completeMHDentistryDoc

First, we import necessary libraries and declare some settings which we will reuse later.

```
library(dplyr) # for moving data
```

```
Attaching package: 'dplyr'

The following objects are masked from 'package:stats':

    filter, lag

The following objects are masked from 'package:base':

    intersect, setdiff, setequal, union
```

```
library(ggplot2) # for graphics/plots
library(mosaic) # for doing randomization tests
```

```
Registered S3 method overwritten by 'mosaic':
  method                           from
  fortify.SpatialPolygonsDataFrame ggplot2


The 'mosaic' package masks several functions from core packages in order to add
additional features.  The original behavior of these functions should not be affected by this.


Attaching package: 'mosaic'

The following object is masked from 'package:Matrix':

    mean

The following object is masked from 'package:ggplot2':

    stat

The following objects are masked from 'package:dplyr':

    count, do, tally

The following objects are masked from 'package:stats':
```

```
    binom.test, cor, cor.test, cov, fivenum, IQR, median, prop.test,
    quantile, sd, t.test, var
The following objects are masked from 'package:base':

    max, mean, min, prod, range, sample, sum
```

```
reSeed <- 1 # seed for reproducability,
# essentially makes every "random" process determiniistic
# this allows other scientists to rexamine our work
# in the same way we did
# with the same outcomes
# the number itself is arbitrary

repCtMos <- 100000#100#000 # number of times we sim, 10 000 recommended, more is better, we do 10(

# set our directory, to our directory
setwd("C:\\Users\\trogi\\Downloads\\consultDentistry")
getwd()
```

```
[1] "C:/Users/trogi/Downloads/consultDentistry"
```

```
list.files()
```

```
 [1] "2024Responses.csv"                "2025Responses.csv"
 [3] "burnPlot.png"                     "combinedFileForAnalysis.csv"
 [5] "comboWithSums.csv"                "comboWithSums2Sas.csv"
 [7] "comboWithSums2SasEditCols.csv"    "completeMHDentistryDoc.html"
 [9] "completeMHDentistryDoc.qmd"       "completeMHDentistryDoc.rmarkdown"
[11] "completeMHDentistryDoc_files"     "consultingEvolutionMentalHealth.qmd"
[13] "DentistComboForSas.csv"           "gadPlot.png"
[15] "phqPlot.png"
```

Next we will import the original files

```
df2024orig <- read.csv("2024Responses.csv")
df2025orig <- read.csv("2025Responses.csv")
```

The new file uses sentences as data, but the old one uses numeric values to represent respondent's answers. To make sure both files agree with eachother, we will map all of the sentences to numeric values. These numeric values come from the point system that the original questionaires use.

```
# this is our method of mapping sentences to numbers
mapScheme <- c("Not at all" = 0,
               "Several days" = 1,
               "More than half the days" = 2,
               "Nearly every day" = 3,
               "I enjoy my school, I have no symptoms of burnout." = 0,
               "I am under stress, and don't always have as much energy as I did, but I don't fee
```

```
                "I am definitely burning out and have one or more symptoms of burnout e.g. emotio
                "The symptoms of burnout that I'm experiencing won't go away. I think about schoo
                "I feel completely burned out. I am the point where I may need to seek help." = 4


# now we use the scheme to map sentences to words
df2025mapped<- df2025orig %>%
  mutate(across(c(4:19), ~ mapScheme[.] ))
```

The questionairre is all one thing in both samples, but its made of 3 smaller questionaires (PHQ9 [8 questions], BURN [1 question],GAD7 [7 questions]. The method of the original questionaires was to simply add up the scores, where each question is worth one point. Its important to know that all of the questions have a negative "valance", meaning that more points = less mentally healthy. First we will label each column and combine them into one.

```
namesph19b82025 <- colnames(df2025orig[4:11])
namesburn2025 <- colnames(df2025orig[12])
namesgad92025 <- colnames(df2025orig[13:19])


namesph19b82024 <- colnames(df2024orig[5:12])
namesburn2024 <- colnames(df2024orig[13])
namesgad92024 <-colnames(df2024orig[14:20])

relCol2025 <- df2025mapped[c(1,2,3,4:19)]
relCol2024 <- df2024orig[c(1,3,4,5:20)]
relCol2025$yearTaken <- 2025
relCol2024$yearTaken <- 2024

colnames(relCol2024) <- colnames(relCol2025)

combined2024and2025 <- rbind(relCol2024,relCol2025)
```

Now we will sum the scores, just as a doctor would. (note, the burnout one is a sum, but the sum of one score)

```
sumComboDF <- combined2024and2025

#colnames(sumComboDF[13:19])
#sumComboDF[12]

#rowSums(sumComboDF[4:11])


sumComboDF$phqScore <- rowSums(sumComboDF[4:11], na.rm = TRUE)
sumComboDF$burnScore <- sumComboDF[[12]]
sumComboDF$gadScore <- rowSums(sumComboDF[13:19], na.rm = TRUE)
```

Now rename the colums to work better, since the original names are full sentences

```
#c("ID", "Timestamp",   "DENTALYR", "GENDER", "DEP1", "DEP2", "DEP3", "DEP4", "DEP5", "DEP6", "DEI
# we should also add the id column for the entire df
sumComboDF <- tibble::rowid_to_column(sumComboDF, "ID")



names(sumComboDF)
```

```
 [1] "ID"
 [2] "Timestamp"
 [3] "What.year.in.dental.school.are.you."
 [4] "What.is.your.gender."
 [5] "Over.the.last.two.weeks..how.often.have.you.lost.interest.or.pleasure.in.doing.things."
 [6] "Over.the.last.2.weeks..how.often.have.you.felt.sad..low..down..depressed.or.hopeless."
 [7]
"Over.the.last.2.weeks..how.often.have.you.had.trouble.falling.or.staying.asleep..or.sleeping.too
.much."
 [8] "Over.the.last.2.weeks..how.often.have.you.felt.tired.or.had.little.energy."
 [9] "Over.the.last.2.weeks..how.often.have.you.had.a.poor.appetite.or.overeaten."
[10]
"Over.the.last.2.weeks..how.often.have.you.felt.bad.about.yourself..or.that.you.are.a.failure.or.
have.let.yourself.or.your.family.down."
[11]
"Over.the.last.2.weeks..how.often.have.you.had.trouble.concentrating.on.things..such.as.reading.t
he.newspaper.or.watching.television."
[12]
"Over.the.last.2.weeks..how.often.have.you.moved.or.spoken.so.slowly.that.other.people.could.have
.noticed..Or.the.opposite...being.so.fidgety.or.restless.that.you.have.been.moving.around.a.lot.m
ore.than.usual."
[13] "Using.your.definition.of..burnout...please.select.one.of.the.answers.below."
[14] "In.the.last.2.weeks..how.often.are.you.feeling.nervous..anxious..or.on.edge."
[15] "In.the.last.2.weeks..how.often.have.you.not.been.able.to.stop.or.control.worrying."
[16] "In.the.last.2.weeks..how.often.have.you.been.worrying.too.much.about.different.things."
[17] "In.the.last.2.weeks..how.often.have.you.had.trouble.relaxing."
[18] "In.the.last.2.weeks..how.often.have.you.been.so.restless.that.is.is.hard.to.sit.still."
[19] "In.the.last.2.weeks..how.often.have.you.become.easily.annoyed.or.irritable."
[20] "In.the.last.2.weeks..how.often.have.you.felt.afraid.as.if.something.awful.might.happen."
[21] "yearTaken"
[22] "phqScore"
[23] "burnScore"
[24] "gadScore"
```

```
names(sumComboDF) <- c("ID", "Timestamp",   "DENTALYR", "GENDER", "DEP1", "DEP2", "DEP3", "DEP4",

length(c("ID", "Timestamp", "DENTALYR", "GENDER", "DEP1", "DEP2", "DEP3", "DEP4", "DEP5", "DEP6",
```

```
[1] 24
```

```
length(names(sumComboDF))
```

```
[1] 24
```

```
sumComboDF
```

