Genepar: Pain & Medication Use

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Session Information

Data Summary

Data structure:

\$ SCORE DN4

\$ OPIOIDS

\$ NSAIDS

\$ OTHER

\$ GABA ANALOGS

```
# load data:
df <- readRDS("./genepar/GENEPAR1.RDS")</pre>
# select relevant variables:
df \leftarrow df[,c(1:3,7,9:12,62,78:82)]; glimpse(df)
## Rows: 982
## Columns: 14
                    <chr> "000715", "002163", "002666", "002716", "003768", "0041~
## $ ID
## $ DIAGNOSIS
                    <fct> Lower Back Pain, Neuropathic Pain, Neuropathic Pain, Ne~
                    <fct> Female, Male, Male, Female, Male, Male, Female, F~
## $ SEX
                    <fct> CHUM, MUHC, MUHC, HDL, HDL, CHUM, CHUS, CHUM, HDL, CHUM~
## $ CLINIC
## $ AGE
                    <db1> 52, 25, 60, 52, 36, 60, NA, 45, 37, 36, 52, 40, 55, 47,~
## $ BMI
                    <dbl> 19, 25, 28, 27, 29, 27, 23, 22, 29, 20, 32, 24, 27, 20,~
## $ PAIN_BASELINE
                    <dbl> 7, 8, 6, 6, 8, 6, NA, 2, 8, 2, 4, 8, 7, 8, 5, 7, 5, 5, ~
## $ PAIN_FOLLOW_UP <dbl> 9, 7, 4, 3, 3, 1, 9, 2, 7, 1, 4, 8, 8, 8, 1, 10, 6, 3, ~
```

\$ ACETAMINOPHEN <fct> 1, 0, 1, 0, 0, 1, NA, NA, 0, 1, 0, 1, 1, 0, NA, 0, 0, 0~

<dbl> 6, 6, 4, 3, 1, 0, 3, 4, 4, 7, 3, 6, 6, 4, 2, 2, 5, 5, 2~

<fct> 0, 0, 0, 1, 0, 1, NA, NA, 0, 1, 1, 1, 1, 0, NA, 0, 0, 0~

<fct> 1, 0, 0, 0, 1, 1, NA, NA, 1, 0, 1, 1, 0, 1, NA, 0, 0, 1~

<fct> 0, 0, 1, 0, 0, 1, NA, NA, 1, 0, 1, 1, 1, 0, NA, 0, 0, 0~

<fct> 1, 1, 0, 0, 0, NA, NA, 1, 0, 1, 1, 0, 1, NA, 1, 1, 1~

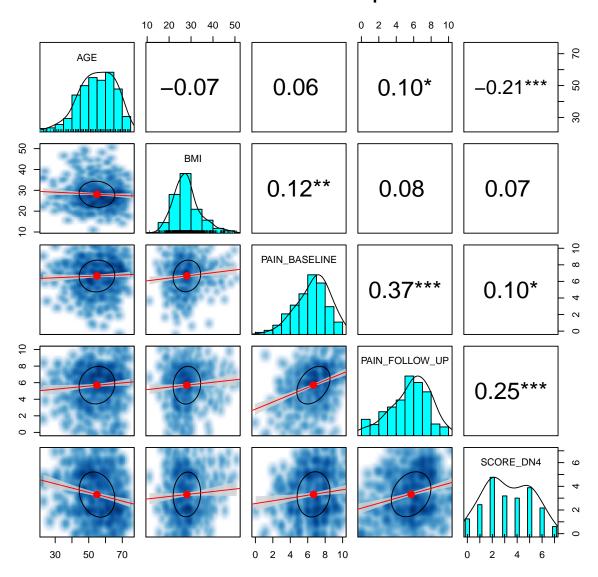
Table 1: Summary of all continuous variables

Variable	DIAGNOSIS	N	Missing	Mean	SD	Min	Median	Max	p.value
AGE	LBP	500	9	54.9	10.6	23	56	75	< 0.001
	NP	470	3	51.6	11.4	18	52	77	
$_{ m BMI}$	LBP	509	0	28.1	6.3	11	27	51	0.300
	NP	473	0	27.7	6.4	13	27	60	
PAIN_BASELINE	LBP	500	9	6.7	1.9	0	7	10	0.300
	NP	470	3	6.5	1.9	0	7	10	
PAIN_FOLLOW_UP	LBP	501	8	5.7	2.3	0	6	10	0.700
	NP	465	8	5.8	2.4	0	6	10	
SCORE_DN4	LBP	509	0	3.3	1.9	0	3	7	< 0.001
	NP	473	0	3.9	1.9	0	4	7	

