    me-T-Scores-per-case.csv'
173 # paste0(
                                                          173 # paste0(
# 'OUTPUT-FILES/CHILD/T-SCORES-PER-CASE/Child-
                                                          174
                                                               # 'OUTPUT-FILES/CHILD/T-SCORES-PER-CASE/Child-
    512-Home-T-Scores-per-case-',
                                                               512-Home-T-Scores-per-case-',
175 # format(Sys.Date(), "%Y-%m-%d"),
                                                                # format(Sys.Date(), "%Y-%m-%d"),
                                                          175
176 # '.csv'
                                                                # '.CSV'
                                                          176
177 #)
                                                          177
                                                                # )
178),
                                                          178),
179 na = ''
                                                          179 na = ''
180 )
                                                          180 )
181
                                                          181
182 # clean up environment
                                                          182 # clean up environment
183 rm(list = ls(pattern='.*_nz'))
                                                          183 rm(list = ls(pattern='.*_nz'))
                                                          184
185 # histogram to check normality
                                                          185 # histogram to check normality
186 # MASS::truehist(Child_512_Home$TOT_NT, h = 1)
                                                          186 # MASS::truehist(Child_512_Home$TOT_NT, h = 1)
187 # hist_plot <- ggplot(data = Child_512_Home, aes(T</pre>
                                                          187 # hist_plot <- ggplot(data = Child_512_Home, aes(T</pre>
    0T_NT)) +
                                                               0T_NT)) +
188 # geom_histogram(
                                                          188 # geom_histogram(
189 #
        hinwidth = .2.
                                                          189 #
                                                                   binwidth = .2
        col = "red"
                                                                    col = "red"
190 #
                                                          190 #
191 # ) +
                                                          191 # ) +
```

192

h a normalized T-score (and

h a normalized T-score (and

192

```
# scale_y_continuous(breaks = seq(0, 250, 25)) +
                                                            # scale_y_continuous(breaks = seq(0, 250, 25)) +
193 # labs(title = "TOT_NT")
                                                         193 # labs(title = "TOT_NT")
                                                         194 # print(hist_plot)
194 # print(hist_plot)
195
                                                         195
196 # GENERATE RAW-TO-T LOOKUP TABLES -----
                                                         196 # GENERATE RAW-TO-T LOOKUP TABLES -----
197
                                                         197
198 # Generate raw-to-T lookup columns. Handle TOT and
                                                         198 # Generate raw-to-T lookup columns. Handle TOT and
    subscale scores separately,
                                                              subscale scores separately,
199 # because each type has different raw score range.
                                                         199 # because each type has different raw score range.
    Start wtih TOT. Input is
                                                             Start wtih TOT. Input is
200 # stand sample with raw scores and normalized T sc
                                                         200 # stand sample with raw scores and normalized T sc
    ores for each case. Group
                                                              ores for each case. Group
201 # cases by raw score, relationship between raw and
                                                         201 # cases by raw score, relationship between raw and
    T is many-to-one.
                                                              T is many-to-one.
202 TOT_lookup <- Child_512_Home %>% group_by(
                                                         202 TOT_lookup <- Child_512_Home %>% group_by(
203 TOT_raw
                                                         203
                                                              TOT raw
204 ) %>%
                                                         204 ) %>%
205 # Because raw-to-T is many to one, all values of
                                                         205 # Because raw-to-T is many to one, all values of
    T are identical for each raw.
                                                             T are identical for each raw.
