Analyses on cases with two or more measuements

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This document contains the multilevel analyses to explain the variability in the outcome measure 'trust in the government' during the COVID pandemic. In these analyses, only cases with two or more measurements are included.

Setup

Packages and functions used

```
# set random number generator
set.seed(11)

# setup environment
library(dplyr)      # Data wrangling improved
library(mice)       # For incomplete data analysis
library(miceadds)   # Additions to mice
library(ggmice)     # Plotting device for mice
library(lme4)       # Linear mixed-effect modeling
library(magrittr)   # Pipes in R
library(broom.mixed)# tidy and glance models for mixed effects classes
library(purrr)      # functional programming
library(ggplot2)
options(scipen = 999)
```

Read in the incomplete data

Import the weighted data.

```
dat_incomplete <- haven::read_sav("../Data/Alle metingen_lang bestand_REWEIGHTED_toshare_2408
  filter(gewogen == "ja")
ids_incomplete <- unique(dat_incomplete$id)
```

Import the imputed data.

```
load("../Data/imp_post.RData")
```

Filter cases with 2+ measurements

Find cases who had two or more measurements observed *before* imputation.

```
ids_two_measurements <- imp_post$data[rowSums(is.na(imp_post$data)) < 10, ] %>%
  group_by(id) %>%
  summarise(n = n()) %>%
  filter(n > 1) %>%
  .$id
```

How many measurements do these cases have?

```
measurements_per_id <- imp_post$data[rowSums(is.na(imp_post$data)) < 10, ] %>%
  group_by(id) %>%
  summarise(n = n())
measurements_per_id$n |> table()
```

```
    1     2     3     4     5
28399  8807  4835  6319  2109
```

Subset the data to only include cases with two or more measurements and convert time from months to years.

```
imp_jr <- imp_post %>%
  mice::complete(., "all") %>%
  map(., function(.x){
    mutate(.x, time_jr = meting_mnd/12) %>%
    filter(id %in% ids_two_measurements)
    })
```

Compare descriptives

Select relevant demographic variables.

```
full_sample <- mice::complete(imp_post)[, c("meting_mnd", "sekse", "age", "etn_herkomst", "ed
  filter(meting_mnd == 0)
subset <- imp_jr[[1]][, c("meting_mnd", "sekse", "age", "etn_herkomst", "edu", "q60_1")] |>
  filter(meting_mnd == 0)
```

Convert age into categories.

```
# full sample
full_sample$age_cat <- NA
full_sample[full_sample$age < 35, "age_cat"] <- "18-34"
full_sample[full_sample$age >= 35 & full_sample$age < 50, "age_cat"] <- "35-49"
full_sample[full_sample$age >= 50 & full_sample$age < 65, "age_cat"] <- "50-64"
full_sample[full_sample$age >= 65, "age_cat"] <- "65+"
full_sample$age_cat <- factor(full_sample$age_cat, levels = c("18-34", "35-49", "50-64", "65-
# subset
subset$age_cat <- NA
subset[subset$age < 35, "age_cat"] <- "18-34"
subset[subset$age >= 35 & subset$age < 50, "age_cat"] <- "35-49"
subset[subset$age >= 50 & subset$age < 65, "age_cat"] <- "50-64"
subset[subset$age >= 65, "age_cat"] <- "65+"
subset$age_cat <- factor(subset$age_cat, levels = c("18-34", "35-49", "50-64", "65+"))
```

Compute summary stats per variable.

```
dat_plot <- rbind(
  cbind(set = "full sample", full_sample),
  cbind(set = "subset", subset))
```

Sex.

```
data.frame(rbind(summary(full_sample$sekse), summary(subset$sekse))) |> knitr::kable()
```

Man	Vrouw
29190	21283
13675	8395

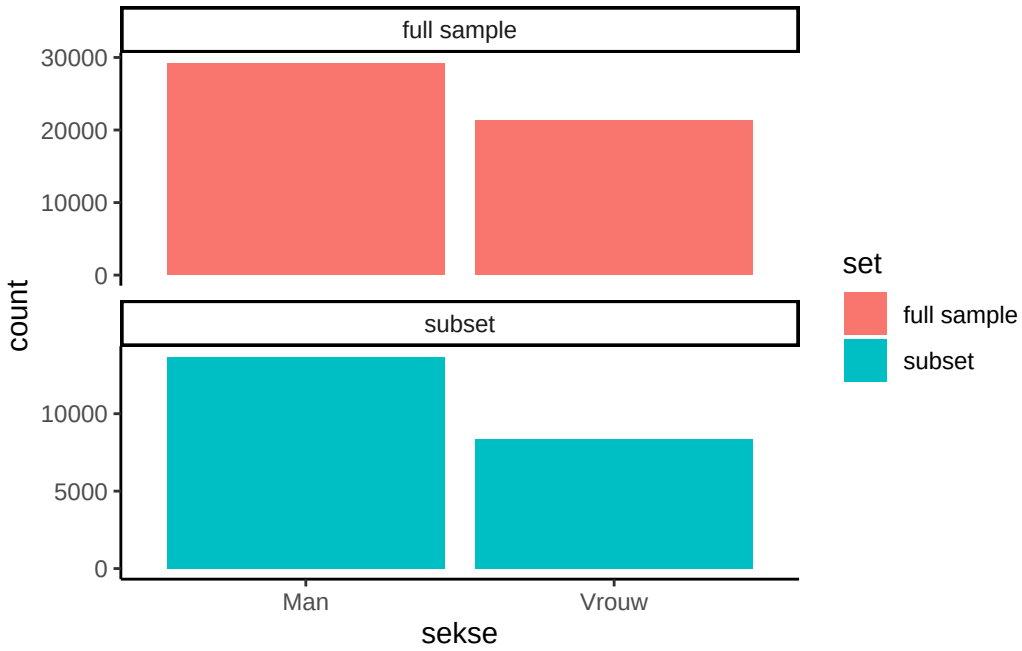
```
table(full_sample$sekse)/nrow(full_sample)
```

```
     Man    Vrouw
0.578329 0.421671
```

```
table(subset$sekse)/nrow(subset)
```

```
      Man     Vrouw
0.6196194 0.3803806
```

```
ggplot(dat_plot, aes(x = sekse, fill = set)) +
  geom_bar() +
  facet_wrap(~set, ncol = 1, scales = "free_y") +
  theme_classic()
```