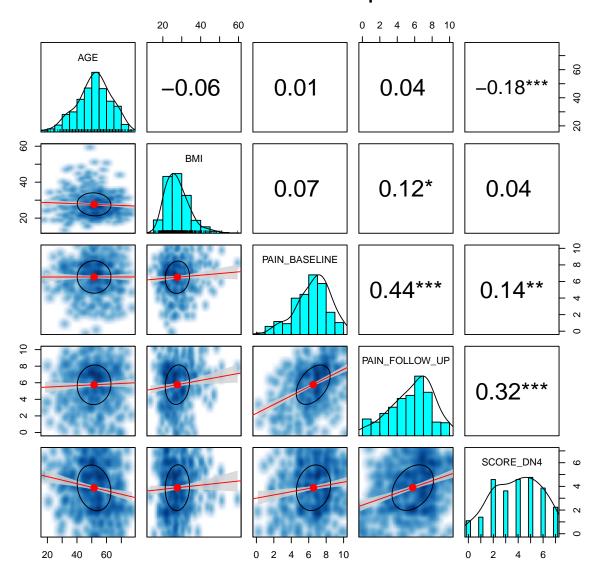
Summary of continuous variables:

```
dt <- summarize(df, type = "numeric", group = "DIAGNOSIS")
dt <- as.data.frame(dt)
row.names(dt) <- NULL
names(dt)[1] <- "Variable"
dt <- dt[,-c(3,6,9,11,13,15)]
dt$DIAGNOSIS[dt$DIAGNOSIS == "Lower Back Pain"] <- "LBP"
dt$DIAGNOSIS[dt$DIAGNOSIS == "Neuropathic Pain"] <- "NP"
kbl(dt, booktabs = T, caption = "Summary of all continuous variables", format="latex") %>%
kable_styling(latex_options = "scale_down")
```

Correlation Matrix of LBP patients



Correlation Matrix of NP patients



Summary of categorical variables:

```
dt <- summarize(df[,-4], type = "factor", group = "DIAGNOSIS")
dt <- as.data.frame(dt)
dt <- dt[,-c(3,6,9)]
names(dt) <- c("Variable","Level","N_LBP","%_LBP","N_NP","%_NP","p.value")
kbl(dt, booktabs = T, caption = "Summary of all categorical variables", format="latex") %>%
kable_styling(latex_options = "scale_down")
```

Table 2: Summary of all categorical variables

Variable	Level	N_LBP	%_LBP	N_NP	%_NP	p.value
SEX	Female	276	54.2	308	65.1	0.001
	Male	233	45.8	165	34.9	
ACETAMINOPHEN	0	200	39.3	180	38.1	0.192
	1	223	43.8	165	34.9	
	<Missing $>$	86	16.9	128	27.1	
GABA_ANALOGS	0	234	46.0	192	40.6	0.942
	1	189	37.1	153	32.3	
	<missing></missing>	86	16.9	128	27.1	
OPIOIDS	0	224	44.0	201	42.5	0.145
	1	199	39.1	144	30.4	
	<missing></missing>	86	16.9	128	27.1	
NSAIDS	0	230	45.2	227	48.0	0.001
	1	193	37.9	118	24.9	
	<missing></missing>	86	16.9	128	27.1	
OTHER	0	250	49.1	179	37.8	0.049
	1	173	34.0	166	35.1	
	<missing></missing>	86	16.9	128	27.1	

