library(lme4)

## Loading required package: Matrix

library(car)  
library(arm)

## Loading required package: MASS

##   
## arm (Version 1.8-6, built: 2015-7-7)

## Working directory is C:/Users/ngreen1/Dropbox/small-area & chlamydia/R\_code/scripts/mrp

##   
## Attaching package: 'arm'

## The following object is masked from 'package:car':  
##   
## logit

library(pander)  
library(knitr)  
library(stargazer)

##   
## Please cite as:

## Hlavac, Marek (2015). stargazer: Well-Formatted Regression and Summary Statistics Tables.

## R package version 5.2. http://CRAN.R-project.org/package=stargazer

library(xtable)

##   
## Attaching package: 'xtable'

## The following object is masked from 'package:arm':  
##   
## display

library(lattice)  
library(plyr)  
require(memisc)

## Loading required package: memisc

## Warning: package 'memisc' was built under R version 3.2.5

##   
## Attaching package: 'memisc'

## The following object is masked from 'package:plyr':  
##   
## rename

## The following object is masked from 'package:car':  
##   
## recode

## The following object is masked from 'package:Matrix':  
##   
## as.array

## The following objects are masked from 'package:stats':  
##   
## contr.sum, contr.treatment, contrasts

## The following object is masked from 'package:base':  
##   
## as.array

library(sjPlot)

## Warning: package 'sjPlot' was built under R version 3.2.5

library(STIecoPredict)  
  
# load("C:/Users/ngreen1/Dropbox/small-area & chlamydia/R\_code/scripts/mrp/data/cleaned-regn-input-mrpNatsal.RData")  
load("./data/cleaned-regn-input-mrpNatsal.RData")

Natsal[] <- lapply(Natsal, unclass)  
Natsal0 <- Natsal  
## older ages sparsely sampled  
Natsal <- subset(Natsal, age>15 & age<45)

What range do we want to regress over? The surveillance data is only for <24 years olds in most cases so there's probably no point in using all ages.

# http://stats.stackexchange.com/questions/31569/questions-about-how-random-effects-are-specified-in-lmer  
  
fit0 <- glmer(formula = cttestly ~ 1+(1|age),  
data = Natsal, family = binomial(link="logit"), weights = total\_wt)

## Warning: non-integer #successes in a binomial glm!

## a null model  
fit12 <- fit0  
summary(fit12)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ 1 + (1 | age)  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4704.3 4718.4 -2350.2 4700.3 8542   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.3696 -0.4500 -0.3238 -0.2031 7.2803   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## age (Intercept) 0.7829 0.8848   
## Number of obs: 8544, groups: age, 29  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -1.7728 0.1692 -10.48 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

fit13 <- update(fit0, .~. + sex)

## Warning: non-integer #successes in a binomial glm!

summary(fit13)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ (1 | age) + sex  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4636.3 4657.5 -2315.2 4630.3 8541   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.5901 -0.4407 -0.3269 -0.2051 8.3210   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## age (Intercept) 0.8298 0.911   
## Number of obs: 8544, groups: age, 29  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -2.73154 0.21063 -12.968 <2e-16 \*\*\*  
## sex 0.63173 0.07579 8.335 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr)  
## sex -0.564

fit14 <- update(fit13, .~. - (1|age) + (sex|age))

## Warning: non-integer #successes in a binomial glm!

summary(fit14)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ sex + (sex | age)  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4637.6 4672.9 -2313.8 4627.6 8539   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.5292 -0.4450 -0.3270 -0.2037 8.8038   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## age (Intercept) 1.28322 1.1328   
## sex 0.01918 0.1385 -1.00  
## Number of obs: 8544, groups: age, 29  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -2.83388 0.25410 -11.153 < 2e-16 \*\*\*  
## sex 0.69116 0.08839 7.819 5.32e-15 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr)  
## sex -0.755

fit15 <- update(fit13, .~. + ethnic2)

