HW 9 Template

Mark Lai

2022-10-31

```r
library(here)  # makes reading data more consistent
library(tidyverse)  # for data manipulation and plotting
library(haven)  # for importing SPSS/SAS/Stata data
library(lme4)  # for multilevel analysis
library(boot)  # for bootstrap CI
library(bootmlm)  # for multilevel bootstrap
library(performance)  # for ICC and R^2
library(sjPlot)  # for plotting
library(parameters)  # for kr results
library(modelsummary)  # for making tables
theme_set(theme_classic() +
    theme(panel.grid.major.y = element_line(color = "grey92")))
```

Revised Prospectus

You can separate your prospectus and preliminary analysis in different files, if needed. Please Include:

- Sufficient background to understand your research
- Research questions clearly defined
- A description of the nesting structure of your data
- Your plan of data analysis

Preliminary Analysis

Import Data

```r
happy_dat <- read_sav(here("data_files", "happy_combined.sav"))
# Cluster means
happy_dat <- happy_dat %>%
    group_by(country) %>%
    mutate(income_cm = mean(income)) %>%
    ungroup()
```

Variable Summary

- `CountryID`: Country ID

- country: Country's name
- income: Income level (0-*least income* to 9-*most income*)
- happy: Feel happy (1-*not happy* to 4-*very happy*)

```
# By Country
datasummary(country ~ (income + happy) * (N + Mean + SD),
            data = happy_dat)
```

Intraclass Correlation

```
m0 <- lmer(happy ~ (1 | country), data = happy_dat)
performance::icc(m0)
```

```
## # Intraclass Correlation Coefficient
##
##     Adjusted ICC: 0.121
##   Unadjusted ICC: 0.121
```

Model

Level 1:

$$\text{happy}_{ij} = \beta_{0j} + \beta_{1j}\text{income}_{ij} + e_{ij}$$

Level 2:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}\text{income\_cm}_j + u_{0j}$$
$$\beta_{1j} = \gamma_{10} + u_{1j}$$

```
m1 <- lmer(happy ~ income + income_cm + (income | country),
           data = happy_dat)
```

Results

```
msummary(m1,
         estimate = c("{estimate} [{conf.low}, {conf.high}]"),
         statistic = NULL,  # suppress the extra rows for SEs
         shape = effect + term ~ model,
         title = "Table 1: Model coefficients")
```

```
plot_model(m1, type = "pred", pred.type = "re",
           terms = "income", show.data = TRUE,
           jitter = 0.1, dot.size = 0.2)
```

country	income			overall happy		
	N	Mean	SD	N	Mean	SD
Argentina	113	3.08	1.99	113	2.95	0.83
Austria	162	4.23	2.45	162	3.25	0.66
Belarus	121	3.45	1.77	121	2.53	0.61
Belgium	206	4.64	2.56	206	3.31	0.62
Brazil	182	1.67	1.86	182	2.98	0.66
Bulgaria	118	3.70	1.75	118	2.45	0.82
Canada	180	5.44	2.60	180	3.08	0.78
Chile	181	3.90	2.58	181	2.99	0.82
China	108	2.50	1.86	108	2.94	0.83
Czech-Slov	187	4.36	2.06	187	2.68	0.64
Denmark	112	4.24	2.70	112	3.38	0.57
Estonia	110	3.03	1.34	110	2.59	0.67
Finland	70	7.07	2.40	70	3.09	0.53
France	117	4.05	3.00	117	3.17	0.67
Hungary	142	3.66	1.94	142	2.63	0.89
India	306	2.92	2.30	306	2.86	0.76
Ireland	118	5.58	2.47	118	3.32	0.61
Italy	192	2.49	1.29	192	2.98	0.57
Japan	87	4.57	2.82	87	2.97	0.67
Latvia	96	2.47	1.31	96	2.57	0.59
Mexico	187	3.35	2.09	187	2.98	0.72
Moscow	114	4.32	1.75	114	2.57	0.76
N. Ireland	32	4.97	3.00	32	3.25	0.67
Netherlands	114	4.32	2.85	114	3.33	0.66
Nigeria	89	4.48	2.53	89	3.09	0.87
Norway	155	4.56	2.90	155	3.16	0.59
Poland	129	3.66	1.76	129	3.00	0.48
Portugal	146	3.49	2.69	146	2.79	0.69
Romania	147	3.71	1.79	147	2.68	0.71
Russia	197	3.51	2.18	197	2.56	0.68
S. Africa	328	3.48	2.38	328	2.98	0.83
Spain	435	3.36	2.06	435	3.06	0.65
Sweden	107	3.82	3.57	107	3.29	0.55
Switzerland	142	3.91	2.79	142	3.28	0.58
Turkey	139	3.14	1.59	139	3.06	0.86
U.S.A.	202	3.38	1.82	202	3.29	0.67
Uk	133	5.05	2.94	133	3.26	0.65
W. Germany	222	3.15	2.53	222	3.00	0.59

Table 1: Table 1: Model coefficients