Statistical modeling

1. Mixed effects model (LBP)

```
# models
dt <- df %>% dplyr::filter(DIAGNOSIS == "Lower Back Pain") %>%
 dplyr::select(PAIN_BASELINE, PAIN_FOLLOW_UP, ACETAMINOPHEN, GABA_ANALOGS,
        NSAIDS, OPIOIDS, OTHER, AGE, SEX, BMI, CLINIC)
m1ac <- lmer(PAIN_FOLLOW_UP ~ AGE + SEX + BMI + (1 | CLINIC) + PAIN_BASELINE + ACETAMINOPHEN,
            data = dt)
m1gb <- lmer(PAIN_FOLLOW_UP ~ GABA_ANALOGS + AGE + SEX + BMI + (1 | CLINIC) + PAIN_BASELINE,
            data = dt)
m1op <- lmer(PAIN_FOLLOW_UP ~ OPIOIDS + AGE + SEX + BMI + (1 | CLINIC) + PAIN_BASELINE,
            data = dt)
m1ns <- lmer(PAIN_FOLLOW_UP ~ NSAIDS + AGE + SEX + BMI + (1 | CLINIC) + PAIN_BASELINE,
            data = dt
export_summs(m1ac, m1gb, m1op, m1ns, scale = T,
             error_format = "[{conf.low}, {conf.high}]") %>%
 kbl(booktabs = T, digits = 4, caption = "LBP models", format="latex") %>%
kable_styling(latex_options = "scale_down")
```

Table 3: LBP models

nom.	Model I	Model 2	Model 3	Model 8
1 (hirecept) 2 3 AGE	Model 1 3.500(1200221 *** (5.22000(22002775, 3.0270020024860) (6.32000(22007075, 3.0270020024860) (6.32000(22007002250), 6.3270034000000)	Model 2	Model I - DOCUMENTATION *** [D. TOTAL TOTAL TOTAL TOTAL TOTAL - D. TOTAL TOTAL TOTAL TOTAL TOTAL - D. TOTAL TOTAL TOTAL TOTAL TOTAL - D. OLD CONTROL TOTAL - D. TOTAL TOTAL TOTAL TOTAL TOTAL - D. TOTAL TOTAL TOTAL - D. TOTAL -	Model
6 7 RMI	# # # # # # # # # # # # # # # # # # #	-CONTINUED TO A TEMPORATION OF A TEMPORA	-6.120+1602311238 [-0.3321318*707946, 0.3762860022091.0] 0.332162603003030 [-0.332162000032040.0.0.0.0.0.0.000100027123] -7.7080650007070421***	-6.076023602000238 [-6.477905010212, 0.3220622279622] [-6.47202640000077 [-6.47202600000077 [-6.47202600000007]
11 ACKTAMINOPHEN	B. DELITYPHECIPORS, LORGEROPOTERNO O. SCHOLLESCENCE O. SCHOLLESCENCE O. SCHOLLESCENCEN, O. REFERENCE NELSE	[A.DECTEMOTERNET, LOUISE DOMINISTE] -D. EPICL EDWARD MEDICAL CONTENSION [1842] (D.T. MOCHES L'EVAND. A. CONTENSION [1842])	(I. Judin Edinescheller), (I. International Control of	[0.3932139030035, 1.000603071423]
10 COTOLINS 10 COTOLINS 10 NORLINS		[по инстительной постанований выпас.]	O.LINDONTHITIN [GITPKIDHITIHIT, GADWATZIANGEN]	A TOWNSHIP OF THE STATE OF THE
11 N	ar .	ar .	ar .	637
41 BC 51 B2 Sed	5 1603.68000000227 1804.18000000000000000000000000000000000	5 1541.05941094301 1640.2701094302 1611.059610101101	SI TENTANTINUM TEN	S TEXTATIONEERS TEXTATIONEERS TO THE TEXTATIONEERS
1 - All matinums predictors are mean restrict and maled by 1 standard divisation. *** $y < 0.001;$ ** $y < 0.01;$ * $y < 0.05.$				

```
plot_summs(m1ac, m1gb, m1op, m1ns, scale = T, plot.distributions = T)
```

follow-up LBP ~ Drug + baseline LBP + age + sex + BMI + (1 | clinic)