                                                         206 # and summarizing by the min value of T per raw
206 # and summarizing by the min value of T per raw
    yields the ONLY value of T per
                                                              yields the ONLY value of T per
207
    # raw. But we need the raw column to contain all
                                                         207
                                                               # raw. But we need the raw column to contain all
    possible values of raw, and
                                                              possible values of raw, and
208 # not all possible values of raw are represented
                                                         208
                                                              # not all possible values of raw are represented
    in the stand sample. Thus
                                                             in the stand sample. Thus
209 # current data object jumps possible raw values
                                                         209 # current data object jumps possible raw values
     (e.g, raw = 62 and raw = 65
                                                               (e.g, raw = 62 and raw = 65
210 # might be adjacent rows in this table)
                                                         210
                                                              # might be adjacent rows in this table)
211
     summarise(
                                                         211
                                                               summarise(
      TOT NT = min(TOT NT)
                                                                TOT NT = min(TOT NT)
212
                                                         212
213 ) %>%
                                                         213
                                                               ) %>%
# complete expands the table vertically, filling
                                                              # complete expands the table vertically, filling
    in missing values of raw
                                                             in missing values of raw
# within the range given. This leaves NA cells f
                                                         215 # within the range given. This leaves NA cells f
    or T for those rows that
                                                              or T for those rows that
# didn't have raw values in the input object.
                                                         216
                                                              # didn't have raw values in the input object.
217 complete(
                                                         217
                                                              complete(
      T0T_raw = 10:240
                                                                T0T_raw = 10:240
218
                                                         218
219 ) %>%
                                                         219 ) %>%
# fill replaces NA in T going down the table, wi
                                                         # fill replaces NA in T going down the table, wi
    th values from the last
                                                              th values from the last
221
    # preceding (lagging) cell that was not NA.
                                                         221
                                                              # preceding (lagging) cell that was not NA.
222
     fill(
                                                         222
                                                               fill(
      TOT_NT
                                                                TOT_NT
223
                                                         223
    ) %>%
                                                               ) %>%
224
                                                         224
# A second call of fill is needed to handle inpu
                                                              # A second call of fill is needed to handle inpu
    ts where the first cell(s) of
                                                             ts where the first cell(s) of
                                                              # T are NA. 2nd fill call is uses direction up t
# T are NA. 2nd fill call is uses direction up t
                                                         226
    o fill those first NA cells
                                                              o fill those first NA cells
     # with the value from the first subsequent (lead
                                                               # with the value from the first subsequent (lead
    ing) cell that is not NA.
                                                             ing) cell that is not NA.
228 fill(
                                                         228
                                                              fill(
229
      TOT_NT,
                                                         229
                                                               TOT_NT,
       .direction = "up"
230
                                                         230
                                                                 .direction = "up"
231 ) %>%
                                                         231 ) %>%
232
     rename(
                                                         232
                                                               rename(
      raw = T0T_raw
                                                                raw = T0T_raw
233
                                                         233
234
      ) %>%
                                                         234
                                                               ) %>%
     mutate_at(
                                                               mutate_at(
235
                                                         235
236
     vars(TOT_NT), \sim case_when(
                                                         236
                                                                vars(TOT_NT), \sim case_when(
237
        raw < 60 \sim NA_integer_,
                                                         237
                                                                  raw < 60 \sim NA_integer_,
                                                                  TRUE ~ .x
238
         TRUE ~ .x
                                                         238
239
       )
                                                         239
                                                                 )
240
      )
                                                         240
                                                                )
241
                                                         241
```

```
242 # Repeat above for subscale raw-to-T columns.
                                                            242 # Repeat above for subscale raw-to-T columns.
