

# R Code Outputs - Appendix

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## BASMI Score analysis

### Filter out those with treatment\_order

```
# Filter rows where treatment_order > 3 and select unique ttas_id
filtered_ttas_id_more_than_3 <- dataframe_sorted_and_reclassified_basmi %>%
  filter(treatment_order %in% as.character(3:15)) %>%
  distinct(ttas_id) # Select unique ttas_id

# Filter out those with treatment_order > 4 and select unique ttas_id
filtered_ttas_id_more_than_4 <- dataframe_sorted_and_reclassified_basmi %>%
  filter(treatment_order %in% as.character(4:15)) %>%
  distinct(ttas_id) # Select unique ttas_id

# Filter out those with treatment_order > 5 and select unique ttas_id
filtered_ttas_id_more_than_5 <- dataframe_sorted_and_reclassified_basmi %>%
  filter(treatment_order %in% as.character(5:15)) %>%
  distinct(ttas_id) # Select unique ttas_id

# Filter out those with treatment_order > 6 and select unique ttas_id
filtered_ttas_id_more_than_6 <- dataframe_sorted_and_reclassified_basmi %>%
  filter(treatment_order %in% as.character(6:15)) %>%
  distinct(ttas_id) # Select unique ttas_id

# Filter out those with treatment_order > 7 and select unique ttas_id
filtered_ttas_id_more_than_7 <- dataframe_sorted_and_reclassified_basmi %>%
  filter(treatment_order %in% as.character(7:15)) %>%
  distinct(ttas_id) # Select unique ttas_id

# Filter out those with treatment_order > 8 and select unique ttas_id
```

```

filtered_ttas_id_more_than_8 <- dataframe_sorted_and_reclassified_basmi %>%
  filter(treatment_order %in% as.character(8:15)) %>%
  distinct(ttas_id)          # Select unique ttas_id

```

```

# View the result

```

```

print(filtered_ttas_id_more_than_3)

```

```

# A tibble: 182 x 1

```

```

  ttas_id
  <fct>

```

```

1 1
2 3
3 6
4 7
5 8
6 9
7 10
8 13
9 15
10 17

```

```

# i 172 more rows

```

```

print(filtered_ttas_id_more_than_4)

```

```

# A tibble: 112 x 1

```

```

  ttas_id
  <fct>

```

```

1 1
2 3
3 6
4 7
5 8
6 10
7 13
8 15
9 17
10 18

```

```

# i 102 more rows

```

```
print(filtered_ttas_id_more_than_5)
```

```
# A tibble: 66 x 1
  ttas_id
  <fct>
1 3
2 7
3 13
4 17
5 26
6 27
7 28
8 29
9 31
10 32
# i 56 more rows
```

```
print(filtered_ttas_id_more_than_6)
```

```
# A tibble: 41 x 1
  ttas_id
  <fct>
1 3
2 7
3 13
4 26
5 31
6 36
7 40
8 54
9 85
10 136
# i 31 more rows
```

```
print(filtered_ttas_id_more_than_7)
```

```
# A tibble: 19 x 1
  ttas_id
  <fct>
1 7
```

```

2 26
3 36
4 40
5 136
6 223
7 239
8 280
9 282
10 305
11 359
12 427
13 659
14 834
15 835
16 870
17 952
18 962
19 973

```

```
print(filtered_ttas_id_more_than_8)
```

```

# A tibble: 7 x 1
  ttas_id
  <fct>
1 26
2 223
3 239
4 280
5 359
6 659
7 834

```

```

# Print the all rows with ttas_id shown in filter_ttas_id_more_than_8
filtered_ttas_id_more_than_8_characteristics <- demographics_sheet_data %>%
  filter(ttas_id %in% filtered_ttas_id_more_than_8$ttas_id)

print(filtered_ttas_id_more_than_8_characteristics)

```

```

# A tibble: 7 x 6
  ttas_id diagnosis          age_at_onset age_at_diag hlab27status gender
  <fct>   <fct>              <dbl>      <dbl> <chr>      <fct>

```

1	26	Axial SpA- AS	20	34 Positive	Male
2	223	Axial SpA- AS	23	33 Positive	Male
3	239	Axial SpA- AS	21	23 Positive	Male
4	280	Axial SpA- AS	11	15 Positive	Male
5	359	Axial SpA- AS	14	30 Positive	Male
6	659	Axial SpA- AS	20	27 undiagnosed	Male
7	834	Axial SpA- nr-axSpA	17	28 Positive	Male

```
# Print the all rows with ttas_id shown in filter_ttas_id_more_than_7
filtered_ttas_id_more_than_7_characteristics <- demographics_sheet_data %>%
  filter(ttas_id %in% filtered_ttas_id_more_than_7$ttas_id)

print(filtered_ttas_id_more_than_7_characteristics)
```

```
# A tibble: 19 x 6
  ttas_id diagnosis      age_at_onset age_at_diag hlab27status gender
  <dbl>   <fct>         <dbl>         <dbl> <chr>         <fct>
1 7      Axial SpA- AS      28            29 Negative    Male
2 26     Axial SpA- AS      20            34 Positive    Male
3 36     Axial SpA- AS      26            33 Positive    Male
4 40     Axial SpA- AS      23            27 Positive    Female
5 136    Axial SpA- AS      21            34 Positive    Male
6 223    Axial SpA- AS      23            33 Positive    Male
7 239    Axial SpA- AS      21            23 Positive    Male
8 280    Axial SpA- AS      11            15 Positive    Male
9 282    Axial SpA- AS      15            27 Positive    Female
10 305    Axial SpA- AS      26            32 Positive    Male
11 359    Axial SpA- AS      14            30 Positive    Male
12 427    Axial SpA- AS      19            48 Positive    Male
13 659    Axial SpA- AS      20            27 undiagnosed Male
14 834    Axial SpA- nr-axSpA    17            28 Positive    Male
15 835    Axial SpA- AS      17            24 Positive    Female
16 870    Axial SpA- AS      16            36 Positive    Male
17 952    Axial SpA- AS      20            69 Negative    Female
18 962    Axial SpA- AS      11            17 Positive    Female
19 973    Axial SpA- nr-axSpA    20            23 Negative    Female
```

```
# Print the all rows with ttas_id shown in filter_ttas_id_more_than_6
filtered_ttas_id_more_than_6_characteristics <- demographics_sheet_data %>%
  filter(ttas_id %in% filtered_ttas_id_more_than_6$ttas_id)

print(filtered_ttas_id_more_than_6_characteristics)
```

```
# A tibble: 41 x 6
  ttas_id diagnosis      age_at_onset age_at_diag hlab27status gender
  <fct>    <fct>          <dbl>      <dbl> <chr>      <fct>
1 3      Axial SpA- AS      14        20 Positive   Male
2 7      Axial SpA- AS      28        29 Negative   Male
3 13     Axial SpA- AS      15        17 Positive   Male
4 26     Axial SpA- AS      20        34 Positive   Male
5 31     Axial SpA- AS      16        31 Positive   Male
6 36     Axial SpA- AS      26        33 Positive   Male
7 40     Axial SpA- AS      23        27 Positive   Female
8 54     Axial SpA- nr-axSpA 13        34 Positive   Female
9 85     Axial SpA- AS      21        24 Positive   Male
10 136    Axial SpA- AS      21        34 Positive   Male
# i 31 more rows
```

## lme4 code for treatment and diagnosis: BASMI score

```
# Make sure that the reference level for treatment_reclassified is
# "Standard Non-High Cost Drug Treatment"
dataframe_sorted_and_reclassified_basmi$treatment_reclassified <-
  relevel(dataframe_sorted_and_reclassified_basmi$treatment_reclassified,
    ref = "Standard Non-High Cost Drug Treatment")

# Make sure that the reference level for hlab27status is "undiagnosed"
dataframe_sorted_and_reclassified_basmi$hlab27status <-
  relevel(dataframe_sorted_and_reclassified_basmi$hlab27status,
    ref = "undiagnosed")

# Make sure that the reference level for diagnosis is "Axial SpA- nr-axSpA"
dataframe_sorted_and_reclassified_basmi$diagnosis <-
  relevel(dataframe_sorted_and_reclassified_basmi$diagnosis,
    ref = "Axial SpA- AS")

# Make sure that the reference level for treatment_order is 1
dataframe_sorted_and_reclassified_basmi$treatment_order <-
  relevel(dataframe_sorted_and_reclassified_basmi$treatment_order,
    ref = 1)

# Make sure that the reference level for last_known_smoking_status is
# "no information"
```

```
dataframe_sorted_and_reclassified_basmi$last_known_smoking_status <-
  relevel(dataframe_sorted_and_reclassified_basmi$last_known_smoking_status,
    ref = "no information")

# Make sure that the reference level for last_known_vaping_status is
# "no information"
dataframe_sorted_and_reclassified_basmi$last_known_vaping_status <-
  relevel(dataframe_sorted_and_reclassified_basmi$last_known_vaping_status,
    ref = "no information")
```

```
model_treatment_diagnosis_basmi_full <- lmer(
  basmi_score ~ gender + hlab27status + age_at_basmi +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * diagnosis +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basmi,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_basmi_reduced <- lmer(
  basmi_score ~ gender + hlab27status + age_at_basmi +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basmi,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_diagnosis_basmi_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula: basmi\_score ~ gender + hlab27status + age\_at\_basmi + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
treatment\_reclassified \* diagnosis + time\_in\_years + (time\_in\_years |  
ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_basmi

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 42649.8

Scaled residuals:

Min	1Q	Median	3Q	Max
-5.9712	-0.5719	-0.0037	0.5632	6.0621

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.688242	1.63959	
	time_in_years	0.003774	0.06144	-0.16
Residual		0.485653	0.69689	

Number of obs: 17483, groups: ttas\_id, 1043

Fixed effects:

	Estimate
(Intercept)	1.036e+00
genderMale	4.986e-01
hlab27statusNegative	-3.084e-02
hlab27statusPositive	-8.758e-02
age_at_basmi	4.851e-02
diagnosisAxial SpA- nr-axSpA	-8.901e-01
treatment_order2	-1.577e-01
treatment_order3	-8.230e-02
treatment_order4	-2.951e-01
treatment_order5	-2.202e-01
treatment_order6	-3.334e-01
treatment_order7	-4.816e-01
treatment_order8	-9.411e-01
treatment_order9	-6.343e-02
treatment_order11	1.429e+00
last_known_smoking_statussex-smoker	5.167e-01
last_known_smoking_statusnever	3.532e-01
last_known_smoking_statussmoker	6.993e-01
last_known_vaping_statussex-vaper	-1.997e+00
last_known_vaping_statusnever	-8.279e-01
last_known_vaping_statusvaper	-6.080e-01
treatment_reclassifiedAnti-IL17	2.737e-02
treatment_reclassifiedAnti-TNF	-8.745e-02
treatment_reclassifiedJAK Inhibitor	1.320e-01
time_in_years	4.150e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	-5.263e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-1.944e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	-6.290e-02



	Std. Error
(Intercept)	2.228e-01
genderMale	1.146e-01
hlab27statusNegative	1.872e-01
hlab27statusPositive	1.295e-01
age_at_basmi	4.047e-03
diagnosisAxial SpA- nr-axSpA	1.594e-01
treatment_order2	7.513e-02
treatment_order3	6.199e-02
treatment_order4	9.066e-02
treatment_order5	1.010e-01
treatment_order6	1.346e-01
treatment_order7	1.968e-01
treatment_order8	2.839e-01
treatment_order9	3.354e-01
treatment_order11	5.077e-01
last_known_smoking_statussex-smoker	2.615e-01
last_known_smoking_statusnever	2.619e-01
last_known_smoking_statussmoker	3.278e-01
last_known_vaping_statussex-vaper	5.955e-01
last_known_vaping_statusnever	2.520e-01
last_known_vaping_statusvaper	3.686e-01
treatment_reclassifiedAnti-IL17	1.173e-01
treatment_reclassifiedAnti-TNF	7.201e-02
treatment_reclassifiedJAK Inhibitor	3.882e-01
time_in_years	4.786e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.316e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.330e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	6.862e-01
	df
(Intercept)	1.108e+03
genderMale	1.024e+03
hlab27statusNegative	1.037e+03
hlab27statusPositive	1.024e+03
age_at_basmi	1.165e+03
diagnosisAxial SpA- nr-axSpA	1.063e+03
treatment_order2	1.464e+04
treatment_order3	1.392e+04
treatment_order4	1.456e+04
treatment_order5	1.257e+04
treatment_order6	1.354e+04
treatment_order7	8.835e+03
treatment_order8	1.601e+04

treatment_order9	1.594e+04
treatment_order11	1.384e+04
last_known_smoking_statussex-smoker	1.022e+03
last_known_smoking_statusnever	1.023e+03
last_known_smoking_statussmoker	1.028e+03
last_known_vaping_statussex-vaper	1.044e+03
last_known_vaping_statusnever	1.021e+03
last_known_vaping_statusvaper	1.022e+03
treatment_reclassifiedAnti-IL17	1.319e+04
treatment_reclassifiedAnti-TNF	1.478e+04
treatment_reclassifiedJAK Inhibitor	4.443e+03
time_in_years	1.698e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.292e+04
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.026e+04
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.276e+04
	t value
(Intercept)	4.647
genderMale	4.350
hlab27statusNegative	-0.165
hlab27statusPositive	-0.676
age_at_basmi	11.986
diagnosisAxial SpA- nr-axSpA	-5.585
treatment_order2	-2.099
treatment_order3	-1.328
treatment_order4	-3.255
treatment_order5	-2.179
treatment_order6	-2.477
treatment_order7	-2.447
treatment_order8	-3.315
treatment_order9	-0.189
treatment_order11	2.814
last_known_smoking_statussex-smoker	1.976
last_known_smoking_statusnever	1.349
last_known_smoking_statussmoker	2.134
last_known_vaping_statussex-vaper	-3.353
last_known_vaping_statusnever	-3.286
last_known_vaping_statusvaper	-1.649
treatment_reclassifiedAnti-IL17	0.233
treatment_reclassifiedAnti-TNF	-1.214
treatment_reclassifiedJAK Inhibitor	0.340
time_in_years	0.867
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	-1.587
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-1.462

```

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor -0.092
                                                                    Pr(>|t|)
(Intercept)                                                         3.77e-06 ***
genderMale                                                            1.50e-05 ***
hlab27statusNegative                                                  0.869156
hlab27statusPositive                                                  0.499073
age_at_basmi                                                         < 2e-16 ***
diagnosisAxial SpA- nr-axSpA                                         2.97e-08 ***
treatment_order2                                                      0.035796 *
treatment_order3                                                      0.184333
treatment_order4                                                      0.001136 **
treatment_order5                                                      0.029325 *
treatment_order6                                                      0.013263 *
treatment_order7                                                      0.014429 *
treatment_order8                                                      0.000920 ***
treatment_order9                                                      0.849998
treatment_order11                                                    0.004897 **
last_known_smoking_statussex-smoker                                  0.048397 *
last_known_smoking_statusnever                                       0.177759
last_known_smoking_statussmoker                                       0.033114 *
last_known_vaping_statussex-vaper                                    0.000829 ***
last_known_vaping_statusnever                                         0.001052 **
last_known_vaping_statusvaper                                         0.099406 .
treatment_reclassifiedAnti-IL17                                       0.815559
treatment_reclassifiedAnti-TNF                                         0.224596
treatment_reclassifiedJAK Inhibitor                                   0.733896
time_in_years                                                         0.385991
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17       0.112479
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF         0.143804
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor    0.926968
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_basmi_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: basmi_score ~ gender + hlab27status + age_at_basmi + diagnosis +
      treatment_order + last_known_smoking_status + last_known_vaping_status +
      treatment_reclassified + time_in_years + (time_in_years |      ttas_id)
Data: dataframe_sorted_and_reclassified_basmi
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 42652.1

Scaled residuals:

Min	1Q	Median	3Q	Max
-5.9701	-0.5730	-0.0043	0.5634	6.0617

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.681583	1.63755	
	time_in_years	0.003781	0.06149	-0.16
Residual		0.485725	0.69694	

Number of obs: 17483, groups: ttas\_id, 1043

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	1.038e+00	2.225e-01	1.109e+03	4.664
genderMale	4.993e-01	1.145e-01	1.025e+03	4.362
hlab27statusNegative	-3.719e-02	1.869e-01	1.037e+03	-0.199
hlab27statusPositive	-8.643e-02	1.294e-01	1.025e+03	-0.668
age_at_basmi	4.846e-02	4.042e-03	1.165e+03	11.988
diagnosisAxial SpA- nr-axSpA	-9.194e-01	1.582e-01	1.045e+03	-5.812
treatment_order2	-1.573e-01	7.511e-02	1.466e+04	-2.094
treatment_order3	-8.758e-02	6.184e-02	1.396e+04	-1.416
treatment_order4	-2.943e-01	9.042e-02	1.459e+04	-3.255
treatment_order5	-2.437e-01	9.980e-02	1.256e+04	-2.441
treatment_order6	-3.191e-01	1.333e-01	1.380e+04	-2.393
treatment_order7	-4.777e-01	1.929e-01	8.793e+03	-2.476
treatment_order8	-9.651e-01	2.832e-01	1.594e+04	-3.408
treatment_order9	-7.127e-02	3.353e-01	1.596e+04	-0.213
treatment_order11	1.413e+00	5.075e-01	1.388e+04	2.784
last_known_smoking_statussex-smoker	5.279e-01	2.610e-01	1.022e+03	2.022
last_known_smoking_statusnever	3.644e-01	2.614e-01	1.023e+03	1.394
last_known_smoking_statussmoker	7.057e-01	3.273e-01	1.028e+03	2.156
last_known_vaping_statussex-vaper	-2.007e+00	5.948e-01	1.045e+03	-3.375
last_known_vaping_statusnever	-8.376e-01	2.516e-01	1.021e+03	-3.330
last_known_vaping_statusvaper	-6.161e-01	3.681e-01	1.022e+03	-1.674
treatment_reclassifiedAnti-IL17	-1.653e-02	1.122e-01	1.362e+04	-0.147
treatment_reclassifiedAnti-TNF	-9.914e-02	7.166e-02	1.464e+04	-1.383
treatment_reclassifiedJAK Inhibitor	1.153e-01	3.248e-01	7.203e+03	0.355
time_in_years	4.168e-03	4.783e-03	1.699e+03	0.871

Pr(>|t|)

(Intercept) 3.49e-06 \*\*\*

```

genderMale                1.42e-05 ***
hlab27statusNegative      0.842288
hlab27statusPositive      0.504176
age_at_basmi              < 2e-16 ***
diagnosisAxial SpA- nr-axSpA 8.21e-09 ***
treatment_order2          0.036249 *
treatment_order3          0.156788
treatment_order4          0.001137 **
treatment_order5          0.014646 *
treatment_order6          0.016721 *
treatment_order7          0.013293 *
treatment_order8          0.000655 ***
treatment_order9          0.831694
treatment_order11         0.005382 **
last_known_smoking_statussex-smoker 0.043403 *
last_known_smoking_statusnever 0.163641
last_known_smoking_statussmoker 0.031290 *
last_known_vaping_statussex-vaper 0.000766 ***
last_known_vaping_statusnever 0.000901 ***
last_known_vaping_statusvaper 0.094520 .
treatment_reclassifiedAnti-IL17 0.882914
treatment_reclassifiedAnti-TNF 0.166564
treatment_reclassifiedJAK Inhibitor 0.722733
time_in_years              0.383648

```

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
anova(model_treatment_diagnosis_basmi_full, model_treatment_diagnosis_basmi_reduced)
```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_basmi

Models:

model\_treatment\_diagnosis\_basmi\_reduced: basmi\_score ~ gender + hlab27status + age\_at\_basmi

model\_treatment\_diagnosis\_basmi\_full: basmi\_score ~ gender + hlab27status + age\_at\_basmi + d

	npar	AIC	BIC	logLik	deviance	Chisq
model_treatment_diagnosis_basmi_reduced	29	42644	42869	-21293	42586	
model_treatment_diagnosis_basmi_full	32	42646	42894	-21291	42582	3.8121

Df Pr(>Chisq)

model\_treatment\_diagnosis\_basmi\_reduced

model\_treatment\_diagnosis\_basmi\_full      3      0.2825

**For BASMI only: Plot predicted lmer() geom\_line**

**lme4 code for treatment and gender: BASMI score**

```
model_treatment_gender_basmi_full <- lmer(
  basmi_score ~ gender + hlab27status + age_at_basmi +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basmi,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_gender_basmi_reduced <- lmer(
  basmi_score ~ gender + hlab27status + age_at_basmi +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basmi,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_gender_basmi_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula: basmi\_score ~ gender + hlab27status + age\_at\_basmi + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
treatment\_reclassified \* gender + time\_in\_years + (time\_in\_years |  
ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_basmi

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 42654

Scaled residuals:

Min	1Q	Median	3Q	Max
-5.9699	-0.5730	-0.0045	0.5629	6.0616

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.680615	1.63726	
	time_in_years	0.003793	0.06159	-0.16
Residual		0.485703	0.69692	

Number of obs: 17483, groups: ttas\_id, 1043

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	1.033e+00	2.227e-01	1.110e+03
genderMale	5.050e-01	1.147e-01	1.033e+03
hlab27statusNegative	-3.857e-02	1.869e-01	1.037e+03
hlab27statusPositive	-8.790e-02	1.294e-01	1.025e+03
age_at_basmi	4.848e-02	4.042e-03	1.165e+03
diagnosisAxial SpA- nr-axSpA	-9.192e-01	1.582e-01	1.045e+03
treatment_order2	-1.513e-01	7.529e-02	1.464e+04
treatment_order3	-8.545e-02	6.196e-02	1.392e+04
treatment_order4	-2.909e-01	9.050e-02	1.455e+04
treatment_order5	-2.453e-01	9.994e-02	1.255e+04
treatment_order6	-3.125e-01	1.347e-01	1.350e+04
treatment_order7	-4.502e-01	1.955e-01	9.018e+03
treatment_order8	-9.633e-01	2.833e-01	1.593e+04
treatment_order9	-5.652e-02	3.363e-01	1.596e+04
treatment_order11	1.423e+00	5.077e-01	1.388e+04
last_known_smoking_statussex-smoker	5.288e-01	2.610e-01	1.022e+03
last_known_smoking_statusnever	3.644e-01	2.614e-01	1.023e+03
last_known_smoking_statussmoker	7.066e-01	3.273e-01	1.028e+03
last_known_vaping_statussex-vaper	-2.007e+00	5.948e-01	1.044e+03
last_known_vaping_statusnever	-8.373e-01	2.516e-01	1.021e+03
last_known_vaping_statusvaper	-6.141e-01	3.681e-01	1.022e+03
treatment_reclassifiedAnti-IL17	9.867e-02	1.579e-01	1.179e+04
treatment_reclassifiedAnti-TNF	-6.888e-02	9.011e-02	1.404e+04
treatment_reclassifiedJAK Inhibitor	-7.764e-02	3.990e-01	8.222e+03
time_in_years	4.076e-03	4.785e-03	1.698e+03
genderMale:treatment_reclassifiedAnti-IL17	-1.914e-01	1.920e-01	1.121e+04
genderMale:treatment_reclassifiedAnti-TNF	-4.565e-02	7.244e-02	1.295e+04
genderMale:treatment_reclassifiedJAK Inhibitor	5.296e-01	6.306e-01	5.097e+03
t value Pr(> t )			
(Intercept)	4.640	3.90e-06	***
genderMale	4.401	1.19e-05	***
hlab27statusNegative	-0.206	0.836561	
hlab27statusPositive	-0.680	0.496941	

```

age_at_basmi                11.993 < 2e-16 ***
diagnosisAxial SpA- nr-axSpA -5.810 8.28e-09 ***
treatment_order2            -2.010 0.044485 *
treatment_order3            -1.379 0.167842
treatment_order4            -3.214 0.001310 **
treatment_order5            -2.455 0.014118 *
treatment_order6            -2.321 0.020324 *
treatment_order7            -2.303 0.021307 *
treatment_order8            -3.400 0.000674 ***
treatment_order9            -0.168 0.866539
treatment_order11           2.802 0.005083 **
last_known_smoking_statussex-smoker 2.026 0.043029 *
last_known_smoking_statusnever 1.394 0.163617
last_known_smoking_statussmoker 2.159 0.031070 *
last_known_vaping_statussex-vaper -3.374 0.000768 ***
last_known_vaping_statusnever -3.328 0.000904 ***
last_known_vaping_statusvaper -1.668 0.095582 .
treatment_reclassifiedAnti-IL17 0.625 0.531956
treatment_reclassifiedAnti-TNF -0.764 0.444654
treatment_reclassifiedJAK Inhibitor -0.195 0.845709
time_in_years                0.852 0.394469
genderMale:treatment_reclassifiedAnti-IL17 -0.997 0.318841
genderMale:treatment_reclassifiedAnti-TNF -0.630 0.528601
genderMale:treatment_reclassifiedJAK Inhibitor 0.840 0.401036
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_gender_basmi_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: basmi_score ~ gender + hlab27status + age_at_basmi + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified + time_in_years + (time_in_years |      ttas_id)
Data: dataframe_sorted_and_reclassified_basmi
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 42652.1

```

```

Scaled residuals:
    Min       1Q   Median       3Q      Max
-5.9701 -0.5730 -0.0043  0.5634  6.0617

```



Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.681583	1.63755	
	time_in_years	0.003781	0.06149	-0.16
Residual		0.485725	0.69694	

Number of obs: 17483, groups: ttas\_id, 1043

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	1.038e+00	2.225e-01	1.109e+03	4.664
genderMale	4.993e-01	1.145e-01	1.025e+03	4.362
hlab27statusNegative	-3.719e-02	1.869e-01	1.037e+03	-0.199
hlab27statusPositive	-8.643e-02	1.294e-01	1.025e+03	-0.668
age_at_basmi	4.846e-02	4.042e-03	1.165e+03	11.988
diagnosisAxial SpA- nr-axSpA	-9.194e-01	1.582e-01	1.045e+03	-5.812
treatment_order2	-1.573e-01	7.511e-02	1.466e+04	-2.094
treatment_order3	-8.758e-02	6.184e-02	1.396e+04	-1.416
treatment_order4	-2.943e-01	9.042e-02	1.459e+04	-3.255
treatment_order5	-2.437e-01	9.980e-02	1.256e+04	-2.441
treatment_order6	-3.191e-01	1.333e-01	1.380e+04	-2.393
treatment_order7	-4.777e-01	1.929e-01	8.793e+03	-2.476
treatment_order8	-9.651e-01	2.832e-01	1.594e+04	-3.408
treatment_order9	-7.127e-02	3.353e-01	1.596e+04	-0.213
treatment_order11	1.413e+00	5.075e-01	1.388e+04	2.784
last_known_smoking_statussex-smoker	5.279e-01	2.610e-01	1.022e+03	2.022
last_known_smoking_statusnever	3.644e-01	2.614e-01	1.023e+03	1.394
last_known_smoking_statussmoker	7.057e-01	3.273e-01	1.028e+03	2.156
last_known_vaping_statussex-vaper	-2.007e+00	5.948e-01	1.045e+03	-3.375
last_known_vaping_statusnever	-8.376e-01	2.516e-01	1.021e+03	-3.330
last_known_vaping_statusvaper	-6.161e-01	3.681e-01	1.022e+03	-1.674
treatment_reclassifiedAnti-IL17	-1.653e-02	1.122e-01	1.362e+04	-0.147
treatment_reclassifiedAnti-TNF	-9.914e-02	7.166e-02	1.464e+04	-1.383
treatment_reclassifiedJAK Inhibitor	1.153e-01	3.248e-01	7.203e+03	0.355
time_in_years	4.168e-03	4.783e-03	1.699e+03	0.871

Pr(>|t|)

(Intercept)	3.49e-06 ***
genderMale	1.42e-05 ***
hlab27statusNegative	0.842288
hlab27statusPositive	0.504176
age_at_basmi	< 2e-16 ***
diagnosisAxial SpA- nr-axSpA	8.21e-09 ***
treatment_order2	0.036249 *

treatment_order3	0.156788
treatment_order4	0.001137 **
treatment_order5	0.014646 *
treatment_order6	0.016721 *
treatment_order7	0.013293 *
treatment_order8	0.000655 ***
treatment_order9	0.831694
treatment_order11	0.005382 **
last_known_smoking_statussex-smoker	0.043403 *
last_known_smoking_statusnever	0.163641
last_known_smoking_statussmoker	0.031290 *
last_known_vaping_statussex-vaper	0.000766 ***
last_known_vaping_statusnever	0.000901 ***
last_known_vaping_statusvaper	0.094520 .
treatment_reclassifiedAnti-IL17	0.882914
treatment_reclassifiedAnti-TNF	0.166564
treatment_reclassifiedJAK Inhibitor	0.722733
time_in_years	0.383648

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
anova(model_treatment_gender_basmi_full,
       model_treatment_gender_basmi_reduced)
```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_basmi

Models:

model\_treatment\_gender\_basmi\_reduced: basmi\_score ~ gender + hlab27status + age\_at\_basmi + d

model\_treatment\_gender\_basmi\_full: basmi\_score ~ gender + hlab27status + age\_at\_basmi + diagn

	np	AIC	BIC	logLik	deviance	Chisq	Df
model_treatment_gender_basmi_reduced	29	42644	42869	-21293	42586		
model_treatment_gender_basmi_full	32	42648	42896	-21292	42584	2.1116	3

Pr(>Chisq)

model\_treatment\_gender\_basmi\_reduced

model\_treatment\_gender\_basmi\_full 0.5496

## BASDAI Score analysis

### lme4 code for treatment and diagnosis: BASDAI score

```
# Define the full and reduced models
model_treatment_diagnosis_basdai_full <- lmer(
  basdai ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * diagnosis +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basdai,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_basdai_reduced <- lmer(
  basdai ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basdai,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_diagnosis_basdai_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```
basdai ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified *
  diagnosis + time_in_years + (time_in_years | ttas_id)
```

Data: dataframe\_sorted\_and\_reclassified\_basdai

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 55784.4

Scaled residuals:

Min	1Q	Median	3Q	Max
-----	----	--------	----	-----

-4.2641 -0.5984 -0.0645 0.5536 4.6930

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	3.06171	1.750	
	time_in_years	0.01103	0.105	-0.32
Residual		1.92765	1.388	

Number of obs: 14978, groups: ttas\_id, 876

Fixed effects:

	Estimate
(Intercept)	4.518e+00
genderMale	-6.401e-01
hlab27statusNegative	2.591e-01
hlab27statusPositive	-2.304e-01
age_at_prom	9.804e-03
diagnosisAxial SpA- nr-axSpA	5.808e-01
treatment_order2	-9.345e-01
treatment_order3	-6.306e-01
treatment_order4	-6.746e-01
treatment_order5	-4.050e-01
treatment_order6	-2.756e-01
treatment_order7	-3.907e-01
treatment_order8	-1.089e-01
treatment_order9	1.749e-02
treatment_order10	2.144e-01
treatment_order11	1.303e+00
treatment_order12	8.501e-01
treatment_order14	8.277e-01
treatment_order15	-1.349e-01
last_known_smoking_statussex-smoker	-8.510e-02
last_known_smoking_statusnever	-3.716e-01
last_known_smoking_statussmoker	1.116e+00
last_known_vaping_statussex-vaper	2.498e-02
last_known_vaping_statusnever	6.196e-02
last_known_vaping_statusvaper	7.345e-01
treatment_reclassifiedAnti-IL17	-1.371e+00
treatment_reclassifiedAnti-TNF	-1.345e+00
treatment_reclassifiedJAK Inhibitor	-2.124e+00
time_in_years	2.009e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.172e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	4.357e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.507e+00

	Std. Error
(Intercept)	3.133e-01
genderMale	1.294e-01
hlab27statusNegative	2.208e-01
hlab27statusPositive	1.769e-01
age_at_prom	4.830e-03
diagnosisAxial SpA- nr-axSpA	1.507e-01
treatment_order2	8.643e-02
treatment_order3	8.265e-02
treatment_order4	1.053e-01
treatment_order5	1.115e-01
treatment_order6	1.422e-01
treatment_order7	1.943e-01
treatment_order8	2.541e-01
treatment_order9	2.968e-01
treatment_order10	5.592e-01
treatment_order11	6.478e-01
treatment_order12	1.129e+00
treatment_order14	8.993e-01
treatment_order15	1.253e+00
last_known_smoking_statussex-smoker	2.626e-01
last_known_smoking_statusnever	2.615e-01
last_known_smoking_statussmoker	3.153e-01
last_known_vaping_statussex-vaper	5.718e-01
last_known_vaping_statusnever	2.594e-01
last_known_vaping_statusvaper	3.663e-01
treatment_reclassifiedAnti-IL17	1.138e-01
treatment_reclassifiedAnti-TNF	7.855e-02
treatment_reclassifiedJAK Inhibitor	3.749e-01
time_in_years	7.028e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	2.812e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.217e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	6.382e-01
	df
(Intercept)	8.693e+02
genderMale	8.037e+02
hlab27statusNegative	8.481e+02
hlab27statusPositive	8.732e+02
age_at_prom	8.606e+02
diagnosisAxial SpA- nr-axSpA	8.778e+02
treatment_order2	1.360e+04
treatment_order3	1.203e+04
treatment_order4	1.206e+04

treatment_order5	1.014e+04
treatment_order6	1.028e+04
treatment_order7	1.016e+04
treatment_order8	1.268e+04
treatment_order9	1.328e+04
treatment_order10	1.162e+04
treatment_order11	8.631e+03
treatment_order12	9.254e+03
treatment_order14	1.010e+03
treatment_order15	1.202e+03
last_known_smoking_statussex-smoker	7.682e+02
last_known_smoking_statusnever	7.732e+02
last_known_smoking_statussmoker	7.813e+02
last_known_vaping_statussex-vaper	8.248e+02
last_known_vaping_statusnever	7.784e+02
last_known_vaping_statusvaper	7.675e+02
treatment_reclassifiedAnti-IL17	1.318e+04
treatment_reclassifiedAnti-TNF	1.405e+04
treatment_reclassifiedJAK Inhibitor	7.357e+03
time_in_years	8.426e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	9.334e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.118e+04
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.142e+04
	t value
(Intercept)	14.424
genderMale	-4.947
hlab27statusNegative	1.173
hlab27statusPositive	-1.303
age_at_prom	2.030
diagnosisAxial SpA- nr-axSpA	3.855
treatment_order2	-10.812
treatment_order3	-7.630
treatment_order4	-6.406
treatment_order5	-3.631
treatment_order6	-1.939
treatment_order7	-2.011
treatment_order8	-0.428
treatment_order9	0.059
treatment_order10	0.383
treatment_order11	2.011
treatment_order12	0.753
treatment_order14	0.920
treatment_order15	-0.108

last_known_smoking_statussex-smoker	-0.324
last_known_smoking_statusnever	-1.421
last_known_smoking_statussmoker	3.539
last_known_vaping_statussex-vaper	0.044
last_known_vaping_statusnever	0.239
last_known_vaping_statusvaper	2.005
treatment_reclassifiedAnti-IL17	-12.041
treatment_reclassifiedAnti-TNF	-17.118
treatment_reclassifiedJAK Inhibitor	-5.666
time_in_years	2.858
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.128
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	3.580
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	2.361
	Pr(> t )
(Intercept)	< 2e-16 ***
genderMale	9.17e-07 ***
hlab27statusNegative	0.241072
hlab27statusPositive	0.192965
age_at_prom	0.042707 *
diagnosisAxial SpA- nr-axSpA	0.000124 ***
treatment_order2	< 2e-16 ***
treatment_order3	2.52e-14 ***
treatment_order4	1.54e-10 ***
treatment_order5	0.000284 ***
treatment_order6	0.052558 .
treatment_order7	0.044361 *
treatment_order8	0.668405
treatment_order9	0.953017
treatment_order10	0.701415
treatment_order11	0.044331 *
treatment_order12	0.451564
treatment_order14	0.357574
treatment_order15	0.914235
last_known_smoking_statussex-smoker	0.745921
last_known_smoking_statusnever	0.155585
last_known_smoking_statussmoker	0.000425 ***
last_known_vaping_statussex-vaper	0.965167
last_known_vaping_statusnever	0.811244
last_known_vaping_statusvaper	0.045288 *
treatment_reclassifiedAnti-IL17	< 2e-16 ***
treatment_reclassifiedAnti-TNF	< 2e-16 ***
treatment_reclassifiedJAK Inhibitor	1.52e-08 ***
time_in_years	0.004366 **

```

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17      0.259232
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF      0.000344 ***
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.018219 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_basdai_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
basdai ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
      last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
      time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_basdai
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 55799.1

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.2261	-0.6002	-0.0664	0.5534	4.6814

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	3.07457	1.7534	
	time_in_years	0.01097	0.1047	-0.32
Residual		1.92985	1.3892	

Number of obs: 14978, groups: ttas\_id, 876

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	4.516e+00	3.134e-01	8.685e+02	14.411
genderMale	-6.383e-01	1.294e-01	8.024e+02	-4.931
hlab27statusNegative	2.526e-01	2.209e-01	8.476e+02	1.144
hlab27statusPositive	-2.445e-01	1.769e-01	8.716e+02	-1.382
age_at_prom	9.723e-03	4.832e-03	8.597e+02	2.012
diagnosisAxial SpA- nr-axSpA	6.930e-01	1.476e-01	8.237e+02	4.695
treatment_order2	-9.065e-01	8.619e-02	1.364e+04	-10.517
treatment_order3	-5.930e-01	8.207e-02	1.213e+04	-7.225
treatment_order4	-6.300e-01	1.047e-01	1.217e+04	-6.019
treatment_order5	-3.682e-01	1.111e-01	1.027e+04	-3.314



treatment_order6	-2.277e-01	1.412e-01	1.032e+04	-1.613
treatment_order7	-3.580e-01	1.933e-01	1.004e+04	-1.852
treatment_order8	-3.330e-02	2.535e-01	1.273e+04	-0.131
treatment_order9	1.060e-01	2.962e-01	1.338e+04	0.358
treatment_order10	1.806e-01	5.579e-01	1.158e+04	0.324
treatment_order11	1.326e+00	6.476e-01	8.610e+03	2.047
treatment_order12	8.789e-01	1.129e+00	9.264e+03	0.778
treatment_order14	8.578e-01	8.979e-01	1.004e+03	0.955
treatment_order15	-1.403e-01	1.251e+00	1.194e+03	-0.112
last_known_smoking_statussex-smoker	-1.059e-01	2.625e-01	7.647e+02	-0.403
last_known_smoking_statusnever	-3.928e-01	2.614e-01	7.701e+02	-1.503
last_known_smoking_statussmoker	1.091e+00	3.154e-01	7.795e+02	3.461
last_known_vaping_statussex-vaper	2.109e-02	5.719e-01	8.234e+02	0.037
last_known_vaping_statusnever	8.698e-02	2.593e-01	7.755e+02	0.335
last_known_vaping_statusvaper	7.487e-01	3.663e-01	7.659e+02	2.044
treatment_reclassifiedAnti-IL17	-1.334e+00	1.086e-01	1.325e+04	-12.280
treatment_reclassifiedAnti-TNF	-1.301e+00	7.750e-02	1.403e+04	-16.785
treatment_reclassifiedJAK Inhibitor	-1.694e+00	3.111e-01	9.732e+03	-5.445
time_in_years	1.945e-02	7.018e-03	8.368e+02	2.771
	Pr(> t )			
(Intercept)	< 2e-16 ***			
genderMale	9.92e-07 ***			
hlab27statusNegative	0.253117			
hlab27statusPositive	0.167342			
age_at_prom	0.044529 *			
diagnosisAxial SpA- nr-axSpA	3.13e-06 ***			
treatment_order2	< 2e-16 ***			
treatment_order3	5.33e-13 ***			
treatment_order4	1.81e-09 ***			
treatment_order5	0.000921 ***			
treatment_order6	0.106881			
treatment_order7	0.063996 .			
treatment_order8	0.895488			
treatment_order9	0.720300			
treatment_order10	0.746142			
treatment_order11	0.040698 *			
treatment_order12	0.436379			
treatment_order14	0.339641			
treatment_order15	0.910688			
last_known_smoking_statussex-smoker	0.686755			
last_known_smoking_statusnever	0.133300			
last_known_smoking_statussmoker	0.000567 ***			
last_known_vaping_statussex-vaper	0.970592			

```

last_known_vaping_statusnever      0.737373
last_known_vaping_statusvaper      0.041310 *
treatment_reclassifiedAnti-IL17     < 2e-16 ***
treatment_reclassifiedAnti-TNF      < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 5.32e-08 ***
time_in_years                      0.005714 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_basdai_full,
       model_treatment_diagnosis_basdai_reduced)

```

refitting model(s) with ML (instead of REML)

```

Data: dataframe_sorted_and_reclassified_basdai
Models:
model_treatment_diagnosis_basdai_reduced: basdai ~ gender + hlab27status + age_at_prom + diag
model_treatment_diagnosis_basdai_full: basdai ~ gender + hlab27status + age_at_prom + diagno

```

	npars	AIC	BIC	logLik	deviance
model_treatment_diagnosis_basdai_reduced	33	55808	56060	-27871	55742
model_treatment_diagnosis_basdai_full	36	55797	56072	-27863	55725

```

Chisq Df Pr(>Chisq)
model_treatment_diagnosis_basdai_reduced
model_treatment_diagnosis_basdai_full    16.974  3  0.0007155 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

## lme4 code for treatment and gender: BASDAI score

```

# Define the full and reduced models
model_treatment_gender_basdai_full <- lmer(
  basdai ~ hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basdai,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```

```

model_treatment_gender_basdai_reduced <- lmer(
  basdai ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basdai,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

print(summary(model_treatment_gender_basdai_full, corr = FALSE))

```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: basdai ~ hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified *
  gender + time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_basdai
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 55801.5

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.2305	-0.6001	-0.0656	0.5533	4.6794

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	3.07595	1.7538	
	time_in_years	0.01095	0.1046	-0.32
	Residual	1.93024	1.3893	

Number of obs: 14978, groups: ttas\_id, 876

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	4.521e+00	3.140e-01	8.747e+02
hlab27statusNegative	2.493e-01	2.210e-01	8.471e+02
hlab27statusPositive	-2.455e-01	1.769e-01	8.705e+02
age_at_prom	9.700e-03	4.833e-03	8.590e+02
diagnosisAxial SpA- nr-axSpA	6.913e-01	1.476e-01	8.227e+02
treatment_order2	-9.037e-01	8.626e-02	1.365e+04

treatment_order3	-5.898e-01	8.222e-02	1.209e+04
treatment_order4	-6.241e-01	1.052e-01	1.212e+04
treatment_order5	-3.660e-01	1.114e-01	1.021e+04
treatment_order6	-2.191e-01	1.416e-01	1.023e+04
treatment_order7	-3.314e-01	1.951e-01	1.003e+04
treatment_order8	-1.404e-02	2.541e-01	1.261e+04
treatment_order9	1.238e-01	2.968e-01	1.329e+04
treatment_order10	1.905e-01	5.602e-01	1.157e+04
treatment_order11	1.259e+00	6.531e-01	8.610e+03
treatment_order12	9.021e-01	1.130e+00	9.227e+03
treatment_order14	8.866e-01	8.983e-01	9.993e+02
treatment_order15	-2.215e-01	1.255e+00	1.213e+03
last_known_smoking_statussex-smoker	-1.001e-01	2.625e-01	7.648e+02
last_known_smoking_statusnever	-3.881e-01	2.615e-01	7.701e+02
last_known_smoking_statussmoker	1.096e+00	3.155e-01	7.795e+02
last_known_vaping_statussex-vaper	1.241e-02	5.720e-01	8.227e+02
last_known_vaping_statusnever	8.102e-02	2.594e-01	7.759e+02
last_known_vaping_statusvaper	7.455e-01	3.665e-01	7.657e+02
treatment_reclassifiedAnti-IL17	-1.219e+00	1.706e-01	1.049e+04
treatment_reclassifiedAnti-TNF	-1.320e+00	1.020e-01	1.319e+04
treatment_reclassifiedJAK Inhibitor	-1.660e+00	3.752e-01	8.330e+03
genderMale	-6.396e-01	1.312e-01	8.471e+02
time_in_years	1.931e-02	7.015e-03	8.358e+02
treatment_reclassifiedAnti-IL17:genderMale	-1.750e-01	1.941e-01	9.618e+03
treatment_reclassifiedAnti-TNF:genderMale	2.489e-02	9.223e-02	1.170e+04
treatment_reclassifiedJAK Inhibitor:genderMale	-1.702e-01	6.381e-01	9.623e+03
t value Pr(> t )			
(Intercept)	14.398	< 2e-16	***
hlab27statusNegative	1.128	0.259464	
hlab27statusPositive	-1.388	0.165536	
age_at_prom	2.007	0.045045	*
diagnosisAxial SpA- nr-axSpA	4.682	3.31e-06	***
treatment_order2	-10.475	< 2e-16	***
treatment_order3	-7.174	7.73e-13	***
treatment_order4	-5.932	3.07e-09	***
treatment_order5	-3.285	0.001023	**
treatment_order6	-1.547	0.121906	
treatment_order7	-1.699	0.089412	.
treatment_order8	-0.055	0.955942	
treatment_order9	0.417	0.676559	
treatment_order10	0.340	0.733835	
treatment_order11	1.928	0.053904	.
treatment_order12	0.799	0.424521	

```

treatment_order14          0.987 0.323877
treatment_order15         -0.177 0.859898
last_known_smoking_statussex-smoker    -0.381 0.703030
last_known_smoking_statusnever    -1.484 0.138162
last_known_smoking_statussmoker     3.474 0.000542 ***
last_known_vaping_statussex-vaper     0.022 0.982691
last_known_vaping_statusnever     0.312 0.754908
last_known_vaping_statusvaper     2.034 0.042269 *
treatment_reclassifiedAnti-IL17    -7.142 9.82e-13 ***
treatment_reclassifiedAnti-TNF    -12.935 < 2e-16 ***
treatment_reclassifiedJAK Inhibitor    -4.423 9.85e-06 ***
genderMale                 -4.874 1.30e-06 ***
time_in_years              2.752 0.006047 **
treatment_reclassifiedAnti-IL17:genderMale    -0.901 0.367392
treatment_reclassifiedAnti-TNF:genderMale     0.270 0.787258
treatment_reclassifiedJAK Inhibitor:genderMale -0.267 0.789678
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_gender_basdai_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```

basdai ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
  time_in_years + (time_in_years | ttas_id)

```

Data: dataframe\_sorted\_and\_reclassified\_basdai

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 55799.1

Scaled residuals:

	Min	1Q	Median	3Q	Max
	-4.2261	-0.6002	-0.0664	0.5534	4.6814

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	3.07457	1.7534	
	time_in_years	0.01097	0.1047	-0.32
Residual		1.92985	1.3892	