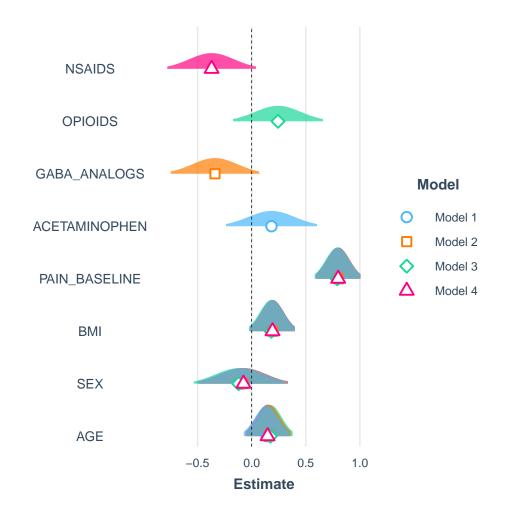


Table 4: NP models

NAMES .	Model I	Model 2	Model 3	Model E
1 (hieropi) 2 3 AGE	Madd : SATTINGORGE 15 *** [A RETTAINGORG ELETHNITH G-DRITTAINGORG ELETHN	Model 7	Madel I 	Model 4 5.00000000001119 *** [5.00000000000000000000] [6.000000000000000000000000000000000000
5 MOK 6 2 MOK 7 BAN JASSELING 9 PAIN JASSELING	0.2011.00.0002231 (0.239/20180000000, 0.7019001212174) (0.0121180000220027, 0.00072217220120) (0.0121180000220027, 0.00072217220120)	0.3351376000000000 [0.3350000000000000000000000000000000000	0.39030003000020 [0.3223941799004 0.40007132240722] 0.402330000223007 [0.40235002230072] 0.4025000223007230 0.4025000023007105 ***	0.22000R03020122 (0.22000R05000000000000000000000000000000
70 ACKTAMINOPHIN 12 CARA_ANALOGS	[L. REFORMELT TANKS, I. I. INFORMATION - 0. INTITIZENZA 0. INTITIZENZA 0. INTITIZENZA - (A. INTITIZENZA 0. INTITIZE	[AARTISEBBRAI, LOTINETERN)	[LAUTHORNITTEL, LOTHORNISHES]	(LACOPORGETERI), LOPPORGENIENCE)
15 0010208 36 37 NSAER		Commission of the commission o	G.SOCTHETRETREER, G.NOWN-SCTTISSISS]	GANGGERIERIERI
II N	239	zas	239	A SHOOL SHIP OF THE PROPERTY SEE
2.1 N (CLENC) 2.1 ARC 4.8 BEC 4.8 BEC 1.1 BEC (Seed)	5 (10/2.099090741 131.302.000117413 (13/2.00011413 (13/2.0001141413 (13/2.0	5 (183.5/1990/00110H 1331.17990/00110H 1331.17990/00110H 1331.17990/00110H 1331.17990/00110H 1331.17590/00110H 1331.17590/0010H 1331.17590/00110H 1331.17590/00110H 1331.17590/00110H 1331.17590/00110H 1331.17590/00110H 1331.17590/0010H 1331.17590/0010H 1331.17590/0010H 1331.17590/0010H 1331.17590/0010H 1331.17590/0010	5 1079 32094209407 1509 32094209407 1509 32094307111 1509 3209430712 1509 3209430712 1509 320940712	5 (DGI_TMGR-08-641) 1331_BF3M-M417 1331_BF3M-M2170 0.17964(CT2000) 13764(CT20
.1. All restinuous predictors are mean restrict and model by 1 standard deviation. *** $y < 0.001$; ** $y < 0.05$.				

2. Mixed effects model (NP)

```
plot_summs(m1ac, m1gb, m1op, m1ns, scale = T, plot.distributions = T)
```

follow-up NP \sim Drug + baseline NP + age + sex + BMI + (1 | clinic)