## Warning: non-integer #successes in a binomial glm!

summary(fit15)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ (1 | age) + sex + ethnic2  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4632.1 4660.3 -2312.0 4624.1 8540   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.5438 -0.4410 -0.3285 -0.2046 9.0684   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## age (Intercept) 0.8426 0.9179   
## Number of obs: 8544, groups: age, 29  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -2.60500 0.21768 -11.967 <2e-16 \*\*\*  
## sex 0.63649 0.07588 8.388 <2e-16 \*\*\*  
## ethnic2 -0.09920 0.04071 -2.436 0.0148 \*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) sex   
## sex -0.539   
## ethnic2 -0.232 -0.030

fit16 <- update(fit15, .~. + smokenow+increasingdrinker)

## Warning: non-integer #successes in a binomial glm!

summary(fit16)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula:   
## cttestly ~ (1 | age) + sex + ethnic2 + smokenow + increasingdrinker  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4576.6 4618.9 -2282.3 4564.6 8538   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.7473 -0.4385 -0.3179 -0.1971 10.5222   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## age (Intercept) 0.8585 0.9265   
## Number of obs: 8544, groups: age, 29  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -3.09964 0.23224 -13.347 < 2e-16 \*\*\*  
## sex 0.74082 0.07850 9.437 < 2e-16 \*\*\*  
## ethnic2 -0.05789 0.04086 -1.417 0.157   
## smokenowTRUE 0.51565 0.08162 6.318 2.65e-10 \*\*\*  
## increasingdrinkerTRUE 0.33277 0.08206 4.055 5.01e-05 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) sex ethnc2 smTRUE  
## sex -0.570   
## ethnic2 -0.266 0.011   
## smokenwTRUE -0.158 0.080 0.032   
## incrsngTRUE -0.275 0.207 0.170 -0.078

fit17 <- update(fit14, .~. + ethnic2+smokenow+increasingdrinker)

## Warning: non-integer #successes in a binomial glm!

summary(fit17)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula:   
## cttestly ~ sex + (sex | age) + ethnic2 + smokenow + increasingdrinker  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4578.3 4634.7 -2281.1 4562.3 8536   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.6875 -0.4411 -0.3193 -0.1922 11.0867   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## age (Intercept) 1.29199 1.137   
## sex 0.01717 0.131 -1.00  
## Number of obs: 8544, groups: age, 29  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -3.19774 0.27115 -11.793 < 2e-16 \*\*\*  
## sex 0.79627 0.09021 8.827 < 2e-16 \*\*\*  
## ethnic2 -0.05572 0.04079 -1.366 0.172   
## smokenowTRUE 0.51468 0.08159 6.308 2.82e-10 \*\*\*  
## increasingdrinkerTRUE 0.33270 0.08199 4.058 4.96e-05 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) sex ethnc2 smTRUE  
## sex -0.739   
## ethnic2 -0.235 0.022   
## smokenwTRUE -0.133 0.066 0.032   
## incrsngTRUE -0.235 0.179 0.169 -0.079

pander(anova(fit12, fit13, fit14, fit15, fit16, fit17))

Data: Natsal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Df | AIC | BIC | logLik | deviance | Chisq | Chi Df | Pr(>Chisq) |
| **fit12** | 2 | 4704 | 4718 | -2350 | 4700 | NA | NA | NA |
| **fit13** | 3 | 4636 | 4657 | -2315 | 4630 | 69.99 | 1 | 5.972e-17 |
| **fit15** | 4 | 4632 | 4660 | -2312 | 4624 | 6.23 | 1 | 0.01256 |
| **fit14** | 5 | 4638 | 4673 | -2314 | 4628 | 0 | 1 | 1 |
| **fit16** | 6 | 4577 | 4619 | -2282 | 4565 | 63 | 1 | 2.066e-15 |
| **fit17** | 8 | 4578 | 4635 | -2281 | 4562 | 2.381 | 2 | 0.3041 |

## a null model  
fit21 <- glmer(formula = cttestly ~ 1+(1|gor),  
data = Natsal, family = binomial(link="logit"), weights = total\_wt)

## Warning: non-integer #successes in a binomial glm!

summary(fit21)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ 1 + (1 | gor)  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 5179.2 5193.3 -2587.6 5175.2 8542   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.1399 -0.4252 -0.3228 -0.2364 4.4928   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## gor (Intercept) 0 0   
## Number of obs: 8544, groups: gor, 9  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -1.66123 0.03557 -46.71 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

fit22 <- update(fit21, .~. + sex+(1|age))