243 subscale_names <- score_names[2:9]
                                                            243 subscale_names <- score_names[2:9]
244
                                                            244
245 subscale_lookup <- map(
                                                            245 subscale_lookup <- map(
246
     subscale_names,
                                                            246
                                                                  subscale_names,
247
     ~ Child_512_Home %>% group_by(
                                                            247
                                                                  ~ Child_512_Home %>% group_by(
248
       !!as.name(paste0(.x, '_raw'))
                                                            248
                                                                   !!as.name(paste0(.x, '_raw'))
     ) %>%
                                                                  ) %>%
249
                                                            249
250
        summarise(
                                                            250
                                                                    summarise(
          !!as.name(paste0(.x, '_NT')) := min(!!as.nam
                                                                      !!as.name(paste0(.x, '_NT')) := min(!!as.nam
251
                                                            251
    e(paste0(.x, '_NT')))
                                                                e(paste0(.x, '_NT')))
252
        ) %>%
                                                            252
                                                                    ) %>%
        complete(
                                                                    complete(
254
          !!as.name(paste0(.x, '_raw')) := 10:240
                                                            254
                                                                      !!as.name(paste0(.x, '_raw')) := 10:240
                                                            255
255
        ) %>%
256
        fill(
                                                            256
                                                                    fill(
257
          paste0(.x, '_NT')
                                                                      paste0(.x, '_NT')
                                                            257
258
        ) %>%
                                                            258
                                                                    ) %>%
259
        fill(
                                                            259
                                                                    fill(
260
          paste0(.x, '_NT'),
                                                            260
                                                                      paste0(.x, '_NT'),
          .direction = "up"
261
                                                            261
                                                                      .direction = "up"
        ) %>%
                                                            262
                                                                    ) %>%
262
263
        rename(
                                                            263
                                                                    rename(
264
          raw = !!as.name(paste0(.x, '_raw'))
                                                            264
                                                                      raw = !!as.name(paste0(.x, '_raw'))
265
        ) %>%
                                                            265
                                                                    ) %>%
                                                            266
266
        mutate at(
                                                                    mutate at(
                                                                      vars(!!as.name(paste0(.x, '_NT'))), ~ case_w
          vars(!!as.name(paste0(.x, '_NT'))), ~ case_w
                                                            267
267
    hen(
                                                                hen(
268
            raw > 40 ~ NA_integer_,
                                                            268
                                                                        raw > 40 ~ NA_integer_,
269
            TRUE ~ .x
                                                            269
                                                                        TRUE ~ .x
270
          )
                                                            270
                                                                      )
271
        )
                                                            271
272 ) %>%
                                                            272 ) %>%
273
     reduce(
                                                            273
                                                                  reduce(
       left_join,
                                                                    left_join,
274
                                                            274
275
        by = 'raw'
                                                            275
                                                                    by = 'raw'
276
                                                            276
277
                                                            277
278 # join TOT and subscale columns
                                                            278 # join TOT and subscale columns
279 all_lookup <- full_join(TOT_lookup, subscale_looku
                                                            279 all_lookup <- full_join(TOT_lookup, subscale_looku
    p, by = 'raw')
                                                                p, by = 'raw')
280
                                                            280
281 all_lookup_col_names <- c(paste0(score_names, '_ra</pre>
                                                            281 all_lookup_col_names <- c(paste0(score_names, '_ra
282
                                                            282
283 # write final raw-to-T lookup table to .csv
                                                            283 # write final raw-to-T lookup table to .csv
284 write_csv(all_lookup, here(
                                                            284 write_csv(all_lookup, here(
285
                                                            285
    'OUTPUT-FILES/CHILD/RAW-T-LOOKUP-TABLES/Child-512-
                                                                 'OUTPUT-FILES/NORMS-OUTPUT-4080T/Child-512-Home-ra
    Home-raw-T-lookup.csv'
                                                                 w-T-lookup-4080T.csv'
286
     # paste0(
                                                            286
     # 'OUTPUT-FILES/CHILD/RAW-T-LOOKUP-TABLES/Chil
                                                            287
                                                                  # 'OUTPUT-FILES/CHILD/RAW-T-LOOKUP-TABLES/Chil
    d-512-Home-raw-T-lookup-',
                                                                d-512-Home-raw-T-lookup-',
288 # format(Sys.Date(), "%Y-%m-%d"),
                                                            288
                                                                  # format(Sys.Date(), "%Y-%m-%d"),
289 # '.csv'
                                                            289
                                                                     '.csv'
290 #)
                                                            290
                                                                 #)
291),
                                                            291 ).