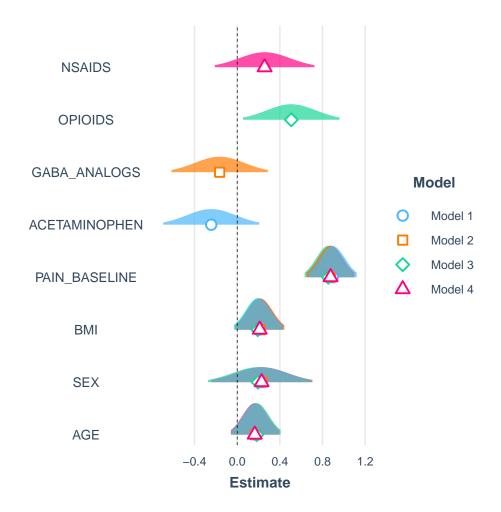


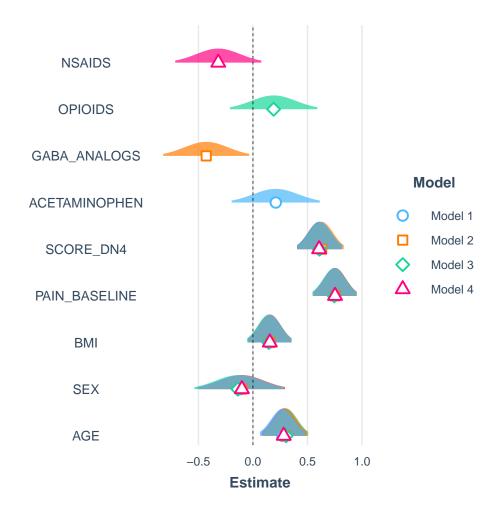
Table 5: DN4 corrected LBP models

-	en .	Model I	Model 2	Model I	Model 4
1 (b 2 2 At	immys)	Madel 1 3.0802191123023 *** [3.280261231274, 3.090402318] 6.27802003213174, 3.090402318] 6.00340911490306, 0.17812004002202]	Model 7 5.00.000.0000.000 *** [S.000.000.000.000 *** 0.000.000.000.000.000 [S.000.000.000.000.000.000.000.000.000.0	Model 2 5.814.8290333327 *** 5.8004339020.9149, 5.03.8003359120] 6.30012351380200** 6.30012351380200** 6.30012351380200** 6.30012351380200** 6.3001235000000000000000000000000000000000	Model
5 86 6 7 80 8 9 99		-0.1114/00400000000, 0.314022349000120 (-0.0170131459000, 0.314178245000120) (-0.018045250020000, 0.31418000118000) (-0.0180000462272***	- E. SERTODO-HARCZINEO (- AUTOLIZACIONEO A. A. DESCONIDO D-ROCE (- AUTOLIZACIONEO DE A. E. D. LOCANOMINOSONIO (- AUTOLIZACIONEO DE A. E. D. LOCANOMINOSONIO - AUTORIA (- AUTOLIZACIONEO DE A. E. D. LOCANOMINOSONIO DE A. E. D. L. LOCANOMINOSONIO DE A. E. D. L. LOCANOMINOSONIO DE A. E. D. L.	- 6. LETHON-DOTTICES (- AUGUSTYTHOLOGO) (- ALIEN LEDING LE, 6. ALIEN CHANGE LE) (- GREENEZHON-LE), 6. ALIEN CHANGE LE) (- ALIEN LEDING LE) (- ALIEN LEDING LE)	6.001200002001 (-0.0012000010111, 0.00111001112000 (-0.0110000000101 (-0.01100000000101 -0.0100112000000000000000000000000000000
12		[0.30027986131700, 0.940060311119] 0.4150279086020 "" 0.1250291914100", 0.0002190217100] 0.3000210672301 0.1000210721200, 0.401140072130]	[0.15050411120232, 0.0000279027742] 0.020032000227*** [0.12750900623002, 0.02132094120677]	[0.20022MENTITES (0.011EDS0160200] 0.6008922MENTITE (0.011EM199602000]	[B.TOZDIZZEGOTYCZNI, GODIODNEZWOZNE] G.KOREROWICZEGOTYCH *** [B. ED ZEZEZOWEZ 1894, G.KOROZYROWIZKOW]
15 G. 17 G	BA_ANALOGS 00008		6.EXPECTATES ([6.EXPECTAGE_PRINT, 6.032EXPROMETED]	G. DORITZENHILIZ [G. DORITZENHILIZ	
29 N 20 1.1 N		427	407	427	-B.ETHORIETZENIA [G.TZENPORRAZIA, B.ETHOLIZIATION] ELT
2.1 N 3.1 Al 4.1 BI		5 166.200017314 16126002773179	S INDUMENTALISM INDUMENTALISM	S HOLDSCHICKS SELECTION SHOWS	S LOGARDICIPATION I SALES CONTRACTOR I SALES CONTRA
6.1 BO	trad	0.31872180794223 0.31872180794223 All minimum prelicion are mean material and model by 1 standard divisition. *** $p < 0.011$; ** $p < 0.011$; * $p < 0.02$.	0.31723939039039 0.31723939039039 All restinance predictors are mean restricted and maked by 1 standard deviation. *** $p < 6001$; ** $p < 0.03$; * $p < 605$.	0.31943099403203 0.31943099403303 All restinations predictors are none-restored and scaled by 1 standard deviation. *** $y < 0.000$; ** $y < 0.00$; * $y < 0.00$.	0.3139634713437 0.3139634713437 All restingues prelicion are mean restored and walrd by 1 visualand deviation. *** $p < 0.000$; ** $p < 0.00$. ** $p < 0.00$.