## Warning: non-integer #successes in a binomial glm!

summary(fit22)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ (1 | gor) + sex + (1 | age)  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4638.3 4666.5 -2315.2 4630.3 8540   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.5901 -0.4407 -0.3269 -0.2051 8.3210   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## age (Intercept) 0.8298 0.911   
## gor (Intercept) 0.0000 0.000   
## Number of obs: 8544, groups: age, 29; gor, 9  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -2.73152 0.21063 -12.968 <2e-16 \*\*\*  
## sex 0.63173 0.07579 8.335 <2e-16 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr)  
## sex -0.564

fit23 <- update(fit22, .~. + ethnic2+student)

## Warning: non-integer #successes in a binomial glm!

summary(fit23)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ (1 | gor) + sex + (1 | age) + ethnic2 + student  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4633.6 4675.9 -2310.8 4621.6 8538   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.6171 -0.4403 -0.3287 -0.2040 9.0123   
##   
## Random effects:  
## Groups Name Variance Std.Dev.  
## age (Intercept) 0.909 0.9534   
## gor (Intercept) 0.000 0.0000   
## Number of obs: 8544, groups: age, 29; gor, 9  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -2.58894 0.22307 -11.606 <2e-16 \*\*\*  
## sex 0.63784 0.07592 8.401 <2e-16 \*\*\*  
## ethnic2 -0.09062 0.04098 -2.211 0.027 \*   
## studentTRUE -0.18893 0.11932 -1.583 0.113   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) sex ethnc2  
## sex -0.525   
## ethnic2 -0.218 -0.029   
## studentTRUE -0.043 -0.015 -0.128

fit24 <- update(fit23, .~. + smokenow+increasingdrinker)

## Warning: non-integer #successes in a binomial glm!

summary(fit24)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ (1 | gor) + sex + (1 | age) + ethnic2 + student +   
## smokenow + increasingdrinker  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4579.7 4636.1 -2281.8 4563.7 8536   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.6932 -0.4387 -0.3179 -0.1968 10.4684   
##   
## Random effects:  
## Groups Name Variance Std.Dev.   
## age (Intercept) 9.007e-01 9.491e-01  
## gor (Intercept) 2.454e-09 4.954e-05  
## Number of obs: 8544, groups: age, 29; gor, 9  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -3.08757 0.23564 -13.103 < 2e-16 \*\*\*  
## sex 0.74171 0.07854 9.444 < 2e-16 \*\*\*  
## ethnic2 -0.05251 0.04117 -1.275 0.202   
## studentTRUE -0.11902 0.12079 -0.985 0.324   
## smokenowTRUE 0.50648 0.08218 6.163 7.12e-10 \*\*\*  
## increasingdrinkerTRUE 0.33558 0.08213 4.086 4.39e-05 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) sex ethnc2 stTRUE smTRUE  
## sex -0.561   
## ethnic2 -0.253 0.012   
## studentTRUE -0.050 -0.014 -0.130   
## smokenwTRUE -0.160 0.078 0.017 0.110   
## incrsngTRUE -0.270 0.208 0.173 -0.036 -0.081

fit25 <- update(fit24, .~. - sex - student + sex\*student)

## Warning: non-integer #successes in a binomial glm!

## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control  
## $checkConv, : Model failed to converge with max|grad| = 0.0027575 (tol =  
## 0.001, component 1)