Number of obs: 14978, groups: ttas\_id, 876

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	4.516e+00	3.134e-01	8.685e+02	14.411
genderMale	-6.383e-01	1.294e-01	8.024e+02	-4.931
hlab27statusNegative	2.526e-01	2.209e-01	8.476e+02	1.144
hlab27statusPositive	-2.445e-01	1.769e-01	8.716e+02	-1.382
age_at_prom	9.723e-03	4.832e-03	8.597e+02	2.012
diagnosisAxial SpA- nr-axSpA	6.930e-01	1.476e-01	8.237e+02	4.695
treatment_order2	-9.065e-01	8.619e-02	1.364e+04	-10.517
treatment_order3	-5.930e-01	8.207e-02	1.213e+04	-7.225
treatment_order4	-6.300e-01	1.047e-01	1.217e+04	-6.019
treatment_order5	-3.682e-01	1.111e-01	1.027e+04	-3.314
treatment_order6	-2.277e-01	1.412e-01	1.032e+04	-1.613
treatment_order7	-3.580e-01	1.933e-01	1.004e+04	-1.852
treatment_order8	-3.330e-02	2.535e-01	1.273e+04	-0.131
treatment_order9	1.060e-01	2.962e-01	1.338e+04	0.358
treatment_order10	1.806e-01	5.579e-01	1.158e+04	0.324
treatment_order11	1.326e+00	6.476e-01	8.610e+03	2.047
treatment_order12	8.789e-01	1.129e+00	9.264e+03	0.778
treatment_order14	8.578e-01	8.979e-01	1.004e+03	0.955
treatment_order15	-1.403e-01	1.251e+00	1.194e+03	-0.112
last_known_smoking_statussex-smoker	-1.059e-01	2.625e-01	7.647e+02	-0.403
last_known_smoking_statusnever	-3.928e-01	2.614e-01	7.701e+02	-1.503
last_known_smoking_statussmoker	1.091e+00	3.154e-01	7.795e+02	3.461
last_known_vaping_statussex-vaper	2.109e-02	5.719e-01	8.234e+02	0.037
last_known_vaping_statusnever	8.698e-02	2.593e-01	7.755e+02	0.335
last_known_vaping_statusvaper	7.487e-01	3.663e-01	7.659e+02	2.044
treatment_reclassifiedAnti-IL17	-1.334e+00	1.086e-01	1.325e+04	-12.280
treatment_reclassifiedAnti-TNF	-1.301e+00	7.750e-02	1.403e+04	-16.785
treatment_reclassifiedJAK Inhibitor	-1.694e+00	3.111e-01	9.732e+03	-5.445
time_in_years	1.945e-02	7.018e-03	8.368e+02	2.771

Pr(>|t|)

(Intercept)	< 2e-16 ***
genderMale	9.92e-07 ***
hlab27statusNegative	0.253117
hlab27statusPositive	0.167342
age_at_prom	0.044529 *
diagnosisAxial SpA- nr-axSpA	3.13e-06 ***
treatment_order2	< 2e-16 ***
treatment_order3	5.33e-13 ***
treatment_order4	1.81e-09 ***
treatment_order5	0.000921 ***

```

treatment_order6          0.106881
treatment_order7          0.063996 .
treatment_order8          0.895488
treatment_order9          0.720300
treatment_order10         0.746142
treatment_order11         0.040698 *
treatment_order12         0.436379
treatment_order14         0.339641
treatment_order15         0.910688
last_known_smoking_statussex-smoker 0.686755
last_known_smoking_statusnever 0.133300
last_known_smoking_statussmoker 0.000567 ***
last_known_vaping_statussex-vaper 0.970592
last_known_vaping_statusnever 0.737373
last_known_vaping_statusvaper 0.041310 *
treatment_reclassifiedAnti-IL17 < 2e-16 ***
treatment_reclassifiedAnti-TNF < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 5.32e-08 ***
time_in_years              0.005714 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_basdai_full,
       model_treatment_gender_basdai_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_basdai

Models:

model\_treatment\_gender\_basdai\_reduced: basdai ~ gender + hlab27status + age\_at\_prom + diagnosis

model\_treatment\_gender\_basdai\_full: basdai ~ hlab27status + age\_at\_prom + diagnosis + treatment

	npar	AIC	BIC	logLik	deviance	Chisq
model_treatment_gender_basdai_reduced	33	55808	56060	-27871	55742	
model_treatment_gender_basdai_full	36	55813	56087	-27871	55741	1.1763

Df Pr(>Chisq)

model_treatment_gender_basdai_reduced		
model_treatment_gender_basdai_full	3	0.7587

## BASFI score

### lme4 code for treatment and diagnosis: BASFI score

```
model_treatment_diagnosis_basfi_full <- lmer(  
  basfi ~ gender + hlab27status + age_at_prom +  
    diagnosis + treatment_order + last_known_smoking_status +  
    last_known_vaping_status +  
    treatment_reclassified * diagnosis +  
    time_in_years + (time_in_years | ttas_id),  
  data = dataframe_sorted_and_reclassified_basfi,  
  control = lmerControl(optimizer = "bobyqa",  
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_basfi_reduced <- lmer(  
  basfi ~ gender + hlab27status + age_at_prom +  
    diagnosis + treatment_order + last_known_smoking_status +  
    last_known_vaping_status +  
    treatment_reclassified +  
    time_in_years + (time_in_years | ttas_id),  
  data = dataframe_sorted_and_reclassified_basfi,  
  control = lmerControl(optimizer = "bobyqa",  
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_diagnosis_basfi_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```
basfi ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +  
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified *  
  diagnosis + time_in_years + (time_in_years | ttas_id)
```

Data: dataframe\_sorted\_and\_reclassified\_basfi

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 53640.3

Scaled residuals:

Min	1Q	Median	3Q	Max
-----	----	--------	----	-----



-5.5571 -0.5012 -0.0280 0.4948 5.5130

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.69619	2.1671	
	time_in_years	0.01483	0.1218	-0.32
Residual		1.93617	1.3915	

Number of obs: 14237, groups: ttas\_id, 873

Fixed effects:

	Estimate
(Intercept)	2.397e+00
genderMale	-3.360e-01
hlab27statusNegative	2.734e-01
hlab27statusPositive	-3.270e-01
age_at_prom	4.138e-02
diagnosisAxial SpA- nr-axSpA	3.059e-02
treatment_order2	-9.546e-01
treatment_order3	-5.849e-01
treatment_order4	-6.429e-01
treatment_order5	-3.202e-01
treatment_order6	-2.269e-01
treatment_order7	-2.562e-01
treatment_order8	3.775e-02
treatment_order9	4.567e-02
treatment_order10	1.023e+00
treatment_order11	1.137e+00
treatment_order12	1.812e+00
treatment_order14	1.252e+00
treatment_order15	6.015e-01
last_known_smoking_statussex-smoker	4.801e-01
last_known_smoking_statusnever	1.963e-02
last_known_smoking_statussmoker	1.184e+00
last_known_vaping_statussex-vaper	-8.056e-01
last_known_vaping_statusnever	-5.008e-01
last_known_vaping_statusvaper	5.365e-01
treatment_reclassifiedAnti-IL17	-9.128e-01
treatment_reclassifiedAnti-TNF	-8.420e-01
treatment_reclassifiedJAK Inhibitor	-2.075e+00
time_in_years	2.230e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	4.645e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.891e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.318e+00

	Std. Error
(Intercept)	3.809e-01
genderMale	1.580e-01
hlab27statusNegative	2.682e-01
hlab27statusPositive	2.146e-01
age_at_prom	5.867e-03
diagnosisAxial SpA- nr-axSpA	1.828e-01
treatment_order2	9.088e-02
treatment_order3	8.780e-02
treatment_order4	1.106e-01
treatment_order5	1.173e-01
treatment_order6	1.485e-01
treatment_order7	2.013e-01
treatment_order8	2.625e-01
treatment_order9	3.049e-01
treatment_order10	5.951e-01
treatment_order11	6.685e-01
treatment_order12	1.154e+00
treatment_order14	9.649e-01
treatment_order15	1.438e+00
last_known_smoking_statussex-smoker	3.211e-01
last_known_smoking_statusnever	3.196e-01
last_known_smoking_statussmoker	3.852e-01
last_known_vaping_statussex-vaper	6.953e-01
last_known_vaping_statusnever	3.173e-01
last_known_vaping_statusvaper	4.480e-01
treatment_reclassifiedAnti-IL17	1.173e-01
treatment_reclassifiedAnti-TNF	8.197e-02
treatment_reclassifiedJAK Inhibitor	3.875e-01
time_in_years	8.189e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	2.912e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.292e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	6.532e-01
	df
(Intercept)	8.779e+02
genderMale	8.105e+02
hlab27statusNegative	8.416e+02
hlab27statusPositive	8.655e+02
age_at_prom	8.835e+02
diagnosisAxial SpA- nr-axSpA	8.651e+02
treatment_order2	1.351e+04
treatment_order3	1.244e+04
treatment_order4	1.234e+04

treatment_order5	1.069e+04
treatment_order6	1.088e+04
treatment_order7	1.056e+04
treatment_order8	1.248e+04
treatment_order9	1.328e+04
treatment_order10	1.108e+04
treatment_order11	8.367e+03
treatment_order12	8.558e+03
treatment_order14	1.101e+03
treatment_order15	1.844e+03
last_known_smoking_statussex-smoker	7.830e+02
last_known_smoking_statusnever	7.865e+02
last_known_smoking_statussmoker	7.919e+02
last_known_vaping_statussex-vaper	8.328e+02
last_known_vaping_statusnever	7.903e+02
last_known_vaping_statusvaper	7.791e+02
treatment_reclassifiedAnti-IL17	1.296e+04
treatment_reclassifiedAnti-TNF	1.370e+04
treatment_reclassifiedJAK Inhibitor	7.686e+03
time_in_years	9.937e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	9.560e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.131e+04
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.100e+04
	t value
(Intercept)	6.294
genderMale	-2.127
hlab27statusNegative	1.019
hlab27statusPositive	-1.524
age_at_prom	7.053
diagnosisAxial SpA- nr-axSpA	0.167
treatment_order2	-10.503
treatment_order3	-6.662
treatment_order4	-5.815
treatment_order5	-2.729
treatment_order6	-1.528
treatment_order7	-1.272
treatment_order8	0.144
treatment_order9	0.150
treatment_order10	1.720
treatment_order11	1.700
treatment_order12	1.570
treatment_order14	1.297
treatment_order15	0.418

last_known_smoking_statussex-smoker	1.495	
last_known_smoking_statusnever	0.061	
last_known_smoking_statussmoker	3.073	
last_known_vaping_statussex-vaper	-1.159	
last_known_vaping_statusnever	-1.578	
last_known_vaping_statusvaper	1.197	
treatment_reclassifiedAnti-IL17	-7.781	
treatment_reclassifiedAnti-TNF	-10.272	
treatment_reclassifiedJAK Inhibitor	-5.354	
time_in_years	2.723	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.595	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.463	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	2.018	
	Pr(> t )	
(Intercept)	4.89e-10	***
genderMale	0.03375	*
hlab27statusNegative	0.30836	
hlab27statusPositive	0.12790	
age_at_prom	3.54e-12	***
diagnosisAxial SpA- nr-axSpA	0.86716	
treatment_order2	< 2e-16	***
treatment_order3	2.82e-11	***
treatment_order4	6.21e-09	***
treatment_order5	0.00636	**
treatment_order6	0.12646	
treatment_order7	0.20325	
treatment_order8	0.88567	
treatment_order9	0.88093	
treatment_order10	0.08550	.
treatment_order11	0.08912	.
treatment_order12	0.11654	
treatment_order14	0.19483	
treatment_order15	0.67573	
last_known_smoking_statussex-smoker	0.13528	
last_known_smoking_statusnever	0.95106	
last_known_smoking_statussmoker	0.00219	**
last_known_vaping_statussex-vaper	0.24694	
last_known_vaping_statusnever	0.11497	
last_known_vaping_statusvaper	0.23152	
treatment_reclassifiedAnti-IL17	7.71e-15	***
treatment_reclassifiedAnti-TNF	< 2e-16	***
treatment_reclassifiedJAK Inhibitor	8.87e-08	***
time_in_years	0.00658	**

```

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17      0.11068
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF      0.14343
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor  0.04366 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_basfi_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
basfi ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
      last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
      time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_basfi
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 53645.7

```

Scaled residuals:
      Min       1Q   Median       3Q      Max
-5.5427 -0.5008 -0.0287  0.4947  5.5150

```

```

Random effects:
Groups   Name              Variance Std.Dev. Corr
ttas_id  (Intercept)      4.71549  2.1715
          time_in_years  0.01483  0.1218  -0.32
Residual                    1.93646  1.3916
Number of obs: 14237, groups:  ttas_id, 873

```

```

Fixed effects:
              Estimate Std. Error      df t value
(Intercept)    2.398e+00  3.814e-01  8.783e+02   6.288
genderMale     -3.363e-01  1.582e-01  8.107e+02  -2.126
hlab27statusNegative
hlab27statusPositive
-3.367e-01    2.148e-01  8.653e+02  -1.567
age_at_prom     4.129e-02  5.875e-03  8.840e+02   7.029
diagnosisAxial SpA- nr-axSpA
treatment_order2
-9.414e-01    9.057e-02  1.355e+04 -10.395
treatment_order3
-5.667e-01    8.714e-02  1.252e+04  -6.503
treatment_order4
-6.207e-01    1.098e-01  1.245e+04  -5.652
treatment_order5
-2.936e-01    1.168e-01  1.082e+04  -2.513

```

treatment_order6	-2.174e-01	1.475e-01	1.095e+04	-1.474
treatment_order7	-2.594e-01	2.003e-01	1.048e+04	-1.295
treatment_order8	6.905e-02	2.617e-01	1.252e+04	0.264
treatment_order9	9.713e-02	3.041e-01	1.335e+04	0.319
treatment_order10	9.686e-01	5.937e-01	1.102e+04	1.632
treatment_order11	1.123e+00	6.683e-01	8.354e+03	1.681
treatment_order12	1.821e+00	1.154e+00	8.561e+03	1.578
treatment_order14	1.261e+00	9.645e-01	1.099e+03	1.307
treatment_order15	5.548e-01	1.438e+00	1.838e+03	0.386
last_known_smoking_statussex-smoker	4.580e-01	3.214e-01	7.818e+02	1.425
last_known_smoking_statusnever	-2.209e-03	3.199e-01	7.855e+02	-0.007
last_known_smoking_statussmoker	1.160e+00	3.857e-01	7.917e+02	3.008
last_known_vaping_statussex-vaper	-7.931e-01	6.963e-01	8.329e+02	-1.139
last_known_vaping_statusnever	-4.762e-01	3.176e-01	7.893e+02	-1.499
last_known_vaping_statusvaper	5.571e-01	4.486e-01	7.790e+02	1.242
treatment_reclassifiedAnti-IL17	-8.568e-01	1.120e-01	1.301e+04	-7.650
treatment_reclassifiedAnti-TNF	-8.227e-01	8.087e-02	1.370e+04	-10.173
treatment_reclassifiedJAK Inhibitor	-1.652e+00	3.199e-01	9.824e+03	-5.163
time_in_years	2.208e-02	8.192e-03	9.904e+02	2.695
	Pr(> t )			
(Intercept)	5.06e-10	***		
genderMale	0.03380	*		
hlab27statusNegative	0.31203			
hlab27statusPositive	0.11749			
age_at_prom	4.15e-12	***		
diagnosisAxial SpA- nr-axSpA	0.60831			
treatment_order2	< 2e-16	***		
treatment_order3	8.15e-11	***		
treatment_order4	1.62e-08	***		
treatment_order5	0.01197	*		
treatment_order6	0.14050			
treatment_order7	0.19538			
treatment_order8	0.79190			
treatment_order9	0.74946			
treatment_order10	0.10279			
treatment_order11	0.09282	.		
treatment_order12	0.11460			
treatment_order14	0.19135			
treatment_order15	0.69958			
last_known_smoking_statussex-smoker	0.15457			
last_known_smoking_statusnever	0.99449			
last_known_smoking_statussmoker	0.00271	**		
last_known_vaping_statussex-vaper	0.25498			

```

last_known_vaping_statusnever      0.13424
last_known_vaping_statusvaper      0.21465
treatment_reclassifiedAnti-IL17     2.15e-14 ***
treatment_reclassifiedAnti-TNF      < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 2.48e-07 ***
time_in_years                      0.00716 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_basfi_full,
       model_treatment_diagnosis_basfi_reduced)

```

refitting model(s) with ML (instead of REML)

```

Data: dataframe_sorted_and_reclassified_basfi
Models:
model_treatment_diagnosis_basfi_reduced: basfi ~ gender + hlab27status + age_at_prom + diagnosis
model_treatment_diagnosis_basfi_full: basfi ~ gender + hlab27status + age_at_prom + diagnosis

              npar   AIC   BIC logLik deviance  Chisq
model_treatment_diagnosis_basfi_reduced    33 53661 53911 -26798    53595
model_treatment_diagnosis_basfi_full       36 53660 53932 -26794    53588 7.3766
              Df Pr(>Chisq)
model_treatment_diagnosis_basfi_reduced
model_treatment_diagnosis_basfi_full      3  0.06082 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

## lme4 code for treatment and gender: BASFI score

```

model_treatment_gender_basfi_full <- lmer(
  basfi ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basfi,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```

```

model_treatment_gender_basfi_reduced <- lmer(
  basfi ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_basfi,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```

```

print(summary(model_treatment_gender_basfi_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```

basfi ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified *
  gender + time_in_years + (time_in_years | ttas_id)

```

Data: dataframe\_sorted\_and\_reclassified\_basfi

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 53641.2

Scaled residuals:

Min	1Q	Median	3Q	Max
-5.5297	-0.4980	-0.0279	0.4949	5.5104

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.73078	2.1750	
	time_in_years	0.01473	0.1214	-0.32
Residual		1.93610	1.3914	

Number of obs: 14237, groups: ttas\_id, 873

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	2.420e+00	3.821e-01	8.823e+02
genderMale	-3.537e-01	1.600e-01	8.435e+02
hlab27statusNegative	2.641e-01	2.688e-01	8.411e+02
hlab27statusPositive	-3.393e-01	2.149e-01	8.639e+02
age_at_prom	4.126e-02	5.878e-03	8.830e+02



diagnosisAxial SpA- nr-axSpA	8.690e-02	1.802e-01	8.225e+02
treatment_order2	-9.324e-01	9.065e-02	1.354e+04
treatment_order3	-5.549e-01	8.733e-02	1.247e+04
treatment_order4	-5.998e-01	1.104e-01	1.239e+04
treatment_order5	-2.805e-01	1.173e-01	1.075e+04
treatment_order6	-1.915e-01	1.479e-01	1.086e+04
treatment_order7	-1.797e-01	2.023e-01	1.042e+04
treatment_order8	1.278e-01	2.625e-01	1.241e+04
treatment_order9	1.525e-01	3.048e-01	1.329e+04
treatment_order10	1.020e+00	5.960e-01	1.106e+04
treatment_order11	9.917e-01	6.736e-01	8.412e+03
treatment_order12	1.899e+00	1.154e+00	8.541e+03
treatment_order14	1.359e+00	9.636e-01	1.094e+03
treatment_order15	4.069e-01	1.439e+00	1.867e+03
last_known_smoking_statussex-smoker	4.726e-01	3.216e-01	7.811e+02
last_known_smoking_statusnever	8.904e-03	3.202e-01	7.848e+02
last_known_smoking_statussmoker	1.170e+00	3.860e-01	7.911e+02
last_known_vaping_statussex-vaper	-8.147e-01	6.966e-01	8.319e+02
last_known_vaping_statusnever	-4.910e-01	3.179e-01	7.889e+02
last_known_vaping_statusvaper	5.471e-01	4.489e-01	7.783e+02
treatment_reclassifiedAnti-IL17	-5.945e-01	1.776e-01	1.078e+04
treatment_reclassifiedAnti-TNF	-9.108e-01	1.080e-01	1.294e+04
treatment_reclassifiedJAK Inhibitor	-1.629e+00	3.876e-01	8.516e+03
time_in_years	2.162e-02	8.182e-03	9.911e+02
genderMale:treatment_reclassifiedAnti-IL17	-4.027e-01	2.010e-01	1.015e+04
genderMale:treatment_reclassifiedAnti-TNF	1.203e-01	9.808e-02	1.174e+04
genderMale:treatment_reclassifiedJAK Inhibitor	-2.990e-01	6.540e-01	9.745e+03
t value Pr(> t )			
(Intercept)	6.333	3.82e-10	***
genderMale	-2.210	0.027378	*
hlab27statusNegative	0.983	0.326131	
hlab27statusPositive	-1.578	0.114838	
age_at_prom	7.020	4.42e-12	***
diagnosisAxial SpA- nr-axSpA	0.482	0.629673	
treatment_order2	-10.285	< 2e-16	***
treatment_order3	-6.353	2.18e-10	***
treatment_order4	-5.431	5.70e-08	***
treatment_order5	-2.392	0.016770	*
treatment_order6	-1.294	0.195548	
treatment_order7	-0.888	0.374360	
treatment_order8	0.487	0.626389	
treatment_order9	0.500	0.616857	
treatment_order10	1.712	0.086955	.

```

treatment_order11          1.472 0.141009
treatment_order12          1.646 0.099809 .
treatment_order14          1.410 0.158842
treatment_order15          0.283 0.777443
last_known_smoking_statussex-smoker 1.470 0.142097
last_known_smoking_statusnever 0.028 0.977821
last_known_smoking_statussmoker 3.031 0.002517 **
last_known_vaping_statussex-vaper -1.170 0.242513
last_known_vaping_statusnever -1.545 0.122865
last_known_vaping_statusvaper 1.219 0.223353
treatment_reclassifiedAnti-IL17 -3.348 0.000817 ***
treatment_reclassifiedAnti-TNF -8.429 < 2e-16 ***
treatment_reclassifiedJAK Inhibitor -4.202 2.68e-05 ***
time_in_years 2.643 0.008348 **
genderMale:treatment_reclassifiedAnti-IL17 -2.004 0.045138 *
genderMale:treatment_reclassifiedAnti-TNF 1.227 0.219893
genderMale:treatment_reclassifiedJAK Inhibitor -0.457 0.647516
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_gender_basfi_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```
basfi ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
      last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
      time_in_years + (time_in_years | ttas_id)
```

Data: dataframe\_sorted\_and\_reclassified\_basfi

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 53645.7

Scaled residuals:

Min	1Q	Median	3Q	Max
-5.5427	-0.5008	-0.0287	0.4947	5.5150

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.71549	2.1715	
	time_in_years	0.01483	0.1218	-0.32
Residual		1.93646	1.3916	

Number of obs: 14237, groups: ttas\_id, 873

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	2.398e+00	3.814e-01	8.783e+02	6.288
genderMale	-3.363e-01	1.582e-01	8.107e+02	-2.126
hlab27statusNegative	2.717e-01	2.686e-01	8.420e+02	1.012
hlab27statusPositive	-3.367e-01	2.148e-01	8.653e+02	-1.567
age_at_prom	4.129e-02	5.875e-03	8.840e+02	7.029
diagnosisAxial SpA- nr-axSpA	9.229e-02	1.800e-01	8.236e+02	0.513
treatment_order2	-9.414e-01	9.057e-02	1.355e+04	-10.395
treatment_order3	-5.667e-01	8.714e-02	1.252e+04	-6.503
treatment_order4	-6.207e-01	1.098e-01	1.245e+04	-5.652
treatment_order5	-2.936e-01	1.168e-01	1.082e+04	-2.513
treatment_order6	-2.174e-01	1.475e-01	1.095e+04	-1.474
treatment_order7	-2.594e-01	2.003e-01	1.048e+04	-1.295
treatment_order8	6.905e-02	2.617e-01	1.252e+04	0.264
treatment_order9	9.713e-02	3.041e-01	1.335e+04	0.319
treatment_order10	9.686e-01	5.937e-01	1.102e+04	1.632
treatment_order11	1.123e+00	6.683e-01	8.354e+03	1.681
treatment_order12	1.821e+00	1.154e+00	8.561e+03	1.578
treatment_order14	1.261e+00	9.645e-01	1.099e+03	1.307
treatment_order15	5.548e-01	1.438e+00	1.838e+03	0.386
last_known_smoking_statussex-smoker	4.580e-01	3.214e-01	7.818e+02	1.425
last_known_smoking_statusnever	-2.209e-03	3.199e-01	7.855e+02	-0.007
last_known_smoking_statussmoker	1.160e+00	3.857e-01	7.917e+02	3.008
last_known_vaping_statussex-vaper	-7.931e-01	6.963e-01	8.329e+02	-1.139
last_known_vaping_statusnever	-4.762e-01	3.176e-01	7.893e+02	-1.499
last_known_vaping_statusvaper	5.571e-01	4.486e-01	7.790e+02	1.242
treatment_reclassifiedAnti-IL17	-8.568e-01	1.120e-01	1.301e+04	-7.650
treatment_reclassifiedAnti-TNF	-8.227e-01	8.087e-02	1.370e+04	-10.173
treatment_reclassifiedJAK Inhibitor	-1.652e+00	3.199e-01	9.824e+03	-5.163
time_in_years	2.208e-02	8.192e-03	9.904e+02	2.695

Pr(>|t|)

(Intercept)	5.06e-10 ***
genderMale	0.03380 *
hlab27statusNegative	0.31203
hlab27statusPositive	0.11749
age_at_prom	4.15e-12 ***
diagnosisAxial SpA- nr-axSpA	0.60831
treatment_order2	< 2e-16 ***
treatment_order3	8.15e-11 ***
treatment_order4	1.62e-08 ***

```

treatment_order5          0.01197 *
treatment_order6          0.14050
treatment_order7          0.19538
treatment_order8          0.79190
treatment_order9          0.74946
treatment_order10         0.10279
treatment_order11         0.09282 .
treatment_order12         0.11460
treatment_order14         0.19135
treatment_order15         0.69958
last_known_smoking_statussex-smoker 0.15457
last_known_smoking_statusnever 0.99449
last_known_smoking_statussmoker 0.00271 **
last_known_vaping_statussex-vaper 0.25498
last_known_vaping_statusnever 0.13424
last_known_vaping_statusvaper 0.21465
treatment_reclassifiedAnti-IL17 2.15e-14 ***
treatment_reclassifiedAnti-TNF < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 2.48e-07 ***
time_in_years             0.00716 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_basfi_full,
       model_treatment_gender_basfi_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_basfi

Models:

model\_treatment\_gender\_basfi\_reduced: basfi ~ gender + hlab27status + age\_at\_prom + diagnosis

model\_treatment\_gender\_basfi\_full: basfi ~ gender + hlab27status + age\_at\_prom + diagnosis +

	npar	AIC	BIC	logLik	deviance	Chisq	Df
model_treatment_gender_basfi_reduced	33	53661	53911	-26798	53595		
model_treatment_gender_basfi_full	36	53660	53932	-26794	53588	7.8094	3

Pr(>Chisq)

model\_treatment\_gender\_basfi\_reduced

model\_treatment\_gender\_basfi\_full 0.05012 .

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## Patient Global Score

### lme4 code for treatment and diagnosis: Patient Global Score

```
model_treatment_diagnosis_patient_global_full <- lmer(
  patient_global ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * diagnosis +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_patient_global,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_patient_global_reduced <- lmer(
  patient_global ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_patient_global,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_diagnosis_patient_global_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula: patient\_global ~ gender + hlab27status + age\_at\_prom + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
treatment\_reclassified \* diagnosis + time\_in\_years + (time\_in\_years |  
ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_patient\_global

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 48635.1

Scaled residuals:

Min	1Q	Median	3Q	Max
-----	----	--------	----	-----

-3.2889 -0.6231 -0.0840 0.5448 4.8781

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.05519	2.0138	
	time_in_years	0.01287	0.1134	-0.53
Residual		3.15837	1.7772	

Number of obs: 11534, groups: ttas\_id, 870

Fixed effects:

	Estimate
(Intercept)	4.017e+00
genderMale	-5.538e-01
hlab27statusNegative	3.964e-01
hlab27statusPositive	-3.137e-02
age_at_prom	1.605e-02
diagnosisAxial SpA- nr-axSpA	4.183e-01
treatment_order2	-7.351e-01
treatment_order3	-2.172e-01
treatment_order4	-3.650e-01
treatment_order5	-1.549e-01
treatment_order6	9.209e-02
treatment_order7	3.503e-01
treatment_order8	4.132e-01
treatment_order9	-2.910e-01
treatment_order10	1.033e+00
treatment_order11	1.939e+00
treatment_order12	2.115e+00
treatment_order14	1.791e+00
treatment_order15	1.584e+00
last_known_smoking_statussex-smoker	-6.775e-02
last_known_smoking_statusnever	-3.478e-01
last_known_smoking_statussmoker	7.939e-01
last_known_vaping_statussex-vaper	-5.778e-01
last_known_vaping_statusnever	1.437e-01
last_known_vaping_statusvaper	6.887e-01
treatment_reclassifiedAnti-IL17	-1.609e+00
treatment_reclassifiedAnti-TNF	-1.469e+00
treatment_reclassifiedJAK Inhibitor	-2.880e+00
time_in_years	1.597e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	6.949e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	2.167e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.060e+00

	Std. Error
(Intercept)	3.603e-01
genderMale	1.430e-01
hlab27statusNegative	2.496e-01
hlab27statusPositive	2.034e-01
age_at_prom	5.407e-03
diagnosisAxial SpA- nr-axSpA	1.717e-01
treatment_order2	1.242e-01
treatment_order3	1.158e-01
treatment_order4	1.492e-01
treatment_order5	1.602e-01
treatment_order6	1.990e-01
treatment_order7	2.720e-01
treatment_order8	3.610e-01
treatment_order9	4.213e-01
treatment_order10	7.519e-01
treatment_order11	8.586e-01
treatment_order12	1.418e+00
treatment_order14	1.052e+00
treatment_order15	1.634e+00
last_known_smoking_statussex-smoker	2.840e-01
last_known_smoking_statusnever	2.832e-01
last_known_smoking_statussmoker	3.420e-01
last_known_vaping_statussex-vaper	6.261e-01
last_known_vaping_statusnever	2.823e-01
last_known_vaping_statusvaper	3.973e-01
treatment_reclassifiedAnti-IL17	1.636e-01
treatment_reclassifiedAnti-TNF	1.150e-01
treatment_reclassifiedJAK Inhibitor	4.705e-01
time_in_years	7.880e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.581e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.592e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	8.025e-01
	df
(Intercept)	7.984e+02
genderMale	7.032e+02
hlab27statusNegative	7.701e+02
hlab27statusPositive	8.075e+02
age_at_prom	7.540e+02
diagnosisAxial SpA- nr-axSpA	8.069e+02
treatment_order2	9.808e+03
treatment_order3	8.474e+03
treatment_order4	8.570e+03

treatment_order5	6.869e+03
treatment_order6	6.366e+03
treatment_order7	5.458e+03
treatment_order8	8.485e+03
treatment_order9	6.791e+03
treatment_order10	8.020e+03
treatment_order11	6.438e+03
treatment_order12	8.503e+03
treatment_order14	8.974e+02
treatment_order15	1.780e+03
last_known_smoking_statussex-smoker	6.577e+02
last_known_smoking_statusnever	6.651e+02
last_known_smoking_statussmoker	6.713e+02
last_known_vaping_statussex-vaper	7.158e+02
last_known_vaping_statusnever	6.735e+02
last_known_vaping_statusvaper	6.606e+02
treatment_reclassifiedAnti-IL17	8.821e+03
treatment_reclassifiedAnti-TNF	9.962e+03
treatment_reclassifiedJAK Inhibitor	6.085e+03
time_in_years	6.888e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	7.982e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	8.600e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	9.904e+03
	t value
(Intercept)	11.148
genderMale	-3.872
hlab27statusNegative	1.588
hlab27statusPositive	-0.154
age_at_prom	2.968
diagnosisAxial SpA- nr-axSpA	2.436
treatment_order2	-5.920
treatment_order3	-1.876
treatment_order4	-2.446
treatment_order5	-0.967
treatment_order6	0.463
treatment_order7	1.288
treatment_order8	1.145
treatment_order9	-0.691
treatment_order10	1.375
treatment_order11	2.259
treatment_order12	1.491
treatment_order14	1.703
treatment_order15	0.969



last_known_smoking_statussex-smoker	-0.239
last_known_smoking_statusnever	-1.228
last_known_smoking_statussmoker	2.321
last_known_vaping_statussex-vaper	-0.923
last_known_vaping_statusnever	0.509
last_known_vaping_statusvaper	1.733
treatment_reclassifiedAnti-IL17	-9.831
treatment_reclassifiedAnti-TNF	-12.771
treatment_reclassifiedJAK Inhibitor	-6.121
time_in_years	2.027
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.940
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.361
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.321
	Pr(> t )
(Intercept)	< 2e-16 ***
genderMale	0.000118 ***
hlab27statusNegative	0.112690
hlab27statusPositive	0.877451
age_at_prom	0.003090 **
diagnosisAxial SpA- nr-axSpA	0.015046 *
treatment_order2	3.33e-09 ***
treatment_order3	0.060740 .
treatment_order4	0.014469 *
treatment_order5	0.333379
treatment_order6	0.643537
treatment_order7	0.197841
treatment_order8	0.252390
treatment_order9	0.489725
treatment_order10	0.169309
treatment_order11	0.023933 *
treatment_order12	0.135896
treatment_order14	0.088854 .
treatment_order15	0.332499
last_known_smoking_statussex-smoker	0.811552
last_known_smoking_statusnever	0.219739
last_known_smoking_statussmoker	0.020578 *
last_known_vaping_statussex-vaper	0.356413
last_known_vaping_statusnever	0.610917
last_known_vaping_statusvaper	0.083487 .
treatment_reclassifiedAnti-IL17	< 2e-16 ***
treatment_reclassifiedAnti-TNF	< 2e-16 ***
treatment_reclassifiedJAK Inhibitor	9.88e-10 ***
time_in_years	0.043041 *

```
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17      0.052380 .
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF      0.173514
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.186567
```

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_diagnosis_patient_global_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [

lmerModLmerTest]

Formula: patient\_global ~ gender + hlab27status + age\_at\_prom + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
treatment\_reclassified + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_patient\_global

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 48640.6

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.2968	-0.6235	-0.0846	0.5477	4.8635

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.07330	2.0182	
	time_in_years	0.01281	0.1132	-0.54
Residual		3.15996	1.7776	

Number of obs: 11534, groups: ttas\_id, 870

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	4.015e+00	3.602e-01	7.988e+02	11.147
genderMale	-5.527e-01	1.430e-01	7.032e+02	-3.866
hlab27statusNegative	3.976e-01	2.496e-01	7.708e+02	1.593
hlab27statusPositive	-4.390e-02	2.032e-01	8.068e+02	-0.216
age_at_prom	1.594e-02	5.405e-03	7.546e+02	2.948
diagnosisAxial SpA- nr-axSpA	5.050e-01	1.653e-01	7.333e+02	3.056
treatment_order2	-7.208e-01	1.239e-01	9.831e+03	-5.816
treatment_order3	-1.945e-01	1.152e-01	8.616e+03	-1.688
treatment_order4	-3.441e-01	1.483e-01	8.683e+03	-2.320
treatment_order5	-1.233e-01	1.597e-01	6.958e+03	-0.772
treatment_order6	8.712e-02	1.978e-01	6.357e+03	0.440

treatment_order7	3.454e-01	2.706e-01	5.387e+03	1.277
treatment_order8	4.466e-01	3.603e-01	8.525e+03	1.239
treatment_order9	-2.387e-01	4.206e-01	6.851e+03	-0.567
treatment_order10	9.920e-01	7.495e-01	8.007e+03	1.323
treatment_order11	1.901e+00	8.578e-01	6.438e+03	2.216
treatment_order12	2.136e+00	1.418e+00	8.536e+03	1.507
treatment_order14	1.817e+00	1.049e+00	9.002e+02	1.732
treatment_order15	1.509e+00	1.632e+00	1.785e+03	0.925
last_known_smoking_statussex-smoker	-1.028e-01	2.835e-01	6.543e+02	-0.362
last_known_smoking_statusnever	-3.809e-01	2.827e-01	6.622e+02	-1.347
last_known_smoking_statussmoker	7.622e-01	3.417e-01	6.704e+02	2.231
last_known_vaping_statussex-vaper	-5.614e-01	6.256e-01	7.145e+02	-0.897
last_known_vaping_statusnever	1.787e-01	2.819e-01	6.710e+02	0.634
last_known_vaping_statusvaper	7.121e-01	3.970e-01	6.599e+02	1.794
treatment_reclassifiedAnti-IL17	-1.503e+00	1.544e-01	9.221e+03	-9.732
treatment_reclassifiedAnti-TNF	-1.439e+00	1.130e-01	9.985e+03	-12.735
treatment_reclassifiedJAK Inhibitor	-2.548e+00	3.937e-01	8.158e+03	-6.472
time_in_years	1.553e-02	7.866e-03	6.875e+02	1.974
	Pr(> t )			
(Intercept)	< 2e-16 ***			
genderMale	0.000121 ***			
hlab27statusNegative	0.111602			
hlab27statusPositive	0.829051			
age_at_prom	0.003294 **			
diagnosisAxial SpA- nr-axSpA	0.002324 **			
treatment_order2	6.20e-09 ***			
treatment_order3	0.091370 .			
treatment_order4	0.020345 *			
treatment_order5	0.440151			
treatment_order6	0.659636			
treatment_order7	0.201816			
treatment_order8	0.215196			
treatment_order9	0.570402			
treatment_order10	0.185716			
treatment_order11	0.026708 *			
treatment_order12	0.131906			
treatment_order14	0.083595 .			
treatment_order15	0.355215			
last_known_smoking_statussex-smoker	0.717135			
last_known_smoking_statusnever	0.178324			
last_known_smoking_statussmoker	0.026044 *			
last_known_vaping_statussex-vaper	0.369812			
last_known_vaping_statusnever	0.526347			

```

last_known_vaping_statusvaper      0.073339 .
treatment_reclassifiedAnti-IL17     < 2e-16 ***
treatment_reclassifiedAnti-TNF      < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 1.02e-10 ***
time_in_years                      0.048806 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_patient_global_full,
       model_treatment_diagnosis_patient_global_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_patient\_global

Models:

model\_treatment\_diagnosis\_patient\_global\_reduced: patient\_global ~ gender + hlab27status + age\_at\_prom +

model\_treatment\_diagnosis\_patient\_global\_full: patient\_global ~ gender + hlab27status + age\_at\_prom +

	npar	AIC	BIC	logLik
model_treatment_diagnosis_patient_global_reduced	33	48663	48906	-24298
model_treatment_diagnosis_patient_global_full	36	48663	48927	-24295

	deviance	Chisq	Df	Pr(>Chisq)
model_treatment_diagnosis_patient_global_reduced	48597			
model_treatment_diagnosis_patient_global_full	48591	6.1655	3	0.1038

## lme4 code for treatment and gender: Patient Global Score

```

model_treatment_gender_patient_global_full <- lmer(
  patient_global ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_patient_global,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```

```

model_treatment_gender_patient_global_reduced <- lmer(
  patient_global ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +

```

```

last_known_vaping_status +
treatment_reclassified +
time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_patient_global,
    control = lmerControl(optimizer = "bobyqa",
                          optCtrl = list(maxfun = 2e5)))

```

```
print(summary(model_treatment_gender_patient_global_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]

Formula: patient\_global ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status + treatment\_reclassified \* gender + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_patient\_global

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 48641.3

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.2961	-0.6232	-0.0844	0.5447	4.8499

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.08180	2.0203	
	time_in_years	0.01281	0.1132	-0.54
Residual		3.16045	1.7778	

Number of obs: 11534, groups: ttas\_id, 870

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	4.039e+00	3.617e-01	8.094e+02
genderMale	-5.789e-01	1.482e-01	8.004e+02
hlab27statusNegative	3.922e-01	2.498e-01	7.713e+02
hlab27statusPositive	-4.653e-02	2.033e-01	8.065e+02
age_at_prom	1.592e-02	5.407e-03	7.542e+02
diagnosisAxial SpA- nr-axSpA	5.025e-01	1.654e-01	7.332e+02
treatment_order2	-7.159e-01	1.240e-01	9.847e+03
treatment_order3	-1.878e-01	1.154e-01	8.565e+03

treatment_order4	-3.293e-01	1.492e-01	8.583e+03
treatment_order5	-1.151e-01	1.600e-01	6.900e+03
treatment_order6	9.912e-02	1.983e-01	6.301e+03
treatment_order7	3.789e-01	2.725e-01	5.425e+03
treatment_order8	4.739e-01	3.613e-01	8.421e+03
treatment_order9	-2.204e-01	4.211e-01	6.810e+03
treatment_order10	1.023e+00	7.530e-01	7.999e+03
treatment_order11	1.872e+00	8.661e-01	6.343e+03
treatment_order12	2.160e+00	1.418e+00	8.518e+03
treatment_order14	1.843e+00	1.050e+00	8.986e+02
treatment_order15	1.472e+00	1.638e+00	1.809e+03
last_known_smoking_statussex-smoker	-9.759e-02	2.838e-01	6.550e+02
last_known_smoking_statusnever	-3.747e-01	2.830e-01	6.630e+02
last_known_smoking_statussmoker	7.670e-01	3.420e-01	6.709e+02
last_known_vaping_statussex-vaper	-5.729e-01	6.259e-01	7.143e+02
last_known_vaping_statusnever	1.707e-01	2.822e-01	6.722e+02
last_known_vaping_statusvaper	7.062e-01	3.973e-01	6.602e+02
treatment_reclassifiedAnti-IL17	-1.438e+00	2.305e-01	7.561e+03
treatment_reclassifiedAnti-TNF	-1.514e+00	1.431e-01	9.525e+03
treatment_reclassifiedJAK Inhibitor	-2.596e+00	4.730e-01	7.141e+03
time_in_years	1.533e-02	7.866e-03	6.881e+02
genderMale:treatment_reclassifiedAnti-IL17	-1.123e-01	2.643e-01	6.502e+03
genderMale:treatment_reclassifiedAnti-TNF	1.070e-01	1.269e-01	8.180e+03
genderMale:treatment_reclassifiedJAK Inhibitor	1.047e-02	7.953e-01	7.993e+03
t value Pr(> t )			
(Intercept)	11.168	< 2e-16	***
genderMale	-3.907	0.000101	***
hlab27statusNegative	1.570	0.116773	
hlab27statusPositive	-0.229	0.819018	
age_at_prom	2.944	0.003338	**
diagnosisAxial SpA- nr-axSpA	3.039	0.002458	**
treatment_order2	-5.773	8.02e-09	***
treatment_order3	-1.628	0.103530	
treatment_order4	-2.208	0.027290	*
treatment_order5	-0.719	0.472105	
treatment_order6	0.500	0.617220	
treatment_order7	1.390	0.164454	
treatment_order8	1.312	0.189643	
treatment_order9	-0.523	0.600711	
treatment_order10	1.359	0.174177	
treatment_order11	2.161	0.030703	*
treatment_order12	1.523	0.127709	
treatment_order14	1.756	0.079403	.

```

treatment_order15                0.899 0.368867
last_known_smoking_statussex-smoker -0.344 0.731051
last_known_smoking_statusnever     -1.324 0.185956
last_known_smoking_statussmoker     2.242 0.025263 *
last_known_vaping_statussex-vaper   -0.915 0.360344
last_known_vaping_statusnever       0.605 0.545390
last_known_vaping_statusvaper       1.777 0.075993 .
treatment_reclassifiedAnti-IL17     -6.239 4.64e-10 ***
treatment_reclassifiedAnti-TNF      -10.581 < 2e-16 ***
treatment_reclassifiedJAK Inhibitor  -5.487 4.22e-08 ***
time_in_years                      1.949 0.051699 .
genderMale:treatment_reclassifiedAnti-IL17 -0.425 0.671024
genderMale:treatment_reclassifiedAnti-TNF  0.844 0.398929
genderMale:treatment_reclassifiedJAK Inhibitor 0.013 0.989501
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_gender_patient_global_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: patient_global ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified + time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_patient_global
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 48640.6

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.2968	-0.6235	-0.0846	0.5477	4.8635

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.07330	2.0182	
	time_in_years	0.01281	0.1132	-0.54
Residual		3.15996	1.7776	

Number of obs: 11534, groups: ttas\_id, 870

Fixed effects:

Estimate	Std. Error	df	t	value
----------	------------	----	---	-------

(Intercept)	4.015e+00	3.602e-01	7.988e+02	11.147
genderMale	-5.527e-01	1.430e-01	7.032e+02	-3.866
hlab27statusNegative	3.976e-01	2.496e-01	7.708e+02	1.593
hlab27statusPositive	-4.390e-02	2.032e-01	8.068e+02	-0.216
age_at_prom	1.594e-02	5.405e-03	7.546e+02	2.948
diagnosisAxial SpA- nr-axSpA	5.050e-01	1.653e-01	7.333e+02	3.056
treatment_order2	-7.208e-01	1.239e-01	9.831e+03	-5.816
treatment_order3	-1.945e-01	1.152e-01	8.616e+03	-1.688
treatment_order4	-3.441e-01	1.483e-01	8.683e+03	-2.320
treatment_order5	-1.233e-01	1.597e-01	6.958e+03	-0.772
treatment_order6	8.712e-02	1.978e-01	6.357e+03	0.440
treatment_order7	3.454e-01	2.706e-01	5.387e+03	1.277
treatment_order8	4.466e-01	3.603e-01	8.525e+03	1.239
treatment_order9	-2.387e-01	4.206e-01	6.851e+03	-0.567
treatment_order10	9.920e-01	7.495e-01	8.007e+03	1.323
treatment_order11	1.901e+00	8.578e-01	6.438e+03	2.216
treatment_order12	2.136e+00	1.418e+00	8.536e+03	1.507
treatment_order14	1.817e+00	1.049e+00	9.002e+02	1.732
treatment_order15	1.509e+00	1.632e+00	1.785e+03	0.925
last_known_smoking_statussex-smoker	-1.028e-01	2.835e-01	6.543e+02	-0.362
last_known_smoking_statusnever	-3.809e-01	2.827e-01	6.622e+02	-1.347
last_known_smoking_statussmoker	7.622e-01	3.417e-01	6.704e+02	2.231
last_known_vaping_statussex-vaper	-5.614e-01	6.256e-01	7.145e+02	-0.897
last_known_vaping_statusnever	1.787e-01	2.819e-01	6.710e+02	0.634
last_known_vaping_statusvaper	7.121e-01	3.970e-01	6.599e+02	1.794
treatment_reclassifiedAnti-IL17	-1.503e+00	1.544e-01	9.221e+03	-9.732
treatment_reclassifiedAnti-TNF	-1.439e+00	1.130e-01	9.985e+03	-12.735
treatment_reclassifiedJAK Inhibitor	-2.548e+00	3.937e-01	8.158e+03	-6.472
time_in_years	1.553e-02	7.866e-03	6.875e+02	1.974
Pr(> t )				
(Intercept)	< 2e-16 ***			
genderMale	0.000121 ***			
hlab27statusNegative	0.111602			
hlab27statusPositive	0.829051			
age_at_prom	0.003294 **			
diagnosisAxial SpA- nr-axSpA	0.002324 **			
treatment_order2	6.20e-09 ***			
treatment_order3	0.091370 .			
treatment_order4	0.020345 *			
treatment_order5	0.440151			
treatment_order6	0.659636			
treatment_order7	0.201816			
treatment_order8	0.215196			