292 na = ''
                                                            292 na = ''
293 )
                                                            293
294
                                                            294
296 # generate print pub format raw-to-T table
                                                            296 # generate print pub format raw-to-T table
297 all_lookup_pub <- all_lookup %>%
                                                            297 all_lookup_pub <- all_lookup %>%
    # gather collapses wide table into three-column
                                                            298
                                                                 # gather collapses wide table into three-column
     tall table with key-value
                                                                 tall table with key-value
299
     # pairs: rawscore, scale(key var, many rows for
                                                            299
                                                                 # pairs: rawscore, scale(key var, many rows for
     each scale), T(value
                                                                 each scale), T(value
```

```
# var, one row for each value of T within each s
                                                           300
                                                                # var, one row for each value of T within each s
    cale)
                                                                cale)
301
      gather(scale, T,-raw) %>%
                                                           301
                                                                  gather(scale, T,-raw) %>%
      group_by(scale) %>%
                                                           302
                                                                 group_by(scale) %>%
303
      # expand the table vertically, adding new rows,
                                                           303
                                                                 # expand the table vertically, adding new rows,
     so there's a row for every possible T value
                                                                 so there's a row for every possible T value
                                                                  complete(T = 40:80) %>%
304
     complete(T = 25:75) %>%
                                                           304
305
      ungroup() %>%
                                                           305
                                                                  ungroup() %>%
306
      # regroup table by two levels
                                                           306
                                                                  # regroup table by two levels
307
      group_by(scale, T) %>%
                                                           307
                                                                  group_by(scale, T) %>%
                                                                 # filter step retains all 1-row groups, and the
    # filter step retains all 1-row groups, and the
     first and last rows of any
                                                                 first and last rows of any
     # multi-row groups. n() == 1 returns 1-row group
                                                                 # multi-row groups. n() == 1 returns 1-row group
309
                                                           309
    s; n() > 1 \& row_number()
                                                                s; n() > 1 & row_number()
310
     # %in% c(1, n()) returns rows of multi-row group
                                                           310
                                                                 # %in% c(1, n()) returns rows of multi-row group
    s with the row number of
                                                                s with the row number of
311 \# either 1 (first row), or n() which is the numb
                                                                 # either 1 (first row), or n() which is the numb
                                                           311
    er of rows and also the
                                                                er of rows and also the
312 # number of the last row. The first and last row
                                                                # number of the last row. The first and last row
    s hold the min and max
                                                                s hold the min and max
313 # values of raw for that value of T (the groupin
                                                                # values of raw for that value of T (the groupin
                                                                q variable)
     filter(n() == 1 | n() > 1 & row_number() %in% c
                                                                 filter(n() == 1 | n() > 1 \& row_number() %in% c
                                                           314
    (1. n())) %>%
                                                                (1. n())) %>%
    # Summarise creates a table with one row per gro
                                                                # Summarise creates a table with one row per gro
    up (one row per
                                                                up (one row per
                                                                 # possible value of T). For the 1-row groups, st
    # possible value of T). For the 1-row groups, st
316
    r_c simply passes the
                                                                r_c simply passes the
      # value of raw as a string; for the multi-row gr
                                                                  # value of raw as a string; for the multi-row gr
    oups, str_c joins the min
                                                                oups, str_c joins the min
318 # and max values of raw with the '--' separator.