3. DN4 score corrected mixed effects model (LBP)

```
plot_summs(m1ac, m1gb, m1op, m1ns, scale = T, plot.distributions = T)
```

follow-up LBP \sim Drug + baseline LBP + DN4 score + age + sex + BMI + (1 | clinic)



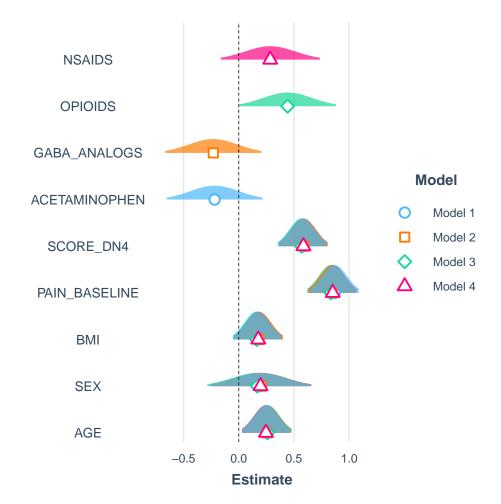
4. DN4 score corrected mixed effects model (NP)

Table 6: DN4 corrected NP models

name.	Model I	Model 2	Model I	Model 4
1 (hierapi) 2 3 AGE	Model T	Model 1 - ANDRALITETON *** [ALTERIZATION 5** [AL	Superfreeding Service (Service	Model d
E RME	0.798/07/T.11.113/05 [-7.208/0506/08/227, 0.028/0501149/70] 0.775/11119.08/0506 [-0.93.6903.5.1122507, 0.207.0906/1209/06] 0.93.6903/07/1108/08***	0.2009/10/00/00/00/00/00/00/00/00/00/00/00/00/	(GENERAL ENGINEERING, GERMEN PARKET) GENERAL ENGINEERING GERMEN GENERAL ENGINEERING GERMEN GENERAL ENGINEERING GERMEN GENERAL ENGINEERING GENERAL	G_MENTALIZATION (G_MITTHETISOLINE, G_MISSINTHEZANIZ G_MITTALIZANIANA (G_MISSINTALIZANIANA (G_MISSINTALIZAN
11 SCHELINI 12 ACKIMINOPHIN	[RADIALERONIN, LONGISTINGHI] OLYMHINGORGEL O	[6.02701.04021.007, 1.04133921.00400] 0.3003200000000000000000000000000000000	[ALDHETHI FRUMNEL, LOUGTELET MO] O. DOMNETET-CLUSET *** (B. ANIZZET-BAUGHELE, O. THALEZET-DOMTZE)	[IL SECRETARIST LINESCONTENS]
10 CARA_ANALOGS 117 GROUNS 18 NSALOS		-0-2000000000001 [-0.000129902399022, 0.200299020004]	0.1136131200000014.f.0.75014000002500]	0.39.00.079/003403
41 860	239 5 181.0002079819 170.0102080002	329 5 180007532033 180334532273	229 5 100.2394127.09 100.2394127.09	[0.14594194327, 0.73777770477] IN STANDARD STAND
	$0.3227900059002\\$ $0.3227900059002\\$ $0.3227900059002\\$ $0.3227900059002\\$	0.333330033407 0.33333033307 All millions prelitions are mean content and scaled by 1 standard deviation. **** $p < 0.021$, *** $p < 0.021$, ** $p < 0.021$, ** $p < 0.021$, *** $p < 0.021$, **	0.239.0279.02793	0.3239431420302 0.3242723439716 All restrictors predictors are some restricted and model by I minutael deviation. *** $y < 0.001$, ** $y < 0.001$, ** $y < 0.001$.

```
plot_summs(m1ac, m1gb, m1op, m1ns, scale = T, plot.distributions = T)
```

follow-up NP \sim Drug + baseline NP + age + sex + BMI + (1 | clinic)