summary(fit25)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula:   
## cttestly ~ (1 | gor) + (1 | age) + ethnic2 + smokenow + increasingdrinker +   
## sex + student + sex:student  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4580.4 4643.9 -2281.2 4562.4 8535   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.6287 -0.4393 -0.3191 -0.1957 10.6349   
##   
## Random effects:  
## Groups Name Variance Std.Dev.   
## age (Intercept) 9.080e-01 0.9529162  
## gor (Intercept) 4.487e-08 0.0002118  
## Number of obs: 8544, groups: age, 29; gor, 9  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -3.15831 0.24467 -12.908 < 2e-16 \*\*\*  
## ethnic2 -0.05275 0.04115 -1.282 0.200   
## smokenowTRUE 0.50737 0.08221 6.172 6.75e-10 \*\*\*  
## increasingdrinkerTRUE 0.33745 0.08214 4.108 3.99e-05 \*\*\*  
## sex 0.78706 0.08828 8.915 < 2e-16 \*\*\*  
## studentTRUE 0.19508 0.30207 0.646 0.518   
## sex:studentTRUE -0.21154 0.18725 -1.130 0.259   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) ethnc2 smTRUE inTRUE sex stTRUE  
## ethnic2 -0.242   
## smokenwTRUE -0.157 0.017   
## incrsngTRUE -0.265 0.172 -0.082   
## sex -0.600 0.008 0.075 0.194   
## studentTRUE -0.257 -0.058 0.054 0.005 0.416   
## sx:stdnTRUE 0.257 0.006 -0.011 -0.022 -0.455 -0.917  
## convergence code: 0  
## Model failed to converge with max|grad| = 0.0027575 (tol = 0.001, component 1)

## random slopes  
fit26 <- update(fit25, .~. - (1|age) + (student|age))

## Warning: non-integer #successes in a binomial glm!

## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control  
## $checkConv, : Model failed to converge with max|grad| = 0.151169 (tol =  
## 0.001, component 1)

summary(fit26)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ (1 | gor) + ethnic2 + smokenow + increasingdrinker +   
## sex + student + (student | age) + sex:student  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4570.9 4648.5 -2274.5 4548.9 8533   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.5145 -0.4414 -0.3183 -0.1940 10.7596   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## age (Intercept) 1.021e+00 1.010471   
## studentTRUE 4.063e-01 0.637419 -1.00  
## gor (Intercept) 6.591e-05 0.008118   
## Number of obs: 8544, groups: age, 29; gor, 9  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -3.15287 0.25300 -12.462 < 2e-16 \*\*\*  
## ethnic2 -0.05949 0.04109 -1.448 0.14768   
## smokenowTRUE 0.49408 0.08244 5.993 2.06e-09 \*\*\*  
## increasingdrinkerTRUE 0.35108 0.08207 4.278 1.89e-05 \*\*\*  
## sex 0.79420 0.08886 8.938 < 2e-16 \*\*\*  
## studentTRUE 0.93886 0.36001 2.608 0.00911 \*\*   
## sex:studentTRUE -0.24962 0.18479 -1.351 0.17675   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) ethnc2 smTRUE inTRUE sex stTRUE  
## ethnic2 -0.230   
## smokenwTRUE -0.150 0.017   
## incrsngTRUE -0.254 0.167 -0.085   
## sex -0.582 0.006 0.070 0.195   
## studentTRUE -0.462 -0.083 0.021 0.020 0.373   
## sx:stdnTRUE 0.253 0.018 -0.008 -0.021 -0.465 -0.787  
## convergence code: 0  
## Model failed to converge with max|grad| = 0.151169 (tol = 0.001, component 1)

fit261 <- update(fit25, .~. - (1|age) + (ethnic2|age))

## Warning: non-integer #successes in a binomial glm!

## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control  
## $checkConv, : Model failed to converge with max|grad| = 0.151072 (tol =  
## 0.001, component 1)