Age.

```
data.frame(rbind(summary(full_sample$age_cat), summary(subset$age_cat))) |> knitr::kable()
```

X18.34	X35.49	X50.64	X65.
7597	10204	17128	15544
2763	3939	7691	7677

```
table(full_sample$age_cat)/nrow(full_sample)
```

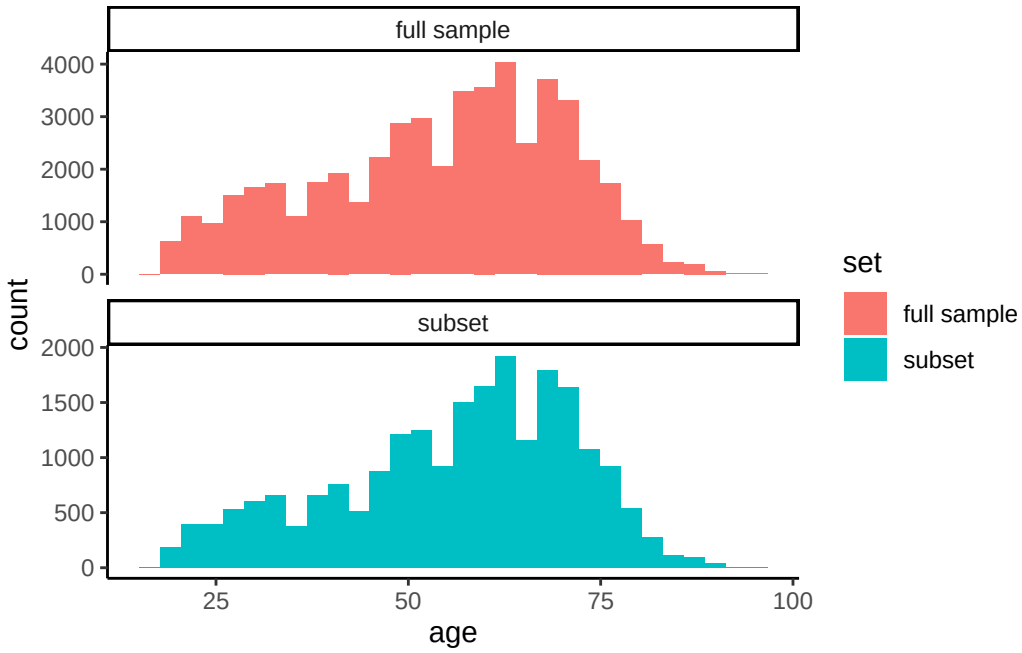
```
    18-34     35-49     50-64       65+
0.1505161 0.2021675 0.3393498 0.3079666
```

```
table(subset$age_cat)/nrow(subset)
```

```
    18-34     35-49     50-64       65+
0.1251926 0.1784776 0.3484821 0.3478478
```

```
ggplot(dat_plot, aes(x = age, fill = set)) +
  geom_histogram() +
  facet_wrap(~set, ncol = 1, scales = "free_y") +
  theme_classic()
```

```
`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



Migration.