```

treatment_order9          0.570402
treatment_order10         0.185716
treatment_order11         0.026708 *
treatment_order12         0.131906
treatment_order14         0.083595 .
treatment_order15         0.355215
last_known_smoking_statussex-smoker 0.717135
last_known_smoking_statusnever 0.178324
last_known_smoking_statussmoker 0.026044 *
last_known_vaping_statussex-vaper 0.369812
last_known_vaping_statusnever 0.526347
last_known_vaping_statusvaper 0.073339 .
treatment_reclassifiedAnti-IL17 < 2e-16 ***
treatment_reclassifiedAnti-TNF < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 1.02e-10 ***
time_in_years             0.048806 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_patient_global_full,
       model_treatment_gender_patient_global_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_patient\_global

Models:

model\_treatment\_gender\_patient\_global\_reduced: patient\_global ~ gender + hlab27status + age\_at\_p

model\_treatment\_gender\_patient\_global\_full: patient\_global ~ gender + hlab27status + age\_at\_p

	npar	AIC	BIC	logLik	deviance
model_treatment_gender_patient_global_reduced	33	48663	48906	-24298	48597
model_treatment_gender_patient_global_full	36	48668	48932	-24298	48596

  

	Chisq	Df	Pr(>Chisq)
model_treatment_gender_patient_global_reduced			
model_treatment_gender_patient_global_full	1.1442	3	0.7664

## Back Pain At Night

### lme4 code for treatment and diagnosis: Back Pain At Night

```
model_treatment_diagnosis_back_pain_at_night_full <- lmer(
  back_pain_at_night ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * diagnosis +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_back_pain_at_night,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

model_treatment_diagnosis_back_pain_at_night_reduced <- lmer(
  back_pain_at_night ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_back_pain_at_night,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

print(summary(model_treatment_diagnosis_back_pain_at_night_full, corr = FALSE))
```

```
Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
back_pain_at_night ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified * diagnosis + time_in_years + (time_in_years |
  ttas_id)
Data: dataframe_sorted_and_reclassified_back_pain_at_night
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 45207.5

Scaled residuals:
```

Min	1Q	Median	3Q	Max
-3.3765	-0.6009	-0.1099	0.5330	5.0198

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	5.07036	2.2517	
	time_in_years	0.01165	0.1079	-0.56
Residual		3.23432	1.7984	

Number of obs: 10608, groups: ttas\_id, 870

Fixed effects:

	Estimate
(Intercept)	4.701e+00
genderMale	-5.879e-01
hlab27statusNegative	4.657e-01
hlab27statusPositive	-5.090e-03
age_at_prom	-2.426e-03
diagnosisAxial SpA- nr-axSpA	2.796e-01
treatment_order2	-1.089e+00
treatment_order3	-6.219e-01
treatment_order4	-6.981e-01
treatment_order5	-2.845e-01
treatment_order6	-4.128e-01
treatment_order7	-1.305e-01
treatment_order8	6.401e-01
treatment_order9	-4.344e-01
treatment_order10	1.025e+00
treatment_order11	1.882e+00
treatment_order12	1.576e+00
treatment_order14	1.980e+00
treatment_order15	1.671e+00
last_known_smoking_statussex-smoker	-2.694e-01
last_known_smoking_statusnever	-6.005e-01
last_known_smoking_statussmoker	9.385e-01
last_known_vaping_statussex-vaper	-3.097e-02
last_known_vaping_statusnever	1.978e-01
last_known_vaping_statusvaper	9.052e-01
treatment_reclassifiedAnti-IL17	-1.310e+00
treatment_reclassifiedAnti-TNF	-1.191e+00
treatment_reclassifiedJAK Inhibitor	-2.667e+00
time_in_years	3.028e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	5.235e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	2.929e-03

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.920e+00
	Std. Error
(Intercept)	3.901e-01
genderMale	1.555e-01
hlab27statusNegative	2.714e-01
hlab27statusPositive	2.194e-01
age_at_prom	5.878e-03
diagnosisAxial SpA- nr-axSpA	1.880e-01
treatment_order2	1.308e-01
treatment_order3	1.228e-01
treatment_order4	1.564e-01
treatment_order5	1.657e-01
treatment_order6	2.053e-01
treatment_order7	2.787e-01
treatment_order8	3.662e-01
treatment_order9	4.271e-01
treatment_order10	7.649e-01
treatment_order11	8.659e-01
treatment_order12	1.431e+00
treatment_order14	1.034e+00
treatment_order15	1.617e+00
last_known_smoking_statussex-smoker	3.092e-01
last_known_smoking_statusnever	3.084e-01
last_known_smoking_statussmoker	3.738e-01
last_known_vaping_statussex-vaper	6.785e-01
last_known_vaping_statusnever	3.077e-01
last_known_vaping_statusvaper	4.347e-01
treatment_reclassifiedAnti-IL17	1.685e-01
treatment_reclassifiedAnti-TNF	1.216e-01
treatment_reclassifiedJAK Inhibitor	4.732e-01
time_in_years	8.089e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.697e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.644e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	8.096e-01
	df
(Intercept)	8.422e+02
genderMale	7.391e+02
hlab27statusNegative	8.097e+02
hlab27statusPositive	8.283e+02
age_at_prom	8.059e+02
diagnosisAxial SpA- nr-axSpA	8.557e+02
treatment_order2	8.780e+03
treatment_order3	7.452e+03

treatment_order4	7.808e+03
treatment_order5	6.023e+03
treatment_order6	5.569e+03
treatment_order7	4.787e+03
treatment_order8	7.389e+03
treatment_order9	5.568e+03
treatment_order10	7.477e+03
treatment_order11	6.392e+03
treatment_order12	8.430e+03
treatment_order14	9.658e+02
treatment_order15	1.922e+03
last_known_smoking_statussex-smoker	6.902e+02
last_known_smoking_statusnever	7.001e+02
last_known_smoking_statussmoker	7.154e+02
last_known_vaping_statussex-vaper	7.382e+02
last_known_vaping_statusnever	7.104e+02
last_known_vaping_statusvaper	7.033e+02
treatment_reclassifiedAnti-IL17	7.909e+03
treatment_reclassifiedAnti-TNF	8.798e+03
treatment_reclassifiedJAK Inhibitor	5.732e+03
time_in_years	7.050e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	8.146e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	8.506e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	9.226e+03
	t value
(Intercept)	12.050
genderMale	-3.780
hlab27statusNegative	1.716
hlab27statusPositive	-0.023
age_at_prom	-0.413
diagnosisAxial SpA- nr-axSpA	1.487
treatment_order2	-8.324
treatment_order3	-5.066
treatment_order4	-4.463
treatment_order5	-1.717
treatment_order6	-2.011
treatment_order7	-0.468
treatment_order8	1.748
treatment_order9	-1.017
treatment_order10	1.341
treatment_order11	2.173
treatment_order12	1.101
treatment_order14	1.914

treatment_order15	1.033
last_known_smoking_statussex-smoker	-0.871
last_known_smoking_statusnever	-1.947
last_known_smoking_statussmoker	2.511
last_known_vaping_statussex-vaper	-0.046
last_known_vaping_statusnever	0.643
last_known_vaping_statusvaper	2.083
treatment_reclassifiedAnti-IL17	-7.774
treatment_reclassifiedAnti-TNF	-9.797
treatment_reclassifiedJAK Inhibitor	-5.635
time_in_years	0.374
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.416
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	0.018
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	2.371
	Pr(> t )
(Intercept)	< 2e-16 ***
genderMale	0.000169 ***
hlab27statusNegative	0.086478 .
hlab27statusPositive	0.981495
age_at_prom	0.679914
diagnosisAxial SpA- nr-axSpA	0.137270
treatment_order2	< 2e-16 ***
treatment_order3	4.15e-07 ***
treatment_order4	8.21e-06 ***
treatment_order5	0.086051 .
treatment_order6	0.044396 *
treatment_order7	0.639692
treatment_order8	0.080488 .
treatment_order9	0.309100
treatment_order10	0.180120
treatment_order11	0.029805 *
treatment_order12	0.270911
treatment_order14	0.055905 .
treatment_order15	0.301555
last_known_smoking_statussex-smoker	0.383907
last_known_smoking_statusnever	0.051906 .
last_known_smoking_statussmoker	0.012265 *
last_known_vaping_statussex-vaper	0.963599
last_known_vaping_statusnever	0.520406
last_known_vaping_statusvaper	0.037650 *
treatment_reclassifiedAnti-IL17	8.56e-15 ***
treatment_reclassifiedAnti-TNF	< 2e-16 ***
treatment_reclassifiedJAK Inhibitor	1.83e-08 ***

```

time_in_years                                0.708232
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17    0.156819
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF      0.985785
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.017755 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_back_pain_at_night_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
back_pain_at_night ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified + time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_back_pain_at_night
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 45214.6

```

Scaled residuals:
    Min       1Q   Median       3Q      Max
-3.3738 -0.6009 -0.1095  0.5308  5.0196

```

```

Random effects:
Groups   Name              Variance Std.Dev. Corr
ttas_id  (Intercept)        5.08081  2.2541
         time_in_years     0.01157  0.1075  -0.57
Residual                3.23716  1.7992
Number of obs: 10608, groups: ttas_id, 870

```

```

Fixed effects:
              Estimate Std. Error      df t value
(Intercept)    4.712e+00  3.897e-01  8.426e+02  12.089
genderMale     -5.888e-01  1.554e-01  7.392e+02  -3.789
hlab27statusNegative  4.676e-01  2.711e-01  8.102e+02   1.725
hlab27statusPositive -1.468e-02  2.191e-01  8.275e+02  -0.067
age_at_prom    -2.573e-03  5.873e-03  8.065e+02  -0.438
diagnosisAxial SpA- nr-axSpA  3.090e-01  1.812e-01  7.854e+02   1.705
treatment_order2  -1.084e+00  1.305e-01  8.805e+03  -8.311
treatment_order3  -6.172e-01  1.222e-01  7.597e+03  -5.050
treatment_order4  -6.728e-01  1.555e-01  7.911e+03  -4.327

```

treatment_order5	-2.590e-01	1.652e-01	6.105e+03	-1.568
treatment_order6	-4.327e-01	2.041e-01	5.573e+03	-2.120
treatment_order7	-1.851e-01	2.773e-01	4.738e+03	-0.668
treatment_order8	6.465e-01	3.654e-01	7.438e+03	1.769
treatment_order9	-3.917e-01	4.264e-01	5.613e+03	-0.919
treatment_order10	8.968e-01	7.625e-01	7.488e+03	1.176
treatment_order11	1.823e+00	8.650e-01	6.407e+03	2.107
treatment_order12	1.556e+00	1.431e+00	8.471e+03	1.087
treatment_order14	1.960e+00	1.032e+00	9.770e+02	1.900
treatment_order15	1.568e+00	1.614e+00	1.942e+03	0.971
last_known_smoking_statussex-smoker	-3.008e-01	3.085e-01	6.871e+02	-0.975
last_known_smoking_statusnever	-6.306e-01	3.077e-01	6.974e+02	-2.049
last_known_smoking_statussmoker	9.039e-01	3.733e-01	7.145e+02	2.422
last_known_vaping_statussex-vaper	-9.543e-03	6.775e-01	7.372e+02	-0.014
last_known_vaping_statusnever	2.268e-01	3.070e-01	7.082e+02	0.739
last_known_vaping_statusvaper	9.325e-01	4.341e-01	7.026e+02	2.148
treatment_reclassifiedAnti-IL17	-1.226e+00	1.592e-01	8.308e+03	-7.699
treatment_reclassifiedAnti-TNF	-1.193e+00	1.192e-01	8.859e+03	-10.002
treatment_reclassifiedJAK Inhibitor	-2.037e+00	3.974e-01	7.568e+03	-5.126
time_in_years	2.741e-03	8.068e-03	7.057e+02	0.340
	Pr(> t )			
(Intercept)	< 2e-16 ***			
genderMale	0.000163 ***			
hlab27statusNegative	0.084976 .			
hlab27statusPositive	0.946580			
age_at_prom	0.661343			
diagnosisAxial SpA- nr-axSpA	0.088582 .			
treatment_order2	< 2e-16 ***			
treatment_order3	4.51e-07 ***			
treatment_order4	1.53e-05 ***			
treatment_order5	0.116987			
treatment_order6	0.034030 *			
treatment_order7	0.504382			
treatment_order8	0.076938 .			
treatment_order9	0.358288			
treatment_order10	0.239560			
treatment_order11	0.035156 *			
treatment_order12	0.276957			
treatment_order14	0.057772 .			
treatment_order15	0.331614			
last_known_smoking_statussex-smoker	0.329782			
last_known_smoking_statusnever	0.040830 *			
last_known_smoking_statussmoker	0.015700 *			



```

last_known_vaping_statussex-vaper    0.988765
last_known_vaping_statusnever        0.460376
last_known_vaping_statusvaper        0.032034 *
treatment_reclassifiedAnti-IL17       1.53e-14 ***
treatment_reclassifiedAnti-TNF        < 2e-16 ***
treatment_reclassifiedJAK Inhibitor    3.03e-07 ***
time_in_years                        0.734131
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_back_pain_at_night_full,
       model_treatment_diagnosis_back_pain_at_night_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_back\_pain\_at\_night

Models:

model\_treatment\_diagnosis\_back\_pain\_at\_night\_reduced: back\_pain\_at\_night ~ gender + hlab27status

model\_treatment\_diagnosis\_back\_pain\_at\_night\_full: back\_pain\_at\_night ~ gender + hlab27status

	npar	AIC	BIC	logLik
model_treatment_diagnosis_back_pain_at_night_reduced	33	45240	45479	-22587
model_treatment_diagnosis_back_pain_at_night_full	36	45238	45500	-22583

  

	deviance	Chisq	Df
model_treatment_diagnosis_back_pain_at_night_reduced	45174		
model_treatment_diagnosis_back_pain_at_night_full	45166	7.6491	3

Pr(>Chisq)

model_treatment_diagnosis_back_pain_at_night_reduced	
model_treatment_diagnosis_back_pain_at_night_full	0.05385 .

```

---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

## lme4 code for treatment and gender: Back Pain At Night

```

model_treatment_gender_back_pain_at_night_full <- lmer(
  back_pain_at_night ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status +
  treatment_reclassified * gender +
  time_in_years + (time_in_years | ttas_id),

```

```
data = dataframe_sorted_and_reclassified_back_pain_at_night,
control = lmerControl(optimizer = "bobyqa",
                      optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_gender_back_pain_at_night_reduced <- lmer(
  back_pain_at_night ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status +
  treatment_reclassified +
  time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_back_pain_at_night,
  control = lmerControl(optimizer = "bobyqa",
                      optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_gender_back_pain_at_night_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [

lmerModLmerTest]

Formula:

```
back_pain_at_night ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified * gender + time_in_years + (time_in_years |
  ttas_id)
```

Data: dataframe\_sorted\_and\_reclassified\_back\_pain\_at\_night

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 45214

Scaled residuals:

	Min	1Q	Median	3Q	Max
	-3.3742	-0.6010	-0.1094	0.5311	5.0195

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	5.06874	2.2514	
	time_in_years	0.01154	0.1074	-0.56
Residual		3.23804	1.7995	

Number of obs: 10608, groups: ttas\_id, 870

Fixed effects:

	Estimate	Std. Error	df
--	----------	------------	----

(Intercept)	4.703e+00	3.910e-01	8.542e+02
genderMale	-5.693e-01	1.608e-01	8.401e+02
hlab27statusNegative	4.584e-01	2.710e-01	8.110e+02
hlab27statusPositive	-1.728e-02	2.190e-01	8.283e+02
age_at_prom	-2.565e-03	5.869e-03	8.066e+02
diagnosisAxial SpA- nr-axSpA	3.073e-01	1.811e-01	7.851e+02
treatment_order2	-1.081e+00	1.305e-01	8.816e+03
treatment_order3	-6.147e-01	1.223e-01	7.556e+03
treatment_order4	-6.649e-01	1.563e-01	7.840e+03
treatment_order5	-2.615e-01	1.655e-01	6.059e+03
treatment_order6	-4.260e-01	2.045e-01	5.530e+03
treatment_order7	-1.512e-01	2.790e-01	4.796e+03
treatment_order8	6.829e-01	3.664e-01	7.347e+03
treatment_order9	-3.711e-01	4.268e-01	5.582e+03
treatment_order10	9.071e-01	7.661e-01	7.476e+03
treatment_order11	1.651e+00	8.735e-01	6.289e+03
treatment_order12	1.588e+00	1.432e+00	8.455e+03
treatment_order14	1.996e+00	1.032e+00	9.750e+02
treatment_order15	1.353e+00	1.621e+00	1.965e+03
last_known_smoking_statussex-smoker	-2.879e-01	3.085e-01	6.888e+02
last_known_smoking_statusnever	-6.204e-01	3.077e-01	6.992e+02
last_known_smoking_statussmoker	9.147e-01	3.732e-01	7.158e+02
last_known_vaping_statussex-vaper	-2.625e-02	6.772e-01	7.386e+02
last_known_vaping_statusnever	2.140e-01	3.071e-01	7.103e+02
last_known_vaping_statusvaper	9.345e-01	4.339e-01	7.035e+02
treatment_reclassifiedAnti-IL17	-9.718e-01	2.366e-01	6.842e+03
treatment_reclassifiedAnti-TNF	-1.185e+00	1.499e-01	8.555e+03
treatment_reclassifiedJAK Inhibitor	-1.987e+00	4.765e-01	6.630e+03
time_in_years	2.590e-03	8.064e-03	7.059e+02
genderMale:treatment_reclassifiedAnti-IL17	-3.963e-01	2.701e-01	5.952e+03
genderMale:treatment_reclassifiedAnti-TNF	-1.352e-02	1.338e-01	7.091e+03
genderMale:treatment_reclassifiedJAK Inhibitor	-2.041e-01	8.000e-01	7.558e+03
t value Pr(> t )			
(Intercept)	12.028	< 2e-16	***
genderMale	-3.540	0.000422	***
hlab27statusNegative	1.691	0.091151	.
hlab27statusPositive	-0.079	0.937132	
age_at_prom	-0.437	0.662161	
diagnosisAxial SpA- nr-axSpA	1.697	0.090109	.
treatment_order2	-8.281	< 2e-16	***
treatment_order3	-5.025	5.16e-07	***
treatment_order4	-4.253	2.13e-05	***
treatment_order5	-1.580	0.114180	

treatment_order6	-2.083	0.037286	*
treatment_order7	-0.542	0.587913	
treatment_order8	1.864	0.062408	.
treatment_order9	-0.870	0.384598	
treatment_order10	1.184	0.236443	
treatment_order11	1.891	0.058728	.
treatment_order12	1.109	0.267507	
treatment_order14	1.933	0.053487	.
treatment_order15	0.835	0.403981	
last_known_smoking_statussex-smoker	-0.933	0.350981	
last_known_smoking_statusnever	-2.016	0.044202	*
last_known_smoking_statussmoker	2.451	0.014486	*
last_known_vaping_statussex-vaper	-0.039	0.969097	
last_known_vaping_statusnever	0.697	0.486019	
last_known_vaping_statusvaper	2.154	0.031605	*
treatment_reclassifiedAnti-IL17	-4.106	4.06e-05	***
treatment_reclassifiedAnti-TNF	-7.903	3.07e-15	***
treatment_reclassifiedJAK Inhibitor	-4.170	3.09e-05	***
time_in_years	0.321	0.748165	
genderMale:treatment_reclassifiedAnti-IL17	-1.467	0.142313	
genderMale:treatment_reclassifiedAnti-TNF	-0.101	0.919520	
genderMale:treatment_reclassifiedJAK Inhibitor	-0.255	0.798649	
---			

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_gender_back_pain_at_night_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [

lmerModLmerTest]

Formula:

```
back_pain_at_night ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified + time_in_years + (time_in_years | ttas_id)
```

Data: dataframe\_sorted\_and\_reclassified\_back\_pain\_at\_night

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 45214.6

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.3738	-0.6009	-0.1095	0.5308	5.0196

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	5.08081	2.2541	
	time_in_years	0.01157	0.1075	-0.57
Residual		3.23716	1.7992	

Number of obs: 10608, groups: ttas\_id, 870

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	4.712e+00	3.897e-01	8.426e+02	12.089
genderMale	-5.888e-01	1.554e-01	7.392e+02	-3.789
hlab27statusNegative	4.676e-01	2.711e-01	8.102e+02	1.725
hlab27statusPositive	-1.468e-02	2.191e-01	8.275e+02	-0.067
age_at_prom	-2.573e-03	5.873e-03	8.065e+02	-0.438
diagnosisAxial SpA- nr-axSpA	3.090e-01	1.812e-01	7.854e+02	1.705
treatment_order2	-1.084e+00	1.305e-01	8.805e+03	-8.311
treatment_order3	-6.172e-01	1.222e-01	7.597e+03	-5.050
treatment_order4	-6.728e-01	1.555e-01	7.911e+03	-4.327
treatment_order5	-2.590e-01	1.652e-01	6.105e+03	-1.568
treatment_order6	-4.327e-01	2.041e-01	5.573e+03	-2.120
treatment_order7	-1.851e-01	2.773e-01	4.738e+03	-0.668
treatment_order8	6.465e-01	3.654e-01	7.438e+03	1.769
treatment_order9	-3.917e-01	4.264e-01	5.613e+03	-0.919
treatment_order10	8.968e-01	7.625e-01	7.488e+03	1.176
treatment_order11	1.823e+00	8.650e-01	6.407e+03	2.107
treatment_order12	1.556e+00	1.431e+00	8.471e+03	1.087
treatment_order14	1.960e+00	1.032e+00	9.770e+02	1.900
treatment_order15	1.568e+00	1.614e+00	1.942e+03	0.971
last_known_smoking_statussex-smoker	-3.008e-01	3.085e-01	6.871e+02	-0.975
last_known_smoking_statusnever	-6.306e-01	3.077e-01	6.974e+02	-2.049
last_known_smoking_statussmoker	9.039e-01	3.733e-01	7.145e+02	2.422
last_known_vaping_statussex-vaper	-9.543e-03	6.775e-01	7.372e+02	-0.014
last_known_vaping_statusnever	2.268e-01	3.070e-01	7.082e+02	0.739
last_known_vaping_statusvaper	9.325e-01	4.341e-01	7.026e+02	2.148
treatment_reclassifiedAnti-IL17	-1.226e+00	1.592e-01	8.308e+03	-7.699
treatment_reclassifiedAnti-TNF	-1.193e+00	1.192e-01	8.859e+03	-10.002
treatment_reclassifiedJAK Inhibitor	-2.037e+00	3.974e-01	7.568e+03	-5.126
time_in_years	2.741e-03	8.068e-03	7.057e+02	0.340

Pr(>|t|)

(Intercept)	< 2e-16 ***
genderMale	0.000163 ***
hlab27statusNegative	0.084976 .
hlab27statusPositive	0.946580

```

age_at_prom 0.661343
diagnosisAxial SpA- nr-axSpA 0.088582 .
treatment_order2 < 2e-16 ***
treatment_order3 4.51e-07 ***
treatment_order4 1.53e-05 ***
treatment_order5 0.116987
treatment_order6 0.034030 *
treatment_order7 0.504382
treatment_order8 0.076938 .
treatment_order9 0.358288
treatment_order10 0.239560
treatment_order11 0.035156 *
treatment_order12 0.276957
treatment_order14 0.057772 .
treatment_order15 0.331614
last_known_smoking_statussex-smoker 0.329782
last_known_smoking_statusnever 0.040830 *
last_known_smoking_statussmoker 0.015700 *
last_known_vaping_statussex-vaper 0.988765
last_known_vaping_statusnever 0.460376
last_known_vaping_statusvaper 0.032034 *
treatment_reclassifiedAnti-IL17 1.53e-14 ***
treatment_reclassifiedAnti-TNF < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 3.03e-07 ***
time_in_years 0.734131
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_back_pain_at_night_full,
       model_treatment_gender_back_pain_at_night_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_back\_pain\_at\_night

Models:

model\_treatment\_gender\_back\_pain\_at\_night\_reduced: back\_pain\_at\_night ~ gender + hlab27status

model\_treatment\_gender\_back\_pain\_at\_night\_full: back\_pain\_at\_night ~ gender + hlab27status +

	npar	AIC	BIC	logLik
model_treatment_gender_back_pain_at_night_reduced	33	45240	45479	-22587
model_treatment_gender_back_pain_at_night_full	36	45243	45505	-22586
		deviance	Chisq	Df Pr(>Chisq)
model_treatment_gender_back_pain_at_night_reduced		45174		

```
model_treatment_gender_back_pain_at_night_full      45171 2.291  3      0.5143
```

## Back Pain Anytime

### lme4 code for treatment and diagnosis: Back Pain Anytime

```
model_treatment_diagnosis_back_pain_anytime_full <- lmer(
  back_pain_anytime ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * diagnosis +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_back_pain_anytime,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_back_pain_anytime_reduced <- lmer(
  back_pain_anytime ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_back_pain_anytime,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_diagnosis_back_pain_anytime_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [

lmerModLmerTest]

Formula: back\_pain\_anytime ~ gender + hlab27status + age\_at\_prom + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
treatment\_reclassified \* diagnosis + time\_in\_years + (time\_in\_years |  
ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_back\_pain\_anytime

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 49179

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.5285	-0.6182	-0.0993	0.5382	4.7733

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.42051	2.1025	
	time_in_years	0.01242	0.1114	-0.49
Residual		3.14265	1.7728	

Number of obs: 11661, groups: ttas\_id, 870

Fixed effects:

	Estimate
(Intercept)	4.731e+00
genderMale	-5.792e-01
hlab27statusNegative	5.764e-01
hlab27statusPositive	5.660e-02
age_at_prom	3.583e-03
diagnosisAxial SpA- nr-axSpA	5.122e-01
treatment_order2	-1.070e+00
treatment_order3	-6.681e-01
treatment_order4	-7.361e-01
treatment_order5	-4.055e-01
treatment_order6	-4.807e-01
treatment_order7	-1.236e-01
treatment_order8	5.230e-01
treatment_order9	-7.879e-01
treatment_order10	8.377e-01
treatment_order11	1.855e+00
treatment_order14	1.149e+00
treatment_order15	-7.668e-02
last_known_smoking_statussex-smoker	-1.996e-01
last_known_smoking_statusnever	-5.273e-01
last_known_smoking_statussmoker	7.857e-01
last_known_vaping_statussex-vaper	-1.885e-01
last_known_vaping_statusnever	9.162e-02
last_known_vaping_statusvaper	7.922e-01
treatment_reclassifiedAnti-IL17	-1.325e+00
treatment_reclassifiedAnti-TNF	-1.329e+00
treatment_reclassifiedJAK Inhibitor	-2.611e+00
time_in_years	7.920e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.700e-01



diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.939e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.664e+00
	Std. Error
(Intercept)	3.797e-01
genderMale	1.514e-01
hlab27statusNegative	2.631e-01
hlab27statusPositive	2.140e-01
age_at_prom	5.710e-03
diagnosisAxial SpA- nr-axSpA	1.802e-01
treatment_order2	1.229e-01
treatment_order3	1.147e-01
treatment_order4	1.485e-01
treatment_order5	1.583e-01
treatment_order6	1.979e-01
treatment_order7	2.804e-01
treatment_order8	3.600e-01
treatment_order9	4.203e-01
treatment_order10	7.467e-01
treatment_order11	8.623e-01
treatment_order14	1.051e+00
treatment_order15	1.632e+00
last_known_smoking_statussex-smoker	3.015e-01
last_known_smoking_statusnever	3.004e-01
last_known_smoking_statussmoker	3.624e-01
last_known_vaping_statussex-vaper	6.612e-01
last_known_vaping_statusnever	2.993e-01
last_known_vaping_statusvaper	4.215e-01
treatment_reclassifiedAnti-IL17	1.639e-01
treatment_reclassifiedAnti-TNF	1.134e-01
treatment_reclassifiedJAK Inhibitor	4.715e-01
time_in_years	8.091e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.617e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.590e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	8.024e-01
	df
(Intercept)	8.293e+02
genderMale	7.316e+02
hlab27statusNegative	7.963e+02
hlab27statusPositive	8.326e+02
age_at_prom	7.888e+02
diagnosisAxial SpA- nr-axSpA	8.256e+02
treatment_order2	9.872e+03
treatment_order3	8.604e+03

treatment_order4	8.635e+03
treatment_order5	6.863e+03
treatment_order6	6.373e+03
treatment_order7	5.152e+03
treatment_order8	8.285e+03
treatment_order9	6.581e+03
treatment_order10	7.914e+03
treatment_order11	5.952e+03
treatment_order14	8.782e+02
treatment_order15	1.756e+03
last_known_smoking_statussex-smoker	6.864e+02
last_known_smoking_statusnever	6.938e+02
last_known_smoking_statussmoker	6.996e+02
last_known_vaping_statussex-vaper	7.449e+02
last_known_vaping_statusnever	7.018e+02
last_known_vaping_statusvaper	6.893e+02
treatment_reclassifiedAnti-IL17	8.722e+03
treatment_reclassifiedAnti-TNF	1.005e+04
treatment_reclassifiedJAK Inhibitor	6.127e+03
time_in_years	7.447e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	8.219e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	8.871e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	9.928e+03
	t value
(Intercept)	12.459
genderMale	-3.825
hlab27statusNegative	2.191
hlab27statusPositive	0.264
age_at_prom	0.628
diagnosisAxial SpA- nr-axSpA	2.843
treatment_order2	-8.711
treatment_order3	-5.826
treatment_order4	-4.956
treatment_order5	-2.562
treatment_order6	-2.429
treatment_order7	-0.441
treatment_order8	1.453
treatment_order9	-1.875
treatment_order10	1.122
treatment_order11	2.152
treatment_order14	1.093
treatment_order15	-0.047
last_known_smoking_statussex-smoker	-0.662

last_known_smoking_statusnever	-1.755	
last_known_smoking_statussmoker	2.168	
last_known_vaping_statussex-vaper	-0.285	
last_known_vaping_statusnever	0.306	
last_known_vaping_statusvaper	1.879	
treatment_reclassifiedAnti-IL17	-8.084	
treatment_reclassifiedAnti-TNF	-11.727	
treatment_reclassifiedJAK Inhibitor	-5.537	
time_in_years	0.979	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.023	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.219	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	2.074	
	Pr(> t )	
(Intercept)	< 2e-16	***
genderMale	0.000142	***
hlab27statusNegative	0.028767	*
hlab27statusPositive	0.791479	
age_at_prom	0.530488	
diagnosisAxial SpA- nr-axSpA	0.004577	**
treatment_order2	< 2e-16	***
treatment_order3	5.88e-09	***
treatment_order4	7.32e-07	***
treatment_order5	0.010437	*
treatment_order6	0.015173	*
treatment_order7	0.659542	
treatment_order8	0.146312	
treatment_order9	0.060875	.
treatment_order10	0.261975	
treatment_order11	0.031445	*
treatment_order14	0.274730	
treatment_order15	0.962540	
last_known_smoking_statussex-smoker	0.508078	
last_known_smoking_statusnever	0.079665	.
last_known_smoking_statussmoker	0.030496	*
last_known_vaping_statussex-vaper	0.775660	
last_known_vaping_statusnever	0.759594	
last_known_vaping_statusvaper	0.060623	.
treatment_reclassifiedAnti-IL17	7.09e-16	***
treatment_reclassifiedAnti-TNF	< 2e-16	***
treatment_reclassifiedJAK Inhibitor	3.20e-08	***
time_in_years	0.327976	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	0.306351	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	0.222701	

```
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.038096 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
print(summary(model_treatment_diagnosis_back_pain_anytime_reduced, corr = FALSE))
```

```
Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: back_pain_anytime ~ gender + hlab27status + age_at_prom + diagnosis +
      treatment_order + last_known_smoking_status + last_known_vaping_status +
      treatment_reclassified + time_in_years + (time_in_years |      ttas_id)
Data: dataframe_sorted_and_reclassified_back_pain_anytime
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 49184.2
```

```
Scaled residuals:
      Min       1Q   Median       3Q      Max
-3.5340 -0.6201 -0.1000  0.5374  4.7615
```

```
Random effects:
 Groups   Name                Variance Std.Dev. Corr
ttas_id  (Intercept)          4.43717  2.106
          time_in_years      0.01232  0.111   -0.49
Residual                    3.14467  1.773
Number of obs: 11661, groups:  ttas_id, 870
```

```
Fixed effects:
              Estimate Std. Error      df t value
(Intercept)    4.729e+00  3.794e-01  8.298e+02  12.465
genderMale     -5.779e-01  1.513e-01  7.316e+02  -3.819
hlab27statusNegative
hlab27statusPositive
age_at_prom    3.549e-03  5.707e-03  7.896e+02   0.622
diagnosisAxial SpA- nr-axSpA
treatment_order2
treatment_order3
treatment_order4
treatment_order5
treatment_order6
treatment_order7
treatment_order8
```

treatment_order9	-7.290e-01	4.195e-01	6.641e+03	-1.738
treatment_order10	7.527e-01	7.443e-01	7.918e+03	1.011
treatment_order11	1.838e+00	8.613e-01	5.968e+03	2.134
treatment_order14	1.152e+00	1.048e+00	8.867e+02	1.099
treatment_order15	-1.318e-01	1.629e+00	1.773e+03	-0.081
last_known_smoking_statussex-smoker	-2.254e-01	3.009e-01	6.829e+02	-0.749
last_known_smoking_statusnever	-5.516e-01	2.999e-01	6.909e+02	-1.839
last_known_smoking_statussmoker	7.589e-01	3.620e-01	6.988e+02	2.096
last_known_vaping_statussex-vaper	-1.837e-01	6.603e-01	7.436e+02	-0.278
last_known_vaping_statusnever	1.172e-01	2.987e-01	6.993e+02	0.392
last_known_vaping_statusvaper	8.076e-01	4.211e-01	6.887e+02	1.918
treatment_reclassifiedAnti-IL17	-1.267e+00	1.546e-01	9.134e+03	-8.191
treatment_reclassifiedAnti-TNF	-1.308e+00	1.116e-01	1.004e+04	-11.721
treatment_reclassifiedJAK Inhibitor	-2.092e+00	3.945e-01	8.172e+03	-5.302
time_in_years	7.349e-03	8.070e-03	7.456e+02	0.911
	Pr(> t )			
(Intercept)	< 2e-16 ***			
genderMale	0.000145 ***			
hlab27statusNegative	0.029476 *			
hlab27statusPositive	0.830883			
age_at_prom	0.534125			
diagnosisAxial SpA- nr-axSpA	0.000892 ***			
treatment_order2	< 2e-16 ***			
treatment_order3	1.28e-08 ***			
treatment_order4	2.01e-06 ***			
treatment_order5	0.016145 *			
treatment_order6	0.016959 *			
treatment_order7	0.612649			
treatment_order8	0.119901			
treatment_order9	0.082297 .			
treatment_order10	0.311892			
treatment_order11	0.032893 *			
treatment_order14	0.271986			
treatment_order15	0.935532			
last_known_smoking_statussex-smoker	0.453978			
last_known_smoking_statusnever	0.066278 .			
last_known_smoking_statussmoker	0.036416 *			
last_known_vaping_statussex-vaper	0.780936			
last_known_vaping_statusnever	0.694854			
last_known_vaping_statusvaper	0.055529 .			
treatment_reclassifiedAnti-IL17	2.93e-16 ***			
treatment_reclassifiedAnti-TNF	< 2e-16 ***			
treatment_reclassifiedJAK Inhibitor	1.17e-07 ***			

```
time_in_years                0.362796
```

```
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anova(model_treatment_diagnosis_back_pain_anytime_full,
       model_treatment_diagnosis_back_pain_anytime_reduced)
```

```
refitting model(s) with ML (instead of REML)
```

```
Data: dataframe_sorted_and_reclassified_back_pain_anytime
```

```
Models:
```

```
model_treatment_diagnosis_back_pain_anytime_reduced: back_pain_anytime ~ gender + hlab27status
```

```
model_treatment_diagnosis_back_pain_anytime_full: back_pain_anytime ~ gender + hlab27status +
```

	npar	AIC	BIC	logLik
model_treatment_diagnosis_back_pain_anytime_reduced	32	49203	49439	-24570
model_treatment_diagnosis_back_pain_anytime_full	35	49203	49461	-24567

	deviance	Chisq	Df
model_treatment_diagnosis_back_pain_anytime_reduced	49139		
model_treatment_diagnosis_back_pain_anytime_full	49133	5.9012	3

```
Pr(>Chisq)
```

```
model_treatment_diagnosis_back_pain_anytime_reduced
```

```
model_treatment_diagnosis_back_pain_anytime_full      0.1165
```

## lme4 code for treatment and gender: Back Pain Anytime

```
model_treatment_gender_back_pain_anytime_full <- lmer(
  back_pain_anytime ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_back_pain_anytime,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_gender_back_pain_anytime_reduced <- lmer(
  back_pain_anytime ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
```

```

treatment_reclassified +
time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_back_pain_anytime,
  control = lmerControl(optimizer = "bobyqa",
                        optCtrl = list(maxfun = 2e5)))

print(summary(model_treatment_gender_back_pain_anytime_full, corr = FALSE))

```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: back_pain_anytime ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified * gender + time_in_years + (time_in_years |
  ttas_id)
Data: dataframe_sorted_and_reclassified_back_pain_anytime
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 49185.8

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.5341	-0.6201	-0.0999	0.5371	4.7679

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.43413	2.1057	
	time_in_years	0.01236	0.1112	-0.49
Residual		3.14515	1.7735	

Number of obs: 11661, groups: ttas\_id, 870

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	4.714e+00	3.807e-01	8.395e+02
genderMale	-5.584e-01	1.559e-01	8.188e+02
hlab27statusNegative	5.733e-01	2.631e-01	7.973e+02
hlab27statusPositive	4.602e-02	2.138e-01	8.314e+02
age_at_prom	3.560e-03	5.707e-03	7.889e+02
diagnosisAxial SpA- nr-axSpA	5.818e-01	1.743e-01	7.598e+02
treatment_order2	-1.057e+00	1.227e-01	9.926e+03
treatment_order3	-6.525e-01	1.142e-01	8.710e+03
treatment_order4	-7.082e-01	1.484e-01	8.673e+03

treatment_order5	-3.859e-01	1.582e-01	6.914e+03
treatment_order6	-4.736e-01	1.972e-01	6.319e+03
treatment_order7	-1.466e-01	2.809e-01	5.148e+03
treatment_order8	5.566e-01	3.604e-01	8.221e+03
treatment_order9	-7.304e-01	4.201e-01	6.607e+03
treatment_order10	7.324e-01	7.478e-01	7.903e+03
treatment_order11	1.788e+00	8.710e-01	5.828e+03
treatment_order14	1.146e+00	1.050e+00	8.809e+02
treatment_order15	-1.921e-01	1.637e+00	1.784e+03
last_known_smoking_statussex-smoker	-2.227e-01	3.011e-01	6.840e+02
last_known_smoking_statusnever	-5.506e-01	3.001e-01	6.919e+02
last_known_smoking_statussmoker	7.615e-01	3.623e-01	6.994e+02
last_known_vaping_statussex-vaper	-1.836e-01	6.606e-01	7.438e+02
last_known_vaping_statusnever	1.161e-01	2.990e-01	7.005e+02
last_known_vaping_statusvaper	8.102e-01	4.213e-01	6.891e+02
treatment_reclassifiedAnti-IL17	-1.211e+00	2.314e-01	7.458e+03
treatment_reclassifiedAnti-TNF	-1.265e+00	1.415e-01	9.723e+03
treatment_reclassifiedJAK Inhibitor	-2.024e+00	4.733e-01	7.152e+03
time_in_years	7.425e-03	8.076e-03	7.435e+02
genderMale:treatment_reclassifiedAnti-IL17	-8.074e-02	2.663e-01	6.384e+03
genderMale:treatment_reclassifiedAnti-TNF	-6.121e-02	1.249e-01	8.501e+03
genderMale:treatment_reclassifiedJAK Inhibitor	-1.556e-01	7.953e-01	8.071e+03
t value Pr(> t )			
(Intercept)	12.382	< 2e-16	***
genderMale	-3.581	0.000362	***
hlab27statusNegative	2.179	0.029621	*
hlab27statusPositive	0.215	0.829649	
age_at_prom	0.624	0.532970	
diagnosisAxial SpA- nr-axSpA	3.339	0.000882	***
treatment_order2	-8.617	< 2e-16	***
treatment_order3	-5.712	1.15e-08	***
treatment_order4	-4.773	1.85e-06	***
treatment_order5	-2.440	0.014728	*
treatment_order6	-2.401	0.016360	*
treatment_order7	-0.522	0.601841	
treatment_order8	1.544	0.122538	
treatment_order9	-1.739	0.082145	.
treatment_order10	0.979	0.327424	
treatment_order11	2.053	0.040103	*
treatment_order14	1.092	0.274971	
treatment_order15	-0.117	0.906575	
last_known_smoking_statussex-smoker	-0.739	0.459858	
last_known_smoking_statusnever	-1.835	0.066983	.



last_known_smoking_statussmoker	2.102	0.035913	*
last_known_vaping_statussex-vaper	-0.278	0.781185	
last_known_vaping_statusnever	0.388	0.697830	
last_known_vaping_statusvaper	1.923	0.054898	.
treatment_reclassifiedAnti-IL17	-5.234	1.70e-07	***
treatment_reclassifiedAnti-TNF	-8.940	< 2e-16	***
treatment_reclassifiedJAK Inhibitor	-4.277	1.92e-05	***
time_in_years	0.919	0.358191	
genderMale:treatment_reclassifiedAnti-IL17	-0.303	0.761761	
genderMale:treatment_reclassifiedAnti-TNF	-0.490	0.624094	
genderMale:treatment_reclassifiedJAK Inhibitor	-0.196	0.844936	

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_gender_back_pain_anytime_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]

Formula: back\_pain\_anytime ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status + treatment\_reclassified + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_back\_pain\_anytime

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 49184.2

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.5340	-0.6201	-0.1000	0.5374	4.7615

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	4.43717	2.106	
	time_in_years	0.01232	0.111	-0.49
Residual		3.14467	1.773	

Number of obs: 11661, groups: ttas\_id, 870

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	4.729e+00	3.794e-01	8.298e+02	12.465
genderMale	-5.779e-01	1.513e-01	7.316e+02	-3.819
hlab27statusNegative	5.735e-01	2.630e-01	7.972e+02	2.181

hlab27statusPositive	4.567e-02	2.138e-01	8.319e+02	0.214
age_at_prom	3.549e-03	5.707e-03	7.896e+02	0.622
diagnosisAxial SpA- nr-axSpA	5.812e-01	1.742e-01	7.602e+02	3.336
treatment_order2	-1.055e+00	1.226e-01	9.901e+03	-8.611
treatment_order3	-6.492e-01	1.140e-01	8.758e+03	-5.695
treatment_order4	-7.018e-01	1.476e-01	8.753e+03	-4.755
treatment_order5	-3.797e-01	1.578e-01	6.973e+03	-2.406
treatment_order6	-4.697e-01	1.967e-01	6.371e+03	-2.388
treatment_order7	-1.411e-01	2.786e-01	5.105e+03	-0.506
treatment_order8	5.588e-01	3.592e-01	8.327e+03	1.555
treatment_order9	-7.290e-01	4.195e-01	6.641e+03	-1.738
treatment_order10	7.527e-01	7.443e-01	7.918e+03	1.011
treatment_order11	1.838e+00	8.613e-01	5.968e+03	2.134
treatment_order14	1.152e+00	1.048e+00	8.867e+02	1.099
treatment_order15	-1.318e-01	1.629e+00	1.773e+03	-0.081
last_known_smoking_statussex-smoker	-2.254e-01	3.009e-01	6.829e+02	-0.749
last_known_smoking_statusnever	-5.516e-01	2.999e-01	6.909e+02	-1.839
last_known_smoking_statussmoker	7.589e-01	3.620e-01	6.988e+02	2.096
last_known_vaping_statussex-vaper	-1.837e-01	6.603e-01	7.436e+02	-0.278
last_known_vaping_statusnever	1.172e-01	2.987e-01	6.993e+02	0.392
last_known_vaping_statusvaper	8.076e-01	4.211e-01	6.887e+02	1.918
treatment_reclassifiedAnti-IL17	-1.267e+00	1.546e-01	9.134e+03	-8.191
treatment_reclassifiedAnti-TNF	-1.308e+00	1.116e-01	1.004e+04	-11.721
treatment_reclassifiedJAK Inhibitor	-2.092e+00	3.945e-01	8.172e+03	-5.302
time_in_years	7.349e-03	8.070e-03	7.456e+02	0.911
	Pr(> t )			
(Intercept)	< 2e-16 ***			
genderMale	0.000145 ***			
hlab27statusNegative	0.029476 *			
hlab27statusPositive	0.830883			
age_at_prom	0.534125			
diagnosisAxial SpA- nr-axSpA	0.000892 ***			
treatment_order2	< 2e-16 ***			
treatment_order3	1.28e-08 ***			
treatment_order4	2.01e-06 ***			
treatment_order5	0.016145 *			
treatment_order6	0.016959 *			
treatment_order7	0.612649			
treatment_order8	0.119901			
treatment_order9	0.082297 .			
treatment_order10	0.311892			
treatment_order11	0.032893 *			
treatment_order14	0.271986			

```

treatment_order15                0.935532
last_known_smoking_statussex-smoker 0.453978
last_known_smoking_statusnever     0.066278 .
last_known_smoking_statussmoker    0.036416 *
last_known_vaping_statussex-vaper  0.780936
last_known_vaping_statusnever      0.694854
last_known_vaping_statusvaper      0.055529 .
treatment_reclassifiedAnti-IL17     2.93e-16 ***
treatment_reclassifiedAnti-TNF      < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 1.17e-07 ***
time_in_years                      0.362796
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_back_pain_anytime_full,
       model_treatment_gender_back_pain_anytime_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_back\_pain\_anytime

Models:

model\_treatment\_gender\_back\_pain\_anytime\_reduced: back\_pain\_anytime ~ gender + hlab27status

model\_treatment\_gender\_back\_pain\_anytime\_full: back\_pain\_anytime ~ gender + hlab27status + age

	npar	AIC	BIC	logLik
model_treatment_gender_back_pain_anytime_reduced	32	49203	49439	-24570
model_treatment_gender_back_pain_anytime_full	35	49209	49467	-24570

  

	deviance	Chisq	Df	Pr(>Chisq)
model_treatment_gender_back_pain_anytime_reduced	49139			
model_treatment_gender_back_pain_anytime_full	49139	0.2953	3	0.9609

## AsQoL

### lme4 code for treatment and diagnosis: AsQoL

```

model_treatment_diagnosis_asqol_full <- lmer(
  as_qol ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +

```

```

treatment_reclassified * diagnosis +
time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_asqol,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```

```

model_treatment_diagnosis_asqol_reduced <- lmer(
  as_qol ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status +
  treatment_reclassified +
  time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_asqol,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```

```

print(summary(model_treatment_diagnosis_asqol_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]