summary(fit261)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ (1 | gor) + ethnic2 + smokenow + increasingdrinker +   
## sex + student + (ethnic2 | age) + sex:student  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4580.8 4658.4 -2279.4 4558.8 8533   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.6787 -0.4369 -0.3182 -0.1965 9.6781   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## age (Intercept) 1.128e+00 1.062295   
## ethnic2 7.057e-03 0.084004 -1.00  
## gor (Intercept) 9.270e-06 0.003045   
## Number of obs: 8544, groups: age, 29; gor, 9  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -3.221645 0.261827 -12.304 < 2e-16 \*\*\*  
## ethnic2 -0.006556 0.047704 -0.137 0.891   
## smokenowTRUE 0.511408 0.082308 6.213 5.19e-10 \*\*\*  
## increasingdrinkerTRUE 0.341156 0.082319 4.144 3.41e-05 \*\*\*  
## sex 0.792158 0.088357 8.965 < 2e-16 \*\*\*  
## studentTRUE 0.200814 0.302351 0.664 0.507   
## sex:studentTRUE -0.210853 0.187451 -1.125 0.261   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) ethnc2 smTRUE inTRUE sex stTRUE  
## ethnic2 -0.492   
## smokenwTRUE -0.149 0.021   
## incrsngTRUE -0.248 0.155 -0.084   
## sex -0.565 0.024 0.076 0.193   
## studentTRUE -0.243 -0.040 0.055 0.005 0.416   
## sx:stdnTRUE 0.239 0.007 -0.011 -0.021 -0.454 -0.917  
## convergence code: 0  
## Model failed to converge with max|grad| = 0.151072 (tol = 0.001, component 1)

## a saturated model  
fit27 <- fit26 <- update(fit25, .~. - (1|age) + (student:ethnic2|age))

## Warning: non-integer #successes in a binomial glm!

## Warning in checkConv(attr(opt, "derivs"), opt$par, ctrl = control  
## $checkConv, : Model failed to converge with max|grad| = 0.0513445 (tol =  
## 0.001, component 1)

summary(fit27)

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula: cttestly ~ (1 | gor) + ethnic2 + smokenow + increasingdrinker +   
## sex + student + (student:ethnic2 | age) + sex:student  
## Data: Natsal  
## Weights: total\_wt  
##   
## AIC BIC logLik deviance df.resid   
## 4583.6 4682.3 -2277.8 4555.6 8530   
##   
## Scaled residuals:   
## Min 1Q Median 3Q Max   
## -1.6655 -0.4381 -0.3162 -0.1976 9.8920   
##   
## Random effects:  
## Groups Name Variance Std.Dev. Corr   
## age (Intercept) 1.017e+00 1.0082500   
## studentFALSE:ethnic2 1.222e-03 0.0349587 -1.00   
## studentTRUE:ethnic2 2.725e-02 0.1650802 -1.00 1.00  
## gor (Intercept) 3.012e-08 0.0001735   
## Number of obs: 8544, groups: age, 29; gor, 9  
##   
## Fixed effects:  
## Estimate Std. Error z value Pr(>|z|)   
## (Intercept) -3.158161 0.261090 -12.096 < 2e-16 \*\*\*  
## ethnic2 0.002468 0.045595 0.054 0.957   
## smokenowTRUE 0.508000 0.082350 6.169 6.88e-10 \*\*\*  
## increasingdrinkerTRUE 0.341169 0.082284 4.146 3.38e-05 \*\*\*  
## sex 0.789909 0.088424 8.933 < 2e-16 \*\*\*  
## studentTRUE 0.397651 0.318627 1.248 0.212   
## sex:studentTRUE -0.210372 0.186968 -1.125 0.261   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Correlation of Fixed Effects:  
## (Intr) ethnc2 smTRUE inTRUE sex stTRUE  
## ethnic2 -0.409   
## smokenwTRUE -0.160 0.021   
## incrsngTRUE -0.245 0.159 -0.084   
## sex -0.560 0.021 0.075 0.193   
## studentTRUE -0.248 0.007 0.048 0.002 0.391   
## sx:stdnTRUE 0.238 0.010 -0.011 -0.020 -0.455 -0.867  
## convergence code: 0  
## Model failed to converge with max|grad| = 0.0513445 (tol = 0.001, component 1)

pander(anova(fit21, fit22, fit23, fit24, fit25, fit26, fit261, fit27))