```
data.frame(rbind(summary(full_sample$etn_herkomst), summary(subset$etn_herkomst))) |> knitr:
```

Nederlandse_achtergrond	Westerse_migratieachtergrond	Niet_westerse_migratieachtergrond
43350	5024	2099
19289	2163	618

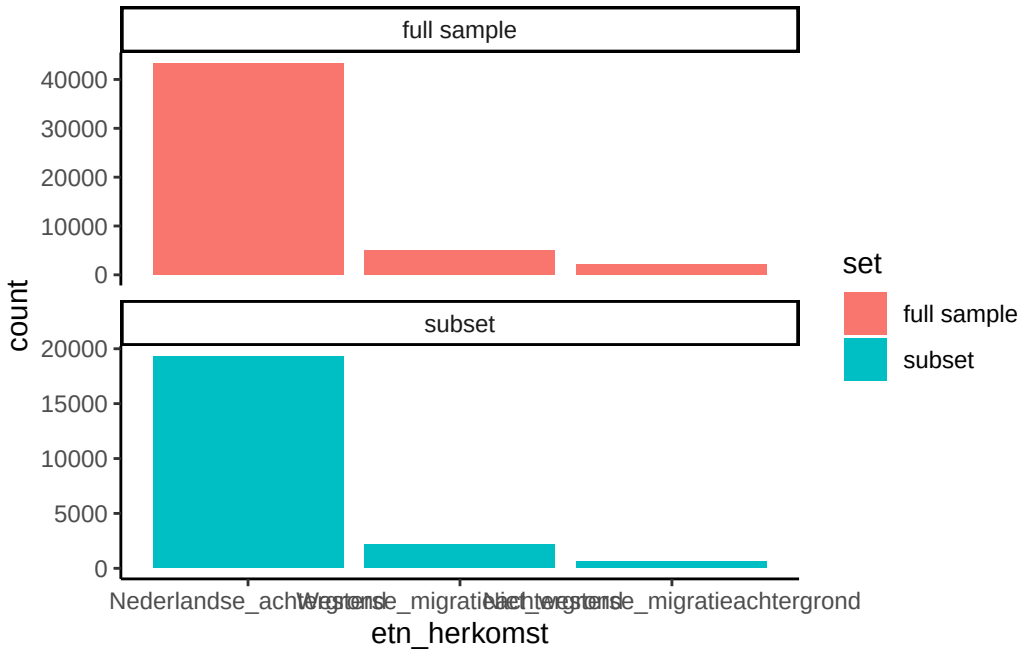
```
table(full_sample$etn_herkomst)/nrow(full_sample)
```

```
          Nederlandse_achtergrond      Westerse_migratieachtergrond
                       0.85887504                       0.09953837
Niet_westerse_migratieachtergrond
                       0.04158659
```

```
table(subset$etn_herkomst)/nrow(subset)
```

```
          Nederlandse_achtergrond      Westerse_migratieachtergrond
                       0.87399184                       0.09800634
Niet_westerse_migratieachtergrond
                       0.02800181
```

```
ggplot(dat_plot, aes(x = etn_herkomst, fill = set)) +
  geom_bar() +
  facet_wrap(~set, ncol = 1, scales = "free_y") +
  theme_classic()
```



Education.

```
data.frame(rbind(summary(full_sample$edu), summary(subset$edu))) |> knitr::kable()
```

Hoog	Middel	Laag
38031	9868	2574
16258	4776	1036

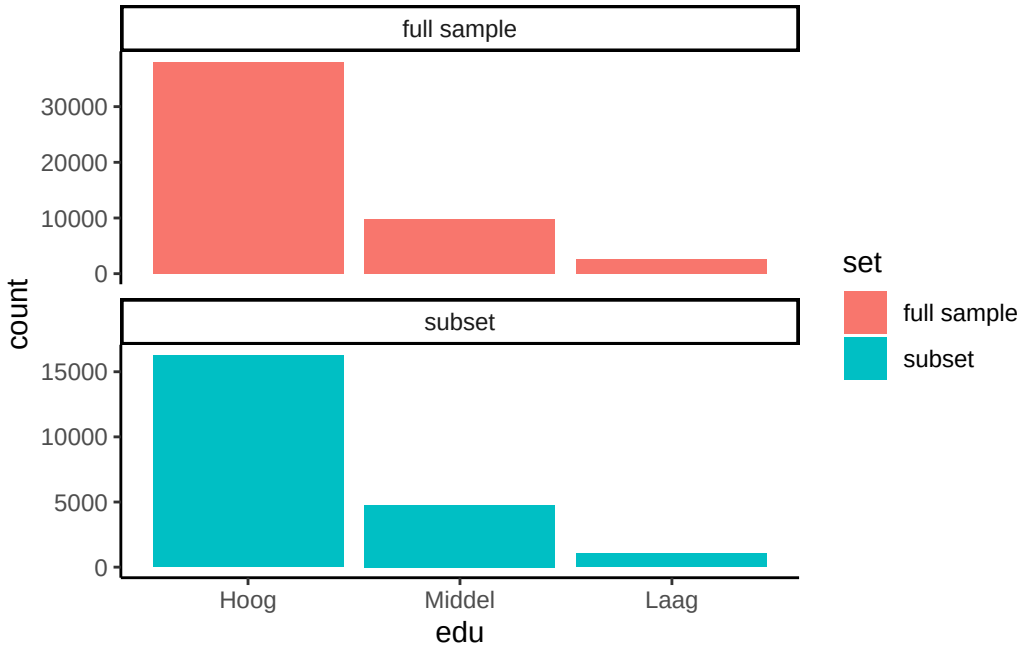
```
table(full_sample$edu)/nrow(full_sample)
```

```
      Hoog     Middel       Laag
0.75349197 0.19551047 0.05099756
```

```
table(subset$edu)/nrow(subset)
```

```
      Hoog     Middel       Laag
0.73665609 0.21640236 0.04694155
```

```
ggplot(dat_plot, aes(x = edu, fill = set)) +
  geom_bar() +
  facet_wrap(~set, ncol = 1, scales = "free_y") +
  theme_classic()
```



Outcome.