Formula:

```

as_qol ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified *
  diagnosis + time_in_years + (time_in_years | ttas_id)

```

Data: dataframe\_sorted\_and\_reclassified\_asqol

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 48179.9

Scaled residuals:

	Min	1Q	Median	3Q	Max
	-4.8977	-0.5333	-0.0434	0.5172	4.6862

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	24.4356	4.9432	
	time_in_years	0.0864	0.2939	-0.47
Residual		7.4279	2.7254	

Number of obs: 9220, groups: ttas\_id, 867

Fixed effects:

	Estimate
(Intercept)	8.466e+00
genderMale	-1.909e+00
hlab27statusNegative	1.155e+00
hlab27statusPositive	-2.180e-01
age_at_prom	1.310e-02
diagnosisAxial SpA- nr-axSpA	4.542e-01
treatment_order2	-9.700e-01
treatment_order3	-2.186e-01
treatment_order4	-3.882e-01
treatment_order5	-9.550e-02
treatment_order6	1.461e-01
treatment_order7	7.635e-02
treatment_order8	6.734e-01
treatment_order9	8.397e-01
treatment_order10	2.268e+00
treatment_order11	2.773e+00
treatment_order12	2.818e+00
treatment_order14	1.853e+00
treatment_order15	8.963e-01
last_known_smoking_statussex-smoker	2.508e-01
last_known_smoking_statusnever	-8.140e-01
last_known_smoking_statussmoker	2.515e+00
last_known_vaping_statussex-vaper	-6.820e-01
last_known_vaping_statusnever	-1.773e-01
last_known_vaping_statusvaper	2.085e+00
treatment_reclassifiedAnti-IL17	-1.746e+00
treatment_reclassifiedAnti-TNF	-1.935e+00
treatment_reclassifiedJAK Inhibitor	-4.668e+00
time_in_years	6.141e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	-5.476e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-6.128e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	3.042e+00
	Std. Error
(Intercept)	8.654e-01
genderMale	3.502e-01
hlab27statusNegative	6.041e-01
hlab27statusPositive	4.932e-01
age_at_prom	1.304e-02
diagnosisAxial SpA- nr-axSpA	4.065e-01
treatment_order2	2.360e-01
treatment_order3	2.274e-01
treatment_order4	2.858e-01

treatment_order5	3.081e-01
treatment_order6	3.683e-01
treatment_order7	4.962e-01
treatment_order8	6.166e-01
treatment_order9	7.621e-01
treatment_order10	1.354e+00
treatment_order11	1.570e+00
treatment_order12	2.400e+00
treatment_order14	2.148e+00
treatment_order15	3.095e+00
last_known_smoking_statussex-smoker	6.984e-01
last_known_smoking_statusnever	6.945e-01
last_known_smoking_statussmoker	8.370e-01
last_known_vaping_statussex-vaper	1.533e+00
last_known_vaping_statusnever	6.917e-01
last_known_vaping_statusvaper	9.819e-01
treatment_reclassifiedAnti-IL17	2.917e-01
treatment_reclassifiedAnti-TNF	2.187e-01
treatment_reclassifiedJAK Inhibitor	8.124e-01
time_in_years	1.888e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	6.169e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	2.907e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.350e+00
df	
(Intercept)	8.658e+02
genderMale	7.759e+02
hlab27statusNegative	8.089e+02
hlab27statusPositive	8.597e+02
age_at_prom	8.361e+02
diagnosisAxial SpA- nr-axSpA	8.150e+02
treatment_order2	8.686e+03
treatment_order3	7.973e+03
treatment_order4	8.079e+03
treatment_order5	7.160e+03
treatment_order6	7.210e+03
treatment_order7	7.142e+03
treatment_order8	7.803e+03
treatment_order9	8.319e+03
treatment_order10	7.591e+03
treatment_order11	6.871e+03
treatment_order12	6.329e+03
treatment_order14	1.082e+03
treatment_order15	1.516e+03

last_known_smoking_statussex-smoker	7.357e+02
last_known_smoking_statusnever	7.370e+02
last_known_smoking_statussmoker	7.388e+02
last_known_vaping_statussex-vaper	8.010e+02
last_known_vaping_statusnever	7.433e+02
last_known_vaping_statusvaper	7.350e+02
treatment_reclassifiedAnti-IL17	8.582e+03
treatment_reclassifiedAnti-TNF	8.852e+03
treatment_reclassifiedJAK Inhibitor	6.646e+03
time_in_years	9.406e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	7.501e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	7.827e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	7.924e+03
	t value
(Intercept)	9.783
genderMale	-5.453
hlab27statusNegative	1.912
hlab27statusPositive	-0.442
age_at_prom	1.005
diagnosisAxial SpA- nr-axSpA	1.117
treatment_order2	-4.110
treatment_order3	-0.961
treatment_order4	-1.359
treatment_order5	-0.310
treatment_order6	0.397
treatment_order7	0.154
treatment_order8	1.092
treatment_order9	1.102
treatment_order10	1.675
treatment_order11	1.766
treatment_order12	1.174
treatment_order14	0.863
treatment_order15	0.290
last_known_smoking_statussex-smoker	0.359
last_known_smoking_statusnever	-1.172
last_known_smoking_statussmoker	3.005
last_known_vaping_statussex-vaper	-0.445
last_known_vaping_statusnever	-0.256
last_known_vaping_statusvaper	2.123
treatment_reclassifiedAnti-IL17	-5.986
treatment_reclassifiedAnti-TNF	-8.846
treatment_reclassifiedJAK Inhibitor	-5.746
time_in_years	0.325

```

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17      -0.888
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF      -2.108
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor  2.253
                                                                    Pr(>|t|)
(Intercept)                                                         < 2e-16 ***
genderMale                                                           6.65e-08 ***
hlab27statusNegative                                                0.05618 .
hlab27statusPositive                                                0.65860
age_at_prom                                                         0.31521
diagnosisAxial SpA- nr-axSpA                                       0.26415
treatment_order2                                                    3.99e-05 ***
treatment_order3                                                    0.33659
treatment_order4                                                    0.17434
treatment_order5                                                    0.75659
treatment_order6                                                    0.69169
treatment_order7                                                    0.87772
treatment_order8                                                    0.27481
treatment_order9                                                    0.27058
treatment_order10                                                   0.09388 .
treatment_order11                                                   0.07741 .
treatment_order12                                                   0.24041
treatment_order14                                                   0.38844
treatment_order15                                                   0.77212
last_known_smoking_statussex-smoker                                0.71962
last_known_smoking_statusnever                                     0.24153
last_known_smoking_statussmoker                                    0.00275 **
last_known_vaping_statussex-vaper                                  0.65658
last_known_vaping_statusnever                                      0.79781
last_known_vaping_statusvaper                                      0.03407 *
treatment_reclassifiedAnti-IL17                                     2.23e-09 ***
treatment_reclassifiedAnti-TNF                                      < 2e-16 ***
treatment_reclassifiedJAK Inhibitor                                9.56e-09 ***
time_in_years                                                       0.74502
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17      0.37469
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF      0.03506 *
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor  0.02426 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_asqol_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [



```

lmerModLmerTest]
Formula:
as_qol ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
  time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_asqol
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 48193.7

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.9125	-0.5298	-0.0430	0.5175	4.6843

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	24.39966	4.940	
	time_in_years	0.08642	0.294	-0.47
Residual		7.43647	2.727	

Number of obs: 9220, groups: ttas\_id, 867

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	8.50496	0.86474	865.07850	9.835
genderMale	-1.91800	0.34991	775.70080	-5.481
hlab27statusNegative	1.15325	0.60361	808.18522	1.911
hlab27statusPositive	-0.20761	0.49282	858.51685	-0.421
age_at_prom	0.01300	0.01303	835.42798	0.998
diagnosisAxial SpA- nr-axSpA	0.28468	0.39735	769.87916	0.716
treatment_order2	-1.00955	0.23493	8715.40608	-4.297
treatment_order3	-0.28013	0.22578	8068.80990	-1.241
treatment_order4	-0.35073	0.28345	8189.11287	-1.237
treatment_order5	-0.10366	0.30679	7265.57543	-0.338
treatment_order6	0.11578	0.36625	7253.74914	0.316
treatment_order7	-0.04819	0.49485	7147.52359	-0.097
treatment_order8	0.61181	0.61509	7849.93608	0.995
treatment_order9	0.85453	0.76058	8377.18386	1.124
treatment_order10	1.97999	1.35078	7572.34466	1.466
treatment_order11	2.67885	1.57034	6867.73248	1.706
treatment_order12	2.63097	2.40043	6337.30685	1.096
treatment_order14	1.63258	2.14763	1080.87246	0.760
treatment_order15	0.72745	3.09457	1511.95942	0.235
last_known_smoking_statussex-smoker	0.26022	0.69735	733.44234	0.373

last_known_smoking_statusnever	-0.81183	0.69354	735.17338	-1.171
last_known_smoking_statussmoker	2.50627	0.83600	737.51593	2.998
last_known_vaping_statussex-vaper	-0.66045	1.53204	800.42621	-0.431
last_known_vaping_statusnever	-0.18467	0.69071	741.41644	-0.267
last_known_vaping_statusvaper	2.09002	0.98092	734.12221	2.131
treatment_reclassifiedAnti-IL17	-1.82701	0.27467	8657.41305	-6.652
treatment_reclassifiedAnti-TNF	-2.04685	0.21378	8846.10361	-9.575
treatment_reclassifiedJAK Inhibitor	-3.54766	0.67279	7682.97642	-5.273
time_in_years	0.00617	0.01887	936.29621	0.327

Pr(>|t|)

(Intercept)	< 2e-16 ***
genderMale	5.71e-08 ***
hlab27statusNegative	0.05641 .
hlab27statusPositive	0.67366
age_at_prom	0.31876
diagnosisAxial SpA- nr-axSpA	0.47394
treatment_order2	1.75e-05 ***
treatment_order3	0.21475
treatment_order4	0.21599
treatment_order5	0.73547
treatment_order6	0.75191
treatment_order7	0.92243
treatment_order8	0.31992
treatment_order9	0.26124
treatment_order10	0.14274
treatment_order11	0.08807 .
treatment_order12	0.27310
treatment_order14	0.44731
treatment_order15	0.81418
last_known_smoking_statussex-smoker	0.70914
last_known_smoking_statusnever	0.24216
last_known_smoking_statussmoker	0.00281 **
last_known_vaping_statussex-vaper	0.66652
last_known_vaping_statusnever	0.78926
last_known_vaping_statusvaper	0.03345 *
treatment_reclassifiedAnti-IL17	3.07e-11 ***
treatment_reclassifiedAnti-TNF	< 2e-16 ***
treatment_reclassifiedJAK Inhibitor	1.38e-07 ***
time_in_years	0.74374

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
anova(model_treatment_diagnosis_asqol_full,
      model_treatment_diagnosis_asqol_reduced)
```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_asqol

Models:

model\_treatment\_diagnosis\_asqol\_reduced: as\_qol ~ gender + hlab27status + age\_at\_prom + diagnosis

model\_treatment\_diagnosis\_asqol\_full: as\_qol ~ gender + hlab27status + age\_at\_prom + diagnosis

	npar	AIC	BIC	logLik	deviance	Chisq
model_treatment_diagnosis_asqol_reduced	33	48257	48493	-24096	48191	
model_treatment_diagnosis_asqol_full	36	48252	48509	-24090	48180	11.169

Df Pr(>Chisq)

model\_treatment\_diagnosis\_asqol\_reduced

model\_treatment\_diagnosis\_asqol\_full 3 0.01085 \*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## lme4 code for treatment and gender: AsQoL

```
model_treatment_gender_asqol_full <- lmer(
  as_qol ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_asqol,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_gender_asqol_reduced <- lmer(
  as_qol ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_asqol,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_gender_asqol_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```
as_qol ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +  
      last_known_smoking_status + last_known_vaping_status + treatment_reclassified *  
      gender + time_in_years + (time_in_years | ttas_id)
```

Data: dataframe\_sorted\_and\_reclassified\_asqol

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 48184

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.9095	-0.5309	-0.0438	0.5185	4.6847

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	24.51922	4.9517	
	time_in_years	0.08603	0.2933	-0.47
Residual		7.43153	2.7261	

Number of obs: 9220, groups: ttas\_id, 867

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	8.596e+00	8.676e-01	8.707e+02
genderMale	-2.032e+00	3.572e-01	8.294e+02
hlab27statusNegative	1.163e+00	6.047e-01	8.086e+02
hlab27statusPositive	-2.090e-01	4.935e-01	8.580e+02
age_at_prom	1.291e-02	1.305e-02	8.352e+02
diagnosisAxial SpA- nr-axSpA	2.734e-01	3.981e-01	7.698e+02
treatment_order2	-1.004e+00	2.349e-01	8.713e+03
treatment_order3	-2.520e-01	2.261e-01	8.037e+03
treatment_order4	-3.417e-01	2.852e-01	8.155e+03
treatment_order5	-7.523e-02	3.075e-01	7.218e+03
treatment_order6	1.861e-01	3.672e-01	7.195e+03
treatment_order7	5.239e-03	4.978e-01	7.119e+03
treatment_order8	6.743e-01	6.174e-01	7.771e+03
treatment_order9	9.517e-01	7.615e-01	8.352e+03
treatment_order10	1.871e+00	1.359e+00	7.569e+03
treatment_order11	2.757e+00	1.583e+00	6.835e+03

treatment_order12	2.561e+00	2.401e+00	6.309e+03
treatment_order14	1.554e+00	2.148e+00	1.073e+03
treatment_order15	7.835e-01	3.101e+00	1.526e+03
last_known_smoking_statussex-smoker	2.962e-01	6.987e-01	7.337e+02
last_known_smoking_statusnever	-7.660e-01	6.949e-01	7.354e+02
last_known_smoking_statussmoker	2.562e+00	8.377e-01	7.379e+02
last_known_vaping_statussex-vaper	-7.099e-01	1.534e+00	8.001e+02
last_known_vaping_statusnever	-2.343e-01	6.921e-01	7.420e+02
last_known_vaping_statusvaper	2.026e+00	9.827e-01	7.342e+02
treatment_reclassifiedAnti-IL17	-1.969e+00	4.133e-01	7.724e+03
treatment_reclassifiedAnti-TNF	-2.356e+00	2.747e-01	8.517e+03
treatment_reclassifiedJAK Inhibitor	-2.870e+00	8.228e-01	7.094e+03
time_in_years	5.767e-03	1.886e-02	9.349e+02
genderMale:treatment_reclassifiedAnti-IL17	1.626e-01	4.710e-01	7.333e+03
genderMale:treatment_reclassifiedAnti-TNF	4.769e-01	2.527e-01	7.667e+03
genderMale:treatment_reclassifiedJAK Inhibitor	-2.493e+00	1.344e+00	7.255e+03
t value Pr(> t )			
(Intercept)	9.908	< 2e-16	***
genderMale	-5.689	1.77e-08	***
hlab27statusNegative	1.924	0.054732	.
hlab27statusPositive	-0.423	0.672075	
age_at_prom	0.990	0.322559	
diagnosisAxial SpA- nr-axSpA	0.687	0.492378	
treatment_order2	-4.272	1.96e-05	***
treatment_order3	-1.115	0.265021	
treatment_order4	-1.198	0.230929	
treatment_order5	-0.245	0.806729	
treatment_order6	0.507	0.612248	
treatment_order7	0.011	0.991602	
treatment_order8	1.092	0.274792	
treatment_order9	1.250	0.211421	
treatment_order10	1.377	0.168612	
treatment_order11	1.742	0.081619	.
treatment_order12	1.067	0.286107	
treatment_order14	0.724	0.469411	
treatment_order15	0.253	0.800564	
last_known_smoking_statussex-smoker	0.424	0.671688	
last_known_smoking_statusnever	-1.102	0.270675	
last_known_smoking_statussmoker	3.058	0.002307	**
last_known_vaping_statussex-vaper	-0.463	0.643720	
last_known_vaping_statusnever	-0.338	0.735089	
last_known_vaping_statusvaper	2.062	0.039567	*
treatment_reclassifiedAnti-IL17	-4.764	1.93e-06	***

```

treatment_reclassifiedAnti-TNF          -8.578 < 2e-16 ***
treatment_reclassifiedJAK Inhibitor      -3.489 0.000488 ***
time_in_years                           0.306 0.759872
genderMale:treatment_reclassifiedAnti-IL17 0.345 0.729835
genderMale:treatment_reclassifiedAnti-TNF 1.887 0.059139 .
genderMale:treatment_reclassifiedJAK Inhibitor -1.855 0.063684 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_gender_asqol_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
as_qol ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
  time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_asqol
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 48193.7

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.9125	-0.5298	-0.0430	0.5175	4.6843

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	24.39966	4.940	
	time_in_years	0.08642	0.294	-0.47
Residual		7.43647	2.727	

Number of obs: 9220, groups: ttas\_id, 867

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	8.50496	0.86474	865.07850	9.835
genderMale	-1.91800	0.34991	775.70080	-5.481
hlab27statusNegative	1.15325	0.60361	808.18522	1.911
hlab27statusPositive	-0.20761	0.49282	858.51685	-0.421
age_at_prom	0.01300	0.01303	835.42798	0.998
diagnosisAxial SpA- nr-axSpA	0.28468	0.39735	769.87916	0.716
treatment_order2	-1.00955	0.23493	8715.40608	-4.297

treatment_order3	-0.28013	0.22578	8068.80990	-1.241
treatment_order4	-0.35073	0.28345	8189.11287	-1.237
treatment_order5	-0.10366	0.30679	7265.57543	-0.338
treatment_order6	0.11578	0.36625	7253.74914	0.316
treatment_order7	-0.04819	0.49485	7147.52359	-0.097
treatment_order8	0.61181	0.61509	7849.93608	0.995
treatment_order9	0.85453	0.76058	8377.18386	1.124
treatment_order10	1.97999	1.35078	7572.34466	1.466
treatment_order11	2.67885	1.57034	6867.73248	1.706
treatment_order12	2.63097	2.40043	6337.30685	1.096
treatment_order14	1.63258	2.14763	1080.87246	0.760
treatment_order15	0.72745	3.09457	1511.95942	0.235
last_known_smoking_statussex-smoker	0.26022	0.69735	733.44234	0.373
last_known_smoking_statusnever	-0.81183	0.69354	735.17338	-1.171
last_known_smoking_statussmoker	2.50627	0.83600	737.51593	2.998
last_known_vaping_statussex-vaper	-0.66045	1.53204	800.42621	-0.431
last_known_vaping_statusnever	-0.18467	0.69071	741.41644	-0.267
last_known_vaping_statusvaper	2.09002	0.98092	734.12221	2.131
treatment_reclassifiedAnti-IL17	-1.82701	0.27467	8657.41305	-6.652
treatment_reclassifiedAnti-TNF	-2.04685	0.21378	8846.10361	-9.575
treatment_reclassifiedJAK Inhibitor	-3.54766	0.67279	7682.97642	-5.273
time_in_years	0.00617	0.01887	936.29621	0.327
	Pr(> t )			
(Intercept)	< 2e-16 ***			
genderMale	5.71e-08 ***			
hlab27statusNegative	0.05641 .			
hlab27statusPositive	0.67366			
age_at_prom	0.31876			
diagnosisAxial SpA- nr-axSpA	0.47394			
treatment_order2	1.75e-05 ***			
treatment_order3	0.21475			
treatment_order4	0.21599			
treatment_order5	0.73547			
treatment_order6	0.75191			
treatment_order7	0.92243			
treatment_order8	0.31992			
treatment_order9	0.26124			
treatment_order10	0.14274			
treatment_order11	0.08807 .			
treatment_order12	0.27310			
treatment_order14	0.44731			
treatment_order15	0.81418			
last_known_smoking_statussex-smoker	0.70914			

```

last_known_smoking_statusnever      0.24216
last_known_smoking_statussmoker      0.00281 **
last_known_vaping_statussex-vaper    0.66652
last_known_vaping_statusnever        0.78926
last_known_vaping_statusvaper        0.03345 *
treatment_reclassifiedAnti-IL17      3.07e-11 ***
treatment_reclassifiedAnti-TNF        < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 1.38e-07 ***
time_in_years                        0.74374
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_asqol_full,
       model_treatment_gender_asqol_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_asqol

Models:

model\_treatment\_gender\_asqol\_reduced: as\_qol ~ gender + hlab27status + age\_at\_prom + diagnosis

model\_treatment\_gender\_asqol\_full: as\_qol ~ gender + hlab27status + age\_at\_prom + diagnosis +

	npars	AIC	BIC	logLik	deviance	Chisq	Df
model_treatment_gender_asqol_reduced	33	48257	48493	-24096		48191	
model_treatment_gender_asqol_full	36	48256	48512	-24092		48184	7.9314 3

Pr(>Chisq)

model\_treatment\_gender\_asqol\_reduced

model\_treatment\_gender\_asqol\_full 0.04745 \*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## Jenkins Sleep

### lme4 code for treatment and diagnosis: Jenkins Sleep

```

model_treatment_diagnosis_jenkins_sleep_1_full <- lmer(
  jenkins_sleep_1 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +

```



```

treatment_reclassified * diagnosis +
time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_jenkins_sleep_1,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

model_treatment_diagnosis_jenkins_sleep_2_full <- lmer(
  jenkins_sleep_2 ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status +
  treatment_reclassified * diagnosis +
  time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_jenkins_sleep_2,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

model_treatment_diagnosis_jenkins_sleep_3_full <- lmer(
  jenkins_sleep_3 ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status +
  treatment_reclassified * diagnosis +
  time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_jenkins_sleep_3,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

model_treatment_diagnosis_jenkins_sleep_4_full <- lmer(
  jenkins_sleep_4 ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status +
  treatment_reclassified * diagnosis +
  time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_jenkins_sleep_4,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

model_treatment_diagnosis_jenkins_sleep_1_reduced <- lmer(
  jenkins_sleep_1 ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status +
  treatment_reclassified +
  time_in_years + (time_in_years | ttas_id),

```

```

        data = dataframe_sorted_and_reclassified_jenkins_sleep_1,
        control = lmerControl(optimizer = "bobyqa",
                               optCtrl = list(maxfun = 2e5)))

model_treatment_diagnosis_jenkins_sleep_2_reduced <- lmer(
  jenkins_sleep_2 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_jenkins_sleep_2,
    control = lmerControl(optimizer = "bobyqa",
                           optCtrl = list(maxfun = 2e5)))

model_treatment_diagnosis_jenkins_sleep_3_reduced <- lmer(
  jenkins_sleep_3 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_jenkins_sleep_3,
    control = lmerControl(optimizer = "bobyqa",
                           optCtrl = list(maxfun = 2e5)))

model_treatment_diagnosis_jenkins_sleep_4_reduced <- lmer(
  jenkins_sleep_4 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_jenkins_sleep_4,
    control = lmerControl(optimizer = "bobyqa",
                           optCtrl = list(maxfun = 2e5)))

print(summary(model_treatment_diagnosis_jenkins_sleep_1_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula: jenkins\_sleep\_1 ~ gender + hlab27status + age\_at\_prom + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
treatment\_reclassified \* diagnosis + time\_in\_years + (time\_in\_years |

```

ttas_id)
Data: dataframe_sorted_and_reclassified_jenkins_sleep_1
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 24984.9

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.2524	-0.5028	-0.1118	0.4751	4.2610

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.138572	1.46239	
	time_in_years	0.004627	0.06803	-0.51
Residual		1.060648	1.02988	

Number of obs: 7756, groups: ttas\_id, 854

Fixed effects:

	Estimate
(Intercept)	2.132e+00
genderMale	-2.780e-01
hlab27statusNegative	2.978e-01
hlab27statusPositive	1.123e-01
age_at_prom	-9.121e-03
diagnosisAxial SpA- nr-axSpA	1.865e-01
treatment_order2	-1.275e-01
treatment_order3	5.091e-02
treatment_order4	-1.226e-01
treatment_order5	2.680e-02
treatment_order6	1.064e-01
treatment_order7	1.539e-01
treatment_order8	3.149e-01
treatment_order9	3.566e-01
treatment_order10	8.435e-01
treatment_order11	3.573e-01
treatment_order12	2.316e-01
treatment_order14	4.855e-01
treatment_order15	1.543e-01
last_known_smoking_statussex-smoker	1.472e-01
last_known_smoking_statusnever	-1.156e-01
last_known_smoking_statussmoker	6.357e-01
last_known_vaping_statussex-vaper	-7.161e-01
last_known_vaping_statusnever	-2.326e-01

last_known_vaping_statusvaper	-1.019e-01
treatment_reclassifiedAnti-IL17	-3.408e-01
treatment_reclassifiedAnti-TNF	-2.314e-01
treatment_reclassifiedJAK Inhibitor	3.545e-02
time_in_years	1.753e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	-1.171e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-7.652e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	-3.214e-01
	Std. Error
(Intercept)	2.758e-01
genderMale	1.066e-01
hlab27statusNegative	1.851e-01
hlab27statusPositive	1.520e-01
age_at_prom	4.020e-03
diagnosisAxial SpA- nr-axSpA	1.281e-01
treatment_order2	9.351e-02
treatment_order3	8.986e-02
treatment_order4	1.085e-01
treatment_order5	1.152e-01
treatment_order6	1.342e-01
treatment_order7	1.756e-01
treatment_order8	2.227e-01
treatment_order9	2.786e-01
treatment_order10	5.356e-01
treatment_order11	5.547e-01
treatment_order12	8.771e-01
treatment_order14	6.794e-01
treatment_order15	8.973e-01
last_known_smoking_statussex-smoker	2.138e-01
last_known_smoking_statusnever	2.128e-01
last_known_smoking_statussmoker	2.572e-01
last_known_vaping_statussex-vaper	4.733e-01
last_known_vaping_statusnever	2.132e-01
last_known_vaping_statusvaper	3.009e-01
treatment_reclassifiedAnti-IL17	1.074e-01
treatment_reclassifiedAnti-TNF	8.424e-02
treatment_reclassifiedJAK Inhibitor	2.883e-01
time_in_years	5.585e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	2.198e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.072e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	4.901e-01
	df
(Intercept)	8.399e+02

genderMale	7.480e+02
hlab27statusNegative	7.552e+02
hlab27statusPositive	7.750e+02
age_at_prom	8.079e+02
diagnosisAxial SpA- nr-axSpA	7.932e+02
treatment_order2	6.305e+03
treatment_order3	5.621e+03
treatment_order4	5.999e+03
treatment_order5	5.161e+03
treatment_order6	4.239e+03
treatment_order7	3.673e+03
treatment_order8	4.137e+03
treatment_order9	2.820e+03
treatment_order10	4.238e+03
treatment_order11	3.012e+03
treatment_order12	6.307e+03
treatment_order14	9.614e+02
treatment_order15	7.670e+02
last_known_smoking_statussex-smoker	7.229e+02
last_known_smoking_statusnever	7.253e+02
last_known_smoking_statussmoker	7.244e+02
last_known_vaping_statussex-vaper	7.173e+02
last_known_vaping_statusnever	7.302e+02
last_known_vaping_statusvaper	7.330e+02
treatment_reclassifiedAnti-IL17	6.188e+03
treatment_reclassifiedAnti-TNF	6.975e+03
treatment_reclassifiedJAK Inhibitor	4.323e+03
time_in_years	5.702e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	6.175e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	6.363e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	6.451e+03
	t value
(Intercept)	7.731
genderMale	-2.607
hlab27statusNegative	1.609
hlab27statusPositive	0.739
age_at_prom	-2.269
diagnosisAxial SpA- nr-axSpA	1.456
treatment_order2	-1.364
treatment_order3	0.567
treatment_order4	-1.130
treatment_order5	0.233
treatment_order6	0.793

treatment_order7	0.876
treatment_order8	1.414
treatment_order9	1.280
treatment_order10	1.575
treatment_order11	0.644
treatment_order12	0.264
treatment_order14	0.715
treatment_order15	0.172
last_known_smoking_statussex-smoker	0.688
last_known_smoking_statusnever	-0.543
last_known_smoking_statussmoker	2.472
last_known_vaping_statussex-vaper	-1.513
last_known_vaping_statusnever	-1.091
last_known_vaping_statusvaper	-0.339
treatment_reclassifiedAnti-IL17	-3.173
treatment_reclassifiedAnti-TNF	-2.747
treatment_reclassifiedJAK Inhibitor	0.123
time_in_years	3.140
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	-0.533
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-0.071
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	-0.656
	Pr(> t )
(Intercept)	3.04e-14 ***
genderMale	0.00930 **
hlab27statusNegative	0.10801
hlab27statusPositive	0.46036
age_at_prom	0.02355 *
diagnosisAxial SpA- nr-axSpA	0.14572
treatment_order2	0.17277
treatment_order3	0.57103
treatment_order4	0.25848
treatment_order5	0.81614
treatment_order6	0.42796
treatment_order7	0.38091
treatment_order8	0.15741
treatment_order9	0.20064
treatment_order10	0.11537
treatment_order11	0.51959
treatment_order12	0.79173
treatment_order14	0.47505
treatment_order15	0.86354
last_known_smoking_statussex-smoker	0.49147
last_known_smoking_statusnever	0.58718

last_known_smoking_statussmoker	0.01367 *
last_known_vaping_statussex-vaper	0.13073
last_known_vaping_statusnever	0.27567
last_known_vaping_statusvaper	0.73493
treatment_reclassifiedAnti-IL17	0.00151 **
treatment_reclassifiedAnti-TNF	0.00603 **
treatment_reclassifiedJAK Inhibitor	0.90214
time_in_years	0.00178 **
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	0.59429
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	0.94308
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	0.51200

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_diagnosis_jenkins_sleep_1_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]

Formula: jenkins\_sleep\_1 ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status + treatment\_reclassified + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_1

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 24982.1

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.2612	-0.5029	-0.1138	0.4757	4.2642

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.138050	1.46221	
	time_in_years	0.004629	0.06804	-0.51
Residual		1.060221	1.02967	

Number of obs: 7756, groups: ttas\_id, 854

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	2.131e+00	2.755e-01	8.375e+02	7.735
genderMale	-2.775e-01	1.066e-01	7.482e+02	-2.602
hlab27statusNegative	2.983e-01	1.850e-01	7.551e+02	1.612

hlab27statusPositive	1.152e-01	1.519e-01	7.736e+02	0.758
age_at_prom	-9.101e-03	4.019e-03	8.069e+02	-2.265
diagnosisAxial SpA- nr-axSpA	1.778e-01	1.228e-01	7.301e+02	1.448
treatment_order2	-1.294e-01	9.207e-02	6.429e+03	-1.406
treatment_order3	4.904e-02	8.855e-02	5.823e+03	0.554
treatment_order4	-1.277e-01	1.071e-01	6.154e+03	-1.192
treatment_order5	1.975e-02	1.145e-01	5.316e+03	0.172
treatment_order6	1.103e-01	1.329e-01	4.293e+03	0.829
treatment_order7	1.603e-01	1.746e-01	3.669e+03	0.918
treatment_order8	3.131e-01	2.219e-01	4.199e+03	1.411
treatment_order9	3.483e-01	2.780e-01	2.864e+03	1.253
treatment_order10	8.717e-01	5.331e-01	4.210e+03	1.635
treatment_order11	3.751e-01	5.541e-01	3.021e+03	0.677
treatment_order12	2.413e-01	8.765e-01	6.314e+03	0.275
treatment_order14	4.943e-01	6.788e-01	9.618e+02	0.728
treatment_order15	1.809e-01	8.967e-01	7.659e+02	0.202
last_known_smoking_statussex-smoker	1.544e-01	2.136e-01	7.208e+02	0.723
last_known_smoking_statusnever	-1.087e-01	2.127e-01	7.238e+02	-0.511
last_known_smoking_statussmoker	6.429e-01	2.571e-01	7.236e+02	2.501
last_known_vaping_statussex-vaper	-7.223e-01	4.733e-01	7.176e+02	-1.526
last_known_vaping_statusnever	-2.387e-01	2.131e-01	7.293e+02	-1.120
last_known_vaping_statusvaper	-1.076e-01	3.008e-01	7.324e+02	-0.358
treatment_reclassifiedAnti-IL17	-3.597e-01	1.015e-01	6.431e+03	-3.544
treatment_reclassifiedAnti-TNF	-2.327e-01	8.196e-02	7.007e+03	-2.840
treatment_reclassifiedJAK Inhibitor	-7.035e-02	2.426e-01	5.517e+03	-0.290
time_in_years	1.756e-02	5.585e-03	5.714e+02	3.143
	Pr(> t )			
(Intercept)	2.96e-14	***		
genderMale	0.009448	**		
hlab27statusNegative	0.107368			
hlab27statusPositive	0.448473			
age_at_prom	0.023785	*		
diagnosisAxial SpA- nr-axSpA	0.147938			
treatment_order2	0.159894			
treatment_order3	0.579744			
treatment_order4	0.233334			
treatment_order5	0.863067			
treatment_order6	0.406940			
treatment_order7	0.358692			
treatment_order8	0.158290			
treatment_order9	0.210419			
treatment_order10	0.102101			
treatment_order11	0.498459			



```

treatment_order12          0.783066
treatment_order14          0.466690
treatment_order15          0.840142
last_known_smoking_statussex-smoker 0.470119
last_known_smoking_statusnever 0.609489
last_known_smoking_statussmoker 0.012604 *
last_known_vaping_statussex-vaper 0.127421
last_known_vaping_statusnever 0.263117
last_known_vaping_statusvaper 0.720583
treatment_reclassifiedAnti-IL17 0.000397 ***
treatment_reclassifiedAnti-TNF 0.004529 **
treatment_reclassifiedJAK Inhibitor 0.771801
time_in_years              0.001757 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_jenkins_sleep_1_full,
       model_treatment_diagnosis_jenkins_sleep_1_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_1

Models:

model\_treatment\_diagnosis\_jenkins\_sleep\_1\_reduced: jenkins\_sleep\_1 ~ gender + hlab27status +

model\_treatment\_diagnosis\_jenkins\_sleep\_1\_full: jenkins\_sleep\_1 ~ gender + hlab27status + age

	npar	AIC	BIC	logLik
model_treatment_diagnosis_jenkins_sleep_1_reduced	33	24983	25212	-12458
model_treatment_diagnosis_jenkins_sleep_1_full	36	24988	25238	-12458

	deviance	Chisq	Df	Pr(>Chisq)
model_treatment_diagnosis_jenkins_sleep_1_reduced	24917			
model_treatment_diagnosis_jenkins_sleep_1_full	24916	0.7231	3	0.8678

```

print(summary(model_treatment_diagnosis_jenkins_sleep_2_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [

lmerModLmerTest]

Formula: jenkins\_sleep\_2 ~ gender + hlab27status + age\_at\_prom + diagnosis +

treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +

treatment\_reclassified \* diagnosis + time\_in\_years + (time\_in\_years |

ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_2

```
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))
```

```
REML criterion at convergence: 26155.6
```

```
Scaled residuals:
```

Min	1Q	Median	3Q	Max
-3.6245	-0.5645	0.0747	0.5587	3.4641

```
Random effects:
```

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.472495	1.57242	
	time_in_years	0.007164	0.08464	-0.62
Residual		1.240551	1.11380	

Number of obs: 7755, groups: ttas\_id, 853

```
Fixed effects:
```

	Estimate
(Intercept)	1.851e+00
genderMale	-4.880e-01
hlab27statusNegative	4.612e-01
hlab27statusPositive	-6.453e-02
age_at_prom	2.421e-02
diagnosisAxial SpA- nr-axSpA	2.271e-01
treatment_order2	-3.048e-01
treatment_order3	-4.525e-02
treatment_order4	2.645e-02
treatment_order5	-1.739e-01
treatment_order6	-1.264e-01
treatment_order7	1.512e-02
treatment_order8	1.759e-01
treatment_order9	1.463e-01
treatment_order10	-4.072e-01
treatment_order11	3.992e-02
treatment_order12	-1.824e-01
treatment_order14	-2.078e-01
treatment_order15	9.926e-02
last_known_smoking_statussex-smoker	1.393e-01
last_known_smoking_statusnever	-1.020e-01
last_known_smoking_statussmoker	5.483e-01
last_known_vaping_statussex-vaper	-6.595e-01
last_known_vaping_statusnever	8.236e-02
last_known_vaping_statusvaper	-1.331e-01
treatment_reclassifiedAnti-IL17	-3.341e-01

treatment_reclassifiedAnti-TNF	-2.449e-01
treatment_reclassifiedJAK Inhibitor	-5.506e-01
time_in_years	1.639e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	5.276e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-1.986e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.387e-01
	Std. Error
(Intercept)	2.848e-01
genderMale	1.092e-01
hlab27statusNegative	1.912e-01
hlab27statusPositive	1.578e-01
age_at_prom	4.126e-03
diagnosisAxial SpA- nr-axSpA	1.327e-01
treatment_order2	1.013e-01
treatment_order3	9.686e-02
treatment_order4	1.171e-01
treatment_order5	1.243e-01
treatment_order6	1.457e-01
treatment_order7	1.912e-01
treatment_order8	2.433e-01
treatment_order9	3.053e-01
treatment_order10	5.775e-01
treatment_order11	6.070e-01
treatment_order12	9.474e-01
treatment_order14	7.431e-01
treatment_order15	9.917e-01
last_known_smoking_statussex-smoker	2.177e-01
last_known_smoking_statusnever	2.167e-01
last_known_smoking_statussmoker	2.624e-01
last_known_vaping_statussex-vaper	4.860e-01
last_known_vaping_statusnever	2.177e-01
last_known_vaping_statusvaper	3.070e-01
treatment_reclassifiedAnti-IL17	1.165e-01
treatment_reclassifiedAnti-TNF	9.127e-02
treatment_reclassifiedJAK Inhibitor	3.145e-01
time_in_years	6.033e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	2.372e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.160e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	5.322e-01
	df
(Intercept)	8.094e+02
genderMale	7.141e+02
hlab27statusNegative	7.275e+02

hlab27statusPositive	7.784e+02
age_at_prom	7.581e+02
diagnosisAxial SpA- nr-axSpA	7.610e+02
treatment_order2	6.670e+03
treatment_order3	6.001e+03
treatment_order4	6.391e+03
treatment_order5	5.742e+03
treatment_order6	5.089e+03
treatment_order7	4.688e+03
treatment_order8	5.342e+03
treatment_order9	3.800e+03
treatment_order10	4.654e+03
treatment_order11	3.851e+03
treatment_order12	6.439e+03
treatment_order14	1.224e+03
treatment_order15	1.027e+03
last_known_smoking_statussex-smoker	6.805e+02
last_known_smoking_statusnever	6.797e+02
last_known_smoking_statussmoker	6.781e+02
last_known_vaping_statussex-vaper	7.240e+02
last_known_vaping_statusnever	6.873e+02
last_known_vaping_statusvaper	6.949e+02
treatment_reclassifiedAnti-IL17	6.826e+03
treatment_reclassifiedAnti-TNF	7.263e+03
treatment_reclassifiedJAK Inhibitor	5.196e+03
time_in_years	6.962e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	6.553e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	6.623e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	6.894e+03
	t value
(Intercept)	6.500
genderMale	-4.471
hlab27statusNegative	2.412
hlab27statusPositive	-0.409
age_at_prom	5.868
diagnosisAxial SpA- nr-axSpA	1.711
treatment_order2	-3.010
treatment_order3	-0.467
treatment_order4	0.226
treatment_order5	-1.399
treatment_order6	-0.867
treatment_order7	0.079
treatment_order8	0.723

treatment_order9	0.479
treatment_order10	-0.705
treatment_order11	0.066
treatment_order12	-0.192
treatment_order14	-0.280
treatment_order15	0.100
last_known_smoking_statussex-smoker	0.640
last_known_smoking_statusnever	-0.471
last_known_smoking_statussmoker	2.090
last_known_vaping_statussex-vaper	-1.357
last_known_vaping_statusnever	0.378
last_known_vaping_statusvaper	-0.434
treatment_reclassifiedAnti-IL17	-2.869
treatment_reclassifiedAnti-TNF	-2.684
treatment_reclassifiedJAK Inhibitor	-1.751
time_in_years	2.716
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	2.224
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-1.712
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	0.261
	Pr(> t )
(Intercept)	1.40e-10 ***
genderMale	9.07e-06 ***
hlab27statusNegative	0.01612 *
hlab27statusPositive	0.68263
age_at_prom	6.59e-09 ***
diagnosisAxial SpA- nr-axSpA	0.08743 .
treatment_order2	0.00262 **
treatment_order3	0.64041
treatment_order4	0.82132
treatment_order5	0.16194
treatment_order6	0.38582
treatment_order7	0.93700
treatment_order8	0.46989
treatment_order9	0.63188
treatment_order10	0.48074
treatment_order11	0.94757
treatment_order12	0.84737
treatment_order14	0.77979
treatment_order15	0.92029
last_known_smoking_statussex-smoker	0.52231
last_known_smoking_statusnever	0.63789
last_known_smoking_statussmoker	0.03701 *
last_known_vaping_statussex-vaper	0.17517

```

last_known_vaping_statusnever 0.70531
last_known_vaping_statusvaper 0.66467
treatment_reclassifiedAnti-IL17 0.00414 **
treatment_reclassifiedAnti-TNF 0.00730 **
treatment_reclassifiedJAK Inhibitor 0.08006 .
time_in_years 0.00676 **
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17 0.02619 *
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF 0.08695 .
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.79448
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_jenkins_sleep_2_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: jenkins_sleep_2 ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified + time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_jenkins_sleep_2
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 26162.9

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.6242	-0.5610	0.0831	0.5580	3.4444

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.466720	1.57058	
	time_in_years	0.007209	0.08491	-0.62
Residual		1.241973	1.11444	

Number of obs: 7755, groups: ttas\_id, 853

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	1.883e+00	2.841e-01	8.035e+02	6.631
genderMale	-4.915e-01	1.090e-01	7.113e+02	-4.509
hlab27statusNegative	4.750e-01	1.909e-01	7.244e+02	2.488
hlab27statusPositive	-5.967e-02	1.574e-01	7.733e+02	-0.379
age_at_prom	2.380e-02	4.118e-03	7.537e+02	5.780

diagnosisAxial SpA- nr-axSpA	1.878e-01	1.260e-01	6.823e+02	1.491
treatment_order2	-3.340e-01	9.984e-02	6.788e+03	-3.345
treatment_order3	-6.755e-02	9.556e-02	6.188e+03	-0.707
treatment_order4	-5.438e-03	1.157e-01	6.530e+03	-0.047
treatment_order5	-1.681e-01	1.236e-01	5.874e+03	-1.359
treatment_order6	-1.825e-01	1.446e-01	5.148e+03	-1.262
treatment_order7	-2.276e-02	1.903e-01	4.694e+03	-0.120
treatment_order8	1.344e-01	2.426e-01	5.418e+03	0.554
treatment_order9	1.300e-01	3.049e-01	3.857e+03	0.426
treatment_order10	-4.382e-01	5.752e-01	4.619e+03	-0.762
treatment_order11	-3.019e-02	6.068e-01	3.865e+03	-0.050
treatment_order12	-1.928e-01	9.474e-01	6.440e+03	-0.203
treatment_order14	-2.148e-01	7.432e-01	1.218e+03	-0.289
treatment_order15	8.422e-03	9.923e-01	1.021e+03	0.008
last_known_smoking_statussex-smoker	1.169e-01	2.170e-01	6.747e+02	0.539
last_known_smoking_statusnever	-1.267e-01	2.161e-01	6.747e+02	-0.586
last_known_smoking_statussmoker	5.230e-01	2.618e-01	6.743e+02	1.998
last_known_vaping_statussex-vaper	-6.223e-01	4.853e-01	7.207e+02	-1.282
last_known_vaping_statusnever	1.081e-01	2.172e-01	6.830e+02	0.498
last_known_vaping_statusvaper	-9.702e-02	3.064e-01	6.912e+02	-0.317
treatment_reclassifiedAnti-IL17	-2.466e-01	1.101e-01	7.002e+03	-2.240
treatment_reclassifiedAnti-TNF	-2.759e-01	8.886e-02	7.290e+03	-3.105
treatment_reclassifiedJAK Inhibitor	-4.592e-01	2.642e-01	6.274e+03	-1.738
time_in_years	1.657e-02	6.035e-03	6.930e+02	2.746
Pr(> t )				
(Intercept)	6.12e-11	***		
genderMale	7.63e-06	***		
hlab27statusNegative	0.013076	*		
hlab27statusPositive	0.704815			
age_at_prom	1.10e-08	***		
diagnosisAxial SpA- nr-axSpA	0.136512			
treatment_order2	0.000828	***		
treatment_order3	0.479644			
treatment_order4	0.962523			
treatment_order5	0.174048			
treatment_order6	0.206875			
treatment_order7	0.904803			
treatment_order8	0.579611			
treatment_order9	0.669886			
treatment_order10	0.446184			
treatment_order11	0.960324			
treatment_order12	0.838780			
treatment_order14	0.772647			

```

treatment_order15                0.993230
last_known_smoking_statussex-smoker 0.590216
last_known_smoking_statusnever     0.557844
last_known_smoking_statussmoker    0.046159 *
last_known_vaping_statussex-vaper  0.200196
last_known_vaping_statusnever      0.618635
last_known_vaping_statusvaper      0.751582
treatment_reclassifiedAnti-IL17    0.025127 *
treatment_reclassifiedAnti-TNF     0.001909 **
treatment_reclassifiedJAK Inhibitor 0.082316 .
time_in_years                     0.006198 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_jenkins_sleep_2_full,
       model_treatment_diagnosis_jenkins_sleep_2_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_2

Models:

model\_treatment\_diagnosis\_jenkins\_sleep\_2\_reduced: jenkins\_sleep\_2 ~ gender + hlab27status +

model\_treatment\_diagnosis\_jenkins\_sleep\_2\_full: jenkins\_sleep\_2 ~ gender + hlab27status + age

	npar	AIC	BIC	logLik
model_treatment_diagnosis_jenkins_sleep_2_reduced	33	26167	26396	-13050
model_treatment_diagnosis_jenkins_sleep_2_full	36	26163	26413	-13045
	deviance	Chisq	Df	Pr(>Chisq)
model_treatment_diagnosis_jenkins_sleep_2_reduced	26101			
model_treatment_diagnosis_jenkins_sleep_2_full	26091	10.243	3	0.01661

model\_treatment\_diagnosis\_jenkins\_sleep\_2\_reduced

model\_treatment\_diagnosis\_jenkins\_sleep\_2\_full \*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```

print(summary(model_treatment_diagnosis_jenkins_sleep_3_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [

lmerModLmerTest]

Formula: jenkins\_sleep\_3 ~ gender + hlab27status + age\_at\_prom + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +



```

    treatment_reclassified * diagnosis + time_in_years + (time_in_years |
    ttas_id)
Data: dataframe_sorted_and_reclassified_jenkins_sleep_3
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 26638.6

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.7627	-0.5637	0.0115	0.5541	3.5384

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.346304	1.53177	
	time_in_years	0.005602	0.07485	-0.56
Residual		1.339334	1.15730	

Number of obs: 7756, groups: ttas\_id, 854

Fixed effects:

	Estimate
(Intercept)	1.774e+00
genderMale	-3.852e-01
hlab27statusNegative	4.331e-01
hlab27statusPositive	5.567e-02
age_at_prom	1.567e-02
diagnosisAxial SpA- nr-axSpA	1.362e-01
treatment_order2	-2.430e-01
treatment_order3	1.095e-01
treatment_order4	7.550e-02
treatment_order5	-1.451e-01
treatment_order6	1.835e-01
treatment_order7	2.874e-01
treatment_order8	-6.301e-02
treatment_order9	-5.510e-01
treatment_order10	7.716e-01
treatment_order11	4.242e-01
treatment_order12	5.883e-01
treatment_order14	5.821e-01
treatment_order15	9.228e-01
last_known_smoking_statussex-smoker	3.213e-02
last_known_smoking_statusnever	-1.541e-01
last_known_smoking_statussmoker	7.811e-01
last_known_vaping_statussex-vaper	-1.017e+00

last_known_vaping_statusnever	1.461e-01
last_known_vaping_statusvaper	4.071e-02
treatment_reclassifiedAnti-IL17	-3.473e-01
treatment_reclassifiedAnti-TNF	-2.835e-01
treatment_reclassifiedJAK Inhibitor	-5.212e-01
time_in_years	1.207e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	4.602e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-3.286e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	2.939e-01
	Std. Error
(Intercept)	2.863e-01
genderMale	1.099e-01
hlab27statusNegative	1.918e-01
hlab27statusPositive	1.578e-01
age_at_prom	4.162e-03
diagnosisAxial SpA- nr-axSpA	1.337e-01
treatment_order2	1.036e-01
treatment_order3	9.902e-02
treatment_order4	1.199e-01
treatment_order5	1.271e-01
treatment_order6	1.483e-01
treatment_order7	1.944e-01
treatment_order8	2.483e-01
treatment_order9	3.098e-01
treatment_order10	5.901e-01
treatment_order11	6.152e-01
treatment_order12	9.762e-01
treatment_order14	7.445e-01
treatment_order15	9.864e-01
last_known_smoking_statussex-smoker	2.198e-01
last_known_smoking_statusnever	2.189e-01
last_known_smoking_statussmoker	2.649e-01
last_known_vaping_statussex-vaper	4.879e-01
last_known_vaping_statusnever	2.196e-01
last_known_vaping_statusvaper	3.097e-01
treatment_reclassifiedAnti-IL17	1.193e-01
treatment_reclassifiedAnti-TNF	9.353e-02
treatment_reclassifiedJAK Inhibitor	3.211e-01
time_in_years	5.899e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	2.433e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.188e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	5.474e-01
	df

(Intercept)	8.428e+02
genderMale	7.472e+02
hlab27statusNegative	7.565e+02
hlab27statusPositive	7.888e+02
age_at_prom	7.983e+02
diagnosisAxial SpA- nr-axSpA	7.962e+02
treatment_order2	6.394e+03
treatment_order3	5.785e+03
treatment_order4	6.222e+03
treatment_order5	5.503e+03
treatment_order6	4.620e+03
treatment_order7	4.101e+03
treatment_order8	4.496e+03
treatment_order9	3.065e+03
treatment_order10	4.557e+03
treatment_order11	3.464e+03
treatment_order12	6.637e+03
treatment_order14	1.225e+03
treatment_order15	9.748e+02
last_known_smoking_statussex-smoker	7.158e+02
last_known_smoking_statusnever	7.168e+02
last_known_smoking_statussmoker	7.166e+02
last_known_vaping_statussex-vaper	7.350e+02
last_known_vaping_statusnever	7.239e+02
last_known_vaping_statusvaper	7.280e+02
treatment_reclassifiedAnti-IL17	6.421e+03
treatment_reclassifiedAnti-TNF	7.055e+03
treatment_reclassifiedJAK Inhibitor	4.758e+03
time_in_years	6.002e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	6.566e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	6.502e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	6.753e+03
	t value
(Intercept)	6.194
genderMale	-3.504
hlab27statusNegative	2.257
hlab27statusPositive	0.353
age_at_prom	3.766
diagnosisAxial SpA- nr-axSpA	1.019
treatment_order2	-2.346
treatment_order3	1.106
treatment_order4	0.630
treatment_order5	-1.142

treatment_order6	1.237
treatment_order7	1.478
treatment_order8	-0.254
treatment_order9	-1.779
treatment_order10	1.308
treatment_order11	0.690
treatment_order12	0.603
treatment_order14	0.782
treatment_order15	0.936
last_known_smoking_statussex-smoker	0.146
last_known_smoking_statusnever	-0.704
last_known_smoking_statussmoker	2.949
last_known_vaping_statussex-vaper	-2.084
last_known_vaping_statusnever	0.665
last_known_vaping_statusvaper	0.131
treatment_reclassifiedAnti-IL17	-2.912
treatment_reclassifiedAnti-TNF	-3.031
treatment_reclassifiedJAK Inhibitor	-1.624
time_in_years	2.045
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.891
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-2.766
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	0.537
	Pr(> t )
(Intercept)	9.17e-10 ***
genderMale	0.000486 ***
hlab27statusNegative	0.024268 *
hlab27statusPositive	0.724328
age_at_prom	0.000178 ***
diagnosisAxial SpA- nr-axSpA	0.308593
treatment_order2	0.018985 *
treatment_order3	0.268931
treatment_order4	0.528984
treatment_order5	0.253640
treatment_order6	0.216004
treatment_order7	0.139425
treatment_order8	0.799709
treatment_order9	0.075415 .
treatment_order10	0.191100
treatment_order11	0.490547
treatment_order12	0.546752
treatment_order14	0.434444
treatment_order15	0.349761
last_known_smoking_statussex-smoker	0.883826

```

last_known_smoking_statusnever      0.481551
last_known_smoking_statussmoker      0.003289 **
last_known_vaping_statussex-vaper    0.037495 *
last_known_vaping_statusnever        0.505990
last_known_vaping_statusvaper        0.895458
treatment_reclassifiedAnti-IL17      0.003605 **
treatment_reclassifiedAnti-TNF        0.002447 **
treatment_reclassifiedJAK Inhibitor    0.104546
time_in_years                        0.041262 *
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17 0.058636 .
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF 0.005696 **
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.591280
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_jenkins_sleep_3_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: jenkins_sleep_3 ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified + time_in_years + (time_in_years |      ttas_id)
Data: dataframe_sorted_and_reclassified_jenkins_sleep_3
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 26650.6

```

Scaled residuals:
    Min      1Q  Median      3Q      Max
-3.8082 -0.5605  0.0176  0.5511  3.5269

```

```

Random effects:
Groups   Name              Variance Std.Dev. Corr
ttas_id  (Intercept)      2.343907 1.53098
          time_in_years  0.005558 0.07455 -0.57
Residual                1.342385 1.15861
Number of obs: 7756, groups:  ttas_id, 854

```

```

Fixed effects:
              Estimate Std. Error      df t value
(Intercept)  1.824e+00  2.856e-01  8.369e+02   6.385
genderMale   -3.893e-01  1.098e-01  7.444e+02  -3.546

```

hlab27statusNegative	4.494e-01	1.916e-01	7.533e+02	2.346
hlab27statusPositive	6.517e-02	1.574e-01	7.825e+02	0.414
age_at_prom	1.510e-02	4.155e-03	7.944e+02	3.634
diagnosisAxial SpA- nr-axSpA	5.497e-02	1.272e-01	7.187e+02	0.432
treatment_order2	-2.897e-01	1.021e-01	6.503e+03	-2.836
treatment_order3	7.011e-02	9.771e-02	5.965e+03	0.717
treatment_order4	3.402e-02	1.185e-01	6.350e+03	0.287
treatment_order5	-1.482e-01	1.264e-01	5.622e+03	-1.172
treatment_order6	1.133e-01	1.470e-01	4.653e+03	0.770
treatment_order7	2.272e-01	1.933e-01	4.080e+03	1.175
treatment_order8	-1.206e-01	2.476e-01	4.537e+03	-0.487
treatment_order9	-5.775e-01	3.092e-01	3.085e+03	-1.867
treatment_order10	7.083e-01	5.875e-01	4.524e+03	1.206
treatment_order11	3.423e-01	6.147e-01	3.469e+03	0.557
treatment_order12	5.535e-01	9.762e-01	6.648e+03	0.567
treatment_order14	5.504e-01	7.431e-01	1.225e+03	0.741
treatment_order15	8.167e-01	9.847e-01	9.739e+02	0.829
last_known_smoking_statussex-smoker	1.534e-02	2.192e-01	7.104e+02	0.070
last_known_smoking_statusnever	-1.753e-01	2.184e-01	7.123e+02	-0.803
last_known_smoking_statussmoker	7.572e-01	2.644e-01	7.132e+02	2.864
last_known_vaping_statussex-vaper	-9.755e-01	4.870e-01	7.301e+02	-2.003
last_known_vaping_statusnever	1.700e-01	2.191e-01	7.201e+02	0.776
last_known_vaping_statusvaper	8.051e-02	3.092e-01	7.244e+02	0.260
treatment_reclassifiedAnti-IL17	-2.695e-01	1.128e-01	6.647e+03	-2.389
treatment_reclassifiedAnti-TNF	-3.382e-01	9.108e-02	7.080e+03	-3.714
treatment_reclassifiedJAK Inhibitor	-3.653e-01	2.706e-01	5.885e+03	-1.350
time_in_years	1.225e-02	5.888e-03	5.949e+02	2.080
	Pr(> t )			
(Intercept)	2.84e-10	***		
genderMale	0.000415	***		
hlab27statusNegative	0.019247	*		
hlab27statusPositive	0.678988			
age_at_prom	0.000297	***		
diagnosisAxial SpA- nr-axSpA	0.665771			
treatment_order2	0.004584	**		
treatment_order3	0.473116			
treatment_order4	0.774096			
treatment_order5	0.241174			
treatment_order6	0.441196			
treatment_order7	0.239901			
treatment_order8	0.626054			
treatment_order9	0.061938	.		
treatment_order10	0.228009			

```

treatment_order11          0.577640
treatment_order12          0.570720
treatment_order14          0.459008
treatment_order15          0.407094
last_known_smoking_statussex-smoker 0.944222
last_known_smoking_statusnever 0.422492
last_known_smoking_statussmoker 0.004305 **
last_known_vaping_statussex-vaper 0.045536 *
last_known_vaping_statusnever 0.438097
last_known_vaping_statusvaper 0.794610
treatment_reclassifiedAnti-IL17 0.016914 *
treatment_reclassifiedAnti-TNF 0.000206 ***
treatment_reclassifiedJAK Inhibitor 0.177121
time_in_years              0.037916 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_jenkins_sleep_3_full,
       model_treatment_diagnosis_jenkins_sleep_3_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_3

Models:

model\_treatment\_diagnosis\_jenkins\_sleep\_3\_reduced: jenkins\_sleep\_3 ~ gender + hlab27status +

model\_treatment\_diagnosis\_jenkins\_sleep\_3\_full: jenkins\_sleep\_3 ~ gender + hlab27status + age

	npars	AIC	BIC	logLik
model_treatment_diagnosis_jenkins_sleep_3_reduced	33	26655	26885	-13295
model_treatment_diagnosis_jenkins_sleep_3_full	36	26646	26897	-13287

  

	deviance	Chisq	Df	Pr(>Chisq)
model_treatment_diagnosis_jenkins_sleep_3_reduced	26589			
model_treatment_diagnosis_jenkins_sleep_3_full	26574	14.866	3	0.001935

model\_treatment\_diagnosis\_jenkins\_sleep\_3\_reduced

model\_treatment\_diagnosis\_jenkins\_sleep\_3\_full \*\*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```

print(summary(model_treatment_diagnosis_jenkins_sleep_4_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [

```

lmerModLmerTest]
Formula: jenkins_sleep_4 ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified * diagnosis + time_in_years + (time_in_years |
  ttas_id)
Data: dataframe_sorted_and_reclassified_jenkins_sleep_4
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 25745.6

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.0127	-0.5571	0.0436	0.5651	3.5289

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.09093	1.44600	
	time_in_years	0.00516	0.07184	-0.52
Residual		1.18284	1.08758	

Number of obs: 7758, groups: ttas\_id, 854

Fixed effects:

	Estimate
(Intercept)	2.852e+00
genderMale	-6.476e-01
hlab27statusNegative	4.985e-01
hlab27statusPositive	6.982e-02
age_at_prom	-2.810e-03
diagnosisAxial SpA- nr-axSpA	4.718e-01
treatment_order2	-1.790e-01
treatment_order3	7.913e-02
treatment_order4	8.650e-02
treatment_order5	1.533e-01
treatment_order6	1.924e-01
treatment_order7	3.824e-01
treatment_order8	1.530e-01
treatment_order9	-1.786e-01
treatment_order10	9.314e-01
treatment_order11	5.566e-01
treatment_order12	6.513e-01
treatment_order14	4.956e-01
treatment_order15	3.809e-01
last_known_smoking_statusex-smoker	-4.856e-02



last_known_smoking_statusnever	-2.124e-01
last_known_smoking_statussmoker	6.912e-01
last_known_vaping_statussex-vaper	-1.284e-03
last_known_vaping_statusnever	1.980e-01
last_known_vaping_statusvaper	3.367e-01
treatment_reclassifiedAnti-IL17	-4.229e-01
treatment_reclassifiedAnti-TNF	-3.119e-01
treatment_reclassifiedJAK Inhibitor	-8.988e-01
time_in_years	1.984e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	6.259e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-1.915e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	3.948e-01
	Std. Error
(Intercept)	2.763e-01
genderMale	1.064e-01
hlab27statusNegative	1.849e-01
hlab27statusPositive	1.524e-01
age_at_prom	4.018e-03
diagnosisAxial SpA- nr-axSpA	1.281e-01
treatment_order2	9.796e-02
treatment_order3	9.390e-02
treatment_order4	1.136e-01
treatment_order5	1.207e-01
treatment_order6	1.409e-01
treatment_order7	1.844e-01
treatment_order8	2.347e-01
treatment_order9	2.937e-01
treatment_order10	5.612e-01
treatment_order11	5.833e-01
treatment_order12	9.236e-01
treatment_order14	7.146e-01
treatment_order15	9.460e-01
last_known_smoking_statussex-smoker	2.132e-01
last_known_smoking_statusnever	2.121e-01
last_known_smoking_statussmoker	2.563e-01
last_known_vaping_statussex-vaper	4.744e-01
last_known_vaping_statusnever	2.126e-01
last_known_vaping_statusvaper	3.001e-01
treatment_reclassifiedAnti-IL17	1.128e-01
treatment_reclassifiedAnti-TNF	8.846e-02
treatment_reclassifiedJAK Inhibitor	3.038e-01
time_in_years	5.714e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	2.304e-01

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.125e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	5.167e-01
	df
(Intercept)	7.921e+02
genderMale	7.082e+02
hlab27statusNegative	7.060e+02
hlab27statusPositive	7.444e+02
age_at_prom	7.531e+02
diagnosisAxial SpA- nr-axSpA	7.375e+02
treatment_order2	6.332e+03
treatment_order3	5.737e+03
treatment_order4	6.163e+03
treatment_order5	5.439e+03
treatment_order6	4.555e+03
treatment_order7	4.038e+03
treatment_order8	4.468e+03
treatment_order9	3.078e+03
treatment_order10	4.481e+03
treatment_order11	3.358e+03
treatment_order12	6.479e+03
treatment_order14	1.106e+03
treatment_order15	8.809e+02
last_known_smoking_statussex-smoker	6.845e+02
last_known_smoking_statusnever	6.830e+02
last_known_smoking_statussmoker	6.795e+02
last_known_vaping_statussex-vaper	7.117e+02
last_known_vaping_statusnever	6.872e+02
last_known_vaping_statusvaper	6.928e+02
treatment_reclassifiedAnti-IL17	6.407e+03
treatment_reclassifiedAnti-TNF	7.044e+03
treatment_reclassifiedJAK Inhibitor	4.623e+03
time_in_years	5.903e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	6.397e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	6.424e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	6.649e+03
	t value
(Intercept)	10.321
genderMale	-6.085
hlab27statusNegative	2.696
hlab27statusPositive	0.458
age_at_prom	-0.699
diagnosisAxial SpA- nr-axSpA	3.683
treatment_order2	-1.827

treatment_order3	0.843
treatment_order4	0.761
treatment_order5	1.271
treatment_order6	1.365
treatment_order7	2.074
treatment_order8	0.652
treatment_order9	-0.608
treatment_order10	1.660
treatment_order11	0.954
treatment_order12	0.705
treatment_order14	0.694
treatment_order15	0.403
last_known_smoking_statussex-smoker	-0.228
last_known_smoking_statusnever	-1.001
last_known_smoking_statussmoker	2.697
last_known_vaping_statussex-vaper	-0.003
last_known_vaping_statusnever	0.931
last_known_vaping_statusvaper	1.122
treatment_reclassifiedAnti-IL17	-3.750
treatment_reclassifiedAnti-TNF	-3.526
treatment_reclassifiedJAK Inhibitor	-2.958
time_in_years	3.473
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	0.272
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-0.017
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	0.764
	Pr(> t )
(Intercept)	< 2e-16 ***
genderMale	1.9e-09 ***
hlab27statusNegative	0.007177 **
hlab27statusPositive	0.647030
age_at_prom	0.484589
diagnosisAxial SpA- nr-axSpA	0.000247 ***
treatment_order2	0.067766 .
treatment_order3	0.399455
treatment_order4	0.446500
treatment_order5	0.203940
treatment_order6	0.172313
treatment_order7	0.038169 *
treatment_order8	0.514536
treatment_order9	0.543147
treatment_order10	0.097036 .
treatment_order11	0.340011
treatment_order12	0.480722

treatment_order14	0.488108
treatment_order15	0.687269
last_known_smoking_statussex-smoker	0.819899
last_known_smoking_statusnever	0.317057
last_known_smoking_statussmoker	0.007166 **
last_known_vaping_statussex-vaper	0.997841
last_known_vaping_statusnever	0.352053
last_known_vaping_statusvaper	0.262207
treatment_reclassifiedAnti-IL17	0.000179 ***
treatment_reclassifiedAnti-TNF	0.000424 ***
treatment_reclassifiedJAK Inhibitor	0.003110 **
time_in_years	0.000553 ***
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	0.785927
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	0.986416
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	0.444881

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_diagnosis_jenkins_sleep_4_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [ lmerModLmerTest]

Formula: jenkins\_sleep\_4 ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status + treatment\_reclassified + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_4

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 25743.1

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.0135	-0.5584	0.0431	0.5658	3.5312

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.091444	1.44618	
	time_in_years	0.005152	0.07178	-0.52
Residual		1.182579	1.08746	

Number of obs: 7758, groups: ttas\_id, 854

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	2.855e+00	2.759e-01	7.901e+02	10.348
genderMale	-6.482e-01	1.064e-01	7.083e+02	-6.093
hlab27statusNegative	4.978e-01	1.848e-01	7.060e+02	2.694
hlab27statusPositive	6.750e-02	1.522e-01	7.426e+02	0.443
age_at_prom	-2.831e-03	4.014e-03	7.523e+02	-0.705
diagnosisAxial SpA- nr-axSpA	4.754e-01	1.223e-01	6.728e+02	3.889
treatment_order2	-1.780e-01	9.653e-02	6.450e+03	-1.844
treatment_order3	7.941e-02	9.258e-02	5.927e+03	0.858
treatment_order4	9.322e-02	1.122e-01	6.307e+03	0.831
treatment_order5	1.584e-01	1.199e-01	5.581e+03	1.321
treatment_order6	1.902e-01	1.396e-01	4.603e+03	1.362
treatment_order7	3.736e-01	1.833e-01	4.031e+03	2.038
treatment_order8	1.549e-01	2.338e-01	4.522e+03	0.662
treatment_order9	-1.699e-01	2.931e-01	3.116e+03	-0.580
treatment_order10	8.933e-01	5.584e-01	4.458e+03	1.600
treatment_order11	5.386e-01	5.826e-01	3.366e+03	0.925
treatment_order12	6.343e-01	9.229e-01	6.490e+03	0.687
treatment_order14	4.793e-01	7.136e-01	1.108e+03	0.672
treatment_order15	3.550e-01	9.448e-01	8.806e+02	0.376
last_known_smoking_statussex-smoker	-5.346e-02	2.129e-01	6.823e+02	-0.251
last_known_smoking_statusnever	-2.175e-01	2.118e-01	6.814e+02	-1.027
last_known_smoking_statussmoker	6.855e-01	2.560e-01	6.788e+02	2.677
last_known_vaping_statussex-vaper	2.895e-03	4.741e-01	7.115e+02	0.006
last_known_vaping_statusnever	2.022e-01	2.124e-01	6.863e+02	0.952
last_known_vaping_statusvaper	3.410e-01	2.998e-01	6.921e+02	1.137
treatment_reclassifiedAnti-IL17	-4.126e-01	1.066e-01	6.626e+03	-3.872
treatment_reclassifiedAnti-TNF	-3.132e-01	8.606e-02	7.065e+03	-3.639
treatment_reclassifiedJAK Inhibitor	-7.704e-01	2.556e-01	5.787e+03	-3.014
time_in_years	1.981e-02	5.710e-03	5.906e+02	3.470

Pr(>|t|)

(Intercept)	< 2e-16 ***
genderMale	1.82e-09 ***
hlab27statusNegative	0.007223 **
hlab27statusPositive	0.657544
age_at_prom	0.480859
diagnosisAxial SpA- nr-axSpA	0.000111 ***
treatment_order2	0.065218 .
treatment_order3	0.391032
treatment_order4	0.406115
treatment_order5	0.186500
treatment_order6	0.173221
treatment_order7	0.041610 *

```

treatment_order8          0.507722
treatment_order9          0.562187
treatment_order10         0.109744
treatment_order11         0.355254
treatment_order12         0.491878
treatment_order14         0.501927
treatment_order15         0.707217
last_known_smoking_statussex-smoker 0.801776
last_known_smoking_statusnever 0.304823
last_known_smoking_statussmoker 0.007597 **
last_known_vaping_statussex-vaper 0.995130
last_known_vaping_statusnever 0.341409
last_known_vaping_statusvaper 0.255813
treatment_reclassifiedAnti-IL17 0.000109 ***
treatment_reclassifiedAnti-TNF 0.000275 ***
treatment_reclassifiedJAK Inhibitor 0.002591 **
time_in_years              0.000559 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_jenkins_sleep_4_full,
       model_treatment_diagnosis_jenkins_sleep_4_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_4

Models:

model\_treatment\_diagnosis\_jenkins\_sleep\_4\_reduced: jenkins\_sleep\_4 ~ gender + hlab27status +

model\_treatment\_diagnosis\_jenkins\_sleep\_4\_full: jenkins\_sleep\_4 ~ gender + hlab27status + ag

	npar	AIC	BIC	logLik
model_treatment_diagnosis_jenkins_sleep_4_reduced	33	25745	25975	-12840
model_treatment_diagnosis_jenkins_sleep_4_full	36	25751	26001	-12839
	deviance	Chisq	Df	Pr(>Chisq)
model_treatment_diagnosis_jenkins_sleep_4_reduced	25679			
model_treatment_diagnosis_jenkins_sleep_4_full	25679	0.6732	3	0.8795

## lme4 code for treatment and gender: Jenkins Sleep

```

model_treatment_gender_jenkins_sleep_1_full <- lmer(
  jenkins_sleep_1 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_jenkins_sleep_1,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

model_treatment_gender_jenkins_sleep_2_full <- lmer(
  jenkins_sleep_2 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_jenkins_sleep_2,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

model_treatment_gender_jenkins_sleep_3_full <- lmer(
  jenkins_sleep_3 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_jenkins_sleep_3,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

model_treatment_gender_jenkins_sleep_4_full <- lmer(
  jenkins_sleep_4 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_jenkins_sleep_4,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```

```

model_treatment_gender_jenkins_sleep_1_reduced <- lmer(
  jenkins_sleep_1 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_jenkins_sleep_1,
    control = lmerControl(optimizer = "bobyqa",
      optCtrl = list(maxfun = 2e5)))

model_treatment_gender_jenkins_sleep_2_reduced <- lmer(
  jenkins_sleep_2 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_jenkins_sleep_2,
    control = lmerControl(optimizer = "bobyqa",
      optCtrl = list(maxfun = 2e5)))

model_treatment_gender_jenkins_sleep_3_reduced <- lmer(
  jenkins_sleep_3 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_jenkins_sleep_3,
    control = lmerControl(optimizer = "bobyqa",
      optCtrl = list(maxfun = 2e5)))

model_treatment_gender_jenkins_sleep_4_reduced <- lmer(
  jenkins_sleep_4 ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_jenkins_sleep_4,
    control = lmerControl(optimizer = "bobyqa",
      optCtrl = list(maxfun = 2e5)))

```



```
print(summary(model_treatment_gender_jenkins_sleep_1_full, corr = FALSE))
```

```
Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: jenkins_sleep_1 ~ gender + hlab27status + age_at_prom + diagnosis +
      treatment_order + last_known_smoking_status + last_known_vaping_status +
      treatment_reclassified * gender + time_in_years + (time_in_years |
      ttas_id)
Data: dataframe_sorted_and_reclassified_jenkins_sleep_1
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))
```

REML criterion at convergence: 24981.7

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.2896	-0.5035	-0.1150	0.4719	4.2700

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.139998	1.46287	
	time_in_years	0.004568	0.06759	-0.51
Residual		1.060564	1.02984	

Number of obs: 7756, groups: ttas\_id, 854

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	2.123e+00	2.763e-01	8.484e+02
genderMale	-2.598e-01	1.120e-01	8.655e+02
hlab27statusNegative	2.963e-01	1.850e-01	7.570e+02
hlab27statusPositive	1.143e-01	1.519e-01	7.744e+02
age_at_prom	-9.097e-03	4.017e-03	8.080e+02
diagnosisAxial SpA- nr-axSpA	1.758e-01	1.228e-01	7.312e+02
treatment_order2	-1.279e-01	9.229e-02	6.417e+03
treatment_order3	5.217e-02	8.878e-02	5.762e+03
treatment_order4	-1.298e-01	1.081e-01	6.073e+03
treatment_order5	1.737e-02	1.149e-01	5.226e+03
treatment_order6	1.256e-01	1.334e-01	4.237e+03
treatment_order7	1.750e-01	1.759e-01	3.673e+03
treatment_order8	3.385e-01	2.226e-01	4.125e+03
treatment_order9	3.786e-01	2.782e-01	2.831e+03
treatment_order10	8.099e-01	5.365e-01	4.254e+03
treatment_order11	2.590e-01	5.582e-01	2.958e+03

treatment_order12	2.287e-01	8.771e-01	6.320e+03
treatment_order14	4.859e-01	6.785e-01	9.702e+02
treatment_order15	3.312e-02	8.988e-01	7.814e+02
last_known_smoking_statussex-smoker	1.674e-01	2.136e-01	7.221e+02
last_known_smoking_statusnever	-9.641e-02	2.127e-01	7.254e+02
last_known_smoking_statussmoker	6.576e-01	2.571e-01	7.251e+02
last_known_vaping_statussex-vaper	-7.399e-01	4.729e-01	7.175e+02
last_known_vaping_statusnever	-2.519e-01	2.132e-01	7.314e+02
last_known_vaping_statusvaper	-1.140e-01	3.008e-01	7.338e+02
treatment_reclassifiedAnti-IL17	-2.156e-01	1.466e-01	5.123e+03
treatment_reclassifiedAnti-TNF	-2.230e-01	1.029e-01	6.775e+03
treatment_reclassifiedJAK Inhibitor	1.973e-01	2.955e-01	4.896e+03
time_in_years	1.731e-02	5.573e-03	5.709e+02
genderMale:treatment_reclassifiedAnti-IL17	-2.324e-01	1.651e-01	4.701e+03
genderMale:treatment_reclassifiedAnti-TNF	-1.171e-02	9.729e-02	5.975e+03
genderMale:treatment_reclassifiedJAK Inhibitor	-8.085e-01	4.779e-01	5.119e+03
t value Pr(> t )			
(Intercept)	7.683	4.27e-14	***
genderMale	-2.319	0.02062	*
hlab27statusNegative	1.601	0.10969	
hlab27statusPositive	0.753	0.45171	
age_at_prom	-2.265	0.02379	*
diagnosisAxial SpA- nr-axSpA	1.432	0.15257	
treatment_order2	-1.386	0.16590	
treatment_order3	0.588	0.55678	
treatment_order4	-1.201	0.22988	
treatment_order5	0.151	0.87992	
treatment_order6	0.942	0.34645	
treatment_order7	0.995	0.31974	
treatment_order8	1.521	0.12837	
treatment_order9	1.361	0.17365	
treatment_order10	1.510	0.13119	
treatment_order11	0.464	0.64271	
treatment_order12	0.261	0.79433	
treatment_order14	0.716	0.47406	
treatment_order15	0.037	0.97062	
last_known_smoking_statussex-smoker	0.784	0.43347	
last_known_smoking_statusnever	-0.453	0.65041	
last_known_smoking_statussmoker	2.558	0.01073	*
last_known_vaping_statussex-vaper	-1.565	0.11811	
last_known_vaping_statusnever	-1.182	0.23772	
last_known_vaping_statusvaper	-0.379	0.70485	
treatment_reclassifiedAnti-IL17	-1.471	0.14143	

treatment_reclassifiedAnti-TNF	-2.167	0.03025	*
treatment_reclassifiedJAK Inhibitor	0.667	0.50450	
time_in_years	3.106	0.00199	**
genderMale:treatment_reclassifiedAnti-IL17	-1.408	0.15934	
genderMale:treatment_reclassifiedAnti-TNF	-0.120	0.90420	
genderMale:treatment_reclassifiedJAK Inhibitor	-1.692	0.09075	.

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_gender_jenkins_sleep_1_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]  
 Formula: jenkins\_sleep\_1 ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status + treatment\_reclassified + time\_in\_years + (time\_in\_years | ttas\_id)  
 Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_1  
 Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 24982.1

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.2612	-0.5029	-0.1138	0.4757	4.2642

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.138050	1.46221	
	time_in_years	0.004629	0.06804	-0.51
Residual		1.060221	1.02967	

Number of obs: 7756, groups: ttas\_id, 854

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	2.131e+00	2.755e-01	8.375e+02	7.735
genderMale	-2.775e-01	1.066e-01	7.482e+02	-2.602
hlab27statusNegative	2.983e-01	1.850e-01	7.551e+02	1.612
hlab27statusPositive	1.152e-01	1.519e-01	7.736e+02	0.758
age_at_prom	-9.101e-03	4.019e-03	8.069e+02	-2.265
diagnosisAxial SpA- nr-axSpA	1.778e-01	1.228e-01	7.301e+02	1.448
treatment_order2	-1.294e-01	9.207e-02	6.429e+03	-1.406
treatment_order3	4.904e-02	8.855e-02	5.823e+03	0.554

treatment_order4	-1.277e-01	1.071e-01	6.154e+03	-1.192
treatment_order5	1.975e-02	1.145e-01	5.316e+03	0.172
treatment_order6	1.103e-01	1.329e-01	4.293e+03	0.829
treatment_order7	1.603e-01	1.746e-01	3.669e+03	0.918
treatment_order8	3.131e-01	2.219e-01	4.199e+03	1.411
treatment_order9	3.483e-01	2.780e-01	2.864e+03	1.253
treatment_order10	8.717e-01	5.331e-01	4.210e+03	1.635
treatment_order11	3.751e-01	5.541e-01	3.021e+03	0.677
treatment_order12	2.413e-01	8.765e-01	6.314e+03	0.275
treatment_order14	4.943e-01	6.788e-01	9.618e+02	0.728
treatment_order15	1.809e-01	8.967e-01	7.659e+02	0.202
last_known_smoking_statussex-smoker	1.544e-01	2.136e-01	7.208e+02	0.723
last_known_smoking_statusnever	-1.087e-01	2.127e-01	7.238e+02	-0.511
last_known_smoking_statussmoker	6.429e-01	2.571e-01	7.236e+02	2.501
last_known_vaping_statussex-vaper	-7.223e-01	4.733e-01	7.176e+02	-1.526
last_known_vaping_statusnever	-2.387e-01	2.131e-01	7.293e+02	-1.120
last_known_vaping_statusvaper	-1.076e-01	3.008e-01	7.324e+02	-0.358
treatment_reclassifiedAnti-IL17	-3.597e-01	1.015e-01	6.431e+03	-3.544
treatment_reclassifiedAnti-TNF	-2.327e-01	8.196e-02	7.007e+03	-2.840
treatment_reclassifiedJAK Inhibitor	-7.035e-02	2.426e-01	5.517e+03	-0.290
time_in_years	1.756e-02	5.585e-03	5.714e+02	3.143
	Pr(> t )			
(Intercept)	2.96e-14	***		
genderMale	0.009448	**		
hlab27statusNegative	0.107368			
hlab27statusPositive	0.448473			
age_at_prom	0.023785	*		
diagnosisAxial SpA- nr-axSpA	0.147938			
treatment_order2	0.159894			
treatment_order3	0.579744			
treatment_order4	0.233334			
treatment_order5	0.863067			
treatment_order6	0.406940			
treatment_order7	0.358692			
treatment_order8	0.158290			
treatment_order9	0.210419			
treatment_order10	0.102101			
treatment_order11	0.498459			
treatment_order12	0.783066			
treatment_order14	0.466690			
treatment_order15	0.840142			
last_known_smoking_statussex-smoker	0.470119			
last_known_smoking_statusnever	0.609489			

```

last_known_smoking_statussmoker      0.012604 *
last_known_vaping_statussex-vaper     0.127421
last_known_vaping_statusnever         0.263117
last_known_vaping_statusvaper         0.720583
treatment_reclassifiedAnti-IL17        0.000397 ***
treatment_reclassifiedAnti-TNF         0.004529 **
treatment_reclassifiedJAK Inhibitor    0.771801
time_in_years                          0.001757 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_jenkins_sleep_1_full,
       model_treatment_gender_jenkins_sleep_1_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_1

Models:

model\_treatment\_gender\_jenkins\_sleep\_1\_reduced: jenkins\_sleep\_1 ~ gender + hlab27status + age\_at\_prom

model\_treatment\_gender\_jenkins\_sleep\_1\_full: jenkins\_sleep\_1 ~ gender + hlab27status + age\_at\_prom +

	npars	AIC	BIC	logLik	deviance
model_treatment_gender_jenkins_sleep_1_reduced	33	24983	25212	-12458	24917
model_treatment_gender_jenkins_sleep_1_full	36	24984	25234	-12456	24912

  

	Chisq	Df	Pr(>Chisq)
model_treatment_gender_jenkins_sleep_1_reduced			
model_treatment_gender_jenkins_sleep_1_full	4.8057	3	0.1866

```

print(summary(model_treatment_gender_jenkins_sleep_2_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]

Formula: jenkins\_sleep\_2 ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status + treatment\_reclassified \* gender + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_2

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 26164.8

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.6214	-0.5622	0.0799	0.5570	3.4242

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.469699	1.57153	
	time_in_years	0.007188	0.08478	-0.62
Residual		1.242472	1.11466	

Number of obs: 7755, groups: ttas\_id, 853

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	1.913e+00	2.852e-01	8.148e+02
genderMale	-5.292e-01	1.157e-01	8.444e+02
hlab27statusNegative	4.677e-01	1.910e-01	7.263e+02
hlab27statusPositive	-6.582e-02	1.575e-01	7.744e+02
age_at_prom	2.383e-02	4.117e-03	7.544e+02
diagnosisAxial SpA- nr-axSpA	1.863e-01	1.260e-01	6.833e+02
treatment_order2	-3.254e-01	1.001e-01	6.772e+03
treatment_order3	-5.810e-02	9.582e-02	6.125e+03
treatment_order4	1.093e-02	1.168e-01	6.438e+03
treatment_order5	-1.557e-01	1.241e-01	5.790e+03
treatment_order6	-1.651e-01	1.451e-01	5.090e+03
treatment_order7	5.121e-03	1.917e-01	4.685e+03
treatment_order8	1.594e-01	2.435e-01	5.365e+03
treatment_order9	1.494e-01	3.053e-01	3.829e+03
treatment_order10	-4.328e-01	5.790e-01	4.639e+03
treatment_order11	-2.800e-02	6.120e-01	3.796e+03
treatment_order12	-1.841e-01	9.483e-01	6.431e+03
treatment_order14	-2.063e-01	7.437e-01	1.217e+03
treatment_order15	5.120e-03	9.960e-01	1.035e+03
last_known_smoking_statussex-smoker	1.236e-01	2.171e-01	6.761e+02
last_known_smoking_statusnever	-1.170e-01	2.162e-01	6.763e+02
last_known_smoking_statussmoker	5.315e-01	2.619e-01	6.756e+02
last_known_vaping_statussex-vaper	-6.394e-01	4.852e-01	7.210e+02
last_known_vaping_statusnever	9.454e-02	2.174e-01	6.853e+02
last_known_vaping_statusvaper	-1.105e-01	3.065e-01	6.926e+02
treatment_reclassifiedAnti-IL17	-2.349e-01	1.596e-01	6.071e+03
treatment_reclassifiedAnti-TNF	-3.520e-01	1.114e-01	7.026e+03
treatment_reclassifiedJAK Inhibitor	-4.327e-01	3.227e-01	5.841e+03
time_in_years	1.642e-02	6.030e-03	6.913e+02
genderMale:treatment_reclassifiedAnti-IL17	-2.914e-02	1.796e-01	5.660e+03
genderMale:treatment_reclassifiedAnti-TNF	1.211e-01	1.052e-01	6.214e+03

```

genderMale:treatment_reclassifiedJAK Inhibitor -2.039e-01  5.208e-01  5.824e+03
t value Pr(>|t|)
(Intercept) 6.707 3.72e-11 ***
genderMale -4.575 5.49e-06 ***
hlab27statusNegative 2.448 0.01458 *
hlab27statusPositive -0.418 0.67604
age_at_prom 5.789 1.04e-08 ***
diagnosisAxial SpA- nr-axSpA 1.479 0.13960
treatment_order2 -3.251 0.00115 **
treatment_order3 -0.606 0.54434
treatment_order4 0.094 0.92542
treatment_order5 -1.255 0.20967
treatment_order6 -1.138 0.25506
treatment_order7 0.027 0.97869
treatment_order8 0.655 0.51272
treatment_order9 0.489 0.62456
treatment_order10 -0.748 0.45479
treatment_order11 -0.046 0.96350
treatment_order12 -0.194 0.84605
treatment_order14 -0.277 0.78156
treatment_order15 0.005 0.99590
last_known_smoking_statussex-smoker 0.569 0.56935
last_known_smoking_statusnever -0.541 0.58856
last_known_smoking_statussmoker 2.030 0.04279 *
last_known_vaping_statussex-vaper -1.318 0.18796
last_known_vaping_statusnever 0.435 0.66373
last_known_vaping_statusvaper -0.361 0.71848
treatment_reclassifiedAnti-IL17 -1.472 0.14107
treatment_reclassifiedAnti-TNF -3.161 0.00158 **
treatment_reclassifiedJAK Inhibitor -1.341 0.17996
time_in_years 2.723 0.00662 **
genderMale:treatment_reclassifiedAnti-IL17 -0.162 0.87109
genderMale:treatment_reclassifiedAnti-TNF 1.151 0.24998
genderMale:treatment_reclassifiedJAK Inhibitor -0.392 0.69538
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_gender_jenkins_sleep_2_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: jenkins_sleep_2 ~ gender + hlab27status + age_at_prom + diagnosis +

```

```

treatment_order + last_known_smoking_status + last_known_vaping_status +
treatment_reclassified + time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_jenkins_sleep_2
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 26162.9

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.6242	-0.5610	0.0831	0.5580	3.4444

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.466720	1.57058	
	time_in_years	0.007209	0.08491	-0.62
Residual		1.241973	1.11444	

Number of obs: 7755, groups: ttas\_id, 853

Fixed effects:

	Estimate	Std. Error	df	t	value
(Intercept)	1.883e+00	2.841e-01	8.035e+02	6.631	
genderMale	-4.915e-01	1.090e-01	7.113e+02	-4.509	
hlab27statusNegative	4.750e-01	1.909e-01	7.244e+02	2.488	
hlab27statusPositive	-5.967e-02	1.574e-01	7.733e+02	-0.379	
age_at_prom	2.380e-02	4.118e-03	7.537e+02	5.780	
diagnosisAxial SpA- nr-axSpA	1.878e-01	1.260e-01	6.823e+02	1.491	
treatment_order2	-3.340e-01	9.984e-02	6.788e+03	-3.345	
treatment_order3	-6.755e-02	9.556e-02	6.188e+03	-0.707	
treatment_order4	-5.438e-03	1.157e-01	6.530e+03	-0.047	
treatment_order5	-1.681e-01	1.236e-01	5.874e+03	-1.359	
treatment_order6	-1.825e-01	1.446e-01	5.148e+03	-1.262	
treatment_order7	-2.276e-02	1.903e-01	4.694e+03	-0.120	
treatment_order8	1.344e-01	2.426e-01	5.418e+03	0.554	
treatment_order9	1.300e-01	3.049e-01	3.857e+03	0.426	
treatment_order10	-4.382e-01	5.752e-01	4.619e+03	-0.762	
treatment_order11	-3.019e-02	6.068e-01	3.865e+03	-0.050	
treatment_order12	-1.928e-01	9.474e-01	6.440e+03	-0.203	
treatment_order14	-2.148e-01	7.432e-01	1.218e+03	-0.289	
treatment_order15	8.422e-03	9.923e-01	1.021e+03	0.008	
last_known_smoking_statussex-smoker	1.169e-01	2.170e-01	6.747e+02	0.539	
last_known_smoking_statusnever	-1.267e-01	2.161e-01	6.747e+02	-0.586	
last_known_smoking_statussmoker	5.230e-01	2.618e-01	6.743e+02	1.998	
last_known_vaping_statussex-vaper	-6.223e-01	4.853e-01	7.207e+02	-1.282	



last_known_vaping_statusnever	1.081e-01	2.172e-01	6.830e+02	0.498
last_known_vaping_statusvaper	-9.702e-02	3.064e-01	6.912e+02	-0.317
treatment_reclassifiedAnti-IL17	-2.466e-01	1.101e-01	7.002e+03	-2.240
treatment_reclassifiedAnti-TNF	-2.759e-01	8.886e-02	7.290e+03	-3.105
treatment_reclassifiedJAK Inhibitor	-4.592e-01	2.642e-01	6.274e+03	-1.738
time_in_years	1.657e-02	6.035e-03	6.930e+02	2.746
	Pr(> t )			
(Intercept)	6.12e-11	***		
genderMale	7.63e-06	***		
hlab27statusNegative	0.013076	*		
hlab27statusPositive	0.704815			
age_at_prom	1.10e-08	***		
diagnosisAxial SpA- nr-axSpA	0.136512			
treatment_order2	0.000828	***		
treatment_order3	0.479644			
treatment_order4	0.962523			
treatment_order5	0.174048			
treatment_order6	0.206875			
treatment_order7	0.904803			
treatment_order8	0.579611			
treatment_order9	0.669886			
treatment_order10	0.446184			
treatment_order11	0.960324			
treatment_order12	0.838780			
treatment_order14	0.772647			
treatment_order15	0.993230			
last_known_smoking_statussex-smoker	0.590216			
last_known_smoking_statusnever	0.557844			
last_known_smoking_statussmoker	0.046159	*		
last_known_vaping_statussex-vaper	0.200196			
last_known_vaping_statusnever	0.618635			
last_known_vaping_statusvaper	0.751582			
treatment_reclassifiedAnti-IL17	0.025127	*		
treatment_reclassifiedAnti-TNF	0.001909	**		
treatment_reclassifiedJAK Inhibitor	0.082316	.		
time_in_years	0.006198	**		
---				

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
anova(model_treatment_gender_jenkins_sleep_2_full,
       model_treatment_gender_jenkins_sleep_2_reduced)
```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_2

Models:

model\_treatment\_gender\_jenkins\_sleep\_2\_reduced: jenkins\_sleep\_2 ~ gender + hlab27status + age\_at\_prom

model\_treatment\_gender\_jenkins\_sleep\_2\_full: jenkins\_sleep\_2 ~ gender + hlab27status + age\_at\_prom +

	npars	AIC	BIC	logLik	deviance
model_treatment_gender_jenkins_sleep_2_reduced	33	26167	26396	-13050	26101
model_treatment_gender_jenkins_sleep_2_full	36	26171	26421	-13049	26099

Chisq Df Pr(>Chisq)

model\_treatment\_gender\_jenkins\_sleep\_2\_reduced

model\_treatment\_gender\_jenkins\_sleep\_2\_full 1.898 3 0.5938

```
print(summary(model_treatment_gender_jenkins_sleep_3_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]

Formula: jenkins\_sleep\_3 ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status + treatment\_reclassified \* gender + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_3

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 26649.3

Scaled residuals:

	Min	1Q	Median	3Q	Max
	-3.7913	-0.5635	0.0160	0.5512	3.5234

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.343539	1.53086	
	time_in_years	0.005516	0.07427	-0.57
Residual		1.342714	1.15876	