                                                                 # and max values of raw with the '--' separator.
                                                           318
319 summarise(raw = str_c(raw, collapse = '--')) %>%
                                                                 summarise(raw = str_c(raw, collapse = '--')) %>%
                                                           319
320 # recode missing values of raw to '-'
                                                           320
                                                                 # recode missing values of raw to '-'
    mutate_at(vars(raw), ~ case_when(is.na(.x) ~ '-
                                                                 mutate_at(vars(raw), ~ case_when(is.na(.x) ~ '-
                                                           321
    ', TRUE ~ .x)) %>%
                                                                 , TRUE ~ .x)) %>%
     # sort on two levels
                                                                  # sort on two levels
      arrange(scale, desc(T)) %>%
                                                                  arrange(scale, desc(T)) %>%
323
                                                           323
      # spread table back to wide, all values of T (on
                                                                  # spread table back to wide, all values of T (on
324
                                                           324
    e row for each), scale
                                                                e row for each), scale
    # columns filled with values of rawscore
                                                           325
                                                                # columns filled with values of rawscore
326 spread(scale, raw) %>%
                                                                spread(scale, raw) %>%
                                                           326
     # sort descending on T
                                                                  # sort descending on T
327
                                                           327
      arrange(desc(T)) %>%
                                                                 arrange(desc(T)) %>%
328
                                                           328
329
     # rename with desired final column names
                                                           329
                                                                 # rename with desired final column names
     rename_at(vars(ends_with('_NT')), ~ gsub("_NT",
                                                                 rename_at(vars(ends_with('_NT')), ~ gsub("_NT",
330
                                                           330
                                                                 "_raw", .)) %>%
     "_raw", .)) %>%
      # order columns left-to-right
331
                                                           331
                                                                  # order columns left-to-right
    select(T, all_lookup_col_names)
                                                                  select(T, all_lookup_col_names) %>%
332
                                                           332
                                                                  # drop row where T == NA
                                                           333
                                                           334
                                                                  filter(!is.na(T))
333
                                                           335
                                                           336 # write final print format raw-to-T lookup table t
334 # write final print format raw-to-T lookup table t
    0 CSV
                                                                O .CSV
335 write_csv(all_lookup_pub, here(
                                                           337 write_csv(all_lookup_pub, here(
336
                                                           338
    'OUTPUT-FILES/CHILD/PRINT-FORMAT-NORMS-TABLES/Chil
                                                                'OUTPUT-FILES/NORMS-OUTPUT-4080T/Child-512-Home-pr
    d-512-Home-print-raw-T-lookup.csv'
                                                                int-raw-T-lookup-4080T.csv'
337
        # paste0(
                                                           339
                                                                    # paste0(
338
         'OUTPUT-FILES/CHILD/PRINT-FORMAT-NORMS-TABLE
                                                           340
                                                                      'OUTPUT-FILES/CHILD/PRINT-FORMAT-NORMS-TABLE
    S/Child-512-Home-print-raw-T-lookup-',
                                                                S/Child-512-Home-print-raw-T-lookup-',
339
     # format(Sys.Date(), "%Y-%m-%d"),
                                                           341
                                                                 # format(Sys.Date(), "%Y-%m-%d"),
340
          '.csv'
                                                           342
                                                                     '.csv'
     #)
                                                                 #)
341
                                                           343
342 ).
                                                           344 ).
343 na = ''
                                                           345 na = ''
344
                                                           346
```

```
345
                                                            347
346 # write raw score descriptives for all scales (usi
                                                            348 # write raw score descriptives for all scales (usi
    ng psych::describe)
                                                                ng psych::describe)
347 Child_512_Home_raw_desc <-
                                                            349 Child_512_Home_raw_desc <-
     Child_512_Home %>%
                                                                  Child_512_Home %>%
348
                                                            350
349
      select(contains('raw')) %>%
                                                            351
                                                                  select(contains('raw')) %>%
     describe(fast = T) %>%
                                                            352
                                                                  describe(fast = T) %>%
351
     rownames to column() %>%
                                                            353
                                                                  rownames to column() %>%
352
      rename(scale = rowname) %>%
                                                                  rename(scale = rowname) %>%
                                                            354
353
      select(scale, n, mean, sd) %>%
                                                            355
                                                                  select(scale, n, mean, sd) %>%
354
      mutate_at(vars(mean, sd), ~(round(., 2)))
                                                            356
                                                                  mutate_at(vars(mean, sd), ~(round(., 2)))
356 write_csv(Child_512_Home_raw_desc, here(
                                                            358 write_csv(Child_512_Home_raw_desc, here(
      'OUTPUT-FILES/CHILD/DESCRIPTIVES/Child-512-Home-
                                                                   'OUTPUT-FILES/CHILD/DESCRIPTIVES/Child-512-Home-
                                                            359
    raw-desc.csv'
                                                                 raw-desc.csv'
358
     # paste0(
                                                            360
                                                                  # paste0(
359
          'OUTPUT-FILES/CHILD/DESCRIPTIVES/Child-512-H
                                                            361
                                                                      'OUTPUT-FILES/CHILD/DESCRIPTIVES/Child-512-H
    ome-raw-desc-',
                                                                ome-raw-desc-',
     # format(Sys.Date(), "%Y-%m-%d"),
                                                                  # format(Sys.Date(), "%Y-%m-%d"),
360
                                                            362
          '.csv'
                                                                      '.csv'
361
                                                            363
362
      # )
                                                            364
                                                                  #)
363),
                                                            365 ).