```
mean(full_sample$q60_1)
```

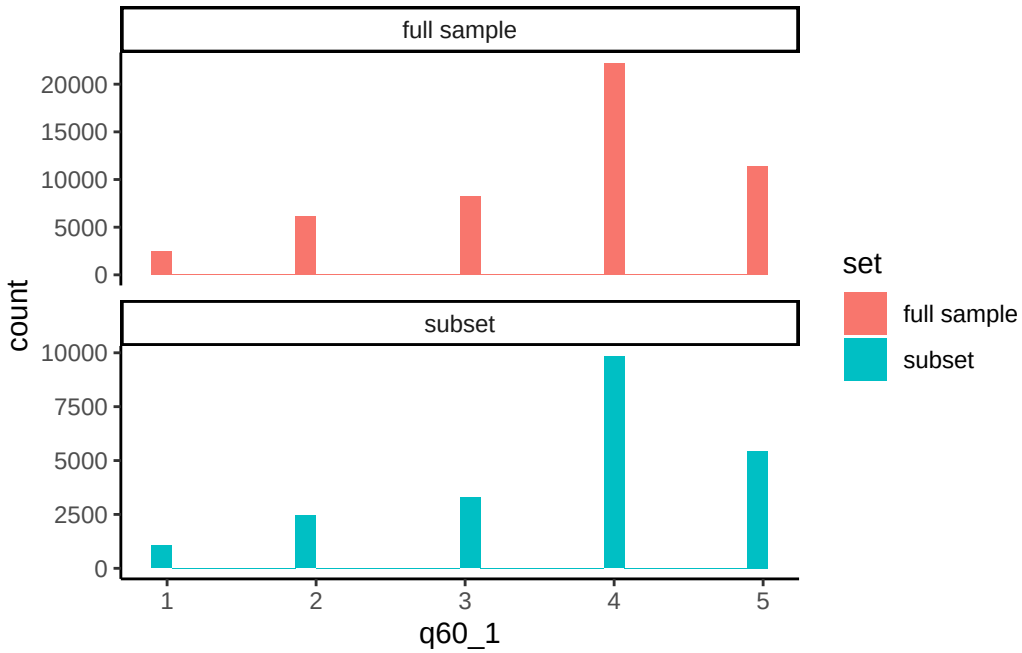
```
[1] 3.672023
```

```
mean(subset$q60_1)
```

```
[1] 3.731944
```

```
ggplot(dat_plot, aes(x = q60_1, fill = set)) +
  geom_histogram() +
  facet_wrap(~set, ncol = 1, scales = "free_y") +
  theme_classic()
```

```
`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



Descriptives table

Descriptives before imputation.

```
dat_no_imp <- dat_incomplete |>
  haven::as_factor() |>
  filter(id %in% ids_two_measurements) |>
  select(id, wave = METING, sex = SEKSE, age = GEBOORTEJAAR, ethn = ETN_HERKOMST, edu)
# fix age categories
dat_no_imp$age <- 2020 - dat_no_imp$age
dat_no_imp$age_cat <- NA
dat_no_imp[dat_no_imp$age < 35, "age_cat"] <- "18-34"
dat_no_imp[dat_no_imp$age >= 35 & dat_no_imp$age < 50, "age_cat"] <- "35-49"
dat_no_imp[dat_no_imp$age >= 50 & dat_no_imp$age < 65, "age_cat"] <- "50-64"
dat_no_imp[dat_no_imp$age >= 65, "age_cat"] <- "65+"
dat_no_imp$age_cat <- factor(dat_no_imp$age_cat, levels = c("18-34", "35-49", "50-64", "65+"
# fix edu categories
dat_no_imp$edu_cat <- NA
dat_no_imp[as.numeric(dat_no_imp$edu) > 5, "edu_cat"] <- "low"
dat_no_imp[as.numeric(dat_no_imp$edu) > 2 & as.numeric(dat_no_imp$edu) < 6, "edu_cat"] <- "m
dat_no_imp[as.numeric(dat_no_imp$edu) < 3, "edu_cat"] <- "high"
```

Characteristic	1 N = 5,269[1]
GESLACHT	
man	3,165 (60%)
vrouw	2,104 (40%)
ethn	
Nederlandse achtergrond	4,667 (89%)
Westerste migratieachtergrond	504 (9.6%)
Niet-Westerse migratie-achtergrond	98 (1.9%)
Wat is de hoogste opleiding die u heeft afgemaakt?	
WO doctoraal of master	1,043 (20%)
HBO/WO bachelor of kandidaats	1,419 (27%)
HAVO/VWO bovenbouw, WO/HBO propedeuse	1,138 (22%)
MBO 2-3-4, of MBO voor 1998	1,073 (20%)
Eerste drie jaar HAVO/VWO, MAVO, VMBO (theoretisch en gemengde leerweg)	261 (5.0%)
MBO 1, LBO, VBO, VMBO (kader- en beroepsgerichte leerweg)	316 (6.0%)
Geen onderwijs/basisonderwijs	19 (0.4%)
age_cat	
18-34	580 (11%)
35-49	1,044 (20%)
50-64	1,835 (35%)
65+	1,810 (34%)
edu_cat	
high	2,462 (47%)
low	335 (6.4%)
middle	2,472 (47%)