Number of obs: 7756, groups: ttas\_id, 854

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	1.854e+00	2.866e-01	8.505e+02
genderMale	-4.217e-01	1.163e-01	8.811e+02
hlab27statusNegative	4.385e-01	1.915e-01	7.567e+02

hlab27statusPositive	5.715e-02	1.573e-01	7.851e+02
age_at_prom	1.511e-02	4.150e-03	7.965e+02
diagnosisAxial SpA- nr-axSpA	5.172e-02	1.271e-01	7.208e+02
treatment_order2	-2.789e-01	1.023e-01	6.494e+03
treatment_order3	8.216e-02	9.794e-02	5.909e+03
treatment_order4	5.467e-02	1.196e-01	6.270e+03
treatment_order5	-1.357e-01	1.269e-01	5.539e+03
treatment_order6	1.394e-01	1.475e-01	4.604e+03
treatment_order7	2.707e-01	1.947e-01	4.091e+03
treatment_order8	-7.555e-02	2.483e-01	4.485e+03
treatment_order9	-5.369e-01	3.095e-01	3.062e+03
treatment_order10	7.032e-01	5.912e-01	4.554e+03
treatment_order11	2.732e-01	6.194e-01	3.398e+03
treatment_order12	5.716e-01	9.769e-01	6.648e+03
treatment_order14	5.702e-01	7.432e-01	1.234e+03
treatment_order15	7.219e-01	9.879e-01	9.928e+02
last_known_smoking_statussex-smoker	2.949e-02	2.191e-01	7.128e+02
last_known_smoking_statusnever	-1.582e-01	2.183e-01	7.150e+02
last_known_smoking_statussmoker	7.745e-01	2.642e-01	7.157e+02
last_known_vaping_statussex-vaper	-1.004e+00	4.864e-01	7.316e+02
last_known_vaping_statusnever	1.476e-01	2.191e-01	7.235e+02
last_known_vaping_statusvaper	6.425e-02	3.090e-01	7.270e+02
treatment_reclassifiedAnti-IL17	-1.531e-01	1.630e-01	5.533e+03
treatment_reclassifiedAnti-TNF	-4.234e-01	1.142e-01	6.858e+03
treatment_reclassifiedJAK Inhibitor	-2.445e-01	3.298e-01	5.303e+03
time_in_years	1.197e-02	5.876e-03	5.948e+02
genderMale:treatment_reclassifiedAnti-IL17	-1.974e-01	1.832e-01	5.151e+03
genderMale:treatment_reclassifiedAnti-TNF	1.356e-01	1.076e-01	6.047e+03
genderMale:treatment_reclassifiedJAK Inhibitor	-5.195e-01	5.330e-01	5.561e+03
	t value	Pr(> t )	
(Intercept)	6.470	1.66e-10	***
genderMale	-3.625	0.000305	***
hlab27statusNegative	2.290	0.022317	*
hlab27statusPositive	0.363	0.716464	
age_at_prom	3.642	0.000288	***
diagnosisAxial SpA- nr-axSpA	0.407	0.684201	
treatment_order2	-2.725	0.006441	**
treatment_order3	0.839	0.401585	
treatment_order4	0.457	0.647564	
treatment_order5	-1.070	0.284853	
treatment_order6	0.945	0.344692	
treatment_order7	1.390	0.164544	
treatment_order8	-0.304	0.760981	

treatment_order9	-1.735	0.082852	.
treatment_order10	1.190	0.234286	
treatment_order11	0.441	0.659149	
treatment_order12	0.585	0.558467	
treatment_order14	0.767	0.443101	
treatment_order15	0.731	0.465121	
last_known_smoking_statussex-smoker	0.135	0.892957	
last_known_smoking_statusnever	-0.725	0.468763	
last_known_smoking_statussmoker	2.931	0.003485	**
last_known_vaping_statussex-vaper	-2.065	0.039276	*
last_known_vaping_statusnever	0.674	0.500839	
last_known_vaping_statusvaper	0.208	0.835351	
treatment_reclassifiedAnti-IL17	-0.940	0.347365	
treatment_reclassifiedAnti-TNF	-3.708	0.000211	***
treatment_reclassifiedJAK Inhibitor	-0.741	0.458553	
time_in_years	2.037	0.042117	*
genderMale:treatment_reclassifiedAnti-IL17	-1.077	0.281364	
genderMale:treatment_reclassifiedAnti-TNF	1.260	0.207687	
genderMale:treatment_reclassifiedJAK Inhibitor	-0.975	0.329715	

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_gender_jenkins_sleep_3_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [ lmerModLmerTest]

Formula: jenkins\_sleep\_3 ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status + treatment\_reclassified + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_3

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 26650.6

Scaled residuals:

	Min	1Q	Median	3Q	Max
	-3.8082	-0.5605	0.0176	0.5511	3.5269

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.343907	1.53098	
	time_in_years	0.005558	0.07455	-0.57

Residual 1.342385 1.15861  
 Number of obs: 7756, groups: tlas\_id, 854

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	1.824e+00	2.856e-01	8.369e+02	6.385
genderMale	-3.893e-01	1.098e-01	7.444e+02	-3.546
hlab27statusNegative	4.494e-01	1.916e-01	7.533e+02	2.346
hlab27statusPositive	6.517e-02	1.574e-01	7.825e+02	0.414
age_at_prom	1.510e-02	4.155e-03	7.944e+02	3.634
diagnosisAxial SpA- nr-axSpA	5.497e-02	1.272e-01	7.187e+02	0.432
treatment_order2	-2.897e-01	1.021e-01	6.503e+03	-2.836
treatment_order3	7.011e-02	9.771e-02	5.965e+03	0.717
treatment_order4	3.402e-02	1.185e-01	6.350e+03	0.287
treatment_order5	-1.482e-01	1.264e-01	5.622e+03	-1.172
treatment_order6	1.133e-01	1.470e-01	4.653e+03	0.770
treatment_order7	2.272e-01	1.933e-01	4.080e+03	1.175
treatment_order8	-1.206e-01	2.476e-01	4.537e+03	-0.487
treatment_order9	-5.775e-01	3.092e-01	3.085e+03	-1.867
treatment_order10	7.083e-01	5.875e-01	4.524e+03	1.206
treatment_order11	3.423e-01	6.147e-01	3.469e+03	0.557
treatment_order12	5.535e-01	9.762e-01	6.648e+03	0.567
treatment_order14	5.504e-01	7.431e-01	1.225e+03	0.741
treatment_order15	8.167e-01	9.847e-01	9.739e+02	0.829
last_known_smoking_statussex-smoker	1.534e-02	2.192e-01	7.104e+02	0.070
last_known_smoking_statusnever	-1.753e-01	2.184e-01	7.123e+02	-0.803
last_known_smoking_statussmoker	7.572e-01	2.644e-01	7.132e+02	2.864
last_known_vaping_statussex-vaper	-9.755e-01	4.870e-01	7.301e+02	-2.003
last_known_vaping_statusnever	1.700e-01	2.191e-01	7.201e+02	0.776
last_known_vaping_statusvaper	8.051e-02	3.092e-01	7.244e+02	0.260
treatment_reclassifiedAnti-IL17	-2.695e-01	1.128e-01	6.647e+03	-2.389
treatment_reclassifiedAnti-TNF	-3.382e-01	9.108e-02	7.080e+03	-3.714
treatment_reclassifiedJAK Inhibitor	-3.653e-01	2.706e-01	5.885e+03	-1.350
time_in_years	1.225e-02	5.888e-03	5.949e+02	2.080
Pr(> t )				
(Intercept)	2.84e-10	***		
genderMale	0.000415	***		
hlab27statusNegative	0.019247	*		
hlab27statusPositive	0.678988			
age_at_prom	0.000297	***		
diagnosisAxial SpA- nr-axSpA	0.665771			
treatment_order2	0.004584	**		
treatment_order3	0.473116			

```

treatment_order4          0.774096
treatment_order5          0.241174
treatment_order6          0.441196
treatment_order7          0.239901
treatment_order8          0.626054
treatment_order9          0.061938 .
treatment_order10         0.228009
treatment_order11         0.577640
treatment_order12         0.570720
treatment_order14         0.459008
treatment_order15         0.407094
last_known_smoking_statussex-smoker 0.944222
last_known_smoking_statusnever 0.422492
last_known_smoking_statussmoker 0.004305 **
last_known_vaping_statussex-vaper 0.045536 *
last_known_vaping_statusnever 0.438097
last_known_vaping_statusvaper 0.794610
treatment_reclassifiedAnti-IL17 0.016914 *
treatment_reclassifiedAnti-TNF 0.000206 ***
treatment_reclassifiedJAK Inhibitor 0.177121
time_in_years              0.037916 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_jenkins_sleep_3_full,
       model_treatment_gender_jenkins_sleep_3_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_3

Models:

model\_treatment\_gender\_jenkins\_sleep\_3\_reduced: jenkins\_sleep\_3 ~ gender + hlab27status + age\_a

model\_treatment\_gender\_jenkins\_sleep\_3\_full: jenkins\_sleep\_3 ~ gender + hlab27status + age\_a

	npars	AIC	BIC	logLik	deviance
model_treatment_gender_jenkins_sleep_3_reduced	33	26655	26885	-13295	26589
model_treatment_gender_jenkins_sleep_3_full	36	26656	26907	-13292	26584

  

	Chisq	Df	Pr(>Chisq)
model_treatment_gender_jenkins_sleep_3_reduced			
model_treatment_gender_jenkins_sleep_3_full	5.1143	3	0.1636

```
print(summary(model_treatment_gender_jenkins_sleep_4_full, corr = FALSE))
```

```
Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: jenkins_sleep_4 ~ gender + hlab27status + age_at_prom + diagnosis +
      treatment_order + last_known_smoking_status + last_known_vaping_status +
      treatment_reclassified * gender + time_in_years + (time_in_years |
      ttas_id)
Data: dataframe_sorted_and_reclassified_jenkins_sleep_4
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))
```

REML criterion at convergence: 25737.8

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.0187	-0.5536	0.0433	0.5663	3.5352

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.082393	1.44305	
	time_in_years	0.005085	0.07131	-0.51
Residual		1.181780	1.08710	

Number of obs: 7758, groups: ttas\_id, 854

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	2.840e+00	2.770e-01	8.012e+02
genderMale	-6.192e-01	1.124e-01	8.239e+02
hlab27statusNegative	4.859e-01	1.848e-01	7.075e+02
hlab27statusPositive	6.452e-02	1.523e-01	7.442e+02
age_at_prom	-2.800e-03	4.015e-03	7.534e+02
diagnosisAxial SpA- nr-axSpA	4.732e-01	1.223e-01	6.733e+02
treatment_order2	-1.770e-01	9.670e-02	6.436e+03
treatment_order3	7.955e-02	9.280e-02	5.875e+03
treatment_order4	1.048e-01	1.132e-01	6.233e+03
treatment_order5	1.523e-01	1.203e-01	5.503e+03
treatment_order6	1.957e-01	1.401e-01	4.559e+03
treatment_order7	4.135e-01	1.846e-01	4.045e+03
treatment_order8	2.024e-01	2.345e-01	4.463e+03
treatment_order9	-1.320e-01	2.933e-01	3.097e+03
treatment_order10	9.599e-01	5.621e-01	4.503e+03
treatment_order11	3.453e-01	5.869e-01	3.304e+03

treatment_order12	7.136e-01	9.235e-01	6.486e+03
treatment_order14	5.620e-01	7.142e-01	1.116e+03
treatment_order15	1.154e-01	9.481e-01	8.968e+02
last_known_smoking_statussex-smoker	-4.218e-02	2.131e-01	6.846e+02
last_known_smoking_statusnever	-2.100e-01	2.121e-01	6.838e+02
last_known_smoking_statussmoker	6.935e-01	2.563e-01	6.807e+02
last_known_vaping_statussex-vaper	-1.149e-02	4.744e-01	7.138e+02
last_known_vaping_statusnever	1.937e-01	2.127e-01	6.891e+02
last_known_vaping_statusvaper	3.536e-01	3.001e-01	6.943e+02
treatment_reclassifiedAnti-IL17	-8.656e-02	1.541e-01	5.439e+03
treatment_reclassifiedAnti-TNF	-3.014e-01	1.079e-01	6.834e+03
treatment_reclassifiedJAK Inhibitor	-8.000e-01	3.115e-01	5.203e+03
time_in_years	1.957e-02	5.705e-03	5.924e+02
genderMale:treatment_reclassifiedAnti-IL17	-5.135e-01	1.734e-01	5.061e+03
genderMale:treatment_reclassifiedAnti-TNF	-2.103e-02	1.020e-01	6.057e+03
genderMale:treatment_reclassifiedJAK Inhibitor	2.593e-02	5.036e-01	5.409e+03
t value Pr(> t )			
(Intercept)	10.254	< 2e-16	***
genderMale	-5.511	4.77e-08	***
hlab27statusNegative	2.629	0.008761	**
hlab27statusPositive	0.424	0.671876	
age_at_prom	-0.697	0.485718	
diagnosisAxial SpA- nr-axSpA	3.871	0.000119	***
treatment_order2	-1.831	0.067219	.
treatment_order3	0.857	0.391321	
treatment_order4	0.926	0.354469	
treatment_order5	1.265	0.205772	
treatment_order6	1.397	0.162361	
treatment_order7	2.239	0.025187	*
treatment_order8	0.863	0.388182	
treatment_order9	-0.450	0.652643	
treatment_order10	1.708	0.087754	.
treatment_order11	0.588	0.556372	
treatment_order12	0.773	0.439734	
treatment_order14	0.787	0.431505	
treatment_order15	0.122	0.903133	
last_known_smoking_statussex-smoker	-0.198	0.843130	
last_known_smoking_statusnever	-0.990	0.322373	
last_known_smoking_statussmoker	2.706	0.006974	**
last_known_vaping_statussex-vaper	-0.024	0.980686	
last_known_vaping_statusnever	0.911	0.362861	
last_known_vaping_statusvaper	1.178	0.239101	
treatment_reclassifiedAnti-IL17	-0.562	0.574231	



```

treatment_reclassifiedAnti-TNF          -2.793 0.005236 **
treatment_reclassifiedJAK Inhibitor      -2.568 0.010245 *
time_in_years                          3.430 0.000645 ***
genderMale:treatment_reclassifiedAnti-IL17 -2.961 0.003083 **
genderMale:treatment_reclassifiedAnti-TNF -0.206 0.836592
genderMale:treatment_reclassifiedJAK Inhibitor 0.051 0.958935

```

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_gender_jenkins_sleep_4_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: jenkins_sleep_4 ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified + time_in_years + (time_in_years |      ttas_id)
Data: dataframe_sorted_and_reclassified_jenkins_sleep_4
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 25743.1

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.0135	-0.5584	0.0431	0.5658	3.5312

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	2.091444	1.44618	
	time_in_years	0.005152	0.07178	-0.52
Residual		1.182579	1.08746	

Number of obs: 7758, groups: ttas\_id, 854

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	2.855e+00	2.759e-01	7.901e+02	10.348
genderMale	-6.482e-01	1.064e-01	7.083e+02	-6.093
hlab27statusNegative	4.978e-01	1.848e-01	7.060e+02	2.694
hlab27statusPositive	6.750e-02	1.522e-01	7.426e+02	0.443
age_at_prom	-2.831e-03	4.014e-03	7.523e+02	-0.705
diagnosisAxial SpA- nr-axSpA	4.754e-01	1.223e-01	6.728e+02	3.889
treatment_order2	-1.780e-01	9.653e-02	6.450e+03	-1.844
treatment_order3	7.941e-02	9.258e-02	5.927e+03	0.858

treatment_order4	9.322e-02	1.122e-01	6.307e+03	0.831
treatment_order5	1.584e-01	1.199e-01	5.581e+03	1.321
treatment_order6	1.902e-01	1.396e-01	4.603e+03	1.362
treatment_order7	3.736e-01	1.833e-01	4.031e+03	2.038
treatment_order8	1.549e-01	2.338e-01	4.522e+03	0.662
treatment_order9	-1.699e-01	2.931e-01	3.116e+03	-0.580
treatment_order10	8.933e-01	5.584e-01	4.458e+03	1.600
treatment_order11	5.386e-01	5.826e-01	3.366e+03	0.925
treatment_order12	6.343e-01	9.229e-01	6.490e+03	0.687
treatment_order14	4.793e-01	7.136e-01	1.108e+03	0.672
treatment_order15	3.550e-01	9.448e-01	8.806e+02	0.376
last_known_smoking_statussex-smoker	-5.346e-02	2.129e-01	6.823e+02	-0.251
last_known_smoking_statusnever	-2.175e-01	2.118e-01	6.814e+02	-1.027
last_known_smoking_statussmoker	6.855e-01	2.560e-01	6.788e+02	2.677
last_known_vaping_statussex-vaper	2.895e-03	4.741e-01	7.115e+02	0.006
last_known_vaping_statusnever	2.022e-01	2.124e-01	6.863e+02	0.952
last_known_vaping_statusvaper	3.410e-01	2.998e-01	6.921e+02	1.137
treatment_reclassifiedAnti-IL17	-4.126e-01	1.066e-01	6.626e+03	-3.872
treatment_reclassifiedAnti-TNF	-3.132e-01	8.606e-02	7.065e+03	-3.639
treatment_reclassifiedJAK Inhibitor	-7.704e-01	2.556e-01	5.787e+03	-3.014
time_in_years	1.981e-02	5.710e-03	5.906e+02	3.470
	Pr(> t )			
(Intercept)	< 2e-16 ***			
genderMale	1.82e-09 ***			
hlab27statusNegative	0.007223 **			
hlab27statusPositive	0.657544			
age_at_prom	0.480859			
diagnosisAxial SpA- nr-axSpA	0.000111 ***			
treatment_order2	0.065218 .			
treatment_order3	0.391032			
treatment_order4	0.406115			
treatment_order5	0.186500			
treatment_order6	0.173221			
treatment_order7	0.041610 *			
treatment_order8	0.507722			
treatment_order9	0.562187			
treatment_order10	0.109744			
treatment_order11	0.355254			
treatment_order12	0.491878			
treatment_order14	0.501927			
treatment_order15	0.707217			
last_known_smoking_statussex-smoker	0.801776			
last_known_smoking_statusnever	0.304823			

```

last_known_smoking_statussmoker      0.007597 **
last_known_vaping_statussex-vaper     0.995130
last_known_vaping_statusnever         0.341409
last_known_vaping_statusvaper         0.255813
treatment_reclassifiedAnti-IL17        0.000109 ***
treatment_reclassifiedAnti-TNF         0.000275 ***
treatment_reclassifiedJAK Inhibitor    0.002591 **
time_in_years                         0.000559 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_jenkins_sleep_4_full,
       model_treatment_gender_jenkins_sleep_4_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_jenkins\_sleep\_4

Models:

model\_treatment\_gender\_jenkins\_sleep\_4\_reduced: jenkins\_sleep\_4 ~ gender + hlab27status + age\_at\_prom

model\_treatment\_gender\_jenkins\_sleep\_4\_full: jenkins\_sleep\_4 ~ gender + hlab27status + age\_at\_prom +

	npar	AIC	BIC	logLik	deviance
model_treatment_gender_jenkins_sleep_4_reduced	33	25745	25975	-12840	25679
model_treatment_gender_jenkins_sleep_4_full	36	25742	25992	-12835	25670

Chisq Df Pr(>Chisq)

model\_treatment\_gender\_jenkins\_sleep\_4\_reduced

model\_treatment\_gender\_jenkins\_sleep\_4\_full 9.3439 3 0.02505 \*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## WPL

### lme4 code for treatment and diagnosis: WPL

```

model_treatment_diagnosis_wpl_full <- lmer(
  wpl ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * diagnosis +

```

```
time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_wpl,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_wpl_reduced <- lmer(
  wpl ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_wpl,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_diagnosis_wpl_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```
wpl ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified *
  diagnosis + time_in_years + (time_in_years | ttas_id)
```

Data: dataframe\_sorted\_and\_reclassified\_wpl

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 43640.6

Scaled residuals:

	Min	1Q	Median	3Q	Max
	-3.7739	-0.5444	-0.1229	0.4683	4.7189

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	405.82	20.145	
	time_in_years	1.24	1.113	-0.45
Residual		287.00	16.941	

Number of obs: 4977, groups: ttas\_id, 593

Fixed effects:

Estimate

(Intercept)	30.22764
genderMale	-4.11204
hlab27statusNegative	6.52628
hlab27statusPositive	2.22174
age_at_prom	0.02257
diagnosisAxial SpA- nr-axSpA	3.72296
treatment_order2	-0.10906
treatment_order3	4.39544
treatment_order4	1.30044
treatment_order5	-0.04188
treatment_order6	5.41504
treatment_order7	-2.90345
treatment_order8	4.16317
treatment_order9	2.34431
last_known_smoking_statussex-smoker	5.67541
last_known_smoking_statusnever	-0.32975
last_known_smoking_statussmoker	10.50513
last_known_vaping_statussex-vaper	-11.16627
last_known_vaping_statusnever	-1.16652
last_known_vaping_statusvaper	0.44150
treatment_reclassifiedAnti-IL17	-11.29082
treatment_reclassifiedAnti-TNF	-9.87075
treatment_reclassifiedJAK Inhibitor	-19.62008
time_in_years	-0.01972
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.21192
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-3.98442
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	25.84277
	Std. Error
(Intercept)	5.02969
genderMale	1.86860
hlab27statusNegative	3.33560
hlab27statusPositive	2.76502
age_at_prom	0.08216
diagnosisAxial SpA- nr-axSpA	2.12469
treatment_order2	1.82741
treatment_order3	1.73065
treatment_order4	2.18857
treatment_order5	2.39191
treatment_order6	3.37120
treatment_order7	3.90780
treatment_order8	6.15783
treatment_order9	6.24156
last_known_smoking_statussex-smoker	3.72999

last_known_smoking_statusnever	3.69583
last_known_smoking_statussmoker	4.53002
last_known_vaping_statussex-vaper	7.52405
last_known_vaping_statusnever	3.83456
last_known_vaping_statusvaper	5.22654
treatment_reclassifiedAnti-IL17	2.45390
treatment_reclassifiedAnti-TNF	1.67482
treatment_reclassifiedJAK Inhibitor	7.42723
time_in_years	0.11207
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	4.69922
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	2.22263
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	10.25968
df	
(Intercept)	569.24795
genderMale	506.58566
hlab27statusNegative	526.02381
hlab27statusPositive	548.36766
age_at_prom	545.29445
diagnosisAxial SpA- nr-axSpA	564.79136
treatment_order2	3503.10204
treatment_order3	3571.03816
treatment_order4	3625.70744
treatment_order5	3138.57176
treatment_order6	3267.89237
treatment_order7	2860.36592
treatment_order8	1555.46097
treatment_order9	1142.83678
last_known_smoking_statussex-smoker	497.33267
last_known_smoking_statusnever	500.29875
last_known_smoking_statussmoker	497.17797
last_known_vaping_statussex-vaper	487.64522
last_known_vaping_statusnever	508.69699
last_known_vaping_statusvaper	501.84342
treatment_reclassifiedAnti-IL17	3815.13837
treatment_reclassifiedAnti-TNF	4030.11467
treatment_reclassifiedJAK Inhibitor	2672.47708
time_in_years	428.17596
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3822.10916
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	3570.49952
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	3892.18163
t value	
(Intercept)	6.010
genderMale	-2.201

hlab27statusNegative	1.957
hlab27statusPositive	0.804
age_at_prom	0.275
diagnosisAxial SpA- nr-axSpA	1.752
treatment_order2	-0.060
treatment_order3	2.540
treatment_order4	0.594
treatment_order5	-0.018
treatment_order6	1.606
treatment_order7	-0.743
treatment_order8	0.676
treatment_order9	0.376
last_known_smoking_statussex-smoker	1.522
last_known_smoking_statusnever	-0.089
last_known_smoking_statussmoker	2.319
last_known_vaping_statussex-vaper	-1.484
last_known_vaping_statusnever	-0.304
last_known_vaping_statusvaper	0.084
treatment_reclassifiedAnti-IL17	-4.601
treatment_reclassifiedAnti-TNF	-5.894
treatment_reclassifiedJAK Inhibitor	-2.642
time_in_years	-0.176
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	0.684
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-1.793
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	2.519
	Pr(> t )
(Intercept)	3.32e-09 ***
genderMale	0.0282 *
hlab27statusNegative	0.0509 .
hlab27statusPositive	0.4220
age_at_prom	0.7837
diagnosisAxial SpA- nr-axSpA	0.0803 .
treatment_order2	0.9524
treatment_order3	0.0111 *
treatment_order4	0.5524
treatment_order5	0.9860
treatment_order6	0.1083
treatment_order7	0.4576
treatment_order8	0.4991
treatment_order9	0.7073
last_known_smoking_statussex-smoker	0.1288
last_known_smoking_statusnever	0.9289
last_known_smoking_statussmoker	0.0208 *

```

last_known_vaping_statussex-vaper          0.1384
last_known_vaping_statusnever              0.7611
last_known_vaping_statusvaper              0.9327
treatment_reclassifiedAnti-IL17             4.34e-06 ***
treatment_reclassifiedAnti-TNF              4.09e-09 ***
treatment_reclassifiedJAK Inhibitor          0.0083 **
time_in_years                             0.8604
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17 0.4943
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF 0.0731 .
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.0118 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_wpl_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
wpl ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
      last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
      time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_wpl
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 43667.3

```

Scaled residuals:
      Min       1Q   Median       3Q      Max
-3.7650 -0.5467 -0.1246  0.4667  4.7119

```

```

Random effects:
Groups   Name              Variance Std.Dev. Corr
ttas_id  (Intercept)      406.58    20.164
          time_in_years    1.22      1.105   -0.45
Residual                287.74    16.963
Number of obs: 4977, groups:  ttas_id, 593

```

```

Fixed effects:
              Estimate Std. Error      df t value
(Intercept)   30.55009    5.02928  570.48364   6.074
genderMale    -4.15159    1.86808  507.38882  -2.222
hlab27statusNegative  6.62777    3.33417  526.87692   1.988

```



hlab27statusPositive	2.30265	2.76139	547.75752	0.834
age_at_prom	0.02420	0.08216	546.62043	0.295
diagnosisAxial SpA- nr-axSpA	2.78990	2.02289	505.08417	1.379
treatment_order2	-0.52025	1.81086	3526.97202	-0.287
treatment_order3	3.99506	1.70992	3710.54848	2.336
treatment_order4	1.11168	2.15819	3687.05060	0.515
treatment_order5	-0.12461	2.36702	3274.89474	-0.053
treatment_order6	5.14456	3.34542	3340.86274	1.538
treatment_order7	-5.07273	3.85315	2801.34420	-1.317
treatment_order8	3.28721	6.12960	1555.20146	0.536
treatment_order9	2.19471	6.22532	1122.61501	0.353
last_known_smoking_statussex-smoker	5.67929	3.72616	496.65037	1.524
last_known_smoking_statusnever	-0.36073	3.69266	500.07589	-0.098
last_known_smoking_statussmoker	10.63886	4.52723	496.95894	2.350
last_known_vaping_statussex-vaper	-11.12190	7.51618	488.04747	-1.480
last_known_vaping_statusnever	-1.29629	3.83025	507.97139	-0.338
last_known_vaping_statusvaper	0.43453	5.22367	502.04999	0.083
treatment_reclassifiedAnti-IL17	-10.47991	2.25903	4085.59028	-4.639
treatment_reclassifiedAnti-TNF	-10.44945	1.63226	4001.86432	-6.402
treatment_reclassifiedJAK Inhibitor	-6.01671	5.51849	3931.09903	-1.090
time_in_years	-0.02327	0.11179	430.44019	-0.208
Pr(> t )				
(Intercept)	2.27e-09 ***			
genderMale	0.0267 *			
hlab27statusNegative	0.0473 *			
hlab27statusPositive	0.4047			
age_at_prom	0.7684			
diagnosisAxial SpA- nr-axSpA	0.1685			
treatment_order2	0.7739			
treatment_order3	0.0195 *			
treatment_order4	0.6065			
treatment_order5	0.9580			
treatment_order6	0.1242			
treatment_order7	0.1881			
treatment_order8	0.5918			
treatment_order9	0.7245			
last_known_smoking_statussex-smoker	0.1281			
last_known_smoking_statusnever	0.9222			
last_known_smoking_statussmoker	0.0192 *			
last_known_vaping_statussex-vaper	0.1396			
last_known_vaping_statusnever	0.7352			
last_known_vaping_statusvaper	0.9337			
treatment_reclassifiedAnti-IL17	3.61e-06 ***			

```

treatment_reclassifiedAnti-TNF      1.71e-10 ***
treatment_reclassifiedJAK Inhibitor  0.2757
time_in_years                       0.8352
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_wpl_full,
       model_treatment_diagnosis_wpl_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_wpl

Models:

model\_treatment\_diagnosis\_wpl\_reduced: wpl ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order

model\_treatment\_diagnosis\_wpl\_full: wpl ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + treatment\_reclassified

	npar	AIC	BIC	logLik	deviance	Chisq
model_treatment_diagnosis_wpl_reduced	28	43797	43979	-21870	43741	
model_treatment_diagnosis_wpl_full	31	43791	43993	-21864	43729	11.976

Df Pr(>Chisq)

model\_treatment\_diagnosis\_wpl\_reduced

model\_treatment\_diagnosis\_wpl\_full      3    0.007467 \*\*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## lme4 code for treatment and gender: WPL

```

model_treatment_gender_wpl_full <- lmer(
  wpl ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_wpl,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```

fixed-effect model matrix is rank deficient so dropping 1 column / coefficient  
fixed-effect model matrix is rank deficient so dropping 1 column / coefficient

```

model_treatment_gender_wpl_reduced <- lmer(
  wpl ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_wpl,
    control = lmerControl(optimizer = "bobyqa",
      optCtrl = list(maxfun = 2e5)))

```

```

print(summary(model_treatment_gender_wpl_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```

wpl ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified *
  gender + time_in_years + (time_in_years | ttas_id)

```

Data: dataframe\_sorted\_and\_reclassified\_wpl

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 43657

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.7743	-0.5475	-0.1222	0.4655	4.7119

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	406.718	20.167	
	time_in_years	1.185	1.089	-0.44
Residual		287.824	16.965	

Number of obs: 4977, groups: ttas\_id, 593

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	31.24396	5.07847	584.84692
genderMale	-4.84885	1.98906	611.59161
hlab27statusNegative	6.47288	3.33944	527.57221
hlab27statusPositive	2.21721	2.76408	548.14481
age_at_prom	0.02290	0.08233	548.28961

diagnosisAxial SpA- nr-axSpA	2.73143	2.02686	505.85017
treatment_order2	-0.32764	1.81345	3528.10657
treatment_order3	4.16011	1.71222	3679.68416
treatment_order4	1.54067	2.17283	3638.16582
treatment_order5	0.03890	2.37567	3203.43045
treatment_order6	5.71258	3.35862	3248.57715
treatment_order7	-4.07953	3.89846	2704.37762
treatment_order8	4.04782	6.13852	1471.35311
treatment_order9	2.74671	6.21643	1085.65497
last_known_smoking_statussex-smoker	5.82026	3.73418	498.18507
last_known_smoking_statusnever	-0.19758	3.70028	501.22794
last_known_smoking_statussmoker	10.68978	4.53545	497.71859
last_known_vaping_statussex-vaper	-11.42057	7.52516	488.11101
last_known_vaping_statusnever	-1.55092	3.84016	509.80783
last_known_vaping_statusvaper	0.17672	5.23625	502.77249
treatment_reclassifiedAnti-IL17	-8.77971	3.56750	3914.59322
treatment_reclassifiedAnti-TNF	-12.25278	2.15938	3872.34174
treatment_reclassifiedJAK Inhibitor	-7.63755	5.63774	3787.12693
time_in_years	-0.02677	0.11152	428.18127
genderMale:treatment_reclassifiedAnti-IL17	-2.72154	4.00461	3364.93807
genderMale:treatment_reclassifiedAnti-TNF	2.47926	2.03638	3357.81238
	t value	Pr(> t )	
(Intercept)	6.152	1.42e-09	***
genderMale	-2.438	0.0151	*
hlab27statusNegative	1.938	0.0531	.
hlab27statusPositive	0.802	0.4228	
age_at_prom	0.278	0.7810	
diagnosisAxial SpA- nr-axSpA	1.348	0.1784	
treatment_order2	-0.181	0.8566	
treatment_order3	2.430	0.0152	*
treatment_order4	0.709	0.4783	
treatment_order5	0.016	0.9869	
treatment_order6	1.701	0.0891	.
treatment_order7	-1.046	0.2954	
treatment_order8	0.659	0.5097	
treatment_order9	0.442	0.6587	
last_known_smoking_statussex-smoker	1.559	0.1197	
last_known_smoking_statusnever	-0.053	0.9574	
last_known_smoking_statussmoker	2.357	0.0188	*
last_known_vaping_statussex-vaper	-1.518	0.1297	
last_known_vaping_statusnever	-0.404	0.6865	
last_known_vaping_statusvaper	0.034	0.9731	
treatment_reclassifiedAnti-IL17	-2.461	0.0139	*

```

treatment_reclassifiedAnti-TNF          -5.674 1.50e-08 ***
treatment_reclassifiedJAK Inhibitor      -1.355  0.1756
time_in_years                          -0.240  0.8104
genderMale:treatment_reclassifiedAnti-IL17 -0.680  0.4968
genderMale:treatment_reclassifiedAnti-TNF  1.217  0.2235
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
fit warnings:
fixed-effect model matrix is rank deficient so dropping 1 column / coefficient

```

```
print(summary(model_treatment_gender_wpl_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
wpl ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
      last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
      time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_wpl
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 43667.3

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.7650	-0.5467	-0.1246	0.4667	4.7119

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	406.58	20.164	
	time_in_years	1.22	1.105	-0.45
Residual		287.74	16.963	

Number of obs: 4977, groups: ttas\_id, 593

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	30.55009	5.02928	570.48364	6.074
genderMale	-4.15159	1.86808	507.38882	-2.222
hlab27statusNegative	6.62777	3.33417	526.87692	1.988
hlab27statusPositive	2.30265	2.76139	547.75752	0.834
age_at_prom	0.02420	0.08216	546.62043	0.295
diagnosisAxial SpA- nr-axSpA	2.78990	2.02289	505.08417	1.379

treatment_order2	-0.52025	1.81086	3526.97202	-0.287
treatment_order3	3.99506	1.70992	3710.54848	2.336
treatment_order4	1.11168	2.15819	3687.05060	0.515
treatment_order5	-0.12461	2.36702	3274.89474	-0.053
treatment_order6	5.14456	3.34542	3340.86274	1.538
treatment_order7	-5.07273	3.85315	2801.34420	-1.317
treatment_order8	3.28721	6.12960	1555.20146	0.536
treatment_order9	2.19471	6.22532	1122.61501	0.353
last_known_smoking_statussex-smoker	5.67929	3.72616	496.65037	1.524
last_known_smoking_statusnever	-0.36073	3.69266	500.07589	-0.098
last_known_smoking_statussmoker	10.63886	4.52723	496.95894	2.350
last_known_vaping_statussex-vaper	-11.12190	7.51618	488.04747	-1.480
last_known_vaping_statusnever	-1.29629	3.83025	507.97139	-0.338
last_known_vaping_statusvaper	0.43453	5.22367	502.04999	0.083
treatment_reclassifiedAnti-IL17	-10.47991	2.25903	4085.59028	-4.639
treatment_reclassifiedAnti-TNF	-10.44945	1.63226	4001.86432	-6.402
treatment_reclassifiedJAK Inhibitor	-6.01671	5.51849	3931.09903	-1.090
time_in_years	-0.02327	0.11179	430.44019	-0.208
	Pr(> t )			
(Intercept)	2.27e-09 ***			
genderMale	0.0267 *			
hlab27statusNegative	0.0473 *			
hlab27statusPositive	0.4047			
age_at_prom	0.7684			
diagnosisAxial SpA- nr-axSpA	0.1685			
treatment_order2	0.7739			
treatment_order3	0.0195 *			
treatment_order4	0.6065			
treatment_order5	0.9580			
treatment_order6	0.1242			
treatment_order7	0.1881			
treatment_order8	0.5918			
treatment_order9	0.7245			
last_known_smoking_statussex-smoker	0.1281			
last_known_smoking_statusnever	0.9222			
last_known_smoking_statussmoker	0.0192 *			
last_known_vaping_statussex-vaper	0.1396			
last_known_vaping_statusnever	0.7352			
last_known_vaping_statusvaper	0.9337			
treatment_reclassifiedAnti-IL17	3.61e-06 ***			
treatment_reclassifiedAnti-TNF	1.71e-10 ***			
treatment_reclassifiedJAK Inhibitor	0.2757			
time_in_years	0.8352			

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
anova(model_treatment_gender_wpl_full,  
       model_treatment_gender_wpl_reduced)
```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_wpl

Models:

model\_treatment\_gender\_wpl\_reduced: wpl ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order

model\_treatment\_gender\_wpl\_full: wpl ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + treatment\_reclassified

	npars	AIC	BIC	logLik	deviance	Chisq	Df
model_treatment_gender_wpl_reduced	28	43797	43979	-21870	43741		
model_treatment_gender_wpl_full	30	43798	43994	-21869	43738	2.5148	2

Pr(>Chisq)

model\_treatment\_gender\_wpl\_reduced

model\_treatment\_gender\_wpl\_full                    0.2844

## Daily Activity Impairment

### lme4 code for treatment and diagnosis: Daily Activity Impairment

```
model_treatment_diagnosis_daily_activity_impairment_full <- lmer(  
  daily_activity_impairment ~ gender + hlab27status + age_at_prom +  
    diagnosis + treatment_order + last_known_smoking_status +  
    last_known_vaping_status +  
    treatment_reclassified * diagnosis +  
    time_in_years + (time_in_years | ttas_id),  
  data = dataframe_sorted_and_reclassified_daily_activity_impairment,  
  control = lmerControl(optimizer = "bobyqa",  
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_daily_activity_impairment_reduced <- lmer(  
  daily_activity_impairment ~ gender + hlab27status + age_at_prom +  
    diagnosis + treatment_order + last_known_smoking_status +  
    last_known_vaping_status +  
    treatment_reclassified +
```

```

time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_daily_activity_impairment,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

print(summary(model_treatment_diagnosis_daily_activity_impairment_full, corr = FALSE))

```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: daily_activity_impairment ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status + treatment_reclassified * diagnosis +
  time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_daily_activity_impairment
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 82698.2

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.9657	-0.5782	-0.0756	0.5085	4.2986

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	550.107	23.454	
	time_in_years	1.806	1.344	-0.53
Residual		290.805	17.053	

Number of obs: 9417, groups: ttas\_id, 850

Fixed effects:

	Estimate
(Intercept)	39.81343
genderMale	-7.85926
hlab27statusNegative	5.43554
hlab27statusPositive	1.33453
age_at_prom	0.10790
diagnosisAxial SpA- nr-axSpA	0.56715
treatment_order2	-1.55312
treatment_order3	3.09044
treatment_order4	1.91999
treatment_order5	5.22894



treatment_order6	5.50053
treatment_order7	5.79665
treatment_order8	7.08616
treatment_order9	2.68028
treatment_order10	2.42673
treatment_order11	12.27760
treatment_order12	12.26511
treatment_order14	19.31758
treatment_order15	-2.54532
last_known_smoking_statussex-smoker	1.66892
last_known_smoking_statusnever	-2.38089
last_known_smoking_statussmoker	9.35225
last_known_vaping_statussex-vaper	-7.29694
last_known_vaping_statusnever	-2.29442
last_known_vaping_statusvaper	2.84035
treatment_reclassifiedAnti-IL17	-15.14361
treatment_reclassifiedAnti-TNF	-12.97546
treatment_reclassifiedJAK Inhibitor	-26.09002
time_in_years	0.01500
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	12.20388
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-1.03432
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	16.61434
	Std. Error
(Intercept)	4.34604
genderMale	1.70129
hlab27statusNegative	2.95121
hlab27statusPositive	2.41239
age_at_prom	0.06401
diagnosisAxial SpA- nr-axSpA	2.01905
treatment_order2	1.33774
treatment_order3	1.29359
treatment_order4	1.57678
treatment_order5	1.66106
treatment_order6	2.03321
treatment_order7	2.68367
treatment_order8	3.45685
treatment_order9	4.09353
treatment_order10	7.90152
treatment_order11	9.79682
treatment_order12	14.18252
treatment_order14	11.42967
treatment_order15	15.73513
last_known_smoking_statussex-smoker	3.39066

last_known_smoking_statusnever	3.37691
last_known_smoking_statussmoker	4.02963
last_known_vaping_statussex-vaper	7.54212
last_known_vaping_statusnever	3.37026
last_known_vaping_statusvaper	4.73407
treatment_reclassifiedAnti-IL17	1.58307
treatment_reclassifiedAnti-TNF	1.15137
treatment_reclassifiedJAK Inhibitor	4.77684
time_in_years	0.09346
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.68948
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.78185
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	8.18673
	df
(Intercept)	799.95451
genderMale	701.25346
hlab27statusNegative	732.28461
hlab27statusPositive	782.40823
age_at_prom	753.96312
diagnosisAxial SpA- nr-axSpA	768.16080
treatment_order2	7666.22123
treatment_order3	6639.53619
treatment_order4	6932.43654
treatment_order5	6101.58352
treatment_order6	5701.77176
treatment_order7	5257.06340
treatment_order8	6586.84005
treatment_order9	4872.31974
treatment_order10	6381.73335
treatment_order11	5158.44444
treatment_order12	6242.02150
treatment_order14	734.34494
treatment_order15	829.06176
last_known_smoking_statussex-smoker	666.80694
last_known_smoking_statusnever	667.18048
last_known_smoking_statussmoker	666.62328
last_known_vaping_statussex-vaper	717.61892
last_known_vaping_statusnever	674.07423
last_known_vaping_statusvaper	672.65395
treatment_reclassifiedAnti-IL17	8082.99945
treatment_reclassifiedAnti-TNF	8684.84060
treatment_reclassifiedJAK Inhibitor	6173.05615
time_in_years	718.59998
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	7265.31798

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	7397.54874
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	8330.71375
	t value
(Intercept)	9.161
genderMale	-4.620
hlab27statusNegative	1.842
hlab27statusPositive	0.553
age_at_prom	1.686
diagnosisAxial SpA- nr-axSpA	0.281
treatment_order2	-1.161
treatment_order3	2.389
treatment_order4	1.218
treatment_order5	3.148
treatment_order6	2.705
treatment_order7	2.160
treatment_order8	2.050
treatment_order9	0.655
treatment_order10	0.307
treatment_order11	1.253
treatment_order12	0.865
treatment_order14	1.690
treatment_order15	-0.162
last_known_smoking_statussex-smoker	0.492
last_known_smoking_statusnever	-0.705
last_known_smoking_statussmoker	2.321
last_known_vaping_statussex-vaper	-0.967
last_known_vaping_statusnever	-0.681
last_known_vaping_statusvaper	0.600
treatment_reclassifiedAnti-IL17	-9.566
treatment_reclassifiedAnti-TNF	-11.270
treatment_reclassifiedJAK Inhibitor	-5.462
time_in_years	0.160
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.308
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-0.580
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	2.029
	Pr(> t )
(Intercept)	< 2e-16 ***
genderMale	4.58e-06 ***
hlab27statusNegative	0.065909 .
hlab27statusPositive	0.580287
age_at_prom	0.092283 .
diagnosisAxial SpA- nr-axSpA	0.778862
treatment_order2	0.245679

treatment_order3	0.016920 *
treatment_order4	0.223393
treatment_order5	0.001652 **
treatment_order6	0.006844 **
treatment_order7	0.030820 *
treatment_order8	0.040415 *
treatment_order9	0.512652
treatment_order10	0.758760
treatment_order11	0.210181
treatment_order12	0.387179
treatment_order14	0.091428 .
treatment_order15	0.871534
last_known_smoking_statussex-smoker	0.622732
last_known_smoking_statusnever	0.481026
last_known_smoking_statussmoker	0.020595 *
last_known_vaping_statussex-vaper	0.333625
last_known_vaping_statusnever	0.496242
last_known_vaping_statusvaper	0.548721
treatment_reclassifiedAnti-IL17	< 2e-16 ***
treatment_reclassifiedAnti-TNF	< 2e-16 ***
treatment_reclassifiedJAK Inhibitor	4.90e-08 ***
time_in_years	0.872560
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	0.000945 ***
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	0.561611
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	0.042447 *
---	

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_diagnosis_daily_activity_impairment_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]

Formula: daily\_activity\_impairment ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status + treatment\_reclassified + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_daily\_activity\_impairment

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 82728.5

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.9526	-0.5794	-0.0746	0.5067	4.2972

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	552.132	23.497	
	time_in_years	1.808	1.345	-0.53
Residual		291.222	17.065	

Number of obs: 9417, groups: ttas\_id, 850

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	40.01383	4.34814	796.81056	9.203
genderMale	-7.90754	1.70315	699.68291	-4.643
hlab27statusNegative	5.53974	2.95422	730.73171	1.875
hlab27statusPositive	1.20936	2.41369	778.46989	0.501
age_at_prom	0.10491	0.06407	752.37125	1.637
diagnosisAxial SpA- nr-axSpA	0.81523	1.93922	694.37948	0.420
treatment_order2	-1.59227	1.32194	7795.14816	-1.204
treatment_order3	3.07315	1.27528	6865.96976	2.410
treatment_order4	1.81408	1.55718	7096.47686	1.165
treatment_order5	5.50481	1.64917	6289.84283	3.338
treatment_order6	4.93547	2.01432	5740.51692	2.450
treatment_order7	5.17018	2.66834	5222.66202	1.938
treatment_order8	6.81181	3.44432	6619.97023	1.978
treatment_order9	2.93593	4.08542	4890.85745	0.719
treatment_order10	1.06983	7.88199	6314.79817	0.136
treatment_order11	11.10983	9.79784	5131.79754	1.134
treatment_order12	11.96879	14.18824	6226.92184	0.844
treatment_order14	19.05189	11.42926	725.42095	1.667
treatment_order15	-4.41631	15.73436	817.97422	-0.281
last_known_smoking_statussex-smoker	1.03811	3.38981	662.27459	0.306
last_known_smoking_statusnever	-2.97841	3.37706	663.46019	-0.882
last_known_smoking_statussmoker	8.76112	4.03171	664.35948	2.173
last_known_vaping_statussex-vaper	-6.61171	7.54777	714.42785	-0.876
last_known_vaping_statusnever	-1.70424	3.37023	670.55488	-0.506
last_known_vaping_statusvaper	3.43701	4.73723	670.58116	0.726
treatment_reclassifiedAnti-IL17	-13.50951	1.50983	8289.66465	-8.948
treatment_reclassifiedAnti-TNF	-13.03685	1.13132	8646.54486	-11.524
treatment_reclassifiedJAK Inhibitor	-20.13444	3.99773	7482.68343	-5.036
time_in_years	0.01650	0.09351	710.49543	0.176

Pr(>|t|)

(Intercept) < 2e-16 \*\*\*

genderMale	4.10e-06 ***
hlab27statusNegative	0.061164 .
hlab27statusPositive	0.616483
age_at_prom	0.101960
diagnosisAxial SpA- nr-axSpA	0.674330
treatment_order2	0.228435
treatment_order3	0.015988 *
treatment_order4	0.244069
treatment_order5	0.000849 ***
treatment_order6	0.014308 *
treatment_order7	0.052726 .
treatment_order8	0.048004 *
treatment_order9	0.472400
treatment_order10	0.892038
treatment_order11	0.256887
treatment_order12	0.398942
treatment_order14	0.095958 .
treatment_order15	0.779027
last_known_smoking_statussex-smoker	0.759514
last_known_smoking_statusnever	0.378122
last_known_smoking_statussmoker	0.030129 *
last_known_vaping_statussex-vaper	0.381334
last_known_vaping_statusnever	0.613251
last_known_vaping_statusvaper	0.468378
treatment_reclassifiedAnti-IL17	< 2e-16 ***
treatment_reclassifiedAnti-TNF	< 2e-16 ***
treatment_reclassifiedJAK Inhibitor	4.85e-07 ***
time_in_years	0.859952

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
anova(model_treatment_diagnosis_daily_activity_impairment_full,
       model_treatment_diagnosis_daily_activity_impairment_reduced)
```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_daily\_activity\_impairment

Models:

model\_treatment\_diagnosis\_daily\_activity\_impairment\_reduced: daily\_activity\_impairment ~ gender

model\_treatment\_diagnosis\_daily\_activity\_impairment\_full: daily\_activity\_impairment ~ gender

	npars	AIC	BIC
model_treatment_diagnosis_daily_activity_impairment_reduced	33	82889	83125

```

model_treatment_diagnosis_daily_activity_impairment_full      36 82878 83135
                                                                logLik deviance
model_treatment_diagnosis_daily_activity_impairment_reduced -41412      82823
model_treatment_diagnosis_daily_activity_impairment_full      -41403      82806
                                                                Chisq Df
model_treatment_diagnosis_daily_activity_impairment_reduced
model_treatment_diagnosis_daily_activity_impairment_full      16.987  3
                                                                Pr(>Chisq)
model_treatment_diagnosis_daily_activity_impairment_reduced
model_treatment_diagnosis_daily_activity_impairment_full      0.0007112 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

## lme4 code for treatment and gender: Daily Activity Impairment

```

model_treatment_gender_daily_activity_impairment_full <- lmer(
  daily_activity_impairment ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_daily_activity_impairment,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

model_treatment_gender_daily_activity_impairment_reduced <- lmer(
  daily_activity_impairment ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_daily_activity_impairment,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

print(summary(model_treatment_gender_daily_activity_impairment_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

```

Formula: daily_activity_impairment ~ gender + hlab27status + age_at_prom +
      diagnosis + treatment_order + last_known_smoking_status +
      last_known_vaping_status + treatment_reclassified * gender +
      time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_daily_activity_impairment
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 82708.2

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.9250	-0.5787	-0.0737	0.5067	4.2899

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	554.910	23.557	
	time_in_years	1.787	1.337	-0.53
Residual		291.188	17.064	

Number of obs: 9417, groups: ttas\_id, 850

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	4.068e+01	4.367e+00	8.117e+02
genderMale	-8.539e+00	1.781e+00	8.162e+02
hlab27statusNegative	5.285e+00	2.957e+00	7.339e+02
hlab27statusPositive	1.086e+00	2.414e+00	7.807e+02
age_at_prom	1.046e-01	6.409e-02	7.545e+02
diagnosisAxial SpA- nr-axSpA	7.400e-01	1.941e+00	6.968e+02
treatment_order2	-1.401e+00	1.325e+00	7.814e+03
treatment_order3	3.302e+00	1.279e+00	6.806e+03
treatment_order4	2.265e+00	1.573e+00	6.939e+03
treatment_order5	5.840e+00	1.661e+00	6.148e+03
treatment_order6	5.283e+00	2.024e+00	5.667e+03
treatment_order7	6.426e+00	2.700e+00	5.185e+03
treatment_order8	7.734e+00	3.456e+00	6.464e+03
treatment_order9	3.695e+00	4.091e+00	4.825e+03
treatment_order10	2.173e+00	7.927e+00	6.346e+03
treatment_order11	9.611e+00	9.894e+00	5.025e+03
treatment_order12	1.288e+01	1.418e+01	6.238e+03
treatment_order14	2.007e+01	1.139e+01	7.259e+02
treatment_order15	-6.065e+00	1.577e+01	8.345e+02
last_known_smoking_statussex-smoker	1.243e+00	3.392e+00	6.646e+02
last_known_smoking_statusnever	-2.800e+00	3.380e+00	6.660e+02



last_known_smoking_statussmoker	8.937e+00	4.035e+00	6.668e+02
last_known_vaping_statussex-vaper	-7.101e+00	7.546e+00	7.150e+02
last_known_vaping_statusnever	-1.980e+00	3.374e+00	6.737e+02
last_known_vaping_statusvaper	3.220e+00	4.741e+00	6.729e+02
treatment_reclassifiedAnti-IL17	-1.074e+01	2.387e+00	6.742e+03
treatment_reclassifiedAnti-TNF	-1.486e+01	1.572e+00	8.160e+03
treatment_reclassifiedJAK Inhibitor	-2.119e+01	4.920e+00	6.808e+03
time_in_years	8.931e-03	9.329e-02	7.124e+02
genderMale:treatment_reclassifiedAnti-IL17	-4.360e+00	2.665e+00	6.080e+03
genderMale:treatment_reclassifiedAnti-TNF	2.535e+00	1.509e+00	7.295e+03
genderMale:treatment_reclassifiedJAK Inhibitor	-7.637e-01	8.010e+00	7.131e+03
	t value	Pr(> t )	
(Intercept)	9.314	< 2e-16	***
genderMale	-4.795	1.94e-06	***
hlab27statusNegative	1.788	0.074267	.
hlab27statusPositive	0.450	0.653039	
age_at_prom	1.633	0.102968	
diagnosisAxial SpA- nr-axSpA	0.381	0.703161	
treatment_order2	-1.058	0.290312	
treatment_order3	2.581	0.009880	**
treatment_order4	1.440	0.149917	
treatment_order5	3.516	0.000441	***
treatment_order6	2.610	0.009087	**
treatment_order7	2.380	0.017335	*
treatment_order8	2.238	0.025244	*
treatment_order9	0.903	0.366413	
treatment_order10	0.274	0.784006	
treatment_order11	0.971	0.331381	
treatment_order12	0.908	0.363679	
treatment_order14	1.762	0.078547	.
treatment_order15	-0.385	0.700628	
last_known_smoking_statussex-smoker	0.366	0.714213	
last_known_smoking_statusnever	-0.829	0.407604	
last_known_smoking_statussmoker	2.215	0.027117	*
last_known_vaping_statussex-vaper	-0.941	0.347015	
last_known_vaping_statusnever	-0.587	0.557465	
last_known_vaping_statusvaper	0.679	0.497208	
treatment_reclassifiedAnti-IL17	-4.499	6.93e-06	***
treatment_reclassifiedAnti-TNF	-9.453	< 2e-16	***
treatment_reclassifiedJAK Inhibitor	-4.308	1.67e-05	***
time_in_years	0.096	0.923762	
genderMale:treatment_reclassifiedAnti-IL17	-1.636	0.101810	
genderMale:treatment_reclassifiedAnti-TNF	1.679	0.093139	.