Data: Natsal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Df | AIC | BIC | logLik | deviance | Chisq | Chi Df | Pr(>Chisq) |
| **fit21** | 2 | 5179 | 5193 | -2588 | 5175 | NA | NA | NA |
| **fit22** | 4 | 4638 | 4667 | -2315 | 4630 | 544.8 | 2 | 4.919e-119 |
| **fit23** | 6 | 4634 | 4676 | -2311 | 4622 | 8.752 | 2 | 0.01257 |
| **fit24** | 8 | 4580 | 4636 | -2282 | 4564 | 57.92 | 2 | 2.647e-13 |
| **fit25** | 9 | 4580 | 4644 | -2281 | 4562 | 1.274 | 1 | 0.2591 |
| **fit261** | 11 | 4581 | 4658 | -2279 | 4559 | 3.581 | 2 | 0.1669 |
| **fit26** | 14 | 4584 | 4682 | -2278 | 4556 | 3.221 | 3 | 0.3588 |
| **fit27** | 14 | 4584 | 4682 | -2278 | 4556 | 0 | 0 | 1 |

pander(anova(fit12, fit13, fit14, fit15, fit16, fit17, fit21, fit22, fit23, fit24, fit25, fit26, fit261, fit27))

Data: Natsal

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Df | AIC | BIC | logLik | deviance | Chisq | Chi Df | Pr(>Chisq) |
| **fit12** | 2 | 4704 | 4718 | -2350 | 4700 | NA | NA | NA |
| **fit21** | 2 | 5179 | 5193 | -2588 | 5175 | 0 | 0 | 1 |
| **fit13** | 3 | 4636 | 4657 | -2315 | 4630 | 544.8 | 1 | 1.678e-120 |
| **fit15** | 4 | 4632 | 4660 | -2312 | 4624 | 6.23 | 1 | 0.01256 |
| **fit22** | 4 | 4638 | 4667 | -2315 | 4630 | 0 | 0 | 1 |
| **fit14** | 5 | 4638 | 4673 | -2314 | 4628 | 2.698 | 1 | 0.1005 |
| **fit16** | 6 | 4577 | 4619 | -2282 | 4565 | 63 | 1 | 2.066e-15 |
| **fit23** | 6 | 4634 | 4676 | -2311 | 4622 | 0 | 0 | 1 |
| **fit17** | 8 | 4578 | 4635 | -2281 | 4562 | 59.33 | 2 | 1.31e-13 |
| **fit24** | 8 | 4580 | 4636 | -2282 | 4564 | 0 | 0 | 1 |
| **fit25** | 9 | 4580 | 4644 | -2281 | 4562 | 1.274 | 1 | 0.2591 |
| **fit261** | 11 | 4581 | 4658 | -2279 | 4559 | 3.581 | 2 | 0.1669 |
| **fit26** | 14 | 4584 | 4682 | -2278 | 4556 | 3.221 | 3 | 0.3588 |
| **fit27** | 14 | 4584 | 4682 | -2278 | 4556 | 0 | 0 | 1 |

fit <- glmer(formula = cttestly ~ 1+student+smokenow+ (1|sex:age)+(1|ethnic2)+(1|gor),  
data = Natsal, family = binomial(link="logit"), weights = total\_wt.int)  
# save(fit, file="C:/Users/nathan.green/Dropbox/small-area & chlamydia/R\_code/scripts/mrp/data/fit.RData")  
  
# step() #doesn't work for random effects models

# display(fit)  
fit

## Generalized linear mixed model fit by maximum likelihood (Laplace  
## Approximation) [glmerMod]  
## Family: binomial ( logit )  
## Formula:   
## cttestly ~ 1 + student + smokenow + (1 | sex:age) + (1 | ethnic2) +   
## (1 | gor)  
## Data: Natsal  
## Weights: total\_wt.int  
## AIC BIC logLik deviance df.resid   
## 5633813 5633856 -2816901 5633801 8538   
## Random effects:  
## Groups Name Std.Dev.  
## sex:age (Intercept) 1.1006   
## gor (Intercept) 0.1196   
## ethnic2 (Intercept) 0.7098   
## Number of obs: 8544, groups: sex:age, 58; gor, 9; ethnic2, 6  
## Fixed Effects:  
## (Intercept) studentTRUE smokenowTRUE   
## -2.4744 -0.1089 0.5246

ranef(fit)