[1] n (%)

```
# descriptives
dat_no_imp |>
  select(-id, -age) |>
  gtsummary::tbl_summary(by = wave)
```

Descriptives of unique respondents.

```
dat_unique <- dat_no_imp[!duplicated(dat_no_imp[,-2]),]
dat_unique |>
  select(-id, -age, -wave) |>
  gtsummary::tbl_summary()
```

Characteristic	**N = 25,390**[1]
GESLACHT	
man	15,796 (62%)
vrouw	9,594 (38%)
ethn	
Nederlandse achtergrond	22,272 (88%)
Westerste migratieachtergrond	2,431 (9.6%)
Niet-Westerse migratie-achtergrond	687 (2.7%)
Wat is de hoogste opleiding die u heeft afgemaakt?	
WO doctoraal of master	5,932 (23%)
HBO/WO bachelor of kandidaats	7,161 (28%)
HAVO/VWO bovenbouw, WO/HBO propedeuse	4,553 (18%)
MBO 2-3-4, of MBO voor 1998	4,307 (17%)
Eerste drie jaar HAVO/VWO, MAVO, VMBO (theoretisch en gemengde leerweg)	1,578 (6.2%)
MBO 1, LBO, VBO, VMBO (kader- en beroepsgerichte leerweg)	1,724 (6.8%)
Geen onderwijs/basisonderwijs	135 (0.5%)
age_cat	
18-34	3,126 (12%)
35-49	4,297 (17%)
50-64	8,707 (34%)
65+	9,260 (36%)
edu_cat	
high	13,093 (52%)
low	1,859 (7.3%)
middle	10,438 (41%)

[1] n (%)

Analyses

Model 1: Intercept and time.

```
fit <- imp_jr %>%
  map(~.x %$% lme4::lmer(
    q60_1 ~ (1 | id) + time_jr,
    weights = .x$weegfactor
  ))
```

AIC

```
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 324085  325711  326531  327620  327643  336963
```

Results

```
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	3.791	0.026	0
time_jr	-0.630	0.026	0

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.816
Residual~~Residual	0.279
ICC|id	0.745

```
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
write.csv2(table_data, file = "../Results/CoefficientsModel1v2.csv", row.names = FALSE)
```

Model 2: Intercept, time, time-invariant variables.

```
fit <- imp_jr %>%
  map(~.x %$% lme4::lmer(
    q60_1 ~ (1 | id) + time_jr +
      age + sekse + etn_herkomst + edu + huis,
    weights = .x$weegfactor
  ))
```

AIC

```
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 323152  324661  325459  326704  326825  336218
```

Results

```
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	3.971	0.185	0.000
time_jr	-0.630	0.026	0.000
age	-0.003	0.003	0.387
sekseVrouw	0.007	0.014	0.599
etn_herkomstWesterse_migratieachtergrond	-0.039	0.024	0.107
etn_herkomstNiet_westerse_migratieachtergrond	-0.071	0.042	0.092
eduMiddel	-0.379	0.017	0.000
eduLaag	-0.520	0.034	0.000

	Estimate	Std.Error	P(>|t|)
huisAlleenstaand_met_kinderen	-0.098	0.038	0.011
huisSamenwonend_met_partner_met_thuiswonende_kinderen	0.134	0.020	0.000
huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	0.147	0.018	0.000
huisAnders	-0.007	0.034	0.829

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.772
Residual~~Residual	0.279
ICC|id	0.735

```
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
write.csv2(table_data, file = "../Results/CoefficientsModel2v2.csv", row.names = FALSE)
```

Model 3: Intercept, time, all explanatory variables.

```
fit <- imp_jr %>%
  map(~.x %$% lme4::lmer(
    q60_1 ~ (1 | id) + time_jr +
      age + sekse + etn_herkomst + edu + huis +
      gezo + rond + drei + onvr,
    weights = .x$weegfactor
  ))
```

AIC

```
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 314591  315934  316687  317810  318268  325973
```

Results

```
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	4.639	0.189	0.000
time_jr	-0.528	0.025	0.000
age	-0.004	0.003	0.110
sekseVrouw	-0.006	0.013	0.658
etn_herkomstWesterse_migratieachtergrond	-0.038	0.022	0.082
etn_herkomstNiet_westerse_migratieachtergrond	-0.072	0.038	0.056
eduMiddel	-0.284	0.017	0.000
eduLaag	-0.371	0.030	0.000
huisAlleenstaand_met_kinderen	-0.075	0.035	0.030
huisSamenwonend_met_partner_met_thuiswonende_kinderen	0.098	0.018	0.000
huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	0.089	0.017	0.000
huisAnders	-0.018	0.030	0.564
gezo	-0.070	0.005	0.000
rond	-0.051	0.007	0.000
drei	0.060	0.013	0.001
onvr	-0.237	0.014	0.000

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.597
Residual~~Residual	0.265
ICC|id	0.692

```
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
write.csv2(table_data, file = "../Results/CoefficientsModel3v2.csv", row.names = FALSE)
```

Model 4: Intercept, time, all explanatory variables and interaction effects with time-invariant variables.