```
genderMale:treatment_reclassifiedJAK Inhibitor -0.095 0.924045
```

```
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
print(summary(model_treatment_gender_daily_activity_impairment_reduced, corr = FALSE))
```

```
Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]
```

```
Formula: daily_activity_impairment ~ gender + hlab27status + age_at_prom +  
  diagnosis + treatment_order + last_known_smoking_status +  
  last_known_vaping_status + treatment_reclassified + time_in_years +  
  (time_in_years | ttas_id)
```

```
Data: dataframe_sorted_and_reclassified_daily_activity_impairment
```

```
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))
```

```
REML criterion at convergence: 82728.5
```

```
Scaled residuals:
```

```
      Min       1Q   Median       3Q      Max  
-3.9526 -0.5794 -0.0746  0.5067  4.2972
```

```
Random effects:
```

```
Groups   Name              Variance Std.Dev. Corr  
ttas_id  (Intercept)      552.132   23.497  
         time_in_years    1.808     1.345   -0.53  
Residual                291.222   17.065
```

```
Number of obs: 9417, groups:  ttas_id, 850
```

```
Fixed effects:
```

	Estimate	Std. Error	df	t value
(Intercept)	40.01383	4.34814	796.81056	9.203
genderMale	-7.90754	1.70315	699.68291	-4.643
hlab27statusNegative	5.53974	2.95422	730.73171	1.875
hlab27statusPositive	1.20936	2.41369	778.46989	0.501
age_at_prom	0.10491	0.06407	752.37125	1.637
diagnosisAxial SpA- nr-axSpA	0.81523	1.93922	694.37948	0.420
treatment_order2	-1.59227	1.32194	7795.14816	-1.204
treatment_order3	3.07315	1.27528	6865.96976	2.410
treatment_order4	1.81408	1.55718	7096.47686	1.165
treatment_order5	5.50481	1.64917	6289.84283	3.338
treatment_order6	4.93547	2.01432	5740.51692	2.450
treatment_order7	5.17018	2.66834	5222.66202	1.938

treatment_order8	6.81181	3.44432	6619.97023	1.978
treatment_order9	2.93593	4.08542	4890.85745	0.719
treatment_order10	1.06983	7.88199	6314.79817	0.136
treatment_order11	11.10983	9.79784	5131.79754	1.134
treatment_order12	11.96879	14.18824	6226.92184	0.844
treatment_order14	19.05189	11.42926	725.42095	1.667
treatment_order15	-4.41631	15.73436	817.97422	-0.281
last_known_smoking_statussex-smoker	1.03811	3.38981	662.27459	0.306
last_known_smoking_statusnever	-2.97841	3.37706	663.46019	-0.882
last_known_smoking_statussmoker	8.76112	4.03171	664.35948	2.173
last_known_vaping_statussex-vaper	-6.61171	7.54777	714.42785	-0.876
last_known_vaping_statusnever	-1.70424	3.37023	670.55488	-0.506
last_known_vaping_statusvaper	3.43701	4.73723	670.58116	0.726
treatment_reclassifiedAnti-IL17	-13.50951	1.50983	8289.66465	-8.948
treatment_reclassifiedAnti-TNF	-13.03685	1.13132	8646.54486	-11.524
treatment_reclassifiedJAK Inhibitor	-20.13444	3.99773	7482.68343	-5.036
time_in_years	0.01650	0.09351	710.49543	0.176
	Pr(> t )			
(Intercept)	< 2e-16	***		
genderMale	4.10e-06	***		
hlab27statusNegative	0.061164	.		
hlab27statusPositive	0.616483			
age_at_prom	0.101960			
diagnosisAxial SpA- nr-axSpA	0.674330			
treatment_order2	0.228435			
treatment_order3	0.015988	*		
treatment_order4	0.244069			
treatment_order5	0.000849	***		
treatment_order6	0.014308	*		
treatment_order7	0.052726	.		
treatment_order8	0.048004	*		
treatment_order9	0.472400			
treatment_order10	0.892038			
treatment_order11	0.256887			
treatment_order12	0.398942			
treatment_order14	0.095958	.		
treatment_order15	0.779027			
last_known_smoking_statussex-smoker	0.759514			
last_known_smoking_statusnever	0.378122			
last_known_smoking_statussmoker	0.030129	*		
last_known_vaping_statussex-vaper	0.381334			
last_known_vaping_statusnever	0.613251			
last_known_vaping_statusvaper	0.468378			

```

treatment_reclassifiedAnti-IL17      < 2e-16 ***
treatment_reclassifiedAnti-TNF        < 2e-16 ***
treatment_reclassifiedJAK Inhibitor 4.85e-07 ***
time_in_years                        0.859952
---

```

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```

anova(model_treatment_gender_daily_activity_impairment_full,
       model_treatment_gender_daily_activity_impairment_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_daily\_activity\_impairment

Models:

model\_treatment\_gender\_daily\_activity\_impairment\_reduced: daily\_activity\_impairment ~ gender

model\_treatment\_gender\_daily\_activity\_impairment\_full: daily\_activity\_impairment ~ gender + 1

	npar	AIC	BIC	
model_treatment_gender_daily_activity_impairment_reduced	33	82889	83125	
model_treatment_gender_daily_activity_impairment_full	36	82887	83144	
		logLik	deviance	Chisq
model_treatment_gender_daily_activity_impairment_reduced		-41412	82823	
model_treatment_gender_daily_activity_impairment_full		-41407	82815	8.0794
	Df	Pr(>Chisq)		

model\_treatment\_gender\_daily\_activity\_impairment\_reduced

model\_treatment\_gender\_daily\_activity\_impairment\_full 3 0.0444 \*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## Presenteeism

### lme4 code for treatment and diagnosis: Presenteeism

```

model_treatment_diagnosis_presenteeism_full <- lmer(
  presenteeism ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * diagnosis +
    time_in_years + (time_in_years | ttas_id),

```

```

data = dataframe_sorted_and_reclassified_presenteeism,
control = lmerControl(optimizer = "bobyqa",
                      optCtrl = list(maxfun = 2e5)))

```

```

model_treatment_diagnosis_presenteeism_reduced <- lmer(
  presenteeism ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_presenteeism,
  control = lmerControl(optimizer = "bobyqa",
                      optCtrl = list(maxfun = 2e5)))

```

```

print(summary(model_treatment_diagnosis_presenteeism_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [

lmerModLmerTest]

Formula: presenteeism ~ gender + hlab27status + age\_at\_prom + diagnosis +  
 treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
 treatment\_reclassified \* diagnosis + time\_in\_years + (time\_in\_years |  
 ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_presenteeism

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 43165.9

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.5418	-0.5400	-0.1107	0.4904	4.9382

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	384.515	19.61	
	time_in_years	1.255	1.12	-0.49
	Residual	237.852	15.42	

Number of obs: 5022, groups: ttas\_id, 596

Fixed effects:

	Estimate
(Intercept)	2.907e+01

genderMale	-3.743e+00
hlab27statusNegative	6.562e+00
hlab27statusPositive	2.243e+00
age_at_prom	-1.161e-02
diagnosisAxial SpA- nr-axSpA	3.491e+00
treatment_order2	-2.406e-01
treatment_order3	3.145e+00
treatment_order4	7.223e-01
treatment_order5	-5.723e-01
treatment_order6	3.654e+00
treatment_order7	-3.812e+00
treatment_order8	5.373e+00
treatment_order9	1.991e+00
last_known_smoking_statussex-smoker	4.508e+00
last_known_smoking_statusnever	-1.014e+00
last_known_smoking_statussmoker	9.196e+00
last_known_vaping_statussex-vaper	-9.573e+00
last_known_vaping_statusnever	3.929e-01
last_known_vaping_statusvaper	2.540e+00
treatment_reclassifiedAnti-IL17	-1.108e+01
treatment_reclassifiedAnti-TNF	-9.562e+00
treatment_reclassifiedJAK Inhibitor	-1.517e+01
time_in_years	-6.006e-03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	4.368e+00
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-4.060e+00
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.976e+01
(Intercept)	Std. Error
genderMale	4.748e+00
hlab27statusNegative	1.766e+00
hlab27statusPositive	3.170e+00
age_at_prom	2.628e+00
diagnosisAxial SpA- nr-axSpA	7.745e-02
treatment_order2	2.002e+00
treatment_order3	1.678e+00
treatment_order4	1.587e+00
treatment_order5	2.008e+00
treatment_order6	2.203e+00
treatment_order7	3.105e+00
treatment_order8	3.605e+00
treatment_order9	5.717e+00
last_known_smoking_statussex-smoker	5.810e+00
last_known_smoking_statusnever	3.532e+00
	3.500e+00

last_known_smoking_statussmoker	4.290e+00
last_known_vaping_statussex-vaper	7.139e+00
last_known_vaping_statusnever	3.629e+00
last_known_vaping_statusvaper	4.950e+00
treatment_reclassifiedAnti-IL17	2.249e+00
treatment_reclassifiedAnti-TNF	1.531e+00
treatment_reclassifiedJAK Inhibitor	6.845e+00
time_in_years	1.065e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	4.326e+00
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	2.049e+00
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	9.403e+00
	df
(Intercept)	5.673e+02
genderMale	5.040e+02
hlab27statusNegative	5.249e+02
hlab27statusPositive	5.466e+02
age_at_prom	5.450e+02
diagnosisAxial SpA- nr-axSpA	5.670e+02
treatment_order2	3.670e+03
treatment_order3	3.636e+03
treatment_order4	3.681e+03
treatment_order5	3.184e+03
treatment_order6	3.419e+03
treatment_order7	3.036e+03
treatment_order8	1.691e+03
treatment_order9	1.346e+03
last_known_smoking_statussex-smoker	4.930e+02
last_known_smoking_statusnever	4.965e+02
last_known_smoking_statussmoker	4.928e+02
last_known_vaping_statussex-vaper	4.830e+02
last_known_vaping_statusnever	5.051e+02
last_known_vaping_statusvaper	4.975e+02
treatment_reclassifiedAnti-IL17	3.959e+03
treatment_reclassifiedAnti-TNF	4.190e+03
treatment_reclassifiedJAK Inhibitor	2.676e+03
time_in_years	4.352e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.793e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	3.676e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	3.880e+03
	t value
(Intercept)	6.122
genderMale	-2.119
hlab27statusNegative	2.070

hlab27statusPositive	0.853
age_at_prom	-0.150
diagnosisAxial SpA- nr-axSpA	1.744
treatment_order2	-0.143
treatment_order3	1.982
treatment_order4	0.360
treatment_order5	-0.260
treatment_order6	1.177
treatment_order7	-1.058
treatment_order8	0.940
treatment_order9	0.343
last_known_smoking_statussex-smoker	1.276
last_known_smoking_statusnever	-0.290
last_known_smoking_statussmoker	2.144
last_known_vaping_statussex-vaper	-1.341
last_known_vaping_statusnever	0.108
last_known_vaping_statusvaper	0.513
treatment_reclassifiedAnti-IL17	-4.928
treatment_reclassifiedAnti-TNF	-6.244
treatment_reclassifiedJAK Inhibitor	-2.216
time_in_years	-0.056
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.010
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-1.981
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	2.101
Pr(> t )	
(Intercept)	1.72e-09 ***
genderMale	0.0346 *
hlab27statusNegative	0.0389 *
hlab27statusPositive	0.3938
age_at_prom	0.8809
diagnosisAxial SpA- nr-axSpA	0.0817 .
treatment_order2	0.8860
treatment_order3	0.0476 *
treatment_order4	0.7191
treatment_order5	0.7950
treatment_order6	0.2393
treatment_order7	0.2903
treatment_order8	0.3475
treatment_order9	0.7319
last_known_smoking_statussex-smoker	0.2024
last_known_smoking_statusnever	0.7722
last_known_smoking_statussmoker	0.0325 *
last_known_vaping_statussex-vaper	0.1806



```

last_known_vaping_statusnever          0.9138
last_known_vaping_statusvaper          0.6080
treatment_reclassifiedAnti-IL17        8.63e-07 ***
treatment_reclassifiedAnti-TNF         4.68e-10 ***
treatment_reclassifiedJAK Inhibitor     0.0268 *
time_in_years                          0.9551
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17 0.3127
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF 0.0476 *
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.0357 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_presenteeism_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: presenteeism ~ gender + hlab27status + age_at_prom + diagnosis +
      treatment_order + last_known_smoking_status + last_known_vaping_status +
      treatment_reclassified + time_in_years + (time_in_years |      ttas_id)
Data: dataframe_sorted_and_reclassified_presenteeism
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 43191.9

```

Scaled residuals:
      Min       1Q   Median       3Q      Max
-3.5393 -0.5420 -0.1121  0.4885  4.9332

```

```

Random effects:
 Groups   Name                Variance Std.Dev. Corr
ttas_id  (Intercept)         385.120   19.624
          time_in_years      1.242     1.114   -0.49
Residual                    238.366   15.439
Number of obs: 5022, groups: ttas_id, 596

```

```

Fixed effects:
              Estimate Std. Error      df t value
(Intercept)   29.36444    4.75084  567.92302   6.181
genderMale    -3.79815    1.76705  504.47603  -2.149
hlab27statusNegative    6.71499    3.17032  525.06417   2.118
hlab27statusPositive    2.34956    2.62661  545.31146   0.895
age_at_prom   -0.01023    0.07749  545.70784  -0.132

```

diagnosisAxial SpA- nr-axSpA	2.56169	1.91030	508.28917	1.341
treatment_order2	-0.68851	1.66205	3697.60418	-0.414
treatment_order3	2.73866	1.56704	3784.44974	1.748
treatment_order4	0.35697	1.98050	3749.26590	0.180
treatment_order5	-0.66685	2.18004	3323.02613	-0.306
treatment_order6	3.21727	3.08113	3500.77567	1.044
treatment_order7	-5.81707	3.55553	2970.05527	-1.636
treatment_order8	4.42616	5.69163	1690.78987	0.778
treatment_order9	1.80350	5.79707	1327.60022	0.311
last_known_smoking_statussex-smoker	4.47860	3.53060	492.21762	1.269
last_known_smoking_statusnever	-1.07812	3.49942	496.03098	-0.308
last_known_smoking_statussmoker	9.31799	4.29046	492.56974	2.172
last_known_vaping_statussex-vaper	-9.43651	7.13891	483.38437	-1.322
last_known_vaping_statusnever	0.32090	3.62748	504.15441	0.088
last_known_vaping_statusvaper	2.58400	4.95078	497.63072	0.522
treatment_reclassifiedAnti-IL17	-10.04907	2.07130	4201.82455	-4.852
treatment_reclassifiedAnti-TNF	-10.13758	1.49303	4167.29858	-6.790
treatment_reclassifiedJAK Inhibitor	-4.26687	5.05524	3994.54540	-0.844
time_in_years	-0.00775	0.10637	436.39799	-0.073
	Pr(> t )			
(Intercept)	1.22e-09 ***			
genderMale	0.0321 *			
hlab27statusNegative	0.0346 *			
hlab27statusPositive	0.3714			
age_at_prom	0.8950			
diagnosisAxial SpA- nr-axSpA	0.1805			
treatment_order2	0.6787			
treatment_order3	0.0806 .			
treatment_order4	0.8570			
treatment_order5	0.7597			
treatment_order6	0.2965			
treatment_order7	0.1019			
treatment_order8	0.4369			
treatment_order9	0.7558			
last_known_smoking_statussex-smoker	0.2052			
last_known_smoking_statusnever	0.7581			
last_known_smoking_statussmoker	0.0303 *			
last_known_vaping_statussex-vaper	0.1868			
last_known_vaping_statusnever	0.9295			
last_known_vaping_statusvaper	0.6019			
treatment_reclassifiedAnti-IL17	1.27e-06 ***			
treatment_reclassifiedAnti-TNF	1.28e-11 ***			
treatment_reclassifiedJAK Inhibitor	0.3987			

```
time_in_years                0.9420
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anova(model_treatment_diagnosis_presenteeism_full,
       model_treatment_diagnosis_presenteeism_reduced)
```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_presenteeism

Models:

model\_treatment\_diagnosis\_presenteeism\_reduced: presenteeism ~ gender + hlab27status + age\_at\_prom

model\_treatment\_diagnosis\_presenteeism\_full: presenteeism ~ gender + hlab27status + age\_at\_prom +

	npars	AIC	BIC	logLik	deviance
model_treatment_diagnosis_presenteeism_reduced	28	43318	43501	-21631	43262
model_treatment_diagnosis_presenteeism_full	31	43312	43515	-21625	43250

Chisq Df Pr(>Chisq)

model\_treatment\_diagnosis\_presenteeism\_reduced

model\_treatment\_diagnosis\_presenteeism\_full 11.655 3 0.008663 \*\*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## lme4 code for treatment and gender: Presenteeism

```
model_treatment_gender_presenteeism_full <- lmer(
  presenteeism ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_presenteeism,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

fixed-effect model matrix is rank deficient so dropping 1 column / coefficient

fixed-effect model matrix is rank deficient so dropping 1 column / coefficient

```

model_treatment_gender_presenteeism_reduced <- lmer(
  presenteeism ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
    data = dataframe_sorted_and_reclassified_presenteeism,
    control = lmerControl(optimizer = "bobyqa",
      optCtrl = list(maxfun = 2e5)))

print(summary(model_treatment_gender_presenteeism_full, corr = FALSE))

```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: presenteeism ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified * gender + time_in_years + (time_in_years |
  ttas_id)
Data: dataframe_sorted_and_reclassified_presenteeism
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 43180.8

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.5458	-0.5441	-0.1076	0.4890	4.9325

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	385.170	19.626	
	time_in_years	1.204	1.097	-0.49
Residual		238.440	15.442	

Number of obs: 5022, groups: ttas\_id, 596

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	30.23921	4.79411	582.00088
genderMale	-4.67388	1.87524	604.26125
hlab27statusNegative	6.54991	3.17441	525.70691
hlab27statusPositive	2.24043	2.62826	545.56225
age_at_prom	-0.01255	0.07764	547.64590

diagnosisAxial SpA- nr-axSpA	2.49655	1.91359	509.19590
treatment_order2	-0.47711	1.66425	3694.47866
treatment_order3	2.93809	1.56914	3747.12857
treatment_order4	0.84173	1.99390	3694.11684
treatment_order5	-0.43222	2.18749	3249.98898
treatment_order6	3.84954	3.09329	3401.20899
treatment_order7	-4.73099	3.59702	2863.01781
treatment_order8	5.25753	5.70061	1591.92700
treatment_order9	2.44613	5.78781	1277.62379
last_known_smoking_statussex-smoker	4.62217	3.53683	493.87682
last_known_smoking_statusnever	-0.90632	3.50532	497.31647
last_known_smoking_statussmoker	9.36778	4.29675	493.47148
last_known_vaping_statussex-vaper	-9.76287	7.14376	483.32680
last_known_vaping_statusnever	0.05440	3.63542	506.10021
last_known_vaping_statusvaper	2.28371	4.96049	498.31456
treatment_reclassifiedAnti-IL17	-8.72048	3.28475	4016.43168
treatment_reclassifiedAnti-TNF	-12.31292	1.98682	3992.73974
treatment_reclassifiedJAK Inhibitor	-6.22527	5.17089	3843.77121
time_in_years	-0.01152	0.10601	434.06744
genderMale:treatment_reclassifiedAnti-IL17	-2.21768	3.68748	3474.78193
genderMale:treatment_reclassifiedAnti-TNF	3.00528	1.87663	3460.29623
	t value	Pr(> t )	
(Intercept)	6.308	5.61e-10	***
genderMale	-2.492	0.01295	*
hlab27statusNegative	2.063	0.03957	*
hlab27statusPositive	0.852	0.39435	
age_at_prom	-0.162	0.87166	
diagnosisAxial SpA- nr-axSpA	1.305	0.19260	
treatment_order2	-0.287	0.77437	
treatment_order3	1.872	0.06123	.
treatment_order4	0.422	0.67294	
treatment_order5	-0.198	0.84338	
treatment_order6	1.244	0.21341	
treatment_order7	-1.315	0.18853	
treatment_order8	0.922	0.35652	
treatment_order9	0.423	0.67263	
last_known_smoking_statussex-smoker	1.307	0.19187	
last_known_smoking_statusnever	-0.259	0.79608	
last_known_smoking_statussmoker	2.180	0.02971	*
last_known_vaping_statussex-vaper	-1.367	0.17238	
last_known_vaping_statusnever	0.015	0.98807	
last_known_vaping_statusvaper	0.460	0.64544	
treatment_reclassifiedAnti-IL17	-2.655	0.00797	**

```

treatment_reclassifiedAnti-TNF          -6.197 6.33e-10 ***
treatment_reclassifiedJAK Inhibitor      -1.204 0.22870
time_in_years                          -0.109 0.91351
genderMale:treatment_reclassifiedAnti-IL17 -0.601 0.54761
genderMale:treatment_reclassifiedAnti-TNF  1.601 0.10937
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
fit warnings:
fixed-effect model matrix is rank deficient so dropping 1 column / coefficient

```

```
print(summary(model_treatment_gender_presenteeism_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: presenteeism ~ gender + hlab27status + age_at_prom + diagnosis +
      treatment_order + last_known_smoking_status + last_known_vaping_status +
      treatment_reclassified + time_in_years + (time_in_years |      ttas_id)
Data: dataframe_sorted_and_reclassified_presenteeism
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 43191.9

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.5393	-0.5420	-0.1121	0.4885	4.9332

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	385.120	19.624	
	time_in_years	1.242	1.114	-0.49
Residual		238.366	15.439	

Number of obs: 5022, groups: ttas\_id, 596

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	29.36444	4.75084	567.92302	6.181
genderMale	-3.79815	1.76705	504.47603	-2.149
hlab27statusNegative	6.71499	3.17032	525.06417	2.118
hlab27statusPositive	2.34956	2.62661	545.31146	0.895
age_at_prom	-0.01023	0.07749	545.70784	-0.132
diagnosisAxial SpA- nr-axSpA	2.56169	1.91030	508.28917	1.341
treatment_order2	-0.68851	1.66205	3697.60418	-0.414

treatment_order3	2.73866	1.56704	3784.44974	1.748
treatment_order4	0.35697	1.98050	3749.26590	0.180
treatment_order5	-0.66685	2.18004	3323.02613	-0.306
treatment_order6	3.21727	3.08113	3500.77567	1.044
treatment_order7	-5.81707	3.55553	2970.05527	-1.636
treatment_order8	4.42616	5.69163	1690.78987	0.778
treatment_order9	1.80350	5.79707	1327.60022	0.311
last_known_smoking_statussex-smoker	4.47860	3.53060	492.21762	1.269
last_known_smoking_statusnever	-1.07812	3.49942	496.03098	-0.308
last_known_smoking_statussmoker	9.31799	4.29046	492.56974	2.172
last_known_vaping_statussex-vaper	-9.43651	7.13891	483.38437	-1.322
last_known_vaping_statusnever	0.32090	3.62748	504.15441	0.088
last_known_vaping_statusvaper	2.58400	4.95078	497.63072	0.522
treatment_reclassifiedAnti-IL17	-10.04907	2.07130	4201.82455	-4.852
treatment_reclassifiedAnti-TNF	-10.13758	1.49303	4167.29858	-6.790
treatment_reclassifiedJAK Inhibitor	-4.26687	5.05524	3994.54540	-0.844
time_in_years	-0.00775	0.10637	436.39799	-0.073

Pr(>|t|)

(Intercept)	1.22e-09 ***
genderMale	0.0321 *
hlab27statusNegative	0.0346 *
hlab27statusPositive	0.3714
age_at_prom	0.8950
diagnosisAxial SpA- nr-axSpA	0.1805
treatment_order2	0.6787
treatment_order3	0.0806 .
treatment_order4	0.8570
treatment_order5	0.7597
treatment_order6	0.2965
treatment_order7	0.1019
treatment_order8	0.4369
treatment_order9	0.7558
last_known_smoking_statussex-smoker	0.2052
last_known_smoking_statusnever	0.7581
last_known_smoking_statussmoker	0.0303 *
last_known_vaping_statussex-vaper	0.1868
last_known_vaping_statusnever	0.9295
last_known_vaping_statusvaper	0.6019
treatment_reclassifiedAnti-IL17	1.27e-06 ***
treatment_reclassifiedAnti-TNF	1.28e-11 ***
treatment_reclassifiedJAK Inhibitor	0.3987
time_in_years	0.9420

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
anova(model_treatment_gender_presenteeism_full,
       model_treatment_gender_presenteeism_reduced)
```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_presenteeism

Models:

model\_treatment\_gender\_presenteeism\_reduced: presenteeism ~ gender + hlab27status + age\_at\_prom

model\_treatment\_gender\_presenteeism\_full: presenteeism ~ gender + hlab27status + age\_at\_prom

	npar	AIC	BIC	logLik	deviance
model_treatment_gender_presenteeism_reduced	28	43318	43501	-21631	43262
model_treatment_gender_presenteeism_full	30	43318	43514	-21629	43258

	Chisq	Df	Pr(>Chisq)
model_treatment_gender_presenteeism_reduced			
model_treatment_gender_presenteeism_full	3.6528	2	0.161

## Absenteeism

### lme4 code for treatment and diagnosis: Absenteeism

```
model_treatment_diagnosis_absenteeism_full <- lmer(
  absenteeism ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * diagnosis +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_absenteeism,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_absenteeism_reduced <- lmer(
  absenteeism ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
```



```
data = dataframe_sorted_and_reclassified_absenteeism,
control = lmerControl(optimizer = "bobyqa",
                      optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_diagnosis_absenteeism_full, corr = FALSE))
```

```
Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: absenteeism ~ gender + hlab27status + age_at_prom + diagnosis +
      treatment_order + last_known_smoking_status + last_known_vaping_status +
      treatment_reclassified * diagnosis + time_in_years + (time_in_years |
      ttas_id)
Data: dataframe_sorted_and_reclassified_absenteeism
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))
```

REML criterion at convergence: 44923.4

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.3006	-0.3098	-0.1335	-0.0170	6.2727

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	82.6043	9.0887	
	time_in_years	0.1343	0.3664	-0.48
Residual		234.3545	15.3086	

Number of obs: 5340, groups: ttas\_id, 602

Fixed effects:

	Estimate
(Intercept)	6.88872
genderMale	-2.38431
hlab27statusNegative	3.46218
hlab27statusPositive	1.30796
age_at_prom	0.03237
diagnosisAxial SpA- nr-axSpA	-1.33313
treatment_order2	2.39252
treatment_order3	6.00974
treatment_order4	5.97908
treatment_order5	5.98744
treatment_order6	11.73399

treatment_order7	8.71764
treatment_order8	16.96066
treatment_order9	2.26343
last_known_smoking_statussex-smoker	5.76589
last_known_smoking_statusnever	3.69300
last_known_smoking_statussmoker	6.49445
last_known_vaping_statussex-vaper	-10.38818
last_known_vaping_statusnever	-7.08410
last_known_vaping_statusvaper	-5.71179
treatment_reclassifiedAnti-IL17	-4.97414
treatment_reclassifiedAnti-TNF	-4.72723
treatment_reclassifiedJAK Inhibitor	-13.63413
time_in_years	-0.01891
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	-1.71504
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.29457
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	13.50593
	Std. Error
(Intercept)	2.65611
genderMale	0.94022
hlab27statusNegative	1.72272
hlab27statusPositive	1.42327
age_at_prom	0.04308
diagnosisAxial SpA- nr-axSpA	1.17526
treatment_order2	1.34975
treatment_order3	1.26574
treatment_order4	1.60367
treatment_order5	1.74336
treatment_order6	2.43334
treatment_order7	2.79132
treatment_order8	4.17421
treatment_order9	4.35948
last_known_smoking_statussex-smoker	1.86070
last_known_smoking_statusnever	1.85186
last_known_smoking_statussmoker	2.23691
last_known_vaping_statussex-vaper	3.64250
last_known_vaping_statusnever	1.92143
last_known_vaping_statusvaper	2.56316
treatment_reclassifiedAnti-IL17	1.83168
treatment_reclassifiedAnti-TNF	1.24411
treatment_reclassifiedJAK Inhibitor	4.75350
time_in_years	0.05507
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.50109
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	1.57495

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	7.81785
	df
(Intercept)	568.02249
genderMale	480.52715
hlab27statusNegative	519.96871
hlab27statusPositive	508.77099
age_at_prom	532.45717
diagnosisAxial SpA- nr-axSpA	590.05500
treatment_order2	3374.07104
treatment_order3	3470.69339
treatment_order4	3323.62155
treatment_order5	2727.15813
treatment_order6	3138.27649
treatment_order7	2787.43326
treatment_order8	1913.76118
treatment_order9	661.58439
last_known_smoking_statussex-smoker	474.59236
last_known_smoking_statusnever	484.73126
last_known_smoking_statussmoker	486.93987
last_known_vaping_statussex-vaper	386.62159
last_known_vaping_statusnever	505.17634
last_known_vaping_statusvaper	453.05610
treatment_reclassifiedAnti-IL17	2763.24823
treatment_reclassifiedAnti-TNF	3946.47692
treatment_reclassifiedJAK Inhibitor	4227.76764
time_in_years	230.71764
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3692.92489
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	2350.18494
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	5077.18222
	t value
(Intercept)	2.594
genderMale	-2.536
hlab27statusNegative	2.010
hlab27statusPositive	0.919
age_at_prom	0.751
diagnosisAxial SpA- nr-axSpA	-1.134
treatment_order2	1.773
treatment_order3	4.748
treatment_order4	3.728
treatment_order5	3.434
treatment_order6	4.822
treatment_order7	3.123
treatment_order8	4.063

treatment_order9	0.519
last_known_smoking_statussex-smoker	3.099
last_known_smoking_statusnever	1.994
last_known_smoking_statussmoker	2.903
last_known_vaping_statussex-vaper	-2.852
last_known_vaping_statusnever	-3.687
last_known_vaping_statusvaper	-2.228
treatment_reclassifiedAnti-IL17	-2.716
treatment_reclassifiedAnti-TNF	-3.800
treatment_reclassifiedJAK Inhibitor	-2.868
time_in_years	-0.343
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	-0.490
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	0.822
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.728
	Pr(> t )
(Intercept)	0.009744 **
genderMale	0.011532 *
hlab27statusNegative	0.044978 *
hlab27statusPositive	0.358539
age_at_prom	0.452784
diagnosisAxial SpA- nr-axSpA	0.257116
treatment_order2	0.076390 .
treatment_order3	2.14e-06 ***
treatment_order4	0.000196 ***
treatment_order5	0.000603 ***
treatment_order6	1.49e-06 ***
treatment_order7	0.001808 **
treatment_order8	5.04e-05 ***
treatment_order9	0.603796
last_known_smoking_statussex-smoker	0.002059 **
last_known_smoking_statusnever	0.046688 *
last_known_smoking_statussmoker	0.003860 **
last_known_vaping_statussex-vaper	0.004579 **
last_known_vaping_statusnever	0.000252 ***
last_known_vaping_statusvaper	0.026343 *
treatment_reclassifiedAnti-IL17	0.006657 **
treatment_reclassifiedAnti-TNF	0.000147 ***
treatment_reclassifiedJAK Inhibitor	0.004148 **
time_in_years	0.731605
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	0.624263
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	0.411175
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	0.084125 .
---	

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
print(summary(model_treatment_diagnosis_absenteeism_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula: absenteeism ~ gender + hlab27status + age\_at\_prom + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
treatment\_reclassified + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_absenteeism

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 44940.3

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.2960	-0.3082	-0.1342	-0.0214	6.2702

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	83.1941	9.1211	
	time_in_years	0.1355	0.3681	-0.49
Residual		234.3994	15.3101	

Number of obs: 5340, groups: ttas\_id, 602

Fixed effects:

	Estimate	Std. Error	df	t	value
(Intercept)	6.80104	2.65515	569.20304	2.561	
genderMale	-2.35922	0.93957	480.93918	-2.511	
hlab27statusNegative	3.33534	1.72123	521.34356	1.938	
hlab27statusPositive	1.16985	1.41997	507.13505	0.824	
age_at_prom	0.03357	0.04307	533.69676	0.779	
diagnosisAxial SpA- nr-axSpA	-0.93559	1.06959	490.67613	-0.875	
treatment_order2	2.53357	1.34002	3460.59279	1.891	
treatment_order3	6.10066	1.25483	3651.98078	4.862	
treatment_order4	6.39728	1.58395	3408.40246	4.039	
treatment_order5	6.02189	1.72908	2822.42615	3.483	
treatment_order6	11.90558	2.41858	3219.79604	4.923	
treatment_order7	8.74599	2.76413	2865.98801	3.164	
treatment_order8	17.28484	4.16154	1951.18225	4.153	
treatment_order9	2.38442	4.35223	663.92331	0.548	
last_known_smoking_statussex-smoker	5.78097	1.85639	473.07963	3.114	

last_known_smoking_statusnever	3.71556	1.84875	484.40833	2.010
last_known_smoking_statussmoker	6.47392	2.23291	485.44161	2.899
last_known_vaping_statussex-vaper	-10.47102	3.63758	386.50330	-2.879
last_known_vaping_statusnever	-7.10433	1.91696	503.80069	-3.706
last_known_vaping_statusvaper	-5.77869	2.56007	452.87378	-2.257
treatment_reclassifiedAnti-IL17	-5.32263	1.69999	3293.57461	-3.131
treatment_reclassifiedAnti-TNF	-4.53200	1.21632	4006.24429	-3.726
treatment_reclassifiedJAK Inhibitor	-9.39043	3.95945	4736.20310	-2.372
time_in_years	-0.02008	0.05503	231.80957	-0.365

Pr(>|t|)

(Intercept)	0.010680 *
genderMale	0.012367 *
hlab27statusNegative	0.053191 .
hlab27statusPositive	0.410411
age_at_prom	0.436076
diagnosisAxial SpA- nr-axSpA	0.382155
treatment_order2	0.058749 .
treatment_order3	1.21e-06 ***
treatment_order4	5.49e-05 ***
treatment_order5	0.000504 ***
treatment_order6	8.97e-07 ***
treatment_order7	0.001572 **
treatment_order8	3.42e-05 ***
treatment_order9	0.583972
last_known_smoking_statussex-smoker	0.001957 **
last_known_smoking_statusnever	0.045009 *
last_known_smoking_statussmoker	0.003909 **
last_known_vaping_statussex-vaper	0.004217 **
last_known_vaping_statusnever	0.000234 ***
last_known_vaping_statusvaper	0.024469 *
treatment_reclassifiedAnti-IL17	0.001757 **
treatment_reclassifiedAnti-TNF	0.000197 ***
treatment_reclassifiedJAK Inhibitor	0.017748 *
time_in_years	0.715580

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```
anova(model_treatment_diagnosis_absenteeism_full,
       model_treatment_diagnosis_absenteeism_reduced)
```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_absenteeism

Models:

model\_treatment\_diagnosis\_absenteeism\_reduced: absenteeism ~ gender + hlab27status + age\_at\_prom +

model\_treatment\_diagnosis\_absenteeism\_full: absenteeism ~ gender + hlab27status + age\_at\_prom +

	npar	AIC	BIC	logLik	deviance
model_treatment_diagnosis_absenteeism_reduced	28	45045	45229	-22495	44989
model_treatment_diagnosis_absenteeism_full	31	45047	45251	-22493	44985

Chisq Df Pr(>Chisq)

model\_treatment\_diagnosis\_absenteeism\_reduced

model\_treatment\_diagnosis\_absenteeism\_full 3.8765 3 0.2751

## lme4 code for treatment and gender: Absenteeism

```
model_treatment_gender_absenteeism_full <- lmer(
  absenteeism ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status +
  treatment_reclassified * gender +
  time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_absenteeism,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_gender_absenteeism_reduced <- lmer(
  absenteeism ~ gender + hlab27status + age_at_prom +
  diagnosis + treatment_order + last_known_smoking_status +
  last_known_vaping_status +
  treatment_reclassified +
  time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_absenteeism,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_gender_absenteeism_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [

lmerModLmerTest]

Formula: absenteeism ~ gender + hlab27status + age\_at\_prom + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +

```

    treatment_reclassified * gender + time_in_years + (time_in_years |
    ttas_id)
Data: dataframe_sorted_and_reclassified_absenteeism
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 44923.7

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.3208	-0.3095	-0.1358	-0.0136	6.2795

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	81.5251	9.0291	
	time_in_years	0.1353	0.3678	-0.47
Residual		234.4041	15.3103	

Number of obs: 5340, groups: ttas\_id, 602

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	6.14055	2.69216	584.65740
genderMale	-1.66386	1.06066	663.13074
hlab27statusNegative	3.48746	1.72007	521.46555
hlab27statusPositive	1.27234	1.42020	509.07201
age_at_prom	0.03451	0.04303	531.99171
diagnosisAxial SpA- nr-axSpA	-0.89624	1.06688	488.71978
treatment_order2	2.43014	1.34077	3430.92055
treatment_order3	6.02034	1.25586	3610.64235
treatment_order4	6.05928	1.59379	3344.96651
treatment_order5	5.98467	1.73752	2794.48855
treatment_order6	11.75554	2.44305	3148.92261
treatment_order7	7.96593	2.82075	2785.95945
treatment_order8	16.73918	4.17929	1855.23689
treatment_order9	2.12207	4.36342	656.48612
last_known_smoking_statussex-smoker	5.68759	1.86058	480.17175
last_known_smoking_statusnever	3.59205	1.85085	488.41273
last_known_smoking_statussmoker	6.38155	2.23392	490.60103
last_known_vaping_statussex-vaper	-10.23592	3.64472	391.15002
last_known_vaping_statusnever	-6.91081	1.92114	508.65577
last_known_vaping_statusvaper	-5.56991	2.56370	456.75268
treatment_reclassifiedAnti-IL17	-6.59681	2.62561	3308.35572
treatment_reclassifiedAnti-TNF	-2.92511	1.54302	3322.37446
treatment_reclassifiedJAK Inhibitor	-7.50724	4.54822	4537.93262



```

time_in_years                -0.01686    0.05517  229.44828
genderMale:treatment_reclassifiedAnti-IL17    1.93439    2.92305 2541.55827
genderMale:treatment_reclassifiedAnti-TNF     -2.31910    1.40498 2221.94744
genderMale:treatment_reclassifiedJAK Inhibitor -4.08378    8.94863 4748.15326
t value Pr(>|t|)
(Intercept)                2.281 0.022913 *
genderMale                 -1.569 0.117193
hlab27statusNegative        2.028 0.043119 *
hlab27statusPositive        0.896 0.370735
age_at_prom                 0.802 0.422928
diagnosisAxial SpA- nr-axSpA -0.840 0.401287
treatment_order2            1.813 0.069996 .
treatment_order3            4.794 1.70e-06 ***
treatment_order4            3.802 0.000146 ***
treatment_order5            3.444 0.000581 ***
treatment_order6            4.812 1.57e-06 ***
treatment_order7            2.824 0.004776 **
treatment_order8            4.005 6.44e-05 ***
treatment_order9            0.486 0.626894
last_known_smoking_statussex-smoker           3.057 0.002361 **
last_known_smoking_statusnever                1.941 0.052862 .
last_known_smoking_statussmoker              2.857 0.004463 **
last_known_vaping_statussex-vaper            -2.808 0.005228 **
last_known_vaping_statusnever                -3.597 0.000353 ***
last_known_vaping_statusvaper                -2.173 0.030323 *
treatment_reclassifiedAnti-IL17              -2.512 0.012036 *
treatment_reclassifiedAnti-TNF               -1.896 0.058086 .
treatment_reclassifiedJAK Inhibitor           -1.651 0.098892 .
time_in_years                             -0.306 0.760185
genderMale:treatment_reclassifiedAnti-IL17     0.662 0.508177
genderMale:treatment_reclassifiedAnti-TNF      -1.651 0.098956 .
genderMale:treatment_reclassifiedJAK Inhibitor -0.456 0.648154
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_gender_absenteeism_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula: absenteeism ~ gender + hlab27status + age\_at\_prom + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
treatment\_reclassified + time\_in\_years + (time\_in\_years | ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_absenteeism  
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 44940.3

Scaled residuals:

Min	1Q	Median	3Q	Max
-3.2960	-0.3082	-0.1342	-0.0214	6.2702

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	83.1941	9.1211	
	time_in_years	0.1355	0.3681	-0.49
Residual		234.3994	15.3101	

Number of obs: 5340, groups: ttas\_id, 602

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	6.80104	2.65515	569.20304	2.561
genderMale	-2.35922	0.93957	480.93918	-2.511
hlab27statusNegative	3.33534	1.72123	521.34356	1.938
hlab27statusPositive	1.16985	1.41997	507.13505	0.824
age_at_prom	0.03357	0.04307	533.69676	0.779
diagnosisAxial SpA- nr-axSpA	-0.93559	1.06959	490.67613	-0.875
treatment_order2	2.53357	1.34002	3460.59279	1.891
treatment_order3	6.10066	1.25483	3651.98078	4.862
treatment_order4	6.39728	1.58395	3408.40246	4.039
treatment_order5	6.02189	1.72908	2822.42615	3.483
treatment_order6	11.90558	2.41858	3219.79604	4.923
treatment_order7	8.74599	2.76413	2865.98801	3.164
treatment_order8	17.28484	4.16154	1951.18225	4.153
treatment_order9	2.38442	4.35223	663.92331	0.548
last_known_smoking_statussex-smoker	5.78097	1.85639	473.07963	3.114
last_known_smoking_statusnever	3.71556	1.84875	484.40833	2.010
last_known_smoking_statussmoker	6.47392	2.23291	485.44161	2.899
last_known_vaping_statussex-vaper	-10.47102	3.63758	386.50330	-2.879
last_known_vaping_statusnever	-7.10433	1.91696	503.80069	-3.706
last_known_vaping_statusvaper	-5.77869	2.56007	452.87378	-2.257
treatment_reclassifiedAnti-IL17	-5.32263	1.69999	3293.57461	-3.131
treatment_reclassifiedAnti-TNF	-4.53200	1.21632	4006.24429	-3.726
treatment_reclassifiedJAK Inhibitor	-9.39043	3.95945	4736.20310	-2.372
time_in_years	-0.02008	0.05503	231.80957	-0.365