Session Information

sessionInfo()

```
## R version 4.0.5 (2021-03-31)
## Platform: x86 64-pc-linux-gnu (64-bit)
## Running under: Ubuntu 20.04.2 LTS
## Matrix products: default
           /usr/lib/x86_64-linux-gnu/blas/libblas.so.3.9.0
## LAPACK: /usr/lib/x86_64-linux-gnu/lapack/liblapack.so.3.9.0
## locale:
   [1] LC_CTYPE=en_CA.UTF-8
                                   LC NUMERIC=C
   [3] LC_TIME=en_CA.UTF-8
                                   LC_COLLATE=en_CA.UTF-8
   [5] LC_MONETARY=en_CA.UTF-8
                                   LC_MESSAGES=en_CA.UTF-8
##
                                   LC_NAME=C
##
  [7] LC_PAPER=en_CA.UTF-8
  [9] LC ADDRESS=C
                                   LC TELEPHONE=C
## [11] LC_MEASUREMENT=en_CA.UTF-8 LC_IDENTIFICATION=C
##
## attached base packages:
                 graphics grDevices utils
## [1] stats
                                                datasets methods
                                                                    base
##
## other attached packages:
  [1] psych_2.1.6
                          jtools_2.1.3
                                             kableExtra_1.3.4
                                                               data.table_1.14.0
   [5] effects_4.2-0
                          knitr_1.31
                                             lme4_1.1-27.1
                                                               Matrix_1.3-2
   [9] papeR_1.0-5
                          xtable_1.8-4
                                             car_3.0-10
                                                               carData_3.0-4
## [13] forcats_0.5.1
                          stringr_1.4.0
                                             dplyr_1.0.5
                                                               purrr_0.3.4
## [17] readr_1.4.0
                          tidyr_1.1.3
                                             tibble_3.1.1
                                                               ggplot2_3.3.3
## [21] tidyverse_1.3.0
## loaded via a namespace (and not attached):
  [1] nlme_3.1-152
                           pbkrtest_0.5.1
                                               fs_1.5.0
                                                                  lubridate_1.7.10
## [5] webshot_0.5.2
                           insight_0.14.2
                                               gmodels_2.18.1
                                                                  httr_1.4.2
## [9] tools 4.0.5
                           backports_1.2.1
                                               utf8 1.2.1
                                                                  R6_2.5.0
## [13] KernSmooth 2.23-18 DBI 1.1.1
                                               colorspace_2.0-0
                                                                  nnet_7.3-15
## [17] withr_2.4.2
                           mnormt_2.0.2
                                               tidyselect_1.1.1
                                                                  curl_4.3
                                                                  xm12_1.3.2
## [21] compiler_4.0.5
                           cli_2.5.0
                                               rvest_1.0.0
## [25] labeling_0.4.2
                           scales_1.1.1
                                               systemfonts_1.0.1
                                                                  digest_0.6.27
## [29] foreign_0.8-81
                           minqa_1.2.4
                                               rmarkdown_2.7
                                                                  svglite_2.0.0
## [33] rio_0.5.26
                                               htmltools_0.5.1.1
                                                                  dbplyr_2.1.0
                           pkgconfig_2.0.3
## [37] rlang_0.4.10
                           readxl_1.3.1
                                               rstudioapi_0.13
                                                                  farver_2.1.0
## [41] generics_0.1.0
                           jsonlite_1.7.2
                                               broom.mixed_0.2.7
                                                                  gtools_3.8.2
## [45] zip_2.1.1
                           huxtable_5.4.0
                                               magrittr_2.0.1
                                                                  Rcpp_1.0.6
## [49] munsell_0.5.0
                           fansi_0.4.2
                                               abind_1.4-5
                                                                  lifecycle_1.0.0
## [53] stringi_1.5.3
                           yaml_2.2.1
                                               MASS_7.3-53.1
                                                                  ggstance_0.3.5
## [57] grid_4.0.5
                           parallel_4.0.5
                                               gdata_2.18.0
                                                                  crayon_1.4.1
## [61] lattice_0.20-41
                           haven_2.4.1
                                               splines_4.0.5
                                                                  pander 0.6.4
## [65] hms_1.0.0
                           tmvnsim_1.0-2
                                               pillar_1.6.0
                                                                  boot_1.3-27
## [69] reprex_1.0.0
                           glue_1.4.2
                                               evaluate_0.14
                                                                  mitools_2.4
## [73] modelr_0.1.8
                           vctrs_0.3.8
                                               nloptr_1.2.2.2
                                                                  cellranger_1.1.0
## [77] gtable_0.3.0
                           assertthat_0.2.1
                                               xfun_0.22
                                                                  openxlsx_4.2.3
                           survey_4.0
                                               viridisLite_0.4.0 survival_3.2-10
## [81] broom_0.7.8
```

[85] ellipsis_0.3.2