```
fit <- imp_jr %>%
  map(
    ~ .x %$% lme4::lmer(
      q60_1 ~ (1 | id) + time_jr +
        age + sekse + etn_herkomst + edu + huis +
        gezo + rond + drei + onvr +
        time_jr:age + time_jr:sekse + time_jr:etn_herkomst + time_jr:edu + time_jr:huis,
      weights = .x$weegfactor
    )
  )
```

AIC

```
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 314563  315940  316616  317693  318202  325403
```

Results

```
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	4.584	0.237	0.000
time_jr	-0.438	0.102	0.002
age	-0.003	0.003	0.340
sekseVrouw	0.016	0.019	0.409
etn_herkomstWesterse_migratieachtergrond	-0.036	0.032	0.269
etn_herkomstNiet_westerse_migratieachtergrond	-0.120	0.054	0.031
eduMiddel	-0.294	0.018	0.000
eduLaag	-0.426	0.035	0.000
huisAlleenstaand_met_kinderen	-0.089	0.050	0.085
huisSamenwonend_met_partner_met_thuiswonende_kinderen	0.114	0.020	0.000
huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	0.104	0.020	0.000
huisAnders	-0.014	0.038	0.716

	Estimate	Std.Error	P(>|t|)
gezo	-0.069	0.005	0.000
rond	-0.051	0.007	0.000
drei	0.059	0.013	0.001
onvr	-0.239	0.014	0.000
time_jr:age	-0.002	0.002	0.340
time_jr:sekseVrouw	-0.034	0.023	0.173
time_jr:etn_herkomstWesterse_migratieachtergrond	-0.003	0.031	0.922
time_jr:etn_herkomstNiet_westerse_migratieachtergrond	0.074	0.053	0.194
time_jr:eduMiddel	0.017	0.013	0.202
time_jr:eduLaag	0.086	0.038	0.045
time_jr:huisAlleenstaand_met_kinderen	0.021	0.051	0.685
time_jr:huisSamenwonend_met_partner_met_thuiswonende_kinderen	-0.025	0.013	0.063
time_jr:huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	-0.023	0.020	0.282
time_jr:huisAnders	-0.006	0.033	0.859

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.597
Residual~~Residual	0.265
ICC|id	0.692

```
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
write.csv2(table_data, file = "../Results/CoefficientsModel4v2.csv", row.names = FALSE)
```

Model 5: Intercept, time, all explanatory variables and all interaction effects.

```
fit <- imp_jr %>%
  map(~.x %$% lme4::lmer(
    q60_1 ~ (1 | id) + time_jr + age + sekse + etn_herkomst + edu + huis +
        gezo + rond + drei + onvr +
        time_jr:age + time_jr:sekse + time_jr:etn_herkomst + time_jr:edu + time_jr:huis +
        time_jr:gezo + time_jr:rond + time_jr:drei + time_jr:onvr,
    weights = .x$weegfactor
  ))
```

```r
fit <- imp_jr %>%
  map(~.x %$% lme4::lmer(
    q60_1 ~ (1 | id) + time_jr + I(time_jr)^2,
    weights = .x$weegfactor
  ))
```

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

AIC

```r
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
 324085  325711  326531  327620  327643  336963 
```

Results

```r
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	3.791	0.026	0
time_jr	-0.630	0.026	0

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.816
Residual~~Residual	0.279
ICC|id	0.745

```
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
table_data <- mutate(table_data, sig = ifelse(table_data$`P(>|t|)` < 0.05, "*", ""))
write.csv2(table_data, file = "../Results/CoefficientsModel5v2.csv", row.names = FALSE)
```

Analyses with new weights

Load new data

```
library(haven)
Alle_metingen_lang_bestand_REWEIGHTED_toshare_240814 <- read_sav("../Data/Alle metingen_lang
View(Alle_metingen_lang_bestand_REWEIGHTED_toshare_240814)
```

Model 1: Intercept and time.