## $`sex:age`  
## (Intercept)  
## 1:16 0.5818126  
## 1:17 1.3882172  
## 1:18 1.3161708  
## 1:19 1.1486283  
## 1:20 1.0191941  
## 1:21 1.0769924  
## 1:22 0.7201885  
## 1:23 0.8207654  
## 1:24 0.1602619  
## 1:25 0.2876651  
## 1:26 0.3272579  
## 1:27 0.1623153  
## 1:28 -0.2501460  
## 1:29 -0.1035635  
## 1:30 -0.9409574  
## 1:31 -0.5605950  
## 1:32 -1.2056499  
## 1:33 -0.2720004  
## 1:34 -0.8671554  
## 1:35 -0.5032039  
## 1:36 -1.3387851  
## 1:37 -1.0428910  
## 1:38 -2.0327239  
## 1:39 -2.5368409  
## 1:40 -1.6377941  
## 1:41 -2.1095552  
## 1:42 -1.1270423  
## 1:43 -1.4313571  
## 1:44 -1.8964862  
## 2:16 0.8942327  
## 2:17 1.4081885  
## 2:18 1.8143831  
## 2:19 1.7744226  
## 2:20 1.8531731  
## 2:21 1.7005296  
## 2:22 1.4288183  
## 2:23 1.2146652  
## 2:24 1.3757781  
## 2:25 0.7536672  
## 2:26 0.9576420  
## 2:27 0.7815436  
## 2:28 0.5941885  
## 2:29 0.5204171  
## 2:30 0.2874248  
## 2:31 0.1408621  
## 2:32 -0.3587454  
## 2:33 0.2004732  
## 2:34 -0.1707864  
## 2:35 -0.4203602  
## 2:36 -0.7681817  
## 2:37 -0.5281477  
## 2:38 -0.2274005  
## 2:39 -0.2603410  
## 2:40 -1.1224411  
## 2:41 -0.2331546  
## 2:42 -0.8032962  
## 2:43 -0.9671164  
## 2:44 -0.9920285  
##   
## $gor  
## (Intercept)  
## 1 -0.122996701  
## 2 -0.003790742  
## 4 -0.028680823  
## 5 -0.130783855  
## 6 -0.040332863  
## 7 -0.020014617  
## 8 0.209461630  
## 9 0.182812991  
## 10 -0.045661659  
##   
## $ethnic2  
## (Intercept)  
## 1 0.58389615  
## 2 -0.69362386  
## 3 0.56916265  
## 4 -1.14745352  
## 5 0.67279419  
## 6 0.01569531

se.ranef(fit)

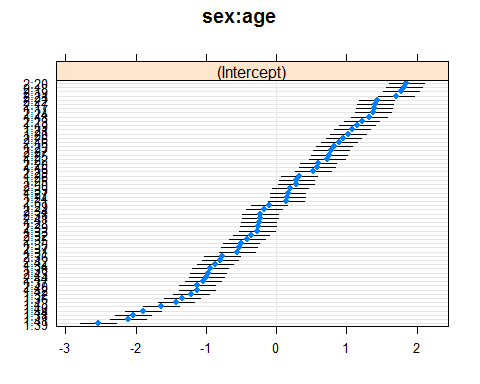
## $`sex:age`  
## (Intercept)  
## 1:16 0.1297843  
## 1:17 0.1297280  
## 1:18 0.1297145  
## 1:19 0.1297255  
## 1:20 0.1297111  
## 1:21 0.1297006  
## 1:22 0.1297561  
## 1:23 0.1297487  
## 1:24 0.1298395  
## 1:25 0.1297578  
## 1:26 0.1297898  
## 1:27 0.1298039  
## 1:28 0.1298506  
## 1:29 0.1299145  
## 1:30 0.1301223  
## 1:31 0.1299103  
## 1:32 0.1303039  
## 1:33 0.1299040  
## 1:34 0.1301778  
## 1:35 0.1300165  
## 1:36 0.1303690  
## 1:37 0.1302086  
## 1:38 0.1310069  
## 1:39 0.1318343  
## 1:40 0.1304709  
## 1:41 0.1308897  
## 1:42 0.1301081  
## 1:43 0.1303906  
## 1:44 0.1311757  
## 2:16 0.1297757  
## 2:17 0.1297154  
## 2:18 0.1297061  
## 2:19 0.1297317  
## 2:20 0.1297083  
## 2:21 0.1297367  
## 2:22 0.1296980  
## 2:23 0.1297111  
## 2:24 0.1297126  
## 2:25 0.1297557  
## 2:26 0.1297429  
## 2:27 0.1297419  
## 2:28 0.1297430  
## 2:29 0.1297407  
## 2:30 0.1297860  
## 2:31 0.1298030  
## 2:32 0.1299273  
## 2:33 0.1298395  
## 2:34 0.1298875  
## 2:35 0.1299290  
## 2:36 0.1301213  
## 2:37 0.1299333  
## 2:38 0.1299140  
## 2:39 0.1298654  
## 2:40 0.1302328  
## 2:41 0.1298666  
## 2:42 0.1299444  
## 2:43 0.1301163  
## 2:44 0.1300450  
##   
## $gor  
## (Intercept)  
## 1 0.03980442  
## 2 0.03965573  
## 4 0.03968414  
## 5 0.03971429  
## 6 0.03968343  
## 7 0.03969132  
## 8 0.03966857  
## 9 0.03964218  
## 10 0.03964564  
##   
## $ethnic2  
## (Intercept)  
## 1 0.1331616  
## 2 0.1332580  
## 3 0.1332448  
## 4 0.1347278  
## 5 0.1332681  
## 6 0.1336070