364 na = ''
                                                            366 na = ''
365 )
                                                            367 )
366
                                                            368
367 # write table of demographic counts
                                                            369 # write table of demographic counts
                                                            370
369 var_order <- c("data", "age_range", "Age", "Gende
                                                            371 var_order <- c("data", "age_range", "Age", "Gende
    r", "ParentHighestEducation", "HighestEducation",
                                                                 r", "ParentHighestEducation", "HighestEducation",
370
                   "Ethnicity", "Region")
                                                            372
                                                                               "Ethnicity", "Region")
371
                                                            373
372 cat_order <- c(
                                                            374 cat_order <- c(
                                                            375
     NA, "SM", "Qual", "Sp", "Daycare", "In-house-En
                                                                  NA, "SM", "Qual", "Sp", "Daycare", "In-house-En
                                                                g", "In-house-Sp", "In-house-Alt",
    g", "In-house-Sp", "In-house-Alt",
375 # age_range
                                                            377
                                                                  # age_range
                                                                  NA, "3.5 to 6 mo", "03.5 to 10 mo", "7 to 10.5 m
    NA, "3.5 to 6 mo", "03.5 to 10 mo", "7 to 10.5 m
    o", "09.5 to 20 mo", "11 to 31.5 mo",
                                                                o", "09.5 to 20 mo", "11 to 31.5 mo",
     "21 to 31.5 mo", "5 to 8 years", "9 to 12 year
                                                                  "21 to 31.5 mo", "5 to 8 years", "9 to 12 year
                                                            379
    s", "12 to 13 years", "14 to 15 years",
                                                                s", "12 to 13 years", "14 to 15 years",
378
     "16 to 17 years", "18 to 21 years", "21.00 to 3
                                                            380
                                                                  "16 to 17 years", "18 to 21 years", "21.00 to 3
    0.99 years", "31.00 to 40.99 years",
                                                                0.99 years", "31.00 to 40.99 years",
379
     "41.00 to 50.99 years", "51.00 to 64.99 years",
                                                            381
                                                                 "41.00 to 50.99 years", "51.00 to 64.99 years",
     "65.00 to 99.99 years",
                                                                 "65.00 to 99.99 years",
380
     # Age
                                                            382
                                                                  # Age
     "2", "3", "4", "5",
                                                                  "2", "3", "4", "5",
381
                                                            383
      # Gender
                                                                  # Gender
382
                                                            384
383
     NA, "Male", "Female",
                                                            385
                                                                  NA, "Male", "Female",
384
      # ParentHighestEducation & HighestEducation
                                                            386
                                                                  # ParentHighestEducation & HighestEducation
     NA, "Did not complete high school (no diploma)",
                                                            387
                                                                  NA, "Did not complete high school (no diploma)",
    "High school graduate (including GED)",
                                                                 "High school graduate (including GED)",
      "Some college or associate degree", "Bachelor's
                                                                  "Some college or associate degree", "Bachelor's
                                                            388
386
     degree or higher",
                                                                  degree or higher",
                                                            389
387
      # Ethnicity
                                                                  # Ethnicity
     NA, "Hispanic", "Asian", "Black", "White", "Amer
388
                                                            390
                                                                  NA, "Hispanic", "Asian", "Black", "White", "Amer
    icanIndAlaskanNat".
                                                                 icanIndAlaskanNat".