```
fit <- imp_jr %>%
  map(~.x %$% lme4::lmer(
    q60_1 ~ (1 | id) + time_jr,
    weights = .x$weegfactor
  ))
```

AIC

```
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 324085  325711  326531  327620  327643  336963
```

Results

```
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	3.791	0.026	0
time_jr	-0.630	0.026	0

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.816
Residual~~Residual	0.279
ICC|id	0.745

```
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
write.csv2(table_data, file = "../Results/CoefficientsModel1v2.csv", row.names = FALSE)
```

Model 2: Intercept, time, time-invariant variables.

```
fit <- imp_jr %>%
  map(~.x %$% lme4::lmer(
    q60_1 ~ (1 | id) + time_jr +
      age + sekse + etn_herkomst + edu + huis,
    weights = .x$weegfactor
  ))
```

AIC

```
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 323152  324661  325459  326704  326825  336218
```

Results

```
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	3.971	0.185	0.000
time_jr	-0.630	0.026	0.000
age	-0.003	0.003	0.387
sekseVrouw	0.007	0.014	0.599
etn_herkomstWesterse_migratieachtergrond	-0.039	0.024	0.107
etn_herkomstNiet_westerse_migratieachtergrond	-0.071	0.042	0.092
eduMiddel	-0.379	0.017	0.000
eduLaag	-0.520	0.034	0.000
huisAlleenstaand_met_kinderen	-0.098	0.038	0.011
huisSamenwonend_met_partner_met_thuiswonende_kinderen	-0.134	0.020	0.000
huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	-0.147	0.018	0.000
huisAnders	-0.007	0.034	0.829

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.772
Residual~~Residual	0.279
ICC|id	0.735

```
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
write.csv2(table_data, file = "../Results/CoefficientsModel2v2.csv", row.names = FALSE)
```

Model 3: Intercept, time, all explanatory variables.

```
fit <- imp_jr %>%
  map(~.x %$% lme4::lmer(
    q60_1 ~ (1 | id) + time_jr +
      age + sekse + etn_herkomst + edu + huis +
      gezo + rond + drei + onvr,
    weights = .x$weegfactor
  ))
```

AIC

```
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 314591  315934  316687  317810  318268  325973
```

Results

```
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	4.639	0.189	0.000
time_jr	-0.528	0.025	0.000
age	-0.004	0.003	0.110
sekseVrouw	-0.006	0.013	0.658
etn_herkomstWesterse_migratieachtergrond	-0.038	0.022	0.082
etn_herkomstNiet_westerse_migratieachtergrond	-0.072	0.038	0.056
eduMiddel	-0.284	0.017	0.000
eduLaag	-0.371	0.030	0.000
huisAlleenstaand_met_kinderen	-0.075	0.035	0.030
huisSamenwonend_met_partner_met_thuiswonende_kinderen	-0.098	0.018	0.000
huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	-0.089	0.017	0.000
huisAnders	-0.018	0.030	0.564
gezo	-0.070	0.005	0.000
rond	-0.051	0.007	0.000
drei	0.060	0.013	0.001

	Estimate	Std.Error	P(>|t|)
onvr	-0.237	0.014	0.000

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.597
Residual~~Residual	0.265
ICC|id	0.692

```
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
write.csv2(table_data, file = "../Results/CoefficientsModel3v2.csv", row.names = FALSE)
```

Model 4: Intercept, time, all explanatory variables and interaction effects with time-invariant variables.

```
fit <- imp_jr %>%
  map(
    ~ .x %$% lme4::lmer(
      q60_1 ~ (1 | id) + time_jr +
        age + sekse + etn_herkomst + edu + huis +
        gezo + rond + drei + onvr +
        time_jr:age + time_jr:sekse + time_jr:etn_herkomst + time_jr:edu + time_jr:huis,
      weights = .x$weegfactor
    )
  )
```

AIC

```
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 314563  315940  316616  317693  318202  325403
```

Results

```
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	4.584	0.237	0.000
time_jr	-0.438	0.102	0.002
age	-0.003	0.003	0.340
sekseVrouw	0.016	0.019	0.409
etn_herkomstWesterse_migratieachtergrond	-0.036	0.032	0.269
etn_herkomstNiet_westerse_migratieachtergrond	-0.120	0.054	0.031
eduMiddel	-0.294	0.018	0.000
eduLaag	-0.426	0.035	0.000
huisAlleenstaand_met_kinderen	-0.089	0.050	0.085
huisSamenwonend_met_partner_met_thuiswonende_kinderen	0.114	0.020	0.000
huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	0.104	0.020	0.000
huisAnders	-0.014	0.038	0.716
gezo	-0.069	0.005	0.000
rond	-0.051	0.007	0.000
drei	0.059	0.013	0.001
onvr	-0.239	0.014	0.000
time_jr:age	-0.002	0.002	0.340
time_jr:sekseVrouw	-0.034	0.023	0.173
time_jr:etn_herkomstWesterse_migratieachtergrond	-0.003	0.031	0.922
time_jr:etn_herkomstNiet_westerse_migratieachtergrond	0.074	0.053	0.194
time_jr:eduMiddel	0.017	0.013	0.202
time_jr:eduLaag	0.086	0.038	0.045
time_jr:huisAlleenstaand_met_kinderen	0.021	0.051	0.685
time_jr:huisSamenwonend_met_partner_met_thuiswonende_kinderen	-0.025	0.013	0.063
time_jr:huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	-0.023	0.020	0.282
time_jr:huisAnders	-0.006	0.033	0.859

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.597

	Estimate
Residual~~Residual	0.265
ICC|id	0.692

```
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
write.csv2(table_data, file = "../Results/CoefficientsModel4v2.csv", row.names = FALSE)
```

Model 5: Intercept, time, all explanatory variables and all interaction effects.