Pr(>|t|)

```

(Intercept)                0.010680 *
genderMale                  0.012367 *
hlab27statusNegative       0.053191 .
hlab27statusPositive       0.410411
age_at_prom                0.436076
diagnosisAxial SpA- nr-axSpA 0.382155
treatment_order2           0.058749 .
treatment_order3           1.21e-06 ***
treatment_order4           5.49e-05 ***
treatment_order5           0.000504 ***
treatment_order6           8.97e-07 ***
treatment_order7           0.001572 **
treatment_order8           3.42e-05 ***
treatment_order9           0.583972
last_known_smoking_statussex-smoker 0.001957 **
last_known_smoking_statusnever 0.045009 *
last_known_smoking_statussmoker 0.003909 **
last_known_vaping_statussex-vaper 0.004217 **
last_known_vaping_statusnever 0.000234 ***
last_known_vaping_statusvaper 0.024469 *
treatment_reclassifiedAnti-IL17 0.001757 **
treatment_reclassifiedAnti-TNF 0.000197 ***
treatment_reclassifiedJAK Inhibitor 0.017748 *
time_in_years              0.715580
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_absenteeism_full,
       model_treatment_gender_absenteeism_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_absenteeism

Models:

model\_treatment\_gender\_absenteeism\_reduced: absenteeism ~ gender + hlab27status + age\_at\_prom +

model\_treatment\_gender\_absenteeism\_full: absenteeism ~ gender + hlab27status + age\_at\_prom +

	npars	AIC	BIC	logLik	deviance
model_treatment_gender_absenteeism_reduced	28	45045	45229	-22495	44989
model_treatment_gender_absenteeism_full	31	45047	45251	-22493	44985

	Chisq	Df	Pr(>Chisq)
model_treatment_gender_absenteeism_reduced			
model_treatment_gender_absenteeism_full	3.9386	3	0.2682

## FACIT

### lme4 code for treatment and diagnosis: FACIT

```
model_treatment_diagnosis_facit_full <- lmer(  
  facit ~ gender + hlab27status + age_at_prom +  
    diagnosis + treatment_order + last_known_smoking_status +  
    last_known_vaping_status +  
    treatment_reclassified * diagnosis +  
    time_in_years + (time_in_years | ttas_id),  
  data = dataframe_sorted_and_reclassified_facit,  
  control = lmerControl(optimizer = "bobyqa",  
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_facit_reduced <- lmer(  
  facit ~ gender + hlab27status + age_at_prom +  
    diagnosis + treatment_order + last_known_smoking_status +  
    last_known_vaping_status +  
    treatment_reclassified +  
    time_in_years + (time_in_years | ttas_id),  
  data = dataframe_sorted_and_reclassified_facit,  
  control = lmerControl(optimizer = "bobyqa",  
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_diagnosis_facit_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```
facit ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +  
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified *  
  diagnosis + time_in_years + (time_in_years | ttas_id)
```

Data: dataframe\_sorted\_and\_reclassified\_facit

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 53559.9

Scaled residuals:

Min	1Q	Median	3Q	Max
-----	----	--------	----	-----

-4.5550 -0.5232 0.0500 0.5395 3.8320

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	115.0801	10.7275	
	time_in_years	0.3679	0.6066	-0.49
Residual		47.6212	6.9008	

Number of obs: 7590, groups: ttas\_id, 856

Fixed effects:

	Estimate
(Intercept)	33.75293
genderMale	5.01951
hlab27statusNegative	-1.94866
hlab27statusPositive	1.11312
age_at_prom	-0.04749
diagnosisAxial SpA- nr-axSpA	-4.27914
treatment_order2	0.41059
treatment_order3	-1.26898
treatment_order4	-1.95169
treatment_order5	-2.01317
treatment_order6	-3.44064
treatment_order7	-2.44621
treatment_order8	-3.79616
treatment_order9	0.52705
treatment_order10	-4.42444
treatment_order11	-8.30490
treatment_order12	-8.30234
treatment_order14	-7.44437
treatment_order15	-0.03236
last_known_smoking_statussex-smoker	-0.42127
last_known_smoking_statusnever	1.22320
last_known_smoking_statussmoker	-6.69038
last_known_vaping_statussex-vaper	2.78754
last_known_vaping_statusnever	-0.33441
last_known_vaping_statusvaper	-6.32847
treatment_reclassifiedAnti-IL17	5.20911
treatment_reclassifiedAnti-TNF	3.79428
treatment_reclassifiedJAK Inhibitor	9.70559
time_in_years	-0.18446
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.91266
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	2.87014
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	-7.98495

	Std. Error
(Intercept)	2.03599
genderMale	0.79582
hlab27statusNegative	1.37113
hlab27statusPositive	1.13535
age_at_prom	0.02972
diagnosisAxial SpA- nr-axSpA	0.93385
treatment_order2	0.63757
treatment_order3	0.61784
treatment_order4	0.75523
treatment_order5	0.79600
treatment_order6	0.94157
treatment_order7	1.26435
treatment_order8	1.57646
treatment_order9	1.87852
treatment_order10	3.62853
treatment_order11	4.09485
treatment_order12	6.06424
treatment_order14	5.09288
treatment_order15	6.79859
last_known_smoking_statussex-smoker	1.60461
last_known_smoking_statusnever	1.59479
last_known_smoking_statussmoker	1.91816
last_known_vaping_statussex-vaper	3.58680
last_known_vaping_statusnever	1.59428
last_known_vaping_statusvaper	2.24912
treatment_reclassifiedAnti-IL17	0.74441
treatment_reclassifiedAnti-TNF	0.56656
treatment_reclassifiedJAK Inhibitor	2.00798
time_in_years	0.04339
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.54984
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	0.76044
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	3.37284
	df
(Intercept)	787.22809
genderMale	696.48241
hlab27statusNegative	711.84270
hlab27statusPositive	756.31936
age_at_prom	746.97427
diagnosisAxial SpA- nr-axSpA	749.17025
treatment_order2	6387.46497
treatment_order3	5817.80768
treatment_order4	6075.73323

treatment_order5	5416.97030
treatment_order6	4894.08777
treatment_order7	4445.70221
treatment_order8	5137.46760
treatment_order9	3524.82834
treatment_order10	5076.26377
treatment_order11	3163.52102
treatment_order12	5829.94791
treatment_order14	928.27243
treatment_order15	760.34954
last_known_smoking_statussex-smoker	667.80998
last_known_smoking_statusnever	667.06322
last_known_smoking_statussmoker	672.39262
last_known_vaping_statussex-vaper	718.33701
last_known_vaping_statusnever	674.57597
last_known_vaping_statusvaper	681.18343
treatment_reclassifiedAnti-IL17	6570.38698
treatment_reclassifiedAnti-TNF	7087.64625
treatment_reclassifiedJAK Inhibitor	4870.78201
time_in_years	699.52723
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	6227.25199
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	6414.17650
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	6457.04109
t value	
(Intercept)	16.578
genderMale	6.307
hlab27statusNegative	-1.421
hlab27statusPositive	0.980
age_at_prom	-1.598
diagnosisAxial SpA- nr-axSpA	-4.582
treatment_order2	0.644
treatment_order3	-2.054
treatment_order4	-2.584
treatment_order5	-2.529
treatment_order6	-3.654
treatment_order7	-1.935
treatment_order8	-2.408
treatment_order9	0.281
treatment_order10	-1.219
treatment_order11	-2.028
treatment_order12	-1.369
treatment_order14	-1.462
treatment_order15	-0.005

last_known_smoking_statussex-smoker	-0.263	
last_known_smoking_statusnever	0.767	
last_known_smoking_statussmoker	-3.488	
last_known_vaping_statussex-vaper	0.777	
last_known_vaping_statusnever	-0.210	
last_known_vaping_statusvaper	-2.814	
treatment_reclassifiedAnti-IL17	6.998	
treatment_reclassifiedAnti-TNF	6.697	
treatment_reclassifiedJAK Inhibitor	4.834	
time_in_years	-4.251	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.234	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	3.774	
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	-2.367	
	Pr(> t )	
(Intercept)	< 2e-16	***
genderMale	5.04e-10	***
hlab27statusNegative	0.155693	
hlab27statusPositive	0.327195	
age_at_prom	0.110472	
diagnosisAxial SpA- nr-axSpA	5.39e-06	***
treatment_order2	0.519600	
treatment_order3	0.040029	*
treatment_order4	0.009782	**
treatment_order5	0.011464	*
treatment_order6	0.000261	***
treatment_order7	0.053083	.
treatment_order8	0.016074	*
treatment_order9	0.779057	
treatment_order10	0.222769	
treatment_order11	0.042630	*
treatment_order12	0.171032	
treatment_order14	0.144156	
treatment_order15	0.996203	
last_known_smoking_statussex-smoker	0.792986	
last_known_smoking_statusnever	0.443355	
last_known_smoking_statussmoker	0.000519	***
last_known_vaping_statussex-vaper	0.437317	
last_known_vaping_statusnever	0.833923	
last_known_vaping_statusvaper	0.005038	**
treatment_reclassifiedAnti-IL17	2.86e-12	***
treatment_reclassifiedAnti-TNF	2.29e-11	***
treatment_reclassifiedJAK Inhibitor	1.38e-06	***
time_in_years	2.42e-05	***



```

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17      0.217213
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF      0.000162 ***
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.017942 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_facit_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula:
facit ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
      last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
      time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_facit
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 53590.9

Scaled residuals:

	Min	1Q	Median	3Q	Max
	-4.5579	-0.5233	0.0493	0.5445	3.8223

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	114.1856	10.6858	
	time_in_years	0.3677	0.6064	-0.48
Residual		47.7754	6.9120	

Number of obs: 7590, groups: ttas\_id, 856

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	33.33851	2.03171	783.22217	16.409
genderMale	5.04951	0.79491	695.43577	6.352
hlab27statusNegative	-2.00476	1.36874	709.65100	-1.465
hlab27statusPositive	0.99988	1.13315	753.20457	0.882
age_at_prom	-0.04404	0.02967	744.21427	-1.484
diagnosisAxial SpA- nr-axSpA	-3.34834	0.89712	680.12594	-3.732
treatment_order2	0.83161	0.62712	6494.81731	1.326
treatment_order3	-0.83545	0.60831	6001.47020	-1.373
treatment_order4	-1.81101	0.74569	6253.60683	-2.429
treatment_order5	-1.76930	0.79112	5590.10109	-2.236

treatment_order6	-3.11493	0.93386	4959.74659	-3.336
treatment_order7	-1.79747	1.25841	4444.20256	-1.428
treatment_order8	-3.33305	1.57166	5195.12585	-2.121
treatment_order9	0.71899	1.87531	3580.32068	0.383
treatment_order10	-3.27268	3.62045	5032.82842	-0.904
treatment_order11	-7.77430	4.09710	3176.25912	-1.898
treatment_order12	-7.49666	6.07135	5838.28770	-1.235
treatment_order14	-6.60835	5.09789	928.38193	-1.296
treatment_order15	0.59820	6.80629	758.68543	0.088
last_known_smoking_statussex-smoker	-0.50039	1.60137	664.59560	-0.312
last_known_smoking_statusnever	1.20138	1.59178	664.26220	0.755
last_known_smoking_statussmoker	-6.66117	1.91467	670.16464	-3.479
last_known_vaping_statussex-vaper	2.65720	3.58342	717.98809	0.742
last_known_vaping_statusnever	-0.32611	1.59125	672.03556	-0.205
last_known_vaping_statusvaper	-6.46871	2.24555	679.31310	-2.881
treatment_reclassifiedAnti-IL17	5.44699	0.70180	6729.85056	7.761
treatment_reclassifiedAnti-TNF	4.33318	0.55144	7059.56072	7.858
treatment_reclassifiedJAK Inhibitor	6.66757	1.68025	5936.76041	3.968
time_in_years	-0.18508	0.04339	698.46031	-4.265
	Pr(> t )			
(Intercept)	< 2e-16 ***			
genderMale	3.83e-10 ***			
hlab27statusNegative	0.143453			
hlab27statusPositive	0.377849			
age_at_prom	0.138172			
diagnosisAxial SpA- nr-axSpA	0.000206 ***			
treatment_order2	0.184858			
treatment_order3	0.169679			
treatment_order4	0.015184 *			
treatment_order5	0.025361 *			
treatment_order6	0.000858 ***			
treatment_order7	0.153255			
treatment_order8	0.033992 *			
treatment_order9	0.701448			
treatment_order10	0.366070			
treatment_order11	0.057851 .			
treatment_order12	0.216969			
treatment_order14	0.195197			
treatment_order15	0.929988			
last_known_smoking_statussex-smoker	0.754774			
last_known_smoking_statusnever	0.450673			
last_known_smoking_statussmoker	0.000536 ***			
last_known_vaping_statussex-vaper	0.458616			

```

last_known_vaping_statusnever      0.837681
last_known_vaping_statusvaper      0.004093 **
treatment_reclassifiedAnti-IL17     9.64e-15 ***
treatment_reclassifiedAnti-TNF      4.48e-15 ***
treatment_reclassifiedJAK Inhibitor  7.33e-05 ***
time_in_years                      2.27e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_facit_full,
       model_treatment_diagnosis_facit_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_facit

Models:

model\_treatment\_diagnosis\_facit\_reduced: facit ~ gender + hlab27status + age\_at\_prom + diagnosis

model\_treatment\_diagnosis\_facit\_full: facit ~ gender + hlab27status + age\_at\_prom + diagnosis + treatment\_order

	npair	AIC	BIC	logLik	deviance	Chisq
model_treatment_diagnosis_facit_reduced	33	53706	53935	-26820	53640	
model_treatment_diagnosis_facit_full	36	53689	53939	-26809	53617	22.83

Df Pr(>Chisq)

model\_treatment\_diagnosis\_facit\_reduced

model\_treatment\_diagnosis\_facit\_full      3   4.381e-05 \*\*\*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## lme4 code for treatment and gender: FACIT

```

model_treatment_gender_facit_full <- lmer(
  facit ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_facit,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```

```

model_treatment_gender_facit_reduced <- lmer(
  facit ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_facit,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

print(summary(model_treatment_gender_facit_full, corr = FALSE))

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula:

```

facit ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
  last_known_smoking_status + last_known_vaping_status + treatment_reclassified *
  gender + time_in_years + (time_in_years | ttas_id)

```

Data: dataframe\_sorted\_and\_reclassified\_facit

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 53575.8

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.5529	-0.5237	0.0508	0.5418	3.8271

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	115.0048	10.7240	
	time_in_years	0.3662	0.6051	-0.49
Residual		47.7420	6.9096	

Number of obs: 7590, groups: ttas\_id, 856

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	32.99308	2.04085	793.90213
genderMale	5.54436	0.83052	801.67352
hlab27statusNegative	-1.96260	1.37138	711.73182
hlab27statusPositive	1.04918	1.13470	754.49843
age_at_prom	-0.04477	0.02971	745.10872

diagnosisAxial SpA- nr-axSpA	-3.33363	0.89873	681.73214
treatment_order2	0.75407	0.62793	6506.88683
treatment_order3	-0.95401	0.60987	5954.69933
treatment_order4	-1.96682	0.75319	6197.43059
treatment_order5	-1.92172	0.79415	5523.31878
treatment_order6	-3.34831	0.93703	4906.44683
treatment_order7	-2.05392	1.26776	4438.10886
treatment_order8	-3.55978	1.57701	5143.85303
treatment_order9	0.51950	1.87617	3558.33070
treatment_order10	-3.20802	3.64385	5065.99913
treatment_order11	-8.18357	4.13656	3079.35874
treatment_order12	-7.45892	6.07225	5832.38990
treatment_order14	-6.56675	5.09541	928.21148
treatment_order15	0.15571	6.82854	766.88731
last_known_smoking_statussex-smoker	-0.57807	1.60373	665.66331
last_known_smoking_statusnever	1.09162	1.59438	665.58216
last_known_smoking_statussmoker	-6.78707	1.91805	671.52579
last_known_vaping_statussex-vaper	2.89986	3.58661	717.47976
last_known_vaping_statusnever	-0.15937	1.59453	674.23375
last_known_vaping_statusvaper	-6.25981	2.24940	680.55040
treatment_reclassifiedAnti-IL17	5.93521	1.02998	5568.21037
treatment_reclassifiedAnti-TNF	5.28467	0.70307	6935.21896
treatment_reclassifiedJAK Inhibitor	5.66413	2.05822	5334.20344
time_in_years	-0.18313	0.04337	697.76645
genderMale:treatment_reclassifiedAnti-IL17	-0.58894	1.17828	5300.87573
genderMale:treatment_reclassifiedAnti-TNF	-1.54625	0.68846	6307.59291
genderMale:treatment_reclassifiedJAK Inhibitor	4.38564	3.31618	5553.88559
t value Pr(> t )			
(Intercept)	16.166	< 2e-16	***
genderMale	6.676	4.59e-11	***
hlab27statusNegative	-1.431	0.152838	
hlab27statusPositive	0.925	0.355454	
age_at_prom	-1.507	0.132222	
diagnosisAxial SpA- nr-axSpA	-3.709	0.000225	***
treatment_order2	1.201	0.229842	
treatment_order3	-1.564	0.117806	
treatment_order4	-2.611	0.009041	**
treatment_order5	-2.420	0.015560	*
treatment_order6	-3.573	0.000356	***
treatment_order7	-1.620	0.105278	
treatment_order8	-2.257	0.024032	*
treatment_order9	0.277	0.781879	
treatment_order10	-0.880	0.378689	

```

treatment_order11          -1.978 0.047978 *
treatment_order12          -1.228 0.219360
treatment_order14          -1.289 0.197803
treatment_order15           0.023 0.981814
last_known_smoking_statussex-smoker    -0.360 0.718623
last_known_smoking_statusnever          0.685 0.493790
last_known_smoking_statussmoker    -3.539 0.000430 ***
last_known_vaping_statussex-vaper       0.809 0.419058
last_known_vaping_statusnever    -0.100 0.920414
last_known_vaping_statusvaper    -2.783 0.005537 **
treatment_reclassifiedAnti-IL17          5.762 8.74e-09 ***
treatment_reclassifiedAnti-TNF          7.517 6.33e-14 ***
treatment_reclassifiedJAK Inhibitor       2.752 0.005944 **
time_in_years              -4.222 2.74e-05 ***
genderMale:treatment_reclassifiedAnti-IL17 -0.500 0.617217
genderMale:treatment_reclassifiedAnti-TNF  -2.246 0.024741 *
genderMale:treatment_reclassifiedJAK Inhibitor  1.322 0.186057
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_gender_facit_reduced, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [lmerModLmerTest]

Formula:

```

facit ~ gender + hlab27status + age_at_prom + diagnosis + treatment_order +
      last_known_smoking_status + last_known_vaping_status + treatment_reclassified +
      time_in_years + (time_in_years | ttas_id)

```

Data: dataframe\_sorted\_and\_reclassified\_facit

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 53590.9

Scaled residuals:

	Min	1Q	Median	3Q	Max
	-4.5579	-0.5233	0.0493	0.5445	3.8223

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	114.1856	10.6858	
	time_in_years	0.3677	0.6064	-0.48
Residual		47.7754	6.9120	

Number of obs: 7590, groups: ttas\_id, 856

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	33.33851	2.03171	783.22217	16.409
genderMale	5.04951	0.79491	695.43577	6.352
hlab27statusNegative	-2.00476	1.36874	709.65100	-1.465
hlab27statusPositive	0.99988	1.13315	753.20457	0.882
age_at_prom	-0.04404	0.02967	744.21427	-1.484
diagnosisAxial SpA- nr-axSpA	-3.34834	0.89712	680.12594	-3.732
treatment_order2	0.83161	0.62712	6494.81731	1.326
treatment_order3	-0.83545	0.60831	6001.47020	-1.373
treatment_order4	-1.81101	0.74569	6253.60683	-2.429
treatment_order5	-1.76930	0.79112	5590.10109	-2.236
treatment_order6	-3.11493	0.93386	4959.74659	-3.336
treatment_order7	-1.79747	1.25841	4444.20256	-1.428
treatment_order8	-3.33305	1.57166	5195.12585	-2.121
treatment_order9	0.71899	1.87531	3580.32068	0.383
treatment_order10	-3.27268	3.62045	5032.82842	-0.904
treatment_order11	-7.77430	4.09710	3176.25912	-1.898
treatment_order12	-7.49666	6.07135	5838.28770	-1.235
treatment_order14	-6.60835	5.09789	928.38193	-1.296
treatment_order15	0.59820	6.80629	758.68543	0.088
last_known_smoking_statussex-smoker	-0.50039	1.60137	664.59560	-0.312
last_known_smoking_statusnever	1.20138	1.59178	664.26220	0.755
last_known_smoking_statussmoker	-6.66117	1.91467	670.16464	-3.479
last_known_vaping_statussex-vaper	2.65720	3.58342	717.98809	0.742
last_known_vaping_statusnever	-0.32611	1.59125	672.03556	-0.205
last_known_vaping_statusvaper	-6.46871	2.24555	679.31310	-2.881
treatment_reclassifiedAnti-IL17	5.44699	0.70180	6729.85056	7.761
treatment_reclassifiedAnti-TNF	4.33318	0.55144	7059.56072	7.858
treatment_reclassifiedJAK Inhibitor	6.66757	1.68025	5936.76041	3.968
time_in_years	-0.18508	0.04339	698.46031	-4.265

Pr(>|t|)

(Intercept)	< 2e-16 ***
genderMale	3.83e-10 ***
hlab27statusNegative	0.143453
hlab27statusPositive	0.377849
age_at_prom	0.138172
diagnosisAxial SpA- nr-axSpA	0.000206 ***
treatment_order2	0.184858
treatment_order3	0.169679
treatment_order4	0.015184 *

```

treatment_order5          0.025361 *
treatment_order6          0.000858 ***
treatment_order7          0.153255
treatment_order8          0.033992 *
treatment_order9          0.701448
treatment_order10         0.366070
treatment_order11         0.057851 .
treatment_order12         0.216969
treatment_order14         0.195197
treatment_order15         0.929988
last_known_smoking_statussex-smoker 0.754774
last_known_smoking_statusnever 0.450673
last_known_smoking_statussmoker 0.000536 ***
last_known_vaping_statussex-vaper 0.458616
last_known_vaping_statusnever 0.837681
last_known_vaping_statusvaper 0.004093 **
treatment_reclassifiedAnti-IL17 9.64e-15 ***
treatment_reclassifiedAnti-TNF 4.48e-15 ***
treatment_reclassifiedJAK Inhibitor 7.33e-05 ***
time_in_years             2.27e-05 ***

```

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

```

anova(model_treatment_gender_facit_full,
       model_treatment_gender_facit_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_facit

Models:

model\_treatment\_gender\_facit\_reduced: facit ~ gender + hlab27status + age\_at\_prom + diagnosis

model\_treatment\_gender\_facit\_full: facit ~ gender + hlab27status + age\_at\_prom + diagnosis +

	npar	AIC	BIC	logLik	deviance	Chisq	Df
model_treatment_gender_facit_reduced	33	53706	53935	-26820	53640		
model_treatment_gender_facit_full	36	53704	53954	-26816	53632	7.6533	3

Pr(>Chisq)

model\_treatment\_gender\_facit\_reduced

model\_treatment\_gender\_facit\_full 0.05375 .

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1



## Margolis

### lme4 code for treatment and diagnosis: Margolis

```
model_treatment_diagnosis_margolis_full <- lmer(
  margolis ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * diagnosis +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_margolis,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
model_treatment_diagnosis_margolis_reduced <- lmer(
  margolis ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_margolis,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))
```

```
print(summary(model_treatment_diagnosis_margolis_full, corr = FALSE))
```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [  
lmerModLmerTest]

Formula: margolis ~ gender + hlab27status + age\_at\_prom + diagnosis +  
treatment\_order + last\_known\_smoking\_status + last\_known\_vaping\_status +  
treatment\_reclassified \* diagnosis + time\_in\_years + (time\_in\_years |  
ttas\_id)

Data: dataframe\_sorted\_and\_reclassified\_margolis

Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

REML criterion at convergence: 50522.5

Scaled residuals:

Min	1Q	Median	3Q	Max
-----	----	--------	----	-----

-5.7731 -0.5013 -0.0797 0.4463 5.6359

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	35.49620	5.9579	
	time_in_years	0.07255	0.2694	-0.61
Residual		30.94467	5.5628	

Number of obs: 7762, groups: ttas\_id, 855

Fixed effects:

	Estimate
(Intercept)	1.062e+01
genderMale	-1.640e+00
hlab27statusNegative	1.872e+00
hlab27statusPositive	1.136e+00
age_at_prom	-5.561e-05
diagnosisAxial SpA- nr-axSpA	-6.167e-01
treatment_order2	-3.009e-01
treatment_order3	-2.611e-01
treatment_order4	2.474e-01
treatment_order5	6.899e-01
treatment_order6	5.943e-01
treatment_order7	9.753e-01
treatment_order8	-4.115e-01
treatment_order9	-1.269e+00
treatment_order10	3.740e+00
treatment_order11	7.109e+00
treatment_order12	1.062e+01
treatment_order14	-6.945e+00
treatment_order15	-7.033e-01
last_known_smoking_statussex-smoker	-9.959e-01
last_known_smoking_statusnever	-1.623e+00
last_known_smoking_statussmoker	3.446e-02
last_known_vaping_statussex-vaper	-4.382e-01
last_known_vaping_statusnever	6.374e-01
last_known_vaping_statusvaper	2.432e-01
treatment_reclassifiedAnti-IL17	-1.867e+00
treatment_reclassifiedAnti-TNF	-1.859e+00
treatment_reclassifiedJAK Inhibitor	-3.927e+00
time_in_years	-7.533e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.834e+00
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-1.237e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	4.400e+00

	Std. Error
(Intercept)	1.114e+00
genderMale	4.263e-01
hlab27statusNegative	7.477e-01
hlab27statusPositive	6.076e-01
age_at_prom	1.630e-02
diagnosisAxial SpA- nr-axSpA	5.351e-01
treatment_order2	4.618e-01
treatment_order3	4.328e-01
treatment_order4	5.349e-01
treatment_order5	5.633e-01
treatment_order6	6.628e-01
treatment_order7	8.885e-01
treatment_order8	1.150e+00
treatment_order9	1.341e+00
treatment_order10	2.645e+00
treatment_order11	2.853e+00
treatment_order12	4.459e+00
treatment_order14	3.067e+00
treatment_order15	4.794e+00
last_known_smoking_statussex-smoker	8.461e-01
last_known_smoking_statusnever	8.445e-01
last_known_smoking_statussmoker	1.018e+00
last_known_vaping_statussex-vaper	1.836e+00
last_known_vaping_statusnever	8.460e-01
last_known_vaping_statusvaper	1.193e+00
treatment_reclassifiedAnti-IL17	5.437e-01
treatment_reclassifiedAnti-TNF	4.214e-01
treatment_reclassifiedJAK Inhibitor	1.465e+00
time_in_years	2.266e-02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	1.143e+00
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	5.387e-01
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	2.554e+00
	df
(Intercept)	8.849e+02
genderMale	7.636e+02
hlab27statusNegative	8.005e+02
hlab27statusPositive	7.985e+02
age_at_prom	8.271e+02
diagnosisAxial SpA- nr-axSpA	8.754e+02
treatment_order2	6.308e+03
treatment_order3	5.505e+03
treatment_order4	6.104e+03

treatment_order5	5.212e+03
treatment_order6	4.254e+03
treatment_order7	3.525e+03
treatment_order8	4.444e+03
treatment_order9	2.391e+03
treatment_order10	5.714e+03
treatment_order11	3.666e+03
treatment_order12	6.970e+03
treatment_order14	1.135e+03
treatment_order15	2.031e+03
last_known_smoking_statussex-smoker	7.121e+02
last_known_smoking_statusnever	7.191e+02
last_known_smoking_statussmoker	7.355e+02
last_known_vaping_statussex-vaper	7.349e+02
last_known_vaping_statusnever	7.341e+02
last_known_vaping_statusvaper	7.304e+02
treatment_reclassifiedAnti-IL17	5.835e+03
treatment_reclassifiedAnti-TNF	6.560e+03
treatment_reclassifiedJAK Inhibitor	5.035e+03
time_in_years	4.889e+02
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	6.815e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	6.406e+03
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	7.017e+03
	t value
(Intercept)	9.539
genderMale	-3.846
hlab27statusNegative	2.503
hlab27statusPositive	1.870
age_at_prom	-0.003
diagnosisAxial SpA- nr-axSpA	-1.153
treatment_order2	-0.652
treatment_order3	-0.603
treatment_order4	0.463
treatment_order5	1.225
treatment_order6	0.897
treatment_order7	1.098
treatment_order8	-0.358
treatment_order9	-0.947
treatment_order10	1.414
treatment_order11	2.492
treatment_order12	2.381
treatment_order14	-2.264
treatment_order15	-0.147

last_known_smoking_statussex-smoker	-1.177
last_known_smoking_statusnever	-1.922
last_known_smoking_statussmoker	0.034
last_known_vaping_statussex-vaper	-0.239
last_known_vaping_statusnever	0.753
last_known_vaping_statusvaper	0.204
treatment_reclassifiedAnti-IL17	-3.433
treatment_reclassifiedAnti-TNF	-4.411
treatment_reclassifiedJAK Inhibitor	-2.682
time_in_years	-3.325
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17	3.354
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF	-0.230
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor	1.723
	Pr(> t )
(Intercept)	< 2e-16 ***
genderMale	0.000130 ***
hlab27statusNegative	0.012510 *
hlab27statusPositive	0.061906 .
age_at_prom	0.997279
diagnosisAxial SpA- nr-axSpA	0.249407
treatment_order2	0.514689
treatment_order3	0.546366
treatment_order4	0.643719
treatment_order5	0.220704
treatment_order6	0.369971
treatment_order7	0.272415
treatment_order8	0.720393
treatment_order9	0.343985
treatment_order10	0.157531
treatment_order11	0.012754 *
treatment_order12	0.017303 *
treatment_order14	0.023757 *
treatment_order15	0.883379
last_known_smoking_statussex-smoker	0.239563
last_known_smoking_statusnever	0.054971 .
last_known_smoking_statussmoker	0.973009
last_known_vaping_statussex-vaper	0.811419
last_known_vaping_statusnever	0.451412
last_known_vaping_statusvaper	0.838504
treatment_reclassifiedAnti-IL17	0.000601 ***
treatment_reclassifiedAnti-TNF	1.04e-05 ***
treatment_reclassifiedJAK Inhibitor	0.007349 **
time_in_years	0.000952 ***

```

diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-IL17      0.000800 ***
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedAnti-TNF      0.818377
diagnosisAxial SpA- nr-axSpA:treatment_reclassifiedJAK Inhibitor 0.084931 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_diagnosis_margolis_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: margolis ~ gender + hlab27status + age_at_prom + diagnosis +
      treatment_order + last_known_smoking_status + last_known_vaping_status +
      treatment_reclassified + time_in_years + (time_in_years |      ttas_id)
Data: dataframe_sorted_and_reclassified_margolis
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 50544

Scaled residuals:

Min	1Q	Median	3Q	Max
-5.7678	-0.5030	-0.0809	0.4447	5.6379

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	35.56216	5.9634	
	time_in_years	0.07059	0.2657	-0.61
Residual		31.02233	5.5698	

Number of obs: 7762, groups: ttas\_id, 855

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	1.069e+01	1.111e+00	8.825e+02	9.622
genderMale	-1.655e+00	4.261e-01	7.634e+02	-3.884
hlab27statusNegative	1.895e+00	7.472e-01	8.006e+02	2.536
hlab27statusPositive	1.086e+00	6.063e-01	7.941e+02	1.792
age_at_prom	-1.138e-03	1.629e-02	8.269e+02	-0.070
diagnosisAxial SpA- nr-axSpA	-4.757e-01	5.044e-01	7.628e+02	-0.943
treatment_order2	-2.937e-01	4.575e-01	6.376e+03	-0.642
treatment_order3	-2.544e-01	4.288e-01	5.685e+03	-0.593
treatment_order4	2.610e-01	5.303e-01	6.215e+03	0.492
treatment_order5	8.456e-01	5.607e-01	5.304e+03	1.508
treatment_order6	3.995e-01	6.579e-01	4.286e+03	0.607

treatment_order7	8.156e-01	8.832e-01	3.511e+03	0.924
treatment_order8	-4.128e-01	1.146e+00	4.448e+03	-0.360
treatment_order9	-1.146e+00	1.337e+00	2.378e+03	-0.857
treatment_order10	3.375e+00	2.635e+00	5.752e+03	1.281
treatment_order11	6.860e+00	2.850e+00	3.687e+03	2.407
treatment_order12	1.063e+01	4.461e+00	6.992e+03	2.383
treatment_order14	-6.918e+00	3.057e+00	1.165e+03	-2.263
treatment_order15	-1.248e+00	4.783e+00	2.078e+03	-0.261
last_known_smoking_statussex-smoker	-1.164e+00	8.443e-01	7.086e+02	-1.378
last_known_smoking_statusnever	-1.776e+00	8.432e-01	7.167e+02	-2.106
last_known_smoking_statussmoker	-1.223e-01	1.017e+00	7.348e+02	-0.120
last_known_vaping_statussex-vaper	-2.762e-01	1.832e+00	7.324e+02	-0.151
last_known_vaping_statusnever	7.750e-01	8.448e-01	7.324e+02	0.917
last_known_vaping_statusvaper	3.980e-01	1.191e+00	7.293e+02	0.334
treatment_reclassifiedAnti-IL17	-1.284e+00	5.169e-01	6.238e+03	-2.484
treatment_reclassifiedAnti-TNF	-1.887e+00	4.111e-01	6.659e+03	-4.591
treatment_reclassifiedJAK Inhibitor	-2.485e+00	1.247e+00	6.033e+03	-1.993
time_in_years	-7.413e-02	2.255e-02	4.871e+02	-3.287
	Pr(> t )			
(Intercept)	< 2e-16 ***			
genderMale	0.000112 ***			
hlab27statusNegative	0.011403 *			
hlab27statusPositive	0.073572 .			
age_at_prom	0.944321			
diagnosisAxial SpA- nr-axSpA	0.345904			
treatment_order2	0.520977			
treatment_order3	0.553053			
treatment_order4	0.622606			
treatment_order5	0.131612			
treatment_order6	0.543751			
treatment_order7	0.355809			
treatment_order8	0.718732			
treatment_order9	0.391388			
treatment_order10	0.200214			
treatment_order11	0.016116 *			
treatment_order12	0.017193 *			
treatment_order14	0.023834 *			
treatment_order15	0.794251			
last_known_smoking_statussex-smoker	0.168587			
last_known_smoking_statusnever	0.035536 *			
last_known_smoking_statussmoker	0.904369			
last_known_vaping_statussex-vaper	0.880251			
last_known_vaping_statusnever	0.359241			

```

last_known_vaping_statusvaper      0.738420
treatment_reclassifiedAnti-IL17     0.013005 *
treatment_reclassifiedAnti-TNF      4.5e-06 ***
treatment_reclassifiedJAK Inhibitor  0.046347 *
time_in_years                      0.001086 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_diagnosis_margolis_full,
       model_treatment_diagnosis_margolis_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_margolis

Models:

model\_treatment\_diagnosis\_margolis\_reduced: margolis ~ gender + hlab27status + age\_at\_prom +

model\_treatment\_diagnosis\_margolis\_full: margolis ~ gender + hlab27status + age\_at\_prom + di

	npars	AIC	BIC	logLik	deviance
model_treatment_diagnosis_margolis_reduced	33	50633	50863	-25284	50567
model_treatment_diagnosis_margolis_full	36	50624	50874	-25276	50552

	Chisq	Df	Pr(>Chisq)
model_treatment_diagnosis_margolis_reduced			
model_treatment_diagnosis_margolis_full	15.071	3	0.001757 **

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

## lme4 code for treatment and gender: Margolis

```

model_treatment_gender_margolis_full <- lmer(
  margolis ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified * gender +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_margolis,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

```



```

model_treatment_gender_margolis_reduced <- lmer(
  margolis ~ gender + hlab27status + age_at_prom +
    diagnosis + treatment_order + last_known_smoking_status +
    last_known_vaping_status +
    treatment_reclassified +
    time_in_years + (time_in_years | ttas_id),
  data = dataframe_sorted_and_reclassified_margolis,
  control = lmerControl(optimizer = "bobyqa",
    optCtrl = list(maxfun = 2e5)))

print(summary(model_treatment_gender_margolis_full, corr = FALSE))

```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: margolis ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified * gender + time_in_years + (time_in_years |
  ttas_id)
Data: dataframe_sorted_and_reclassified_margolis
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 50513.8

Scaled residuals:

	Min	1Q	Median	3Q	Max
	-5.7235	-0.5040	-0.0773	0.4459	5.6242

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	35.77218	5.9810	
	time_in_years	0.06829	0.2613	-0.61
Residual		30.95315	5.5636	

Number of obs: 7762, groups: ttas\_id, 855

Fixed effects:

	Estimate	Std. Error	df
(Intercept)	1.131e+01	1.118e+00	9.010e+02
genderMale	-2.407e+00	4.594e-01	9.528e+02
hlab27statusNegative	1.783e+00	7.473e-01	8.027e+02
hlab27statusPositive	9.930e-01	6.053e-01	7.897e+02
age_at_prom	-1.023e-03	1.628e-02	8.301e+02

diagnosisAxial SpA- nr-axSpA	-5.190e-01	5.051e-01	7.670e+02
treatment_order2	-1.819e-01	4.573e-01	6.383e+03
treatment_order3	-1.151e-01	4.290e-01	5.608e+03
treatment_order4	5.388e-01	5.338e-01	6.097e+03
treatment_order5	1.041e+00	5.612e-01	5.187e+03
treatment_order6	6.526e-01	6.581e-01	4.222e+03
treatment_order7	1.186e+00	8.867e-01	3.544e+03
treatment_order8	-7.644e-02	1.146e+00	4.390e+03
treatment_order9	-8.844e-01	1.333e+00	2.363e+03
treatment_order10	3.752e+00	2.647e+00	5.755e+03
treatment_order11	7.305e+00	2.865e+00	3.606e+03
treatment_order12	1.077e+01	4.454e+00	6.997e+03
treatment_order14	-6.796e+00	3.042e+00	1.200e+03
treatment_order15	-7.309e-01	4.787e+00	2.159e+03
last_known_smoking_statussex-smoker	-1.125e+00	8.444e-01	7.107e+02
last_known_smoking_statusnever	-1.669e+00	8.435e-01	7.197e+02
last_known_smoking_statussmoker	-5.669e-02	1.018e+00	7.386e+02
last_known_vaping_statussex-vaper	-4.789e-01	1.829e+00	7.284e+02
last_known_vaping_statusnever	6.065e-01	8.455e-01	7.359e+02
last_known_vaping_statusvaper	1.952e-01	1.192e+00	7.312e+02
treatment_reclassifiedAnti-IL17	-1.695e+00	7.550e-01	5.211e+03
treatment_reclassifiedAnti-TNF	-3.388e+00	5.186e-01	6.560e+03
treatment_reclassifiedJAK Inhibitor	-2.627e+00	1.509e+00	5.269e+03
time_in_years	-7.578e-02	2.242e-02	4.869e+02
genderMale:treatment_reclassifiedAnti-IL17	4.467e-01	8.437e-01	4.654e+03
genderMale:treatment_reclassifiedAnti-TNF	2.295e+00	4.807e-01	5.439e+03
genderMale:treatment_reclassifiedJAK Inhibitor	-1.753e+00	2.448e+00	6.179e+03
t value Pr(> t )			
(Intercept)	10.112	< 2e-16	***
genderMale	-5.240	1.98e-07	***
hlab27statusNegative	2.386	0.017245	*
hlab27statusPositive	1.640	0.101320	
age_at_prom	-0.063	0.949905	
diagnosisAxial SpA- nr-axSpA	-1.028	0.304471	
treatment_order2	-0.398	0.690759	
treatment_order3	-0.268	0.788455	
treatment_order4	1.009	0.312795	
treatment_order5	1.854	0.063731	.
treatment_order6	0.992	0.321477	
treatment_order7	1.338	0.180972	
treatment_order8	-0.067	0.946811	
treatment_order9	-0.664	0.507069	
treatment_order10	1.417	0.156413	

```

treatment_order11          2.550 0.010817 *
treatment_order12          2.418 0.015612 *
treatment_order14         -2.234 0.025644 *
treatment_order15         -0.153 0.878649
last_known_smoking_statussex-smoker -1.333 0.183080
last_known_smoking_statusnever -1.978 0.048271 *
last_known_smoking_statussmoker -0.056 0.955600
last_known_vaping_statussex-vaper -0.262 0.793507
last_known_vaping_statusnever  0.717 0.473397
last_known_vaping_statusvaper  0.164 0.869924
treatment_reclassifiedAnti-IL17 -2.245 0.024832 *
treatment_reclassifiedAnti-TNF -6.534 6.90e-11 ***
treatment_reclassifiedJAK Inhibitor -1.741 0.081734 .
time_in_years              -3.380 0.000782 ***
genderMale:treatment_reclassifiedAnti-IL17 0.529 0.596513
genderMale:treatment_reclassifiedAnti-TNF  4.774 1.85e-06 ***
genderMale:treatment_reclassifiedJAK Inhibitor -0.716 0.473968
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```
print(summary(model_treatment_gender_margolis_reduced, corr = FALSE))
```

```

Linear mixed model fit by REML. t-tests use Satterthwaite's method [
lmerModLmerTest]
Formula: margolis ~ gender + hlab27status + age_at_prom + diagnosis +
  treatment_order + last_known_smoking_status + last_known_vaping_status +
  treatment_reclassified + time_in_years + (time_in_years | ttas_id)
Data: dataframe_sorted_and_reclassified_margolis
Control: lmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 2e+05))

```

REML criterion at convergence: 50544

Scaled residuals:

Min	1Q	Median	3Q	Max
-5.7678	-0.5030	-0.0809	0.4447	5.6379

Random effects:

Groups	Name	Variance	Std.Dev.	Corr
ttas_id	(Intercept)	35.56216	5.9634	
	time_in_years	0.07059	0.2657	-0.61
Residual		31.02233	5.5698	

Number of obs: 7762, groups: ttas\_id, 855

Fixed effects:

	Estimate	Std. Error	df	t value
(Intercept)	1.069e+01	1.111e+00	8.825e+02	9.622
genderMale	-1.655e+00	4.261e-01	7.634e+02	-3.884
hlab27statusNegative	1.895e+00	7.472e-01	8.006e+02	2.536
hlab27statusPositive	1.086e+00	6.063e-01	7.941e+02	1.792
age_at_prom	-1.138e-03	1.629e-02	8.269e+02	-0.070
diagnosisAxial SpA- nr-axSpA	-4.757e-01	5.044e-01	7.628e+02	-0.943
treatment_order2	-2.937e-01	4.575e-01	6.376e+03	-0.642
treatment_order3	-2.544e-01	4.288e-01	5.685e+03	-0.593
treatment_order4	2.610e-01	5.303e-01	6.215e+03	0.492
treatment_order5	8.456e-01	5.607e-01	5.304e+03	1.508
treatment_order6	3.995e-01	6.579e-01	4.286e+03	0.607
treatment_order7	8.156e-01	8.832e-01	3.511e+03	0.924
treatment_order8	-4.128e-01	1.146e+00	4.448e+03	-0.360
treatment_order9	-1.146e+00	1.337e+00	2.378e+03	-0.857
treatment_order10	3.375e+00	2.635e+00	5.752e+03	1.281
treatment_order11	6.860e+00	2.850e+00	3.687e+03	2.407
treatment_order12	1.063e+01	4.461e+00	6.992e+03	2.383
treatment_order14	-6.918e+00	3.057e+00	1.165e+03	-2.263
treatment_order15	-1.248e+00	4.783e+00	2.078e+03	-0.261
last_known_smoking_statussex-smoker	-1.164e+00	8.443e-01	7.086e+02	-1.378
last_known_smoking_statusnever	-1.776e+00	8.432e-01	7.167e+02	-2.106
last_known_smoking_statussmoker	-1.223e-01	1.017e+00	7.348e+02	-0.120
last_known_vaping_statussex-vaper	-2.762e-01	1.832e+00	7.324e+02	-0.151
last_known_vaping_statusnever	7.750e-01	8.448e-01	7.324e+02	0.917
last_known_vaping_statusvaper	3.980e-01	1.191e+00	7.293e+02	0.334
treatment_reclassifiedAnti-IL17	-1.284e+00	5.169e-01	6.238e+03	-2.484
treatment_reclassifiedAnti-TNF	-1.887e+00	4.111e-01	6.659e+03	-4.591
treatment_reclassifiedJAK Inhibitor	-2.485e+00	1.247e+00	6.033e+03	-1.993
time_in_years	-7.413e-02	2.255e-02	4.871e+02	-3.287
Pr(> t )				
(Intercept)	< 2e-16 ***			
genderMale	0.000112 ***			
hlab27statusNegative	0.011403 *			
hlab27statusPositive	0.073572 .			
age_at_prom	0.944321			
diagnosisAxial SpA- nr-axSpA	0.345904			
treatment_order2	0.520977			
treatment_order3	0.553053			
treatment_order4	0.622606			
treatment_order5	0.131612			

```

treatment_order6          0.543751
treatment_order7          0.355809
treatment_order8          0.718732
treatment_order9          0.391388
treatment_order10         0.200214
treatment_order11         0.016116 *
treatment_order12         0.017193 *
treatment_order14         0.023834 *
treatment_order15         0.794251
last_known_smoking_statussex-smoker 0.168587
last_known_smoking_statusnever 0.035536 *
last_known_smoking_statussmoker 0.904369
last_known_vaping_statussex-vaper 0.880251
last_known_vaping_statusnever 0.359241
last_known_vaping_statusvaper 0.738420
treatment_reclassifiedAnti-IL17 0.013005 *
treatment_reclassifiedAnti-TNF 4.5e-06 ***
treatment_reclassifiedJAK Inhibitor 0.046347 *
time_in_years              0.001086 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```

```

anova(model_treatment_gender_margolis_full,
       model_treatment_gender_margolis_reduced)

```

refitting model(s) with ML (instead of REML)

Data: dataframe\_sorted\_and\_reclassified\_margolis

Models:

model\_treatment\_gender\_margolis\_reduced: margolis ~ gender + hlab27status + age\_at\_prom + di

model\_treatment\_gender\_margolis\_full: margolis ~ gender + hlab27status + age\_at\_prom + diagn

	npars	AIC	BIC	logLik	deviance	Chisq
model_treatment_gender_margolis_reduced	33	50633	50863	-25284	50567	
model_treatment_gender_margolis_full	36	50614	50864	-25271	50542	24.957

Df Pr(>Chisq)

model\_treatment\_gender\_margolis\_reduced

model\_treatment\_gender\_margolis\_full 3 1.576e-05 \*\*\*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1