	ID	Timestamp	DENTALYR	GENDER	DEP1	DEP2	DEP3	DEP4	DEP5
1	1	1/7/2024 12:08:50	D4	Male	1	1	0	0	0
2	2	1/8/2024 14:33:15	D2	Male	0	0	0	0	0
3	3	1/8/2024 14:33:59	D3	Female	0	0	1	1	0
4	4	1/8/2024 14:34:58	D2	Female	1	1	2	1	1
5	5	1/8/2024 14:35:20	D3	Female	1	0	0	3	0
6	6	1/8/2024 14:36:09	D2	Female	0	0	1	0	0
7	7	1/8/2024 14:36:22	D1	Female	0	1	1	0	1
8	8	1/8/2024 14:37:39	D2	Male	0	0	0	0	0
9	9	1/8/2024 14:37:55	D3	Male	0	0	0	3	1
10	10	1/8/2024 14:39:06	D1	Male	0	0	2	1	0
11	11	1/8/2024 14:41:11	D3	Female	0	0	1	1	0
12	12	1/8/2024 14:41:48	D3	Female	0	1	2	2	1
13	13	1/8/2024 14:42:31	D2	Female	1	0	2	2	1
14	14	1/8/2024 14:44:25	D2	Male	1	0	1	1	0
15	15	1/8/2024 14:44:26	D3	Female	0	0	0	1	1
16	16	1/8/2024 14:48:52	D3	Female	1	1	2	2	1
17	17	1/8/2024 14:49:07	D3	Female	0	0	0	0	0
18	18	1/8/2024 14:49:07	D2	Female	2	2	2	2	2
19	19	1/8/2024 14:49:39	D3	Female	0	0	0	0	0
20	20	1/8/2024 15:01:30	D3	Female	1	0	0	1	0
21	21	1/8/2024 15:01:38	D2	Male	0	0	0	0	0
22	22	1/8/2024 15:01:55	D4	Female	0	0	0	2	0
23	23	1/8/2024 15:17:16	D4	Female	0	0	1	1	1
24	24	1/8/2024 15:17:22	D2	Female	1	1	1	1	0
25	25	1/8/2024 15:17:50	D2	Female	0	1	1	0	0
26	26	1/8/2024 15:19:30	D1	Female	0	1	3	3	0
27	27	1/8/2024 16:10:17	D1	Female	2	2	3	3	3
28	28	1/8/2024 17:19:14	D4	Female	0	1	1	1	1
29	29	1/8/2024 18:29:44	D2	Male	0	0	0	1	0
30	30	1/8/2024 18:33:28	D3	Female	0	0	1	1	0
31	31	1/8/2024 18:42:42	D2	Female	0	1	1	1	3
32	32	1/8/2024 18:59:16	D2	Female	1	1	3	2	1
33	33	1/8/2024 19:01:17	D3	Female	0	0	1	1	1
34	34	1/8/2024 19:28:09	D3	Female	0	0	1	1	1
35	35	1/8/2024 19:39:09	D1	Male	0	0	1	1	0
36	36	1/8/2024 20:11:45	D4	Female	0	0	1	2	1
37	37	1/8/2024 22:27:04	D3	Female	1	1	1	1	1
38	38	1/9/2024 7:52:28	D1	Female	0	1	1	2	0
39	39	1/9/2024 9:47:04	D3	Female	0	0	1	1	1
40	40	1/9/2024 10:32:34	D4	Male	2	2	1	2	2

41	41	1/9/2024 13:42:03	D2	Female	1	1	2	2	2
42	42	1/9/2024 16:15:00	D1	Female	0	0	2	0	0
43	43	1/9/2024 17:23:53	D2	Female	0	0	1	1	1
44	44	1/10/2024 14:07:51	D3	Female	0	0	1	0	0
45	45	1/10/2024 14:09:05	D3	Female	0	0	0	0	0
46	46	1/10/2024 14:32:55	D4	Male	0	0	0	1	0
47	47	1/10/2024 14:55:24	D4	Female	1	1	3	1	2
48	48	1/10/2024 15:02:03	D1	Male	0	0	1	0	0
49	49	1/10/2024 15:02:15	D1	Male	0	0	0	2	2
50	50	1/10/2024 15:02:32	D1	Male	0	0	2	2	2
51	51	1/10/2024 15:02:58	D1	Male	0	0	1	1	0
52	52	1/10/2024 15:03:16	D1	Female	1	1	0	1	2
53	53	1/10/2024 15:04:08	D1	Male	0	0	1	2	0
54	54	1/10/2024 15:05:25	D1	Female	0	0	1	1	1
55	55	1/10/2024 15:14:48	D1	Female	1	0	1	1	1
56	56	1/10/2024 16:55:38	D1	Female	1	0	1	1	0
57	57	1/10/2024 22:30:30	D1	Female	1	1	0	2	1
58	58	1/11/2024 8:15:13	D2	Female	0	0	0	1	0
59	59	1/11/2024 8:16:48	D1	Male	1	0	1	1	1
60	60	1/11/2024 8:45:43	D2	Female	1	1	0	1	0
61	61	1/11/2024 9:25:38	D2	Female	1	1	1	2	0
62	62	1/12/2024 9:50:33	D4	Female	0	0	1	1	1
63	63	1/12/2024 9:51:09	D2	Female	0	0	1	1	0
64	64	1/12/2024 9:57:34	D2	Female	0	0	1	1	1
65	65	1/12/2024 9:59:16	D2	Female	0	0	0	1	1
66	66	1/12/2024 10:01:51	D1	Female	1	1	1	0	0
67	67	1/12/2024 10:03:29	D2	Female	1	0	0	0	1
68	68	1/12/2024 10:07:40	D2	Female	0	1	1	1	0
69	69	1/12/2024 10:21:28	D4	Male	0	0	0	0	0
70	70	1/12/2024 10:35:19	D3	Female	0	1	1	1	0
71	71	1/12/2024 10:40:23	D3	Male	0	0	0	0	0
72	72	1/12/2024 10:53:34	D1	Female	0	0	1	1	1
73	73	1/12/2024 10:54:43	D1	Female	1	1	1	1	0
74	74	1/12/2024 11:12:41	D3	Female	0	0	1	1	1
75	75	1/12/2024 11:35:04	D2	Male	0	0	0	1	0
76	76	1/12/2024 12:20:50	D4	Female	0	0	0	3	0
77	77	1/12/2024 12:33:39	D1	Female	1	0	0	0	1
78	78	1/12/2024 12:49:23	D3	Female	1	1	0	1	0
79	79	1/12/2024 14:25:30	D1	Male	1	0	2	1	1
80	80	1/12/2024 15:28:49	D2	Female	0	0	1	1	1
81	81	1/12/2024 16:00:26	D2	Female	0	0	1	0	0
82	82	1/12/2024 18:36:47	D1	Female	1	1	1	1	0
83	83	1/12/2024 20:21:47	D1	Female	1	0	1	1	0
84	84	1/12/2024 22:58:26	D3	Female	1	1	1	2	1
85	85	1/13/2024 13:33:43	D4	Female	1	2	3	2	1
86	86	1/13/2024 20:04:05	D2	Male	1	1	0	1	1
87	87	1/14/2024 11:57:42	D2	Female	1	2	0	0	2
88	88	1/14/2024 22:12:31	D2	Female	0	0	1	0	1
89	89	12/9/2024 11:47:52	D3	Female	0	1	1	2	1
90	90	12/9/2024 11:58:13	D3	Female	2	2	3	3	1
91	91	12/9/2024 14:52:43	D1	Female	2	2	2	3	2

92	92	12/9/2024 14:52:45	D1	Female	1	2	2	3	1
93	93	12/9/2024 14:52:50	D1	Female	3	3	3	3	3
94	94	12/9/2024 14:53:30	D1	Female	0	0	1	1	1
95	95	12/9/2024 14:53:59	D1	Male	3	3	1	3	2
96	96	12/9/2024 14:54:09	D1	Female	1	0	1	2	0
97	97	12/9/2024 14:54:15	D1	Male	1	1	2	2	0
98	98	12/9/2024 14:54:20	D1	Male	2	1	2	3	2
99	99	12/9/2024 14:54:54	D1	Female	1	0	0	1	1
100	100	12/9/2024 14:55:14	D1	Male	1	1	2	3	1
101	101	12/9/2024 14:55:24	D1	Female	1	0	3	3	1
102	102	12/9/2024 14:55:25	D1	Male	1	0	2	2	1
103	103	12/9/2024 14:55:41	D1	Female	1	2	2	3	3
104	104	12/9/2024 14:55:53	D1	Female	2	3	2	3	3
105	105	12/9/2024 14:55:58	D1	Female	1	1	1	1	0
106	106	12/9/2024 14:56:05	D1	Female	1	0	1	1	0
107	107	12/9/2024 14:56:06	D1	Female	2	3	3	3	3
108	108	12/9/2024 14:56:12	D1	Female	1	2	2	3	2
109	109	12/9/2024 14:56:26	D1	Female	1	0	1	2	2
110	110	12/9/2024 14:56:38	D1	Male	1	1	1	2	2
111	111	12/9/2024 14:56:39	D1	Male	2	1	1	2	1
112	112	12/9/2024 14:56:50	D1	Female	2	2	1	3	3
113	113	12/9/2024 14:56:51	D1	Female	1	0	0	2	1
114	114	12/9/2024 14:56:56	D1	Male	2	0	1	1	1
115	115	12/9/2024 14:56:56	D1	Female	2	2	2	1	3
116	116	12/9/2024 14:56:59	D1	Female	3	1	3	3	1
117	117	12/9/2024 14:57:28	D1	Female	1	1	0	2	1
118	118	12/9/2024 14:57:29	D1	Male	1	1	1	1	1
119	119	12/9/2024 14:57:43	D1	Male	0	0	0	0	0
120	120	12/9/2024 14:58:21	D1	Female	1	1	0	3	0
121	121	12/9/2024 14:58:48	D1	Female	1	1	2	3	0
122	122	12/9/2024 14:59:08	D1	Male	0	1	0	1	0
123	123	12/9/2024 14:59:16	D1	Female	2	2	0	3	2
124	124	12/9/2024 17:03:41	D1	Male	1	0	2	0	0
125	125	12/9/2024 17:25:00	D3	Female	0	0	1	1	1
126	126	12/10/2024 10:24:20	D3	Female	0	1	1	1	1
127	127	12/10/2024 10:24:43	D4	Female	0	0	1	1	1
128	128	12/10/2024 10:25:19	D3	Female	2	1	0	3	1
129	129	12/10/2024 10:27:10	D4	Female	1	1	1	2	1
130	130	12/10/2024 10:29:14	D3	Female	1	1	3	2	0
131	131	12/10/2024 10:29:33	D3	Male	0	0	0	0	0
132	132	12/10/2024 10:31:26	D4	Female	1	0	1	1	1
133	133	12/10/2024 10:31:56	D3	Female	0	0	0	1	1
134	134	12/10/2024 10:34:42	D4	Female	0	0	0	2	1
135	135	12/10/2024 10:37:40	D4	Male	0	0	1	2	0
136	136	12/10/2024 10:42:09	D4	Male	1	2	3	3	1
137	137	12/10/2024 10:42:36	D3	Male	2	1	1	3	1
138	138	12/10/2024 10:54:56	D4	Male	1	1	1	1	1
139	139	12/10/2024 11:08:13	D3	Male	0	0	1	1	0
140	140	12/10/2024 11:49:31	D4	Female	1	1	1	2	1
141	141	12/10/2024 11:51:25	D3	Male	1	1	2	2	2
142	142	12/10/2024 11:52:10	D4	Female	0	0	2	1	1