sjt.glmer(fit)  
x <- sjt.glmer(fit)  
x  
  
stargazer(fit, type="html")

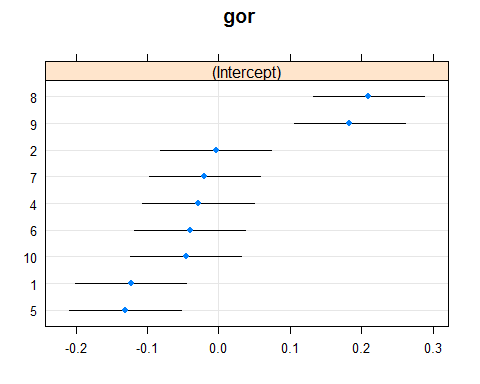
model1 <- glmer(cttestly~1+(1|age), binomial, data=Natsal)  
xv <- seq(0,45,1)  
y <- predict(model1, type="response")  
plot(Natsal$age, Natsal$cttestly)  
points(Natsal$age, y, col="red")

lattice::dotplot(ranef(fit, condVar=TRUE))

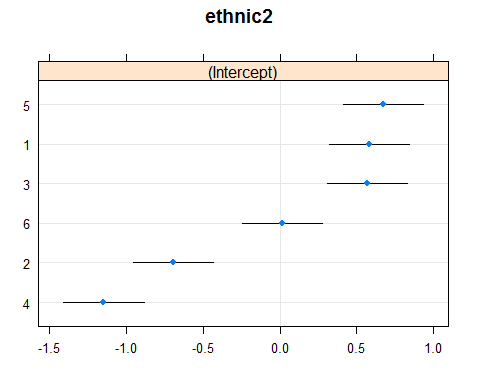
## $`sex:age`



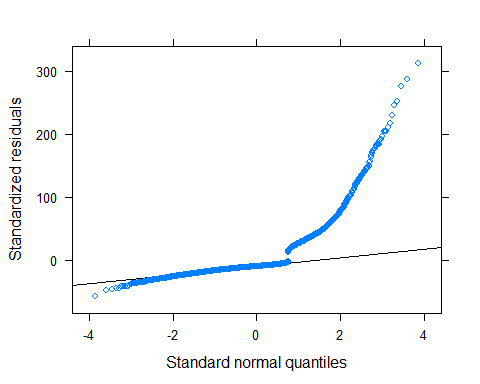
##   
## $gor



##   
## $ethnic2



qqmath(fit)



# http://stackoverflow.com/questions/23478792/warning-messages-when-trying-to-run-glmer-in-r  
  
aa <- allFit(fit)  
is.OK <- sapply(aa,is,"merMod")  
## extract just the successful ones  
aa.OK <- aa[is.OK]  
  
lapply(aa.OK,function(x) x@optinfo$conv$lme4$messages) #messages