```
fit <- imp_jr %>%
  map(~.x %$% lme4::lmer(
    q60_1 ~ (1 | id) + time_jr + age + sekse + etn_herkomst + edu + huis +
        gezo + rond + drei + onvr +
        time_jr:age + time_jr:sekse + time_jr:etn_herkomst + time_jr:edu + time_jr:huis +
        time_jr:gezo + time_jr:rond + time_jr:drei + time_jr:onvr,
    weights = .x$weegfactor
  ))
```

AIC

```
# Summary AIC
fit %>% map( ~ .x %>% AIC()) %>% unlist() %>% summary()
```

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
 314492  315793  316532  317597  318146  325291
```

Results

```
# Pooled imputations
results_vert <-
  mitml::testEstimates(as.mitml.result(fit), extra.pars = TRUE)
knitr::kable(round(results_vert$estimates[, c("Estimate", "Std.Error", "P(>|t|)")], 3))
```

	Estimate	Std.Error	P(>|t|)
(Intercept)	4.587	0.228	0.000

	Estimate	Std.Error	P(>|t|)
time_jr	-0.422	0.101	0.002
age	-0.003	0.004	0.405
sekseVrouw	0.019	0.019	0.328
etn_herkomstWesterse_migratieachtergrond	-0.034	0.032	0.300
etn_herkomstNiet_westerse_migratieachtergrond	-0.119	0.054	0.034
eduMiddel	-0.297	0.018	0.000
eduLaag	-0.429	0.036	0.000
huisAlleenstaand_met_kinderen	-0.091	0.051	0.083
huisSamenwonend_met_partner_met_thuiswonende_kinderen	-0.115	0.020	0.000
huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	-0.103	0.020	0.000
huisAnders	-0.014	0.038	0.708
gezo	-0.062	0.012	0.000
rond	-0.062	0.011	0.000
drei	0.039	0.014	0.017
onvr	-0.218	0.013	0.000
time_jr:age	-0.002	0.002	0.210
time_jr:sekseVrouw	-0.039	0.024	0.129
time_jr:etn_herkomstWesterse_migratieachtergrond	-0.007	0.031	0.830
time_jr:etn_herkomstNiet_westerse_migratieachtergrond	0.072	0.053	0.206
time_jr:eduMiddel	0.023	0.014	0.106
time_jr:eduLaag	0.093	0.040	0.039
time_jr:huisAlleenstaand_met_kinderen	0.024	0.052	0.649
time_jr:huisSamenwonend_met_partner_met_thuiswonende_kinderen	-0.025	0.013	0.057
time_jr:huisSamenwonend_met_partner_zonder_thuiswonende_kinderen	-0.022	0.020	0.282
time_jr:huisAnders	-0.004	0.034	0.906
time_jr:gezo	-0.009	0.015	0.547
time_jr:rond	0.018	0.010	0.093
time_jr:drei	0.029	0.008	0.001
time_jr:onvr	-0.036	0.013	0.014

```
knitr::kable(round(results_vert$extra.pars, 3))
```

	Estimate
Intercept~~Intercept|id	0.594
Residual~~Residual	0.265
ICC|id	0.692

```r
# Save coefficients as csv
table_data <- tibble::rownames_to_column(as.data.frame(results_vert$estimates[, c("Estimate"
table_data <- mutate(table_data, sig = ifelse(table_data$`P(>|t|)` < 0.05, "*", ""))
write.csv2(table_data, file = "../Results/CoefficientsModel5v2.csv", row.names = FALSE)
```

Additional checks

Check correlations

Correlation between the outcome and time

```r
map(imp_jr, ~cor(.x$q60_1, .x$meting_mnd))
```

```
$`1`
[1] -0.271584

$`2`
[1] -0.2893033

$`3`
[1] -0.2860082

$`4`
[1] -0.2669937

$`5`
[1] -0.2781054

$`6`
[1] -0.2697279

$`7`
[1] -0.2771439

$`8`
[1] -0.2738753

$`9`
[1] -0.2747219
```

```
$`10`
[1] -0.279567
```

Check means time-varying variables

```
map(imp_jr, ~.x %>%
        select(meting_mnd, gezo, rond, medi, hulp, eenz, cont, drei, onvr, econ, ment) %>%
        group_by(meting_mnd) %>%
        summarise_all(.funs = mean)) %>%
  Reduce("+", .) / max(imp_post$.imp)
```

```
Warning in max(imp_post$.imp): no non-missing arguments to max; returning -Inf
```

```
  meting_mnd gezo rond medi hulp eenz cont drei onvr econ ment
1          0    0    0    0    0    0    0    0    0    0    0
2          0    0    0    0    0    0    0    0    0    0    0
3          0    0    0    0    0    0    0    0    0    0    0
4          0    0    0    0    0    0    0    0    0    0    0
5          0    0    0    0    0    0    0    0    0    0    0
```