143	143	12/10/2024 11:54:13	D4	Female	0	0	2	1	1
144	144	12/10/2024 11:56:29	D3	Male	1	1	0	1	0
145	145	12/10/2024 11:58:03	D3	Female	2	2	2	2	1
146	146	12/10/2024 12:00:33	D3	Male	0	1	0	2	1
147	147	12/10/2024 12:05:24	D3	Female	2	2	2	2	0
148	148	12/10/2024 12:12:58	D3	Female	0	0	1	1	1
149	149	12/10/2024 13:01:44	D3	Male	1	1	0	2	1
150	150	12/10/2024 13:33:17	D4	Male	1	0	0	1	1
151	151	12/10/2024 15:32:25	D4	Female	1	1	3	3	1
152	152	12/10/2024 15:50:23	D4	Female	0	1	1	1	1
153	153	12/10/2024 16:27:20	D3	Female	0	0	0	0	0
154	154	12/10/2024 18:59:59	D3	Male	1	1	2	2	0
155	155	12/10/2024 19:14:59	D4	Male	0	1	0	1	1
156	156	12/10/2024 20:05:05	D3	Male	1	1	1	1	1
157	157	12/10/2024 20:18:25	D4	Female	0	0	0	1	0
158	158	12/11/2024 8:11:39	D4	Male	0	0	1	1	0
159	159	12/11/2024 9:03:29	D3	Male	1	0	3	3	3
160	160	12/11/2024 10:18:32	D4	Male	1	0	2	2	2
161	161	12/11/2024 10:19:24	D4	Male	3	1	0	1	1
162	162	12/11/2024 10:19:39	D3	Female	1	1	1	1	1
163	163	12/11/2024 10:23:52	D3	Female	1	1	2	3	1
164	164	12/11/2024 10:31:04	D4	Female	0	0	0	2	1
165	165	12/11/2024 10:40:46	D4	Prefer not to say	0	0	0	1	0
166	166	12/11/2024 10:40:56	D3	Male	0	0	0	1	1
167	167	12/11/2024 11:07:07	D4	Male	0	0	0	0	0
168	168	12/11/2024 12:15:40	D4	Male	2	2	0	2	1
169	169	12/11/2024 12:22:30	D4	Male	0	0	0	1	0
170	170	12/11/2024 12:25:24	D4	Male	1	1	0	1	1
171	171	12/11/2024 12:27:17	D3	Male	1	0	1	3	1
172	172	12/11/2024 12:27:40	D4	Male	1	1	1	1	1
173	173	12/11/2024 12:27:59	D3	Male	0	0	0	1	0
174	174	12/11/2024 13:08:51	D1	Female	2	2	1	2	1
175	175	12/11/2024 15:00:52	D3	Female	1	1	0	3	2
176	176	12/12/2024 8:04:48	D2	Female	0	1	1	3	1
177	177	12/12/2024 8:05:58	D2	Female	1	1	1	1	1
178	178	12/12/2024 8:06:37	D2	Female	1	1	1	2	2
179	179	12/12/2024 8:07:15	D2	Female	1	2	2	3	2
180	180	12/12/2024 8:07:19	D2	Female	0	1	1	1	1
181	181	12/12/2024 8:08:05	D2	Female	3	3	3	3	3
182	182	12/12/2024 8:09:04	D2	Male	1	1	2	2	1
183	183	12/12/2024 8:09:21	D2	Female	3	1	3	2	3
184	184	12/12/2024 8:09:52	D2	Male	1	1	0	1	2
185	185	12/12/2024 8:13:51	D2	Female	0	1	3	1	1
186	186	12/12/2024 8:15:50	D2	Male	1	2	3	3	0
187	187	12/12/2024 8:16:59	D2	Female	1	1	1	2	1
188	188	12/12/2024 8:17:32	D2	Female	1	1	0	1	0
189	189	12/12/2024 8:19:34	D2	Female	1	1	2	2	1
190	190	12/12/2024 8:35:13	D2	Female	1	1	1	1	1
191	191	12/12/2024 11:21:44	D2	Female	1	1	2	3	1
192	192	12/12/2024 11:52:32	D2	Female	2	2	3	3	2
193	193	12/12/2024 12:12:43	D3	Female	2	1	0	1	1

194	194	12/12/2024 13:17:50		D2		Female	1	1	2	2	1				
195	195	12/12/2024 13:49:30		D2		Male	0	1	1	1	0				
196	196	12/12/2024 14:32:07		D2		Male	3	3	0	2	0				
197	197	12/12/2024 15:54:44		D2		Male	2	1	1	1	1				
198	198	12/12/2024 18:21:20		D2		Female	1	1	1	2	2				
199	199	12/14/2024 14:33:31		D4		Male	0	0	0	0	0				
200	200	12/15/2024 14:51:57		D3		Male	0	1	0	2	0				
201	201	12/15/2024 19:39:08		D3		Female	2	2	2	2	1				
202	202	12/17/2024 14:11:39		D2		Female	0	0	2	2	1				
203	203	12/17/2024 16:19:50		D3		Female	0	0	3	1	2				
204	204	12/19/2024 21:55:38		D3		Female	0	0	1	1	0				

	DEP6	DEP7	DEP8	BURN1	ANX1	ANX2	ANX3	ANX4	ANX5	ANX6	ANX7	yearTaken	phqScore
1	0	0	0	2	3	1	1	1	3	1	1	2024	2
2	0	0	0	2	1	0	0	0	0	0	0	2024	0
3	0	0	0	1	0	0	0	0	0	0	0	2024	2
4	0	0	0	2	1	2	1	3	2	1	0	2024	6
5	1	0	0	3	3	2	3	3	2	3	1	2024	5
6	0	1	0	2	0	0	0	0	0	1	0	2024	2
7	0	0	0	1	0	0	1	1	0	0	0	2024	3
8	0	0	0	1	1	0	1	0	0	0	0	2024	0
9	0	2	0	2	2	0	1	3	0	0	0	2024	6
10	0	0	0	1	1	0	1	0	0	1	0	2024	3
11	0	0	0	1	1	0	0	0	0	0	0	2024	2
12	0	0	0	1	0	0	0	0	0	1	0	2024	6
13	1	1	0	2	2	2	2	2	1	1	1	2024	8
14	0	0	0	2	0	0	0	1	1	1	0	2024	3
15	0	1	0	2	1	0	1	0	0	1	1	2024	3
16	1	1	0	2	1	1	2	1	1	2	1	2024	9
17	0	0	0	1	0	0	0	0	0	0	0	2024	0
18	3	3	3	2	1	1	1	1	1	1	0	2024	19
19	0	0	0	1	0	0	0	0	0	0	0	2024	0
20	0	1	0	1	1	0	1	0	0	1	0	2024	3
21	0	0	0	1	0	0	0	0	0	0	0	2024	0
22	1	0	0	1	1	0	0	0	0	0	0	2024	3
23	0	0	0	2	1	1	1	1	1	1	0	2024	3
24	1	1	0	2	1	1	1	1	0	1	1	2024	6
25	0	0	0	0	1	1	0	1	0	0	1	2024	2
26	1	1	0	1	1	0	0	0	0	1	0	2024	9
27	1	3	2	2	3	2	2	1	0	2	1	2024	19
28	0	0	1	1	1	1	1	1	0	1	0	2024	5
29	0	0	0	2	0	0	0	0	0	0	0	2024	1
30	0	0	0	1	0	0	1	0	0	0	1	2024	2
31	1	0	0	3	1	1	1	1	1	2	0	2024	7
32	1	0	0	2	1	1	1	1	0	1	1	2024	9
33	0	0	0	2	0	0	1	0	0	0	0	2024	3
34	0	0	0	2	0	0	1	0	0	0	0	2024	3
35	0	0	0	1	1	0	0	0	0	0	0	2024	2
36	0	0	1	2	1	1	1	1	0	1	0	2024	5
37	1	1	0	2	1	1	1	1	0	0	1	2024	7
38	1	0	0	2	1	1	1	1	1	2	0	2024	5
39	0	0	0	1	1	1	1	0	0	1	0	2024	3

40	2	1	0	3	3	2	3	3	1	2	1	2024	12
41	1	1	0	2	1	1	1	1	1	1	2	2024	10
42	0	0	0	0	1	0	0	1	1	0	0	2024	2
43	0	0	0	1	1	0	0	0	1	0	1	2024	3
44	0	0	0	1	0	0	0	0	0	0	0	2024	1
45	1	0	0	1	1	1	1	1	1	1	0	2024	1
46	1	1	0	1	1	1	1	1	0	2	0	2024	3
47	1	0	0	1	1	1	1	0	0	2	0	2024	9
48	0	0	0	1	0	0	0	0	0	0	0	2024	1
49	0	3	2	1	3	2	2	1	1	1	1	2024	9
50	0	1	0	2	0	0	0	0	0	0	0	2024	7
51	0	0	0	1	1	1	1	0	0	0	0	2024	2
52	0	0	0	2	0	0	0	0	0	3	0	2024	5
53	0	0	0	1	0	0	0	0	1	0	0	2024	3
54	1	1	0	1	1	1	1	1	1	0	2	2024	5
55	0	2	2	1	1	0	0	0	2	1	0	2024	8
56	0	3	0	2	1	0	1	1	1	1	0	2024	6
57	0	1	0	2	2	2	1	1	0	1	0	2024	6
58	0	0	0	1	0	0	0	0	0	0	0	2024	1
59	0	1	0	1	1	1	1	1	0	1	0	2024	5
60	0	0	0	1	0	1	1	1	0	1	0	2024	3
61	0	1	0	2	2	1	1	1	0	1	0	2024	6
62	0	0	0	1	1	0	0	1	1	1	0	2024	3
63	0	0	0	1	0	0	0	1	0	1	0	2024	2
64	1	1	0	1	1	1	1	1	1	1	1	2024	5
65	1	1	0	3	1	1	1	1	1	2	1	2024	4
66	1	1	1	1	1	1	1	0	2	0	0	2024	6
67	1	0	0	1	1	1	1	1	1	1	0	2024	3
68	0	0	1	0	0	1	1	0	0	0	0	2024	4
69	0	0	0	1	0	0	0	0	0	0	0	2024	0
70	0	1	0	3	1	0	1	1	0	1	0	2024	4
71	0	0	0	0	0	0	0	0	0	0	0	2024	0
72	1	0	0	1	0	0	0	0	0	0	0	2024	4
73	1	0	0	1	3	2	2	3	2	0	3	2024	5
74	0	1	0	2	0	0	1	0	0	1	0	2024	4
75	1	0	1	1	1	0	0	0	0	1	0	2024	3
76	0	0	0	1	3	1	1	1	0	1	2	2024	3
77	1	1	2	1	2	2	2	2	2	1	1	2024	6
78	0	0	0	0	3	1	2	1	0	1	1	2024	3
79	0	0	0	2	1	0	0	0	1	0	0	2024	5
80	0	0	0	2	1	0	1	0	0	0	0	2024	3
81	0	0	0	0	0	0	1	1	1	0	0	2024	1
82	0	0	0	2	0	1	1	1	1	1	0	2024	4
83	0	2	0	1	1	0	1	1	1	1	1	2024	5
84	0	1	0	2	1	2	1	1	1	1	1	2024	7
85	2	1	3	3	3	3	3	3	3	3	2	2024	15
86	1	0	0	2	1	1	1	1	0	1	0	2024	5
87	0	1	0	0	1	1	1	0	0	0	1	2024	6
88	1	0	0	1	0	0	0	0	0	0	0	2024	3
89	1	1	0	2	2	2	1	2	2	1	0	2025	7
90	1	2	0	2	2	1	2	2	1	3	0	2025	14

91	2	1	1	3	3	3	2	1	1	1	3	2025	15
92	1	2	0	2	3	2	2	2	2	3	1	2025	12
93	2	3	2	2	2	1	1	1	1	2	1	2025	22
94	0	0	0	1	1	0	1	1	0	1	0	2025	3
95	1	1	0	1	1	1	1	1	1	1	0	2025	14
96	0	0	0	1	1	1	1	0	0	1	0	2025	4
97	0	1	0	2	2	2	2	1	1	1	1	2025	7
98	1	1	0	2	0	1	0	2	2	1	0	2025	12
99	0	0	0	1	1	0	1	0	0	1	0	2025	3
100	1	0	1	3	1	1	2	2	1	2	0	2025	10
101	0	2	1	2	2	2	2	2	1	1	0	2025	11
102	1	1	0	1	2	1	1	1	1	1	1	2025	8
103	2	1	0	2	1	1	2	2	1	1	2	2025	14
104	2	1	0	2	3	3	3	3	0	3	3	2025	16
105	0	1	2	3	2	2	1	2	1	2	0	2025	7
106	1	1	0	2	1	1	1	1	1	1	0	2025	5
107	2	0	0	4	2	2	3	3	2	3	2	2025	16
108	3	3	3	2	3	2	3	1	1	2	2	2025	19
109	1	1	0	1	2	0	1	3	0	1	2	2025	8
110	2	2	2	2	2	3	3	2	2	3	2	2025	13
111	0	1	1	2	1	0	1	2	1	2	1	2025	9
112	3	3	2	2	3	1	3	3	1	3	0	2025	19
113	1	2	0	1	1	1	1	1	0	1	0	2025	7
114	0	1	0	2	0	0	0	0	0	3	0	2025	6
115	0	1	0	2	1	1	1	2	0	3	0	2025	11
116	2	2	2	2	1	1	2	1	2	2	1	2025	17
117	1	1	1	1	2	1	2	2	2	2	1	2025	8
118	1	2	1	3	1	1	1	1	1	1	1	2025	9
119	0	0	0	0	0	0	0	0	0	0	0	2025	0
120	1	3	1	1	1	0	0	0	0	1	0	2025	10
121	0	1	0	2	1	1	1	0	0	1	0	2025	8
122	0	0	0	1	0	0	0	0	1	1	0	2025	2
123	1	0	0	2	3	3	3	3	0	1	0	2025	10
124	0	1	0	2	2	3	3	3	2	1	0	2025	4
125	0	1	0	1	1	1	1	1	1	1	0	2025	4
126	0	1	0	3	1	1	1	0	0	2	1	2025	5
127	0	1	0	2	1	0	1	1	1	2	0	2025	4
128	2	0	0	3	2	0	2	1	1	2	2	2025	9
129	2	1	0	2	2	3	2	1	0	2	1	2025	9
130	0	1	1	2	1	1	1	1	1	2	1	2025	9
131	0	0	0	0	0	0	0	0	0	0	0	2025	0
132	0	0	0	3	1	1	1	1	0	1	0	2025	4
133	0	1	0	1	1	0	0	0	0	0	0	2025	3
134	0	0	0	2	1	0	0	0	0	1	1	2025	3
135	0	0	0	2	0	0	1	1	0	0	0	2025	3
136	3	2	0	1	0	1	0	2	0	2	1	2025	15
137	2	2	0	3	1	1	2	3	0	3	2	2025	12
138	0	1	1	1	1	1	1	1	1	1	1	2025	7
139	1	0	0	1	0	0	0	0	0	0	0	2025	3
140	1	1	1	2	1	2	2	1	1	2	1	2025	9
141	0	0	1	3	0	0	1	3	1	1	0	2025	9

142	0	1	0	3	1	0	1	0	0	2	0	2025	5
143	0	0	0	1	1	1	1	1	0	1	1	2025	4
144	0	0	0	2	1	1	1	1	0	0	0	2025	3
145	2	1	0	3	2	2	2	2	1	2	1	2025	12
146	0	0	0	0	1	1	1	0	0	1	1	2025	4
147	2	0	0	2	2	2	1	2	0	0	0	2025	10
148	0	1	0	2	1	1	1	1	1	1	0	2025	4
149	1	1	0	2	1	1	1	1	1	1	0	2025	7
150	1	1	1	1	1	1	1	1	1	1	1	2025	6
151	0	1	0	4	1	1	1	2	2	1	0	2025	10
152	0	0	0	2	0	1	1	0	0	2	1	2025	4
153	0	0	0	1	0	0	0	0	0	0	0	2025	0
154	1	1	0	1	3	2	2	3	2	2	2	2025	8
155	0	0	0	2	1	0	0	0	0	1	0	2025	3
156	1	1	1	2	1	1	1	1	1	3	1	2025	8
157	1	0	0	2	1	0	0	0	0	0	0	2025	2
158	0	0	0	0	0	0	0	0	0	0	0	2025	2
159	1	2	1	2	1	1	2	1	1	2	0	2025	14
160	0	2	1	1	1	0	0	1	1	0	0	2025	10
161	0	0	0	2	0	0	0	0	0	3	0	2025	6
162	1	1	1	2	1	1	1	1	1	1	1	2025	8
163	1	1	0	2	2	2	2	2	1	1	1	2025	10
164	0	0	0	1	1	0	1	0	0	1	0	2025	3
165	0	0	3	4	0	0	0	0	3	0	0	2025	4
166	0	1	1	0	1	0	1	0	1	1	0	2025	4
167	0	0	0	1	0	0	0	0	0	0	0	2025	0
168	0	2	0	2	1	1	1	2	0	1	1	2025	9
169	0	0	0	0	0	0	0	0	0	1	0	2025	1
170	0	1	0	1	0	0	1	1	0	1	0	2025	5
171	1	3	1	2	1	1	1	0	0	1	0	2025	11
172	1	1	1	1	1	1	1	1	1	1	0	2025	8
173	0	0	0	1	1	0	0	0	0	0	0	2025	1
174	2	2	2	4	2	1	2	2	2	2	2	2025	14
175	2	2	3	2	3	1	1	1	1	1	1	2025	14
176	1	2	0	1	1	3	3	2	1	0	1	2025	9
177	1	1	0	2	1	1	1	1	1	1	0	2025	7
178	1	1	0	2	1	1	2	1	1	2	0	2025	9
179	3	1	1	3	2	1	2	3	2	3	2	2025	15
180	1	2	0	2	1	1	1	1	2	1	1	2025	7
181	3	2	0	3	3	3	3	3	0	3	3	2025	20
182	2	2	0	2	1	2	2	2	1	1	1	2025	11
183	1	2	0	3	3	3	3	3	3	3	1	2025	15
184	0	1	0	2	1	0	0	0	0	0	1	2025	6
185	1	1	0	1	2	2	2	2	1	2	2	2025	8
186	3	2	0	3	3	3	3	3	3	3	3	2025	14
187	1	2	0	2	1	0	1	1	1	0	1	2025	9
188	0	1	0	2	0	0	0	0	0	1	0	2025	4
189	1	2	1	3	2	1	2	2	2	3	1	2025	11
190	0	2	0	2	2	1	3	2	1	2	1	2025	7
191	1	1	1	2	3	3	3	2	0	2	1	2025	11
192	3	3	0	3	3	3	3	3	3	1	3	2025	18

193	1	0	0	2	1	0	2	1	1	1	0	2025	6
194	1	1	1	2	2	2	2	2	2	2	2	2025	10
195	0	1	0	1	2	0	1	0	1	0	1	2025	4
196	3	3	3	3	3	3	3	3	2	3	3	2025	17
197	0	1	1	1	1	1	1	1	1	1	1	2025	8
198	1	2	0	3	3	2	3	2	1	1	1	2025	10
199	0	0	0	1	1	0	1	1	1	0	0	2025	0
200	1	1	1	1	2	2	2	1	1	1	0	2025	6
201	1	1	0	2	2	2	2	2	2	1	2	2025	11
202	1	1	0	2	2	1	2	2	0	2	0	2025	7
203	1	1	1	1	1	0	1	1	1	0	0	2025	9
204	0	1	0	1	1	0	1	2	1	0	0	2025	3

	burnScore	gadScore
1	2	11
2	2	1
3	1	0
4	2	10
5	3	17
6	2	1
7	1	2
8	1	2
9	2	6
10	1	3
11	1	1
12	1	1
13	2	11
14	2	3
15	2	4
16	2	9
17	1	0
18	2	6
19	1	0
20	1	3
21	1	0
22	1	1
23	2	6
24	2	6
25	0	4
26	1	2
27	2	11
28	1	5
29	2	0
30	1	2
31	3	7
32	2	6
33	2	1
34	2	1
35	1	1
36	2	5
37	2	5
38	2	7

39	1	4
40	3	15
41	2	8
42	0	3
43	1	3
44	1	0
45	1	6
46	1	6
47	1	5
48	1	0
49	1	11
50	2	0
51	1	3
52	2	3
53	1	1
54	1	7
55	1	4
56	2	5
57	2	7
58	1	0
59	1	5
60	1	4
61	2	6
62	1	4
63	1	2
64	1	7
65	3	8
66	1	5
67	1	6
68	0	2
69	1	0
70	3	4
71	0	0
72	1	0
73	1	15
74	2	2
75	1	2
76	1	9
77	1	12
78	0	9
79	2	2
80	2	2
81	0	3
82	2	5
83	1	6
84	2	8
85	3	20
86	2	5
87	0	4
88	1	0
89	2	10

90	2	11
91	3	14
92	2	15
93	2	9
94	1	4
95	1	6
96	1	4
97	2	10
98	2	6
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104	2	18
105	3	10
106	2	6
107	4	17
108	2	14
109	1	9
110	2	17
111	2	8
112	2	14
113	1	5
114	2	3
115	2	8
116	2	10
117	1	12
118	3	7
119	0	0
120	1	2
121	2	4
122	1	2
123	2	13
124	2	14
125	1	6
126	3	6
127	2	6
128	3	10
129	2	11
130	2	8
131	0	0
132	3	5
133	1	1
134	2	3
135	2	2
136	1	6
137	3	12
138	1	7
139	1	0
140	2	10

141	3	6
142	3	4
143	1	6
144	2	4
145	3	12
146	0	5
147	2	7
148	2	6
149	2	6
150	1	7
151	4	8
152	2	5
153	1	0
154	1	16
155	2	2
156	2	9
157	2	1
158	0	0
159	2	8
160	1	3
161	2	3
162	2	7
163	2	11
164	1	3
165	4	3
166	0	4
167	1	0
168	2	7
169	0	1
170	1	3
171	2	4
172	1	6
173	1	1
174	4	13
175	2	9
176	1	11
177	2	6
178	2	8
179	3	15
180	2	8
181	3	18
182	2	10
183	3	19
184	2	2
185	1	13
186	3	21
187	2	5
188	2	1
189	3	13
190	2	12
191	2	14

```
192         3       19
193         2        6
194         2       14
195         1        5
196         3       20
197         1        7
198         3       13
199         1        4
200         1        9
201         2       13
202         2        9
203         1        4
204         1        5
```

now we can import our prepared df for analysis, and add a few extra columns

```r
# import the data file with everything

mhData <- sumComboDF

mhData <- mhData %>%
  mutate(
    DENTALYR = as.factor(DENTALYR),
    yearTaken = as.factor(yearTaken),
    DENTALYR_NESTED = interaction(DENTALYR, yearTaken, drop = TRUE)
  )


# make two separate files with only the first and second years
secondSampleOnly <- mhData %>% filter(yearTaken == 2025)
firstSampleOnly <- mhData %>% filter(yearTaken == 2024)

# _!_!_!_! WE WILL NOT HAVE CONTRAST DATA
```

To make some graphs, lets declare the size

```r
widset<- 6
hiset <- 4 + 2

nameMap <-  c("D1.2024" = "D1, \n 2023-2024",
              "D2.2024" = "D2, \n 2023-2024",
              "D3.2024" = "D3, \n 2023-2024",
              "D4.2024" = "D4, \n 2023-2024",
              "D1.2025" = "D1, \n 2024-2025",
              "D2.2025" = "D2, \n 2024-2025",
              "D3.2025" = "D3, \n 2024-2025",
              "D4.2025" = "D4, \n 2024-2025")


sum(is.na(mhData$phqScore))  # check for missing phq9 scores
```

```
[1] 0
```

```
sum(is.na(mhData$burnScore))  # check for missing phq9 scores
```

```
[1] 0
```

```
sum(is.na(mhData$gadScore))  # check for missing phq9 scores
```

```
[1] 0
```

```
sum(is.na(mhData$DENTALYR))  # check for missing dental year values
```

```
[1] 0
```

```
sum(is.na(mhData$yearTaken))  # check for missing academic year values
```

```
[1] 0
```

```
table(interaction(mhData$DENTALYR, mhData$yearTaken, drop=TRUE))  # Check for NA levels
```

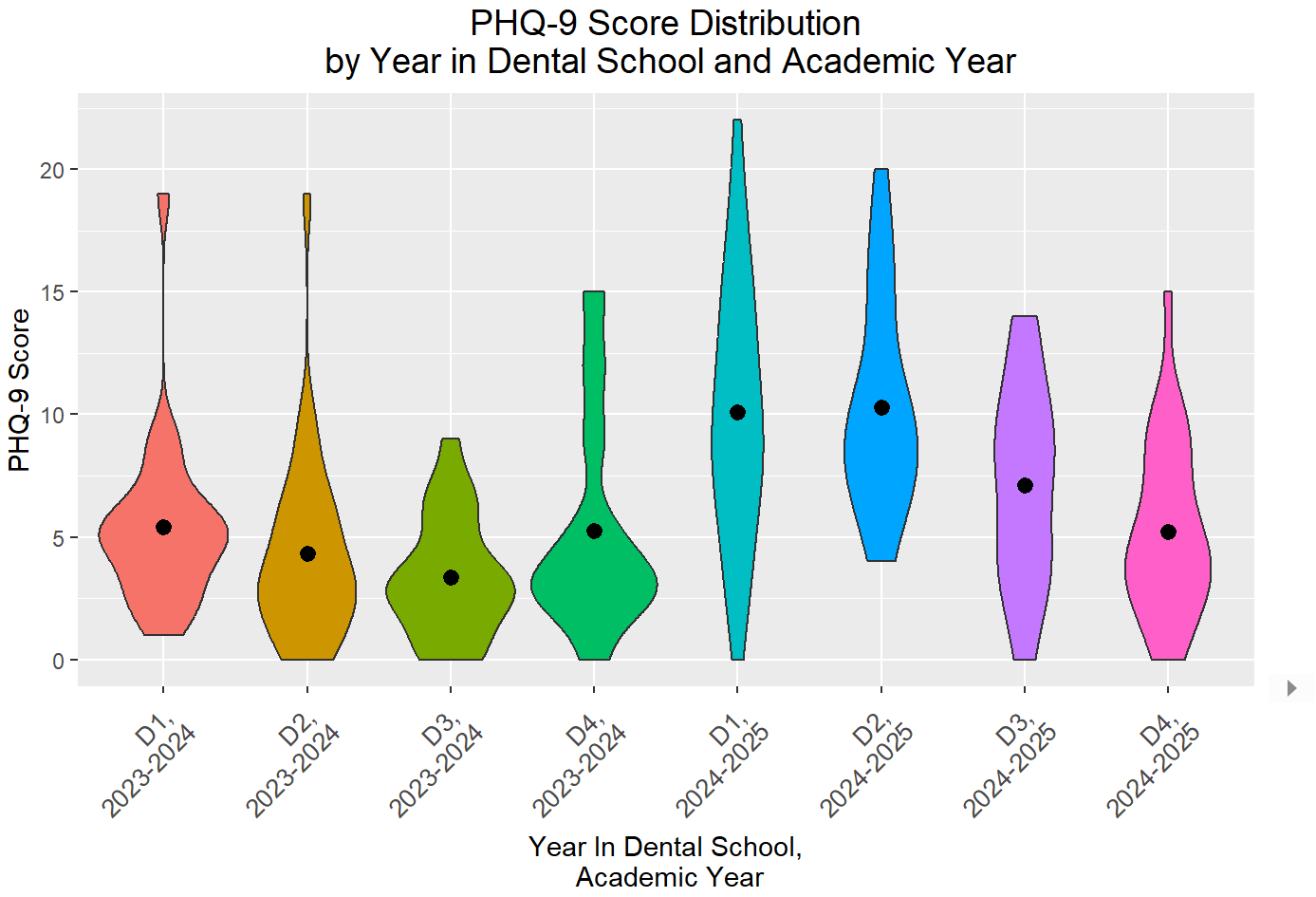
```
D1.2024 D2.2024 D3.2024 D4.2024 D1.2025 D2.2025 D3.2025 D4.2025
     25      29      22      12      35      23      32      26
```

plot phq score

```
phqPlot <- ggplot(data=mhData, mapping=aes(x=interaction(DENTALYR, yearTaken),y=phqScore, fill=in
  geom_violin() +
  scale_y_continuous(limits = range(mhData$phqScore, na.rm=FALSE)) +
  stat_summary(fun="mean", color="black") +
  scale_x_discrete(labels=nameMap) +
  scale_fill_discrete(labels=nameMap, name= "Year In Dental School, Academic Year") +
  labs(title = "PHQ-9 Score Distribution\n by Year in Dental School and Academic Year", size=7)+
  labs(x = "Year In Dental School,\n Academic Year") +
  labs(y = "PHQ-9 Score") +
  theme(axis.text.x = element_text(size = 10)) +
  theme(legend.position = "none") +
    theme(
    plot.title = element_text(hjust = 0.5, size = 14),
    legend.text = element_text(size = 8),      # Reduce legend text size
    legend.title = element_text(size = 9),     # Reduce legend title size
    legend.key.size = unit(0.3, "cm"),         # Shrink legend key boxes
    legend.spacing.y = unit(0.1, "cm")         # Reduce vertical spacing
  ) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))
```

```
print(phqPlot)
```

```
Warning: Removed 8 rows containing missing values or values outside the scale range
(`geom_segment()`).
```




```
ggsave(filename = "phqPlot.png", plot = phqPlot, width = widset, height = hiset)
```

```
Warning: Removed 8 rows containing missing values or values outside the scale range
(`geom_segment()`).
```

plot burn score

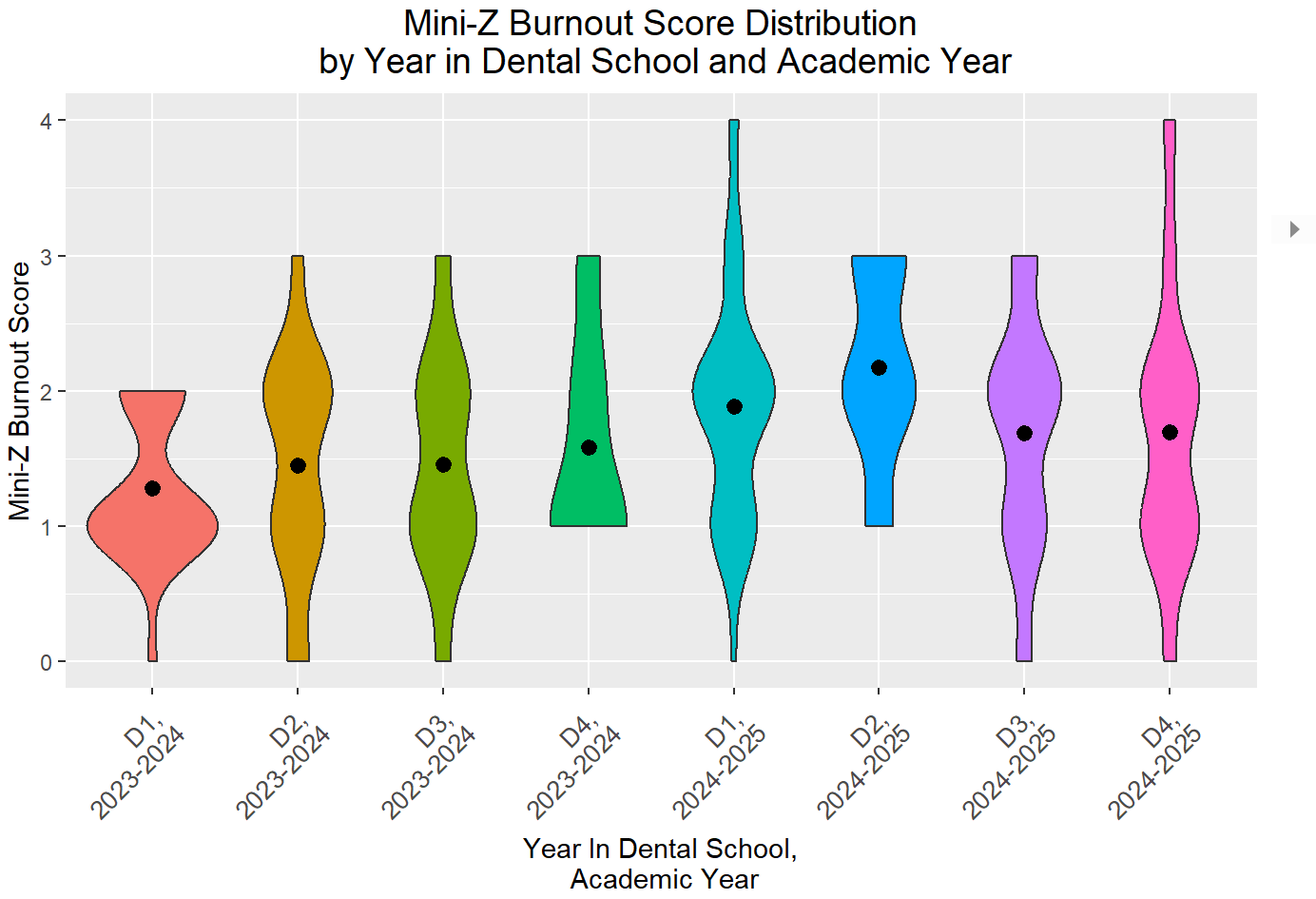
```
burnPlot <- ggplot(data=mhData, mapping=aes(x=interaction(DENTALYR, yearTaken),y=burnScore, fill=
  geom_violin() +
  scale_y_continuous(limits = range(mhData$burnScore, na.rm=FALSE)) +
  stat_summary(fun="mean", color="black") +
  scale_x_discrete(labels=nameMap) +
  scale_fill_discrete(labels=nameMap, name= "Year In Dental School, Academic Year") +
  labs(title = "Mini-Z Burnout Score Distribution\n by Year in Dental School and Academic Year",
  labs(x = "Year In Dental School,\n Academic Year") +
  labs(y = "Mini-Z Burnout Score") +
  theme(axis.text.x = element_text(size = 10)) +
```

```
  theme(legend.position = "none") +
    theme(
    plot.title = element_text(hjust = 0.5, size = 14),
    legend.text = element_text(size = 8),      # Reduce legend text size
    legend.title = element_text(size = 9),     # Reduce legend title size
    legend.key.size = unit(0.3, "cm"),         # Shrink legend key boxes
    legend.spacing.y = unit(0.1, "cm")         # Reduce vertical spacing
  ) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))



print(burnPlot)
```

```
Warning: Removed 8 rows containing missing values or values outside the scale range
(`geom_segment()`).
```




```
ggsave(filename = "burnPlot.png", plot = burnPlot, width = widset, height = hiset)
```

```
Warning: Removed 8 rows containing missing values or values outside the scale range
(`geom_segment()`).
```

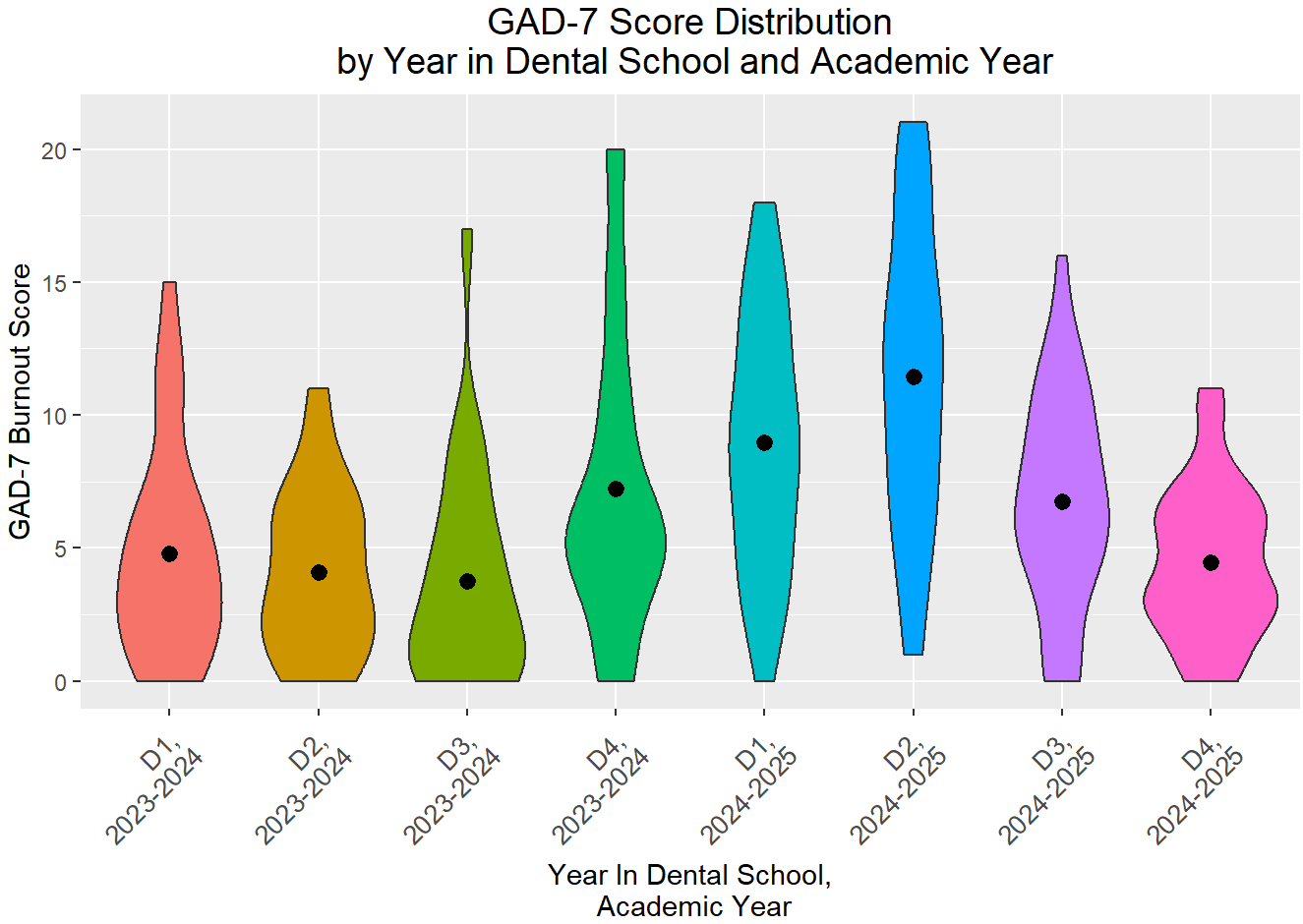
plot gad score

```r
gadPlot <- ggplot(data=mhData, mapping=aes(x=interaction(DENTALYR, yearTaken),y=gadScore, fill=in
  geom_violin() +
  scale_y_continuous(limits = range(mhData$gadScore, na.rm=FALSE)) +
  stat_summary(fun="mean", color="black") +
  scale_x_discrete(labels=nameMap) +
  scale_fill_discrete(labels=nameMap, name= "Year In Dental School, Academic Year") +
  labs(title = "GAD-7 Score Distribution\n by Year in Dental School and Academic Year", size=7)+
  labs(x = "Year In Dental School,\n Academic Year") +
  labs(y = "GAD-7 Burnout Score") +
  theme(axis.text.x = element_text(size = 10)) +
  theme(legend.position = "none") +
    theme(
    plot.title = element_text(hjust = 0.5, size = 14),
    legend.text = element_text(size = 8),      # Reduce legend text size
    legend.title = element_text(size = 9),     # Reduce legend title size
    legend.key.size = unit(0.3, "cm"),         # Shrink legend key boxes
    legend.spacing.y = unit(0.1, "cm")         # Reduce vertical spacing
  ) +
  theme(axis.text.x = element_text(angle = 45, hjust = 1))



print(gadPlot)
```

```
Warning: Removed 8 rows containing missing values or values outside the scale range
(`geom_segment()`).
```




```
ggsave(filename = "gadPlot.png", plot = gadPlot, width = widset, height = hiset)
```

```
Warning: Removed 8 rows containing missing values or values outside the scale range
(`geom_segment()`).
```

phq general score across recent year

```
set.seed(reSeed)

combList <- combn(unique(secondSampleOnly$DENTALYR), 2)
for (x in 1:ncol(combList)){
  this<-combList[,x][1]
  minusThis<-combList[,x][2]
  #print(this)
  #print(minusThis)



  meanDiffer <- mean(phqScore~DENTALYR, data=secondSampleOnly)[this]-mean(phqScore~DENTALYR, data=

  nullSet <- do(repCtMos)*( mean(phqScore~shuffle(DENTALYR), data=secondSampleOnly)[this]-mean(ph

  pValMos <- prop(~( nullSet>=abs(meanDiffer)), data=nullSet)
```

```
  cat(this, " - ", minusThis, " : ", pValMos," ajd: ",pValMos*ncol(combList), "\n")
}
```

```
3  -  1  :  0.00131  ajd:  0.00786
3  -  4  :  0.04252  ajd:  0.25512
3  -  2  :  0.00257  ajd:  0.01542
1  -  4  :  0  ajd:  0
1  -  2  :  0.42631  ajd:  2.55786
4  -  2  :  0  ajd:  0
```

gad score across most recent year

phq score, general, across years [1-6]

```
set.seed(reSeed)

gpMeans <- mhData %>% #DDDDD1 1
  group_by(DENTALYR_NESTED) %>% #__1 1___
  summarise(meanTS = mean(phqScore)) %>% #!!!!!!! 1 1
  pull(meanTS)


pairmean <- function(gpMeans){
  pairwiseDiff <- combn(gpMeans, 2, function(x) abs(x[1] - x[2]))
  return(mean(pairwiseDiff))
}

obsStat <- pairmean(gpMeans)

meanDifStat <- function(data,indices){
  bootData <- data
  bootData$valOfInterest <- sample(data$phqScore) #!!!!!!! 1 2

  bootMeans <- bootData %>%
    group_by(DENTALYR_NESTED) %>% #____1 2___
    summarise(meanTS = mean(valOfInterest)) %>%
    pull(meanTS)

  if (length(bootMeans)<2) return(NA)

  return(pairmean(bootMeans))
}

nullSet <- do(repCtMos)*meanDifStat(data=mhData, 1:nrow(mhData)) #DDDDD2 2
#nullSet


#bootGo$t
bootP <- mean(nullSet >= obsStat) #not a boot but yeah
```

```
gpMeans
```

```
[1]  5.400000  4.310345  3.363636  5.250000 10.085714 10.304348  7.125000
[8]  5.230769
```

```
bootP
```

```
[1] 0
```

phq score, pairwise, across years [1-5]

```
set.seed(reSeed)

combList <- combn(unique(as.character(mhData$DENTALYR_NESTED)), 2)
combList <- combList[, !apply(combList, 2, function(col) any(grepl("D4.2024|D2.2024|D4.2025|D2.202
combList <- combList[, apply(combList, 2, function(col) {
  substr(col[1], 1, 2) == substr(col[2], 1, 2)
})]

combList
```

```
     [,1]      [,2]
[1,] "D3.2024" "D1.2024"
[2,] "D3.2025" "D1.2025"
```

```
for (x in 1:ncol(combList)){
  this<-combList[,x][1]
  minusThis<-combList[,x][2]
  #print(this)
  #print(minusThis)



  meanDiffer <- mean(phqScore~DENTALYR_NESTED, data=mhData)[this]-mean(phqScore~DENTALYR_NESTED, 

  nullSet <- do(repCtMos)*( mean(phqScore~shuffle(DENTALYR_NESTED), data=mhData)[this]-mean(phqSc

  pValMos <- prop(~( nullSet>=abs(meanDiffer)), data=nullSet)

  cat(this, " - ", minusThis, " : ", pValMos," ajd: ",pValMos*ncol(combList), "\n")
}
```

```
D3.2024  -  D3.2025  :  0.00128  ajd:  0.00256
D1.2024  -  D1.2025  :  4e-05  ajd:  8e-05
```

burnscore, general, across years [1-4]

```
set.seed(reSeed)

gpMeans <- mhData %>% #DDDDD1 1
  group_by(DENTALYR_NESTED) %>% #__1 1___
  summarise(meanTS = mean(burnScore)) %>% #!!!!!!! 1 1
  pull(meanTS)


pairmean <- function(gpMeans){
  pairwiseDiff <- combn(gpMeans, 2, function(x) abs(x[1] - x[2]))
  return(mean(pairwiseDiff))
}

obsStat <- pairmean(gpMeans)

meanDifStat <- function(data,indices){
  bootData <- data
  bootData$valOfInterest <- sample(data$burnScore) #!!!!!!! 1 2

  bootMeans <- bootData %>%
    group_by(DENTALYR_NESTED) %>% #____1 2___
    summarise(meanTS = mean(valOfInterest)) %>%
    pull(meanTS)

  if (length(bootMeans)<2) return(NA)

  return(pairmean(bootMeans))
}

nullSet <- do(repCtMos)*meanDifStat(data=mhData, 1:nrow(mhData)) #DDDDD2 2
#nullSet


#bootGo$t
bootP <- mean(nullSet >= obsStat) #not a boot but yeah

gpMeans
```

```
[1] 1.280000 1.448276 1.454545 1.583333 1.885714 2.173913 1.687500 1.692308
```

```
bootP
```

```
[1] 0.01293
```

burnscore, pairwise, across years [1-3]

```
set.seed(reSeed)
```

```
combList <- combn(unique(as.character(mhData$DENTALYR_NESTED)), 2)
combList <- combList[, !apply(combList, 2, function(col) any(grepl("D4.2024|D2.2024|D4.2025|D2.20
combList <- combList[, apply(combList, 2, function(col) {
  substr(col[1], 1, 2) == substr(col[2], 1, 2)
})]

combList
```

```
     [,1]      [,2]
[1,] "D3.2024" "D1.2024"
[2,] "D3.2025" "D1.2025"
```

```
for (x in 1:ncol(combList)){
  this<-combList[,x][1]
  minusThis<-combList[,x][2]
  #print(this)
  #print(minusThis)



  meanDiffer <- mean(burnScore~DENTALYR_NESTED, data=mhData)[this]-mean(burnScore~DENTALYR_NESTED,

  nullSet <- do(repCtMos)*( mean(burnScore~shuffle(DENTALYR_NESTED), data=mhData)[this]-mean(burn

  pValMos <- prop(~( nullSet>=abs(meanDiffer)), data=nullSet)

  cat(this, " - ", minusThis, " : ", pValMos," ajd: ",pValMos*ncol(combList), "\n")
}
```

```
D3.2024  -  D3.2025  :  0.14558  ajd:  0.29116
D1.2024  -  D1.2025  :  0.00176  ajd:  0.00352
```

gadscore, general, across years [1-2]

```
set.seed(reSeed)

gpMeans <- mhData %>% #DDDDD1 1
  group_by(DENTALYR_NESTED) %>% #__1 1___
  summarise(meanTS = mean(gadScore)) %>% #!!!!!!! 1 1
  pull(meanTS)


pairmean <- function(gpMeans){
  pairwiseDiff <- combn(gpMeans, 2, function(x) abs(x[1] - x[2]))
  return(mean(pairwiseDiff))
}

obsStat <- pairmean(gpMeans)
```

```
meanDifStat <- function(data,indices){
  bootData <- data
  bootData$valOfInterest <- sample(data$gadScore) #!!!!!!! 1 2

  bootMeans <- bootData %>%
    group_by(DENTALYR_NESTED) %>% #____1 2___
    summarise(meanTS = mean(valOfInterest)) %>%
    pull(meanTS)

  if (length(bootMeans)<2) return(NA)

  return(pairmean(bootMeans))
}

nullSet <- do(repCtMos)*meanDifStat(data=mhData, 1:nrow(mhData)) #DDDDD2 2
#nullSet


#bootGo$t
bootP <- mean(nullSet >= obsStat) #not a boot but yeah

gpMeans
```

```
[1]  4.800000  4.103448  3.772727  7.250000  8.971429 11.434783  6.750000
[8]  4.461538
```

```
bootP
```

```
[1] 0
```

gadscore, pairwise, across years [1-1]

```
set.seed(reSeed)


combList <- combn(unique(as.character(mhData$DENTALYR_NESTED)), 2)
combList <- combList[, !apply(combList, 2, function(col) any(grepl("D4.2024|D2.2024|D4.2025|D2.20
combList <- combList[, apply(combList, 2, function(col) {
  substr(col[1], 1, 2) == substr(col[2], 1, 2)
})]

combList
```

```
     [,1]      [,2]
[1,] "D3.2024" "D1.2024"
[2,] "D3.2025" "D1.2025"
```

```
for (x in 1:ncol(combList)){
  this<-combList[,x][1]
```

```
  minusThis<-combList[,x][2]
  #print(this)
  #print(minusThis)



  meanDiffer <- mean(gadScore~DENTALYR_NESTED, data=mhData)[this]-mean(gadScore~DENTALYR_NESTED, 

  nullSet <- do(repCtMos)*( mean(gadScore~shuffle(DENTALYR_NESTED), data=mhData)[this]-mean(gadSc

  pValMos <- prop(~( nullSet>=abs(meanDiffer)), data=nullSet)

  cat(this, " - ", minusThis, " : ", pValMos," ajd: ",pValMos*ncol(combList), "\n")
}
```

```
D3.2024  -  D3.2025  :  0.00968  ajd:  0.01936
D1.2024  -  D1.2025  :  0.00021  ajd:  0.00042
```

phq score, general, most recent year [6]

```
set.seed(reSeed)

gpMeans <- secondSampleOnly %>% #DDDDD1 1
  group_by(DENTALYR) %>% #__1 1___
  summarise(meanTS = mean(phqScore)) %>% #!!!!!!! 1 1
  pull(meanTS)


pairmean <- function(gpMeans){
  pairwiseDiff <- combn(gpMeans, 2, function(x) abs(x[1] - x[2]))
  return(mean(pairwiseDiff))
}

obsStat <- pairmean(gpMeans)

meanDifStat <- function(data,indices){
  bootData <- data
  bootData$valOfInterest <- sample(data$phqScore) #!!!!!!! 1 2

  bootMeans <- bootData %>%
    group_by(DENTALYR) %>% #____1 2___
    summarise(meanTS = mean(valOfInterest)) %>%
    pull(meanTS)

  if (length(bootMeans)<2) return(NA)

  return(pairmean(bootMeans))
}

nullSet <- do(repCtMos)*meanDifStat(data=secondSampleOnly, 1:nrow(secondSampleOnly)) #DDDDD2 2
```

```
#nullSet


#bootGo$t
bootP <- mean(nullSet >= obsStat) #not a boot but yeah

gpMeans
```

```
[1] 10.085714 10.304348  7.125000  5.230769
```

```
bootP
```

```
[1] 7e-05
```

phq score, pair, most recent year [5]

```
set.seed(reSeed)

combList <- combn(unique(secondSampleOnly$DENTALYR), 2)
for (x in 1:ncol(combList)){
  this<-combList[,x][1]
  minusThis<-combList[,x][2]
  #print(this)
  #print(minusThis)



  meanDiffer <- mean(phqScore~DENTALYR, data=secondSampleOnly)[this]-mean(phqScore~DENTALYR, data=

  nullSet <- do(repCtMos)*( mean(phqScore~shuffle(DENTALYR), data=secondSampleOnly)[this]-mean(ph

  pValMos <- prop(~( nullSet>=abs(meanDiffer)), data=nullSet)

  cat(this, " - ", minusThis, " : ", pValMos," ajd: ",pValMos*ncol(combList), "\n")
}
```

```
3  -  1  :  0.00131  ajd:  0.00786
3  -  4  :  0.04252  ajd:  0.25512
3  -  2  :  0.00257  ajd:  0.01542
1  -  4  :  0  ajd:  0
1  -  2  :  0.42631  ajd:  2.55786
4  -  2  :  0  ajd:  0
```

burn score, general, most recent year [4]

```
set.seed(reSeed)

gpMeans <- secondSampleOnly %>% #DDDDD1 1
  group_by(DENTALYR) %>% #__1 1___
```

```
  summarise(meanTS = mean(burnScore)) %>% #!!!!!!! 1 1
  pull(meanTS)


pairmean <- function(gpMeans){
  pairwiseDiff <- combn(gpMeans, 2, function(x) abs(x[1] - x[2]))
  return(mean(pairwiseDiff))
}

obsStat <- pairmean(gpMeans)

meanDifStat <- function(data,indices){
  bootData <- data
  bootData$valOfInterest <- sample(data$burnScore) #!!!!!!! 1 2

  bootMeans <- bootData %>%
    group_by(DENTALYR) %>% #____1 2___
    summarise(meanTS = mean(valOfInterest)) %>%
    pull(meanTS)

  if (length(bootMeans)<2) return(NA)

  return(pairmean(bootMeans))
}

nullSet <- do(repCtMos)*meanDifStat(data=secondSampleOnly, 1:nrow(secondSampleOnly)) #DDDDD2 2
#nullSet


#bootGo$t
bootP <- mean(nullSet >= obsStat) #not a boot but yeah

gpMeans
```

```
[1] 1.885714 2.173913 1.687500 1.692308
```

```
bootP
```

```
[1] 0.14034
```

burn score, pair, most recent year [3]

-null

gad score, general, most recent year [2]

```
set.seed(reSeed)

gpMeans <- secondSampleOnly %>% #DDDDD1 1
  group_by(DENTALYR) %>% #__1 1___
```

```
  summarise(meanTS = mean(gadScore)) %>% #!!!!!!! 1 1
  pull(meanTS)


pairmean <- function(gpMeans){
  pairwiseDiff <- combn(gpMeans, 2, function(x) abs(x[1] - x[2]))
  return(mean(pairwiseDiff))
}

obsStat <- pairmean(gpMeans)

meanDifStat <- function(data,indices){
  bootData <- data
  bootData$valOfInterest <- sample(data$gadScore) #!!!!!!! 1 2

  bootMeans <- bootData %>%
    group_by(DENTALYR) %>% #____1 2___
    summarise(meanTS = mean(valOfInterest)) %>%
    pull(meanTS)

  if (length(bootMeans)<2) return(NA)

  return(pairmean(bootMeans))
}

nullSet <- do(repCtMos)*meanDifStat(data=secondSampleOnly, 1:nrow(secondSampleOnly)) #DDDDD2 2
#nullSet


#bootGo$t
bootP <- mean(nullSet >= obsStat) #not a boot but yeah

gpMeans
```

```
[1]  8.971429 11.434783  6.750000  4.461538
```

```
bootP
```

```
[1] 0
```

gad score, pair, most recent year [1]

```
set.seed(reSeed)

combList <- combn(unique(secondSampleOnly$DENTALYR), 2)
for (x in 1:ncol(combList)){
  this<-combList[,x][1]
  minusThis<-combList[,x][2]
  #print(this)
  #print(minusThis)
```

```
  meanDiffer <- mean(gadScore~DENTALYR, data=secondSampleOnly)[this]-mean(gadScore~DENTALYR, data=
  nullSet <- do(repCtMos)*( mean(gadScore~shuffle(DENTALYR), data=secondSampleOnly)[this]-mean(ga
  pValMos <- prop(~( nullSet>=abs(meanDiffer)), data=nullSet)
  cat(this, " - ", minusThis, " : ", pValMos," ajd: ",pValMos*ncol(combList), "\n")
}
```

```
3  -  1  :  0.0151  ajd:  0.0906
3  -  4  :  0.02249  ajd:  0.13494
3  -  2  :  6e-05  ajd:  0.00036
1  -  4  :  0  ajd:  0
1  -  2  :  0.01682  ajd:  0.10092
4  -  2  :  0  ajd:  0
```