                                                                  "NativeHawPacIsl", "MultiRacial", "Other",
389
      "NativeHawPacIsl", "MultiRacial", "Other",
                                                            391
                                                            392
391
      NA, "northeast", "midwest", "south", "west")
                                                            393
                                                                  NA, "northeast", "midwest", "south", "west")
392
                                                            394
393
                                                            395
394 Child_512_Home_demo_counts <- Child_512_Home %>%
                                                            396 Child_512_Home_demo_counts <- Child_512_Home %>%
      select(data, age_range, ParentHighestEducation,
395
                                                            397
                                                                  select(data, age_range, ParentHighestEducation,
     Gender, Ethnicity, Region) %>%
                                                                 Gender, Ethnicity, Region) %>%
396
      gather("Variable", "Category") %>%
                                                            398
                                                                  gather("Variable", "Category") %>%
      group_by(Variable, Category) %>%
                                                                  group_by(Variable, Category) %>%
```

```
398 count(Variable, Category) %>%
                                                          400
                                                               count(Variable, Category) %>%
399 arrange(match(Variable, var_order), match(Catego
                                                          401
                                                              arrange(match(Variable, var_order), match(Catego
    ry, cat_order)) %>%
                                                              ry, cat_order)) %>%
400 ungroup() %>%
                                                          402 ungroup() %>%
401 mutate(Variable = case_when(
                                                          403
                                                              mutate(Variable = case_when(
        lag(Variable) == "data" & Variable == "data" ~
                                                                  lag(Variable) == "data" & Variable == "data" ~
                                                          404
402
       lag(Variable) == "age_range" & Variable == "ag
                                                                  lag(Variable) == "age_range" & Variable == "ag
403
                                                          405
    e_range" ~ "",
                                                              e_range" ~ "",
      lag(Variable) == "Gender" & Variable == "Gende
                                                                  lag(Variable) == "Gender" & Variable == "Gende
404
                                                          406
    r" ~ "",
                                                              r" ~ "",
405
       lag(Variable) == "ParentHighestEducation" & Va
                                                         407
                                                                 lag(Variable) == "ParentHighestEducation" & Va
    riable == "ParentHighestEducation" ~ "",
                                                              riable == "ParentHighestEducation" ~ "",
      lag(Variable) == "Ethnicity" & Variable == "Et
                                                                lag(Variable) == "Ethnicity" & Variable == "Et
406
                                                          408
    hnicity" ~ "",
                                                              hnicity" ~ "",
                                                                 lag(Variable) == "Region" & Variable == "Regio
407
      lag(Variable) == "Region" & Variable == "Regio
                                                          409
    n" ~ "",
                                                              n" ~ "",
408
      TRUE ~ Variable
                                                          410
                                                                TRUE ~ Variable
409
    ))
                                                          411
                                                              ))
                                                          412
410
411 write_csv(Child_512_Home_demo_counts, here(
                                                         413 write_csv(Child_512_Home_demo_counts, here(
412 'OUTPUT-FILES/CHILD/DESCRIPTIVES/Child-512-Home-
                                                         414 'OUTPUT-FILES/CHILD/DESCRIPTIVES/Child-512-Home-
    demo-counts.csv'
                                                              demo-counts.csv'
413 # paste0(
                                                          415 # paste0(
414 # 'OUTPUT-FILES/CHILD/DESCRIPTIVES/Child-512-H
                                                         416 # 'OUTPUT-FILES/CHILD/DESCRIPTIVES/Child-512-H
    ome-demo-counts-',
                                                              ome-demo-counts-',
415 # format(Sys.Date(), "%Y-%m-%d"),
                                                               # format(Sys.Date(), "%Y-%m-%d"),
                                                          417
416 # '.csv'
                                                          418
                                                               # '.csv'
417 #)
                                                          419
                                                               # )
418),
                                                          420),
419 na = '(missing)'
                                                          421 \text{ na} = '(missing)'
420 )
                                                          422 )
421
                                                          423
422
                                                          424
423
                                                          425
424
                                                          426
425
                                                          427
```