Manuscript for MADA Project

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Project Part 1: This dataset was obtained from Kaggle.com at this [link](https://www.kaggle.com/datasets/henryshan/sleep-health-and-lifestyle/data) and was created by Mark Otto and Andrew Fong at MIT. The set has 373 observations for 13 variables covering a broad spectrum associated with sleep and daily routine.

#load in the data and check it out  
library(here)

Warning: package 'here' was built under R version 4.3.2

here() starts at D:/MADA/KOSEWICK-HARDINPARKER-MADA-project/KOSEWICK-HARDIN-PARKER-MADA-project

sleepdata <- read.csv(here("data","raw-data", "ss.csv"))  
summary(sleepdata)

Person.ID Gender Age Occupation   
 Min. : 1 Length:373 Min. :27.00 Length:373   
 1st Qu.: 94 Class :character 1st Qu.:35.00 Class :character   
 Median :187 Mode :character Median :43.00 Mode :character   
 Mean :187 Mean :42.14   
 3rd Qu.:280 3rd Qu.:50.00   
 Max. :373 Max. :59.00   
 Sleep.Duration Quality.of.Sleep Physical.Activity.Level Stress.Level   
 Min. :5.800 Min. :4.000 Min. :30.00 Min. :3.000   
 1st Qu.:6.400 1st Qu.:6.000 1st Qu.:45.00 1st Qu.:4.000   
 Median :7.200 Median :7.000 Median :60.00 Median :5.000   
 Mean :7.129 Mean :7.308 Mean :59.13 Mean :5.391   
 3rd Qu.:7.800 3rd Qu.:8.000 3rd Qu.:75.00 3rd Qu.:7.000   
 Max. :8.500 Max. :9.000 Max. :90.00 Max. :8.000   
 BMI.Category Blood.Pressure Heart.Rate Daily.Steps   
 Length:373 Length:373 Min. :65.00 Min. : 3000   
 Class :character Class :character 1st Qu.:68.00 1st Qu.: 5600   
 Mode :character Mode :character Median :70.00 Median : 7000   
 Mean :70.17 Mean : 6816   
 3rd Qu.:72.00 3rd Qu.: 8000   
 Max. :86.00 Max. :10000   
 Sleep.Disorder   
 Length:373   
 Class :character   
 Mode :character

structure(sleepdata)

Person.ID Gender Age Occupation Sleep.Duration Quality.of.Sleep  
1 1 Male 27 Software Engineer 6.1 6  
2 2 Male 28 Doctor 6.2 6  
3 3 Male 28 Doctor 6.2 6  
4 4 Male 28 Sales Representative 5.9 4  
5 5 Male 28 Sales Representative 5.9 4  
6 6 Male 28 Software Engineer 5.9 4  
7 7 Male 29 Teacher 6.3 6  
8 8 Male 29 Doctor 7.8 7  
9 9 Male 29 Doctor 7.8 7  
10 10 Male 29 Doctor 7.8 7  
11 11 Male 29 Doctor 6.1 6  
12 12 Male 29 Doctor 7.8 7  
13 13 Male 29 Doctor 6.1 6  
14 14 Male 29 Doctor 6.0 6  
15 15 Male 29 Doctor 6.0 6  
16 16 Male 29 Doctor 6.0 6  
17 17 Female 29 Nurse 6.5 5  
18 18 Male 29 Doctor 6.0 6  
19 19 Female 29 Nurse 6.5 5  
20 20 Male 30 Doctor 7.6 7  
21 21 Male 30 Doctor 7.7 7  
22 22 Male 30 Doctor 7.7 7  
23 23 Male 30 Doctor 7.7 7  
24 24 Male 30 Doctor 7.7 7  
25 25 Male 30 Doctor 7.8 7  
26 26 Male 30 Doctor 7.9 7  
27 27 Male 30 Doctor 7.8 7  
28 28 Male 30 Doctor 7.9 7  
29 29 Male 30 Doctor 7.9 7  
30 30 Male 30 Doctor 7.9 7  
31 31 Female 30 Nurse 6.4 5  
32 32 Female 30 Nurse 6.4 5  
33 33 Female 31 Nurse 7.9 8  
34 34 Male 31 Doctor 6.1 6  
35 35 Male 31 Doctor 7.7 7  
36 36 Male 31 Doctor 6.1 6  
37 37 Male 31 Doctor 6.1 6  
38 38 Male 31 Doctor 7.6 7  
39 39 Male 31 Doctor 7.6 7  
40 40 Male 31 Doctor 7.6 7  
41 41 Male 31 Doctor 7.7 7  
42 42 Male 31 Doctor 7.7 7  
43 43 Male 31 Doctor 7.7 7  
44 44 Male 31 Doctor 7.8 7  
45 45 Male 31 Doctor 7.7 7  
46 46 Male 31 Doctor 7.8 7  
47 47 Male 31 Doctor 7.7 7  
48 48 Male 31 Doctor 7.8 7  
49 49 Male 31 Doctor 7.7 7  
50 50 Male 31 Doctor 7.7 7  
51 51 Male 32 Engineer 7.5 8  
52 52 Male 32 Engineer 7.5 8  
53 53 Male 32 Doctor 6.0 6  
54 54 Male 32 Doctor 7.6 7  
55 55 Male 32 Doctor 6.0 6  
56 56 Male 32 Doctor 6.0 6  
57 57 Male 32 Doctor 7.7 7  
58 58 Male 32 Doctor 6.0 6  
59 59 Male 32 Doctor 6.0 6  
60 60 Male 32 Doctor 7.7 7  
61 61 Male 32 Doctor 6.0 6  
62 62 Male 32 Doctor 6.0 6  
63 63 Male 32 Doctor 6.2 6  
64 64 Male 32 Doctor 6.2 6  
65 65 Male 32 Doctor 6.2 6  
66 66 Male 32 Doctor 6.2 6  
67 67 Male 32 Accountant 7.2 8  
68 68 Male 33 Doctor 6.0 6  
69 69 Female 33 Scientist 6.2 6  
70 70 Female 33 Scientist 6.2 6  
71 71 Male 33 Doctor 6.1 6  
72 72 Male 33 Doctor 6.1 6  
73 73 Male 33 Doctor 6.1 6  
74 74 Male 33 Doctor 6.1 6  
75 75 Male 33 Doctor 6.0 6  
76 76 Male 33 Doctor 6.0 6  
77 77 Male 33 Doctor 6.0 6  
78 78 Male 33 Doctor 6.0 6  
79 79 Male 33 Doctor 6.0 6  
80 80 Male 33 Doctor 6.0 6  
81 81 Female 34 Scientist 5.8 4  
82 82 Female 34 Scientist 5.8 4  
83 83 Male 35 Teacher 6.7 7  
84 84 Male 35 Teacher 6.7 7  
85 85 Male 35 Software Engineer 7.5 8  
86 86 Female 35 Accountant 7.2 8  
87 87 Male 35 Engineer 7.2 8  
88 88 Male 35 Engineer 7.2 8  
89 89 Male 35 Engineer 7.3 8  
90 90 Male 35 Engineer 7.3 8  
91 91 Male 35 Engineer 7.3 8  
92 92 Male 35 Engineer 7.3 8  
93 93 Male 35 Software Engineer 7.5 8  
94 94 Male 35 Lawyer 7.4 7  
95 95 Female 36 Accountant 7.2 8  
96 96 Female 36 Accountant 7.1 8  
97 97 Female 36 Accountant 7.2 8  
98 98 Female 36 Accountant 7.1 8  
99 99 Female 36 Teacher 7.1 8  
100 100 Female 36 Teacher 7.1 8  
101 101 Female 36 Teacher 7.2 8  
102 102 Female 36 Teacher 7.2 8  
103 103 Female 36 Teacher 7.2 8  
104 104 Male 36 Teacher 6.6 5  
105 105 Female 36 Teacher 7.2 8  
106 106 Male 36 Teacher 6.6 5  
107 107 Female 37 Nurse 6.1 6  
108 108 Male 37 Engineer 7.8 8  
109 109 Male 37 Engineer 7.8 8  
110 110 Male 37 Lawyer 7.4 8  
111 111 Female 37 Accountant 7.2 8  
112 112 Male 37 Lawyer 7.4 8  
113 113 Female 37 Accountant 7.2 8  
114 114 Male 37 Lawyer 7.4 8  
115 115 Female 37 Accountant 7.2 8  
116 116 Female 37 Accountant 7.2 8  
117 117 Female 37 Accountant 7.2 8  
118 118 Female 37 Accountant 7.2 8  
119 119 Female 37 Accountant 7.2 8  
120 120 Female 37 Accountant 7.2 8  
121 121 Female 37 Accountant 7.2 8  
122 122 Female 37 Accountant 7.2 8  
123 123 Female 37 Accountant 7.2 8  
124 124 Female 37 Accountant 7.2 8  
125 125 Female 37 Accountant 7.2 8  
126 126 Female 37 Nurse 7.5 8  
127 127 Male 38 Lawyer 7.3 8  
128 128 Female 38 Accountant 7.1 8  
129 129 Male 38 Lawyer 7.3 8  
130 130 Male 38 Lawyer 7.3 8  
131 131 Female 38 Accountant 7.1 8  
132 132 Male 38 Lawyer 7.3 8  
133 133 Male 38 Lawyer 7.3 8  
134 134 Female 38 Accountant 7.1 8  
135 135 Male 38 Lawyer 7.3 8  
136 136 Male 38 Lawyer 7.3 8  
137 137 Female 38 Accountant 7.1 8  
138 138 Male 38 Lawyer 7.1 8  
139 139 Female 38 Accountant 7.1 8  
140 140 Male 38 Lawyer 7.1 8  
141 141 Female 38 Accountant 7.1 8  
142 142 Male 38 Lawyer 7.1 8  
143 143 Female 38 Accountant 7.1 8  
144 144 Female 38 Accountant 7.1 8  
145 145 Male 38 Lawyer 7.1 8  
146 146 Female 38 Lawyer 7.4 7  
147 147 Male 39 Lawyer 7.2 8  
148 148 Male 39 Engineer 6.5 5  
149 149 Female 39 Lawyer 6.9 7  
150 150 Female 39 Accountant 8.0 9  
151 151 Female 39 Accountant 8.0 9  
152 152 Male 39 Lawyer 7.2 8  
153 153 Male 39 Lawyer 7.2 8  
154 154 Male 39 Lawyer 7.2 8  
155 155 Male 39 Lawyer 7.2 8  
156 156 Male 39 Lawyer 7.2 8  
157 157 Male 39 Lawyer 7.2 8  
158 158 Male 39 Lawyer 7.2 8  
159 159 Male 39 Lawyer 7.2 8  
160 160 Male 39 Lawyer 7.2 8  
161 161 Male 39 Lawyer 7.2 8  
162 162 Female 40 Accountant 7.2 8  
163 163 Female 40 Accountant 7.2 8  
164 164 Male 40 Lawyer 7.9 8  
165 165 Male 40 Lawyer 7.9 8  
166 166 Male 41 Lawyer 7.6 8  
167 167 Male 41 Engineer 7.3 8  
168 168 Male 41 Lawyer 7.1 7  
169 169 Male 41 Lawyer 7.1 7  
170 170 Male 41 Lawyer 7.7 8  
171 171 Male 41 Lawyer 7.7 8  
172 172 Male 41 Lawyer 7.7 8  
173 173 Male 41 Lawyer 7.7 8  
174 174 Male 41 Lawyer 7.7 8  
175 175 Male 41 Lawyer 7.6 8  
176 176 Male 41 Lawyer 7.6 8  
177 177 Male 41 Lawyer 7.6 8  
178 178 Male 42 Salesperson 6.5 6  
179 179 Male 42 Lawyer 7.8 8  
180 180 Male 42 Lawyer 7.8 8  
181 181 Male 42 Lawyer 7.8 8  
182 182 Male 42 Lawyer 7.8 8  
183 183 Male 42 Lawyer 7.8 8  
184 184 Male 42 Lawyer 7.8 8  
185 185 Female 42 Teacher 6.8 6  
186 186 Female 42 Teacher 6.8 6  
187 187 Female 43 Teacher 6.7 7  
188 188 Male 43 Salesperson 6.3 6  
189 189 Female 43 Teacher 6.7 7  
190 190 Male 43 Salesperson 6.5 6  
191 191 Female 43 Teacher 6.7 7  
192 192 Male 43 Salesperson 6.4 6  
193 193 Male 43 Salesperson 6.5 6  
194 194 Male 43 Salesperson 6.5 6  
195 195 Male 43 Salesperson 6.5 6  
196 196 Male 43 Salesperson 6.5 6  
197 197 Male 43 Salesperson 6.5 6  
198 198 Male 43 Salesperson 6.5 6  
199 199 Male 43 Salesperson 6.5 6  
200 200 Male 43 Salesperson 6.5 6  
201 201 Male 43 Salesperson 6.5 6  
202 202 Male 43 Engineer 7.8 8  
203 203 Male 43 Engineer 7.8 8  
204 204 Male 43 Engineer 6.9 6  
205 205 Male 43 Engineer 7.6 8  
206 206 Male 43 Engineer 7.7 8  
207 207 Male 43 Engineer 7.7 8  
208 208 Male 43 Engineer 7.7 8  
209 209 Male 43 Engineer 7.7 8  
210 210 Male 43 Engineer 7.8 8  
211 211 Male 43 Engineer 7.7 8  
212 212 Male 43 Engineer 7.8 8  
213 213 Male 43 Engineer 7.8 8  
214 214 Male 43 Engineer 7.8 8  
215 215 Male 43 Engineer 7.8 8  
216 216 Male 43 Engineer 7.8 8  
217 217 Male 43 Engineer 7.8 8  
218 218 Male 43 Engineer 7.8 8  
219 219 Male 43 Engineer 7.8 8  
220 220 Male 43 Salesperson 6.5 6  
221 221 Female 44 Teacher 6.6 7  
222 222 Male 44 Salesperson 6.4 6  
223 223 Male 44 Salesperson 6.3 6  
224 224 Male 44 Salesperson 6.4 6  
225 225 Female 44 Teacher 6.6 7  
226 226 Male 44 Salesperson 6.3 6  
227 227 Female 44 Teacher 6.6 7  
228 228 Male 44 Salesperson 6.3 6  
229 229 Female 44 Teacher 6.6 7  
230 230 Male 44 Salesperson 6.3 6  
231 231 Female 44 Teacher 6.6 7  
232 232 Male 44 Salesperson 6.3 6  
233 233 Female 44 Teacher 6.6 7  
234 234 Male 44 Salesperson 6.3 6  
235 235 Female 44 Teacher 6.6 7  
236 236 Male 44 Salesperson 6.3 6  
237 237 Male 44 Salesperson 6.4 6  
238 238 Female 44 Teacher 6.5 7  
239 239 Male 44 Salesperson 6.3 6  
240 240 Male 44 Salesperson 6.4 6  
241 241 Female 44 Teacher 6.5 7  
242 242 Male 44 Salesperson 6.3 6  
243 243 Male 44 Salesperson 6.4 6  
244 244 Female 44 Teacher 6.5 7  
245 245 Male 44 Salesperson 6.3 6  
246 246 Female 44 Teacher 6.5 7  
247 247 Male 44 Salesperson 6.3 6  
248 248 Male 44 Engineer 6.8 7  
249 249 Male 44 Salesperson 6.4 6  
250 250 Male 44 Salesperson 6.5 6  
251 251 Female 45 Teacher 6.8 7  
252 252 Female 45 Teacher 6.8 7  
253 253 Female 45 Teacher 6.5 7  
254 254 Female 45 Teacher 6.5 7  
255 255 Female 45 Teacher 6.5 7  
256 256 Female 45 Teacher 6.5 7  
257 257 Female 45 Teacher 6.6 7  
258 258 Female 45 Teacher 6.6 7  
259 259 Female 45 Teacher 6.6 7  
260 260 Female 45 Teacher 6.6 7  
261 261 Female 45 Teacher 6.6 7  
262 262 Female 45 Teacher 6.6 7  
263 263 Female 45 Teacher 6.6 7  
264 264 Female 45 Manager 6.9 7  
265 265 Male 48 Doctor 7.3 7  
266 266 Female 48 Nurse 5.9 6  
267 267 Male 48 Doctor 7.3 7  
268 268 Female 49 Nurse 6.2 6  
269 269 Female 49 Nurse 6.0 6  
270 270 Female 49 Nurse 6.1 6  
271 271 Female 49 Nurse 6.1 6  
272 272 Female 49 Nurse 6.1 6  
273 273 Female 49 Nurse 6.1 6  
274 274 Female 49 Nurse 6.2 6  
275 275 Female 49 Nurse 6.2 6  
276 276 Female 49 Nurse 6.2 6  
277 277 Male 49 Doctor 8.1 9  
278 278 Male 49 Doctor 8.1 9  
279 279 Female 50 Nurse 6.1 6  
280 280 Female 50 Engineer 8.3 9  
281 281 Female 50 Nurse 6.0 6  
282 282 Female 50 Nurse 6.1 6  
283 283 Female 50 Nurse 6.0 6  
284 284 Female 50 Nurse 6.0 6  
285 285 Female 50 Nurse 6.0 6  
286 286 Female 50 Nurse 6.0 6  
287 287 Female 50 Nurse 6.0 6  
288 288 Female 50 Nurse 6.0 6  
289 289 Female 50 Nurse 6.0 6  
290 290 Female 50 Nurse 6.1 6  
291 291 Female 50 Nurse 6.0 6  
292 292 Female 50 Nurse 6.1 6  
293 293 Female 50 Nurse 6.1 6  
294 294 Female 50 Nurse 6.0 6  
295 295 Female 50 Nurse 6.1 6  
296 296 Female 50 Nurse 6.0 6  
297 297 Female 50 Nurse 6.1 6  
298 298 Female 50 Nurse 6.1 6  
299 299 Female 51 Engineer 8.5 9  
300 300 Female 51 Engineer 8.5 9  
301 301 Female 51 Engineer 8.5 9  
302 302 Female 51 Engineer 8.5 9  
303 303 Female 51 Nurse 7.1 7  
304 304 Female 51 Nurse 6.0 6  
305 305 Female 51 Nurse 6.1 6  
306 306 Female 51 Nurse 6.1 6  
307 307 Female 52 Accountant 6.5 7  
308 308 Female 52 Accountant 6.5 7  
309 309 Female 52 Accountant 6.6 7  
310 310 Female 52 Accountant 6.6 7  
311 311 Female 52 Accountant 6.6 7  
312 312 Female 52 Accountant 6.6 7  
313 313 Female 52 Engineer 8.4 9  
314 314 Female 52 Engineer 8.4 9  
315 315 Female 52 Engineer 8.4 9  
316 316 Female 53 Engineer 8.3 9  
317 317 Female 53 Engineer 8.5 9  
318 318 Female 53 Engineer 8.5 9  
319 319 Female 53 Engineer 8.4 9  
320 320 Female 53 Engineer 8.4 9  
321 321 Female 53 Engineer 8.5 9  
322 322 Female 53 Engineer 8.4 9  
323 323 Female 53 Engineer 8.4 9  
324 324 Female 53 Engineer 8.5 9  
325 325 Female 53 Engineer 8.3 9  
326 326 Female 53 Engineer 8.5 9  
327 327 Female 53 Engineer 8.3 9  
328 328 Female 53 Engineer 8.5 9  
329 329 Female 53 Engineer 8.3 9  
330 330 Female 53 Engineer 8.5 9  
331 331 Female 53 Engineer 8.5 9  
332 332 Female 53 Engineer 8.4 9  
333 333 Female 54 Engineer 8.4 9  
334 334 Female 54 Engineer 8.4 9  
335 335 Female 54 Engineer 8.4 9  
336 336 Female 54 Engineer 8.4 9  
337 337 Female 54 Engineer 8.4 9  
338 338 Female 54 Engineer 8.4 9  
339 339 Female 54 Engineer 8.5 9  
340 340 Female 55 Nurse 8.1 9  
341 341 Female 55 Nurse 8.1 9  
342 342 Female 56 Doctor 8.2 9  
343 343 Female 56 Doctor 8.2 9  
344 344 Female 57 Nurse 8.1 9  
345 345 Female 57 Nurse 8.2 9  
346 346 Female 57 Nurse 8.2 9  
347 347 Female 57 Nurse 8.2 9  
348 348 Female 57 Nurse 8.2 9  
349 349 Female 57 Nurse 8.2 9  
350 350 Female 57 Nurse 8.1 9  
351 351 Female 57 Nurse 8.1 9  
352 352 Female 57 Nurse 8.1 9  
353 353 Female 58 Nurse 8.0 9  
354 354 Female 58 Nurse 8.0 9  
355 355 Female 58 Nurse 8.0 9  
356 356 Female 58 Nurse 8.0 9  
357 357 Female 58 Nurse 8.0 9  
358 358 Female 58 Nurse 8.0 9  
359 359 Female 59 Nurse 8.0 9  
360 360 Female 59 Nurse 8.1 9  
361 361 Female 59 Nurse 8.2 9  
362 362 Female 59 Nurse 8.2 9  
363 363 Female 59 Nurse 8.2 9  
364 364 Female 59 Nurse 8.2 9  
365 365 Female 59 Nurse 8.0 9  
366 366 Female 59 Nurse 8.0 9  
367 367 Female 59 Nurse 8.1 9  
368 368 Female 59 Nurse 8.0 9  
369 369 Female 59 Nurse 8.1 9  
370 370 Female 59 Nurse 8.1 9  
371 371 Female 59 Nurse 8.0 9  
372 372 Female 59 Nurse 8.1 9  
373 373 Female 59 Nurse 8.1 9  
 Physical.Activity.Level Stress.Level BMI.Category Blood.Pressure  
1 42 6 Overweight 126/83  
2 60 8 Normal 125/80  
3 60 8 Normal 125/80  
4 30 8 Obese 140/90  
5 30 8 Obese 140/90  
6 30 8 Obese 140/90  
7 40 7 Obese 140/90  
8 75 6 Normal 120/80  
9 75 6 Normal 120/80  
10 75 6 Normal 120/80  
11 30 8 Normal 120/80  
12 75 6 Normal 120/80  
13 30 8 Normal 120/80  
14 30 8 Normal 120/80  
15 30 8 Normal 120/80  
16 30 8 Normal 120/80  
17 40 7 Normal Weight 132/87  
18 30 8 Normal 120/80  
19 40 7 Normal Weight 132/87  
20 75 6 Normal 120/80  
21 75 6 Normal 120/80  
22 75 6 Normal 120/80  
23 75 6 Normal 120/80  
24 75 6 Normal 120/80  
25 75 6 Normal 120/80  
26 75 6 Normal 120/80  
27 75 6 Normal 120/80  
28 75 6 Normal 120/80  
29 75 6 Normal 120/80  
30 75 6 Normal 120/80  
31 35 7 Normal Weight 130/86  
32 35 7 Normal Weight 130/86  
33 75 4 Normal Weight 117/76  
34 30 8 Normal 125/80  
35 75 6 Normal 120/80  
36 30 8 Normal 125/80  
37 30 8 Normal 125/80  
38 75 6 Normal 120/80  
39 75 6 Normal 120/80  
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41 75 6 Normal 120/80  
42 75 6 Normal 120/80  
43 75 6 Normal 120/80  
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45 75 6 Normal 120/80  
46 75 6 Normal 120/80  
47 75 6 Normal 120/80  
48 75 6 Normal 120/80  
49 75 6 Normal 120/80  
50 75 6 Normal 120/80  
51 45 3 Normal 120/80  
52 45 3 Normal 120/80  
53 30 8 Normal 125/80  
54 75 6 Normal 120/80  
55 30 8 Normal 125/80  
56 30 8 Normal 125/80  
57 75 6 Normal 120/80  
58 30 8 Normal 125/80  
59 30 8 Normal 125/80  
60 75 6 Normal 120/80  
61 30 8 Normal 125/80  
62 30 8 Normal 125/80  
63 30 8 Normal 125/80  
64 30 8 Normal 125/80  
65 30 8 Normal 125/80  
66 30 8 Normal 125/80  
67 50 6 Normal Weight 118/76  
68 30 8 Normal 125/80  
69 50 6 Overweight 128/85  
70 50 6 Overweight 128/85  
71 30 8 Normal 125/80  
72 30 8 Normal 125/80  
73 30 8 Normal 125/80  
74 30 8 Normal 125/80  
75 30 8 Normal 125/80  
76 30 8 Normal 125/80  
77 30 8 Normal 125/80  
78 30 8 Normal 125/80  
79 30 8 Normal 125/80  
80 30 8 Normal 125/80  
81 32 8 Overweight 131/86  
82 32 8 Overweight 131/86  
83 40 5 Overweight 128/84  
84 40 5 Overweight 128/84  
85 60 5 Normal Weight 120/80  
86 60 4 Normal 115/75  
87 60 4 Normal 125/80  
88 60 4 Normal 125/80  
89 60 4 Normal 125/80  
90 60 4 Normal 125/80  
91 60 4 Normal 125/80  
92 60 4 Normal 125/80  
93 60 5 Normal Weight 120/80  
94 60 5 Obese 135/88  
95 60 4 Normal 115/75  
96 60 4 Normal 115/75  
97 60 4 Normal 115/75  
98 60 4 Normal 115/75  
99 60 4 Normal 115/75  
100 60 4 Normal 115/75  
101 60 4 Normal 115/75  
102 60 4 Normal 115/75  
103 60 4 Normal 115/75  
104 35 7 Overweight 129/84  
105 60 4 Normal 115/75  
106 35 7 Overweight 129/84  
107 42 6 Overweight 126/83  
108 70 4 Normal Weight 120/80  
109 70 4 Normal Weight 120/80  
110 60 5 Normal 130/85  
111 60 4 Normal 115/75  
112 60 5 Normal 130/85  
113 60 4 Normal 115/75  
114 60 5 Normal 130/85  
115 60 4 Normal 115/75  
116 60 4 Normal 115/75  
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118 60 4 Normal 115/75  
119 60 4 Normal 115/75  
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121 60 4 Normal 115/75  
122 60 4 Normal 115/75  
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124 60 4 Normal 115/75  
125 60 4 Normal 115/75  
126 60 4 Normal Weight 120/80  
127 60 5 Normal 130/85  
128 60 4 Normal 115/75  
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138 60 5 Normal 130/85  
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141 60 4 Normal 115/75  
142 60 5 Normal 130/85  
143 60 4 Normal 115/75  
144 60 4 Normal 115/75  
145 60 5 Normal 130/85  
146 60 5 Obese 135/88  
147 60 5 Normal 130/85  
148 40 7 Overweight 132/87  
149 50 6 Normal Weight 128/85  
150 80 3 Normal Weight 115/78  
151 80 3 Normal Weight 115/78  
152 60 5 Normal 130/85  
153 60 5 Normal 130/85  
154 60 5 Normal 130/85  
155 60 5 Normal 130/85  
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157 60 5 Normal 130/85  
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159 60 5 Normal 130/85  
160 60 5 Normal 130/85  
161 60 5 Normal 130/85  
162 55 6 Normal Weight 119/77  
163 55 6 Normal Weight 119/77  
164 90 5 Normal 130/85  
165 90 5 Normal 130/85  
166 90 5 Normal 130/85  
167 70 6 Normal Weight 121/79  
168 55 6 Overweight 125/82  
169 55 6 Overweight 125/82  
170 90 5 Normal 130/85  
171 90 5 Normal 130/85  
172 90 5 Normal 130/85  
173 90 5 Normal 130/85  
174 90 5 Normal 130/85  
175 90 5 Normal 130/85  
176 90 5 Normal 130/85  
177 90 5 Normal 130/85  
178 45 7 Overweight 130/85  
179 90 5 Normal 130/85  
180 90 5 Normal 130/85  
181 90 5 Normal 130/85  
182 90 5 Normal 130/85  
183 90 5 Normal 130/85  
184 90 5 Normal 130/85  
185 45 7 Overweight 130/85  
186 45 7 Overweight 130/85  
187 45 4 Overweight 135/90  
188 45 7 Overweight 130/85  
189 45 4 Overweight 135/90  
190 45 7 Overweight 130/85  
191 45 4 Overweight 135/90  
192 45 7 Overweight 130/85  
193 45 7 Overweight 130/85  
194 45 7 Overweight 130/85  
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196 45 7 Overweight 130/85  
197 45 7 Overweight 130/85  
198 45 7 Overweight 130/85  
199 45 7 Overweight 130/85  
200 45 7 Overweight 130/85  
201 45 7 Overweight 130/85  
202 90 5 Normal 130/85  
203 90 5 Normal 130/85  
204 47 7 Normal Weight 117/76  
205 75 4 Overweight 122/80  
206 90 5 Normal 130/85  
207 90 5 Normal 130/85  
208 90 5 Normal 130/85  
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215 90 5 Normal 130/85  
216 90 5 Normal 130/85  
217 90 5 Normal 130/85  
218 90 5 Normal 130/85  
219 90 5 Normal 130/85  
220 45 7 Overweight 130/85  
221 45 4 Overweight 135/90  
222 45 7 Overweight 130/85  
223 45 7 Overweight 130/85  
224 45 7 Overweight 130/85  
225 45 4 Overweight 135/90  
226 45 7 Overweight 130/85  
227 45 4 Overweight 135/90  
228 45 7 Overweight 130/85  
229 45 4 Overweight 135/90  
230 45 7 Overweight 130/85  
231 45 4 Overweight 135/90  
232 45 7 Overweight 130/85  
233 45 4 Overweight 135/90  
234 45 7 Overweight 130/85  
235 45 4 Overweight 135/90  
236 45 7 Overweight 130/85  
237 45 7 Overweight 130/85  
238 45 4 Overweight 135/90  
239 45 7 Overweight 130/85  
240 45 7 Overweight 130/85  
241 45 4 Overweight 135/90  
242 45 7 Overweight 130/85  
243 45 7 Overweight 130/85  
244 45 4 Overweight 135/90  
245 45 7 Overweight 130/85  
246 45 4 Overweight 135/90  
247 45 7 Overweight 130/85  
248 45 7 Overweight 130/85  
249 45 7 Overweight 130/85  
250 45 7 Overweight 130/85  
251 30 6 Overweight 135/90  
252 30 6 Overweight 135/90  
253 45 4 Overweight 135/90  
254 45 4 Overweight 135/90  
255 45 4 Overweight 135/90  
256 45 4 Overweight 135/90  
257 45 4 Overweight 135/90  
258 45 4 Overweight 135/90  
259 45 4 Overweight 135/90  
260 45 4 Overweight 135/90  
261 45 4 Overweight 135/90  
262 45 4 Overweight 135/90  
263 45 4 Overweight 135/90  
264 55 5 Overweight 125/82  
265 65 5 Obese 142/92  
266 90 8 Overweight 140/95  
267 65 5 Obese 142/92  
268 90 8 Overweight 140/95  
269 90 8 Overweight 140/95  
270 90 8 Overweight 140/95  
271 90 8 Overweight 140/95  
272 90 8 Overweight 140/95  
273 90 8 Overweight 140/95  
274 90 8 Overweight 140/95  
275 90 8 Overweight 140/95  
276 90 8 Overweight 140/95  
277 85 3 Obese 139/91  
278 85 3 Obese 139/91  
279 90 8 Overweight 140/95  
280 30 3 Normal 125/80  
281 90 8 Overweight 140/95  
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294 90 8 Overweight 140/95  
295 90 8 Overweight 140/95  
296 90 8 Overweight 140/95  
297 90 8 Overweight 140/95  
298 90 8 Overweight 140/95  
299 30 3 Normal 125/80  
300 30 3 Normal 125/80  
301 30 3 Normal 125/80  
302 30 3 Normal 125/80  
303 55 6 Normal Weight 125/82  
304 90 8 Overweight 140/95  
305 90 8 Overweight 140/95  
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307 45 7 Overweight 130/85  
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312 45 7 Overweight 130/85  
313 30 3 Normal 125/80  
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339 30 3 Normal 125/80  
340 75 4 Overweight 140/95  
341 75 4 Overweight 140/95  
342 90 3 Normal Weight 118/75  
343 90 3 Normal Weight 118/75  
344 75 3 Overweight 140/95  
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373 75 3 Overweight 140/95  
 Heart.Rate Daily.Steps Sleep.Disorder  
1 77 4200 None  
2 75 10000 None  
3 75 10000 None  
4 85 3000 Sleep Apnea  
5 85 3000 Sleep Apnea  
6 85 3000 Insomnia  
7 82 3500 Insomnia  
8 70 8000 None  
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16 70 8000 None  
17 80 4000 Sleep Apnea  
18 70 8000 Sleep Apnea  
19 80 4000 Insomnia  
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30 70 8000 None  
31 78 4100 Sleep Apnea  
32 78 4100 Insomnia  
33 69 6800 None  
34 72 5000 None  
35 70 8000 None  
36 72 5000 None  
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81 81 5200 Sleep Apnea  
82 81 5200 Sleep Apnea  
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86 68 7000 None  
87 65 5000 None  
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93 70 8000 None  
94 84 3300 Sleep Apnea  
95 68 7000 Insomnia  
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185 78 5000 Sleep Apnea  
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264 75 5500 None  
265 83 3500 Insomnia  
266 75 10000 Sleep Apnea  
267 83 3500 Insomnia  
268 75 10000 None  
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277 86 3700 Sleep Apnea  
278 86 3700 Sleep Apnea  
279 75 10000 Insomnia  
280 65 5000 None  
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340 72 5000 Sleep Apnea  
341 72 5000 Sleep Apnea  
342 65 10000 None  
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class(sleepdata)

[1] "data.frame"

We want to explore the influence of each variable on sleep quality and identify which ones seem to have the most impact (both positive and negative). We also wish to explore if certain variables affect male sleep quality more than females. If time allows, we’d also like to see if certain ages seem to be affected by certain variables more often than others. We can focus on every predictor in the dataset since there are only 13.

We can likely use GLMs and t-tests/ANOVA tests to see the significance that variables may have in different combinations on an individual’s sleep quality. Heat maps and various plots will also help with exploratory data analysis. We aren’t exceptionally experienced with statistical analyses, but these are what we can think of at the moment.

End of Project Part 1

Project Part 2:

We’ll include the data cleaning here in order to generate our plots in this document. Please see the eda.qmd file for full exploratory results and the cleaning process.

#load cleaning tools  
library(tidyverse)

Warning: package 'tidyverse' was built under R version 4.3.2

Warning: package 'readr' was built under R version 4.3.2

Warning: package 'stringr' was built under R version 4.3.2

Warning: package 'lubridate' was built under R version 4.3.2

── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──  
✔ dplyr 1.1.3 ✔ readr 2.1.5  
✔ forcats 1.0.0 ✔ stringr 1.5.1  
✔ ggplot2 3.4.3 ✔ tibble 3.2.1  
✔ lubridate 1.9.3 ✔ tidyr 1.3.0  
✔ purrr 1.0.2   
── Conflicts ────────────────────────────────────────── tidyverse\_conflicts() ──  
✖ dplyr::filter() masks stats::filter()  
✖ dplyr::lag() masks stats::lag()  
ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors

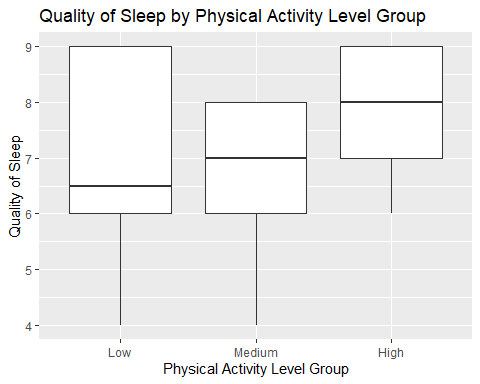
# Splitting the Blood.Pressure variable into systolic and diastolic variable columns  
sleepdata <- sleepdata %>%  
 separate(Blood.Pressure, into = c("systolic", "diastolic"), sep = "/")  
  
# Ensuring that the new columns are considered numeric   
sleepdata$systolic <- as.numeric(sleepdata$systolic)  
sleepdata$diastolic <- as.numeric(sleepdata$diastolic)  
  
# Creating new categorical variable   
  
sleepdata <- sleepdata %>%  
 mutate(cat\_bp = case\_when(  
 systolic < 120 & diastolic < 80 ~ "Normal",  
 systolic >= 120 & systolic <= 129 & diastolic < 80 ~ "Elevated",  
 (systolic >= 130 & systolic <= 139) | (diastolic >= 80 & diastolic <= 89) ~ "Stage 1 Hypertension",  
 systolic >= 140 | diastolic >= 90 ~ "Stage 2 Hypertension"  
 ))  
# Merging "Normal" and "Normal Weight" attributes into a singular "Normal" category  
  
sleepdata <- sleepdata %>%  
 mutate(BMI.Category = case\_when(  
 BMI.Category %in% c("Normal", "Normal Weight") ~ "Normal",  
 BMI.Category == "Overweight" ~ "Overweight",  
 BMI.Category == "Obese" ~ "Obese",  
 ))

Here are the most interesting/distinct plots from the EDA:

Physical Activity plot:

We can clearly see that Physical Activity level has a positive correlation with Quality of Sleep.

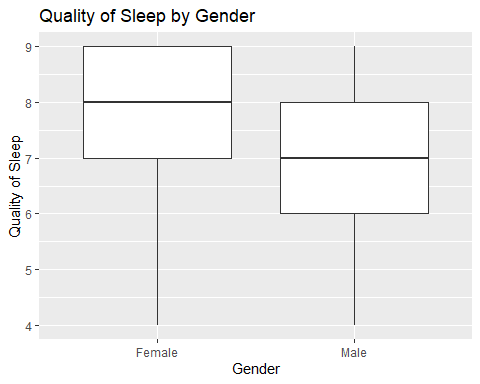
#load plot package  
library(ggplot2)  
  
# Create a new variable for Physical Activity Level groups. Categorizes as "Low", "Medium", or "High"  
sleepdata$PhysicalActivityGroup <- cut(sleepdata$Physical.Activity.Level, breaks = c(0, 30, 60, Inf), labels = c("Low", "Medium", "High"))  
  
# Box plot for Quality of Sleep by Physical Activity Level Group  
ggplot(sleepdata, aes(x = PhysicalActivityGroup, y = Quality.of.Sleep)) +  
 geom\_boxplot() +  
 labs(title = "Quality of Sleep by Physical Activity Level Group", x = "Physical Activity Level Group", y = "Quality of Sleep")



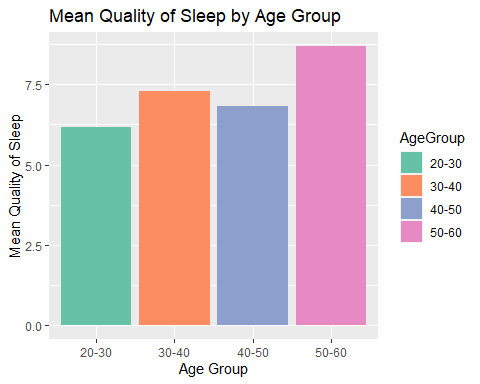
Gender, Age, and Occupation:

We can see some clear differences in self-reported Quality of Sleep between these different groups already. Females tend to report an average of 1 higher according to the boxplot. The different age groups are similar, but the oldest (50-60) reports the highest quality of sleep by far. Our occupations are a bit all over the place, but Sales Representatives seem to have the worst average scores by far.

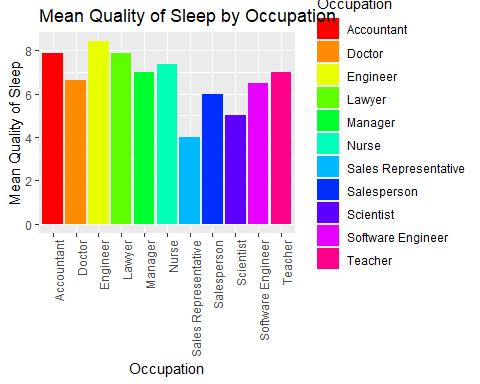
# Boxplot for Quality of Sleep by Gender  
ggplot(sleepdata, aes(x = Gender, y = Quality.of.Sleep)) +  
 geom\_boxplot() +  
 labs(title = "Quality of Sleep by Gender", x = "Gender", y = "Quality of Sleep")



# Create bins for Age in order to create a clean boxplot.  
sleepdata$AgeGroup <- cut(sleepdata$Age, breaks = c(20, 30, 40, 50, 60), labels = c("20-30", "30-40", "40-50", "50-60"), include.lowest = TRUE)  
  
# Calculate mean Quality of Sleep for each Age Group to plot with means for cleaner visuals  
sleepdata\_summary <- sleepdata %>%  
 group\_by(AgeGroup) %>%  
 summarise(MeanQuality = mean(Quality.of.Sleep, na.rm = TRUE))  
  
# Bar plot for Mean Quality of Sleep by Age Group with colorblind-friendly palette  
ggplot(sleepdata\_summary, aes(x = AgeGroup, y = MeanQuality, fill = AgeGroup)) +  
 geom\_bar(stat = "identity") +  
 scale\_fill\_brewer(palette = "Set2") +  
 labs(title = "Mean Quality of Sleep by Age Group", x = "Age Group", y = "Mean Quality of Sleep")

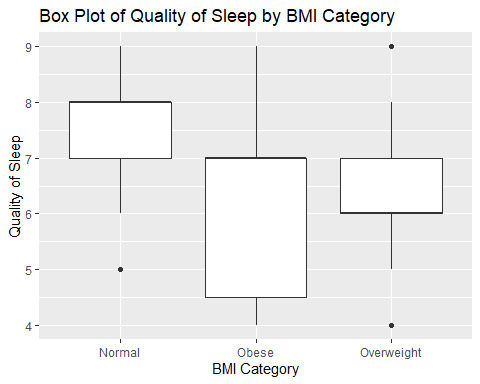


# Calculate mean Quality of Sleep for each Occupation in order to create a bar plot.  
sleepdata\_summary <- sleepdata %>%  
 group\_by(Occupation) %>%  
 summarise(MeanQuality = mean(Quality.of.Sleep, na.rm = TRUE))  
  
# Bar plot for Mean Quality of Sleep by Occupation with manually specified colors  
ggplot(sleepdata\_summary, aes(x = Occupation, y = MeanQuality, fill = Occupation)) +  
 geom\_bar(stat = "identity") +  
 scale\_fill\_manual(values = rainbow(length(unique(sleepdata\_summary$Occupation)))) +  
 theme(axis.text.x = element\_text(angle = 90, hjust = 1)) +  
 labs(title = "Mean Quality of Sleep by Occupation", x = "Occupation", y = "Mean Quality of Sleep")



BMI: We can clearly see that Normal weights seem to have better sleep on average than the obese and overweight categories. However, there are very few in the obese category, so conclusions with that group may not be as supported as others.

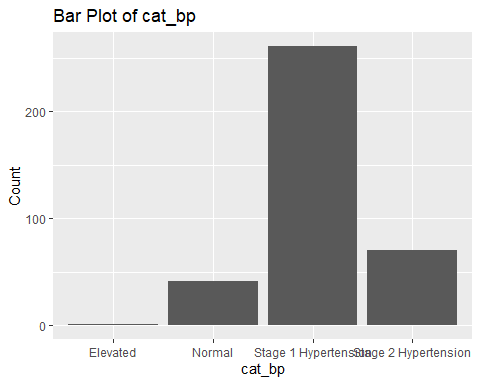
# Box plot for Quality of Sleep by BMI Category  
ggplot(sleepdata, aes(x = BMI.Category, y = Quality.of.Sleep)) +  
 geom\_boxplot() +  
 labs(title = "Box Plot of Quality of Sleep by BMI Category", x = "BMI Category", y = "Quality of Sleep")



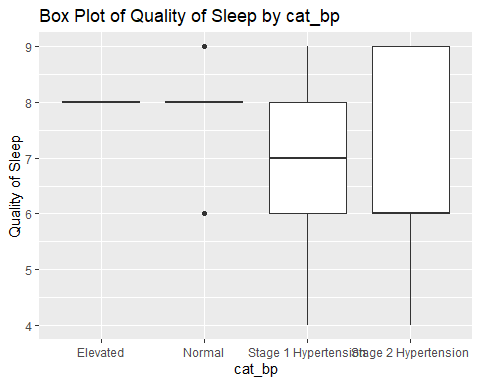
Blood Pressure:

The boxplots look a bit strange for the Elevated and Normal levels, but we can see that it’s likely due to a shortage of data for these categories. We can see, however, that Quality of Sleep does seem to be negatively correlated with increasing stages of hypertension.

# Bar plot for cat\_bp  
ggplot(sleepdata, aes(x = cat\_bp)) +  
 geom\_bar() +  
 labs(title = "Bar Plot of cat\_bp", x = "cat\_bp", y = "Count")



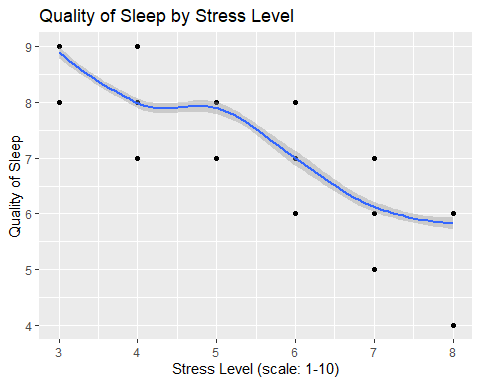
# Box plot for Quality of Sleep by cat\_bp  
ggplot(sleepdata, aes(x = cat\_bp, y = Quality.of.Sleep)) +  
 geom\_boxplot() +  
 labs(title = "Box Plot of Quality of Sleep by cat\_bp", x = "cat\_bp", y = "Quality of Sleep")



And Stress Level: Our scatterplot shows a clear negative correlation between Stress Level and Quality of Sleep. However, this is a subjective scale, so data should be taken with a grain of salt for now.

# Scatterplot for Quality of Sleep by Stress Level  
ggplot(sleepdata, aes(x = Stress.Level, y = Quality.of.Sleep)) +  
 geom\_point() +  
 geom\_smooth(method = "loess") +  
 labs(title = "Quality of Sleep by Stress Level", x = "Stress Level (scale: 1-10)", y = "Quality of Sleep")

`geom\_smooth()` using formula = 'y ~ x'



The other plots were either self explanatory (e.g. Sleep Duration meant higher sleep quality) or had less defined trends (e.g. heart rate and daily steps).

End of Project Part 2

# 1. Summary/Abstract

*Write a summary of your project.*

# 2. Introduction

## 2.1 General Background Information

*Provide enough background on your topic that others can understand the why and how of your analysis*

## 2.2 Description of data and data source

*Describe what the data is, what it contains, where it is from, etc. Eventually this might be part of a methods section.*

## 2.3 Questions/Hypotheses to be addressed

*State the research questions you plan to answer with this analysis.*

To cite other work (important everywhere, but likely happens first in introduction), make sure your references are in the bibtex file specified in the YAML header above (here dataanalysis\_template\_references.bib) and have the right bibtex key. Then you can include like this:

Examples of reproducible research projects can for instance be found in (McKay, Ebell, Billings, et al. 2020; McKay, Ebell, Dale, et al. 2020).

# 3. Methods

*Describe your methods. That should describe the data, the cleaning processes, and the analysis approaches. You might want to provide a shorter description here and all the details in the supplement.*

## 3.1 Schematic of workflow

Sometimes you might want to show a schematic diagram/figure that was not created with code (if you can do it with code, do it). is an example of some - completely random/unrelated - schematic that was generated with Biorender. We store those figures in the assets folder.

## 3.2 Data aquisition

*As applicable, explain where and how you got the data. If you directly import the data from an online source, you can combine this section with the next.*

## 3.3 Data import and cleaning

*Write code that reads in the file and cleans it so it’s ready for analysis. Since this will be fairly long code for most datasets, it might be a good idea to have it in one or several R scripts. If that is the case, explain here briefly what kind of cleaning/processing you do, and provide more details and well documented code somewhere (e.g. as supplement in a paper). All materials, including files that contain code, should be commented well so everyone can follow along.*

## 3.4 Statistical analysis

*Explain anything related to your statistical analyses.*

# 4. Results

## 4.1 Exploratory/Descriptive analysis

*Use a combination of text/tables/figures to explore and describe your data. Show the most important descriptive results here. Additional ones should go in the supplement. Even more can be in the R and Quarto files that are part of your project.*

shows a summary of the data.

Note the loading of the data providing a **relative** path using the ../../ notation. (Two dots means a folder up). You never want to specify an **absolute** path like C:\ahandel\myproject\results\ because if you share this with someone, it won’t work for them since they don’t have that path. You can also use the here R package to create paths. See examples of that below.

|  |
| --- |
| Table 1: Data summary table. |

## 4.2 Basic statistical analysis

*To get some further insight into your data, if reasonable you could compute simple statistics (e.g. simple models with 1 predictor) to look for associations between your outcome(s) and each individual predictor variable. Though note that unless you pre-specified the outcome and main exposure, any “p<0.05 means statistical significance” interpretation is not valid.*

fig-result shows a scatterplot figure produced by one of the R scripts.

## 4.3 Full analysis

*Use one or several suitable statistical/machine learning methods to analyze your data and to produce meaningful figures, tables, etc. This might again be code that is best placed in one or several separate R scripts that need to be well documented. You want the code to produce figures and data ready for display as tables, and save those. Then you load them here.*

Exampleshows a summary of a linear model fit.

|  |
| --- |
| Table 2: Linear model fit table. |

# 5. Discussion

## 5.1 Summary and Interpretation

*Summarize what you did, what you found and what it means.*

## 5.2 Strengths and Limitations

*Discuss what you perceive as strengths and limitations of your analysis.*

## 5.3 Conclusions

*What are the main take-home messages?*

*Include citations in your Rmd file using bibtex, the list of references will automatically be placed at the end*

This paper discusses types of analyses.

These papers are good examples of papers published using a fully reproducible setup similar to the one shown in this template.

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# 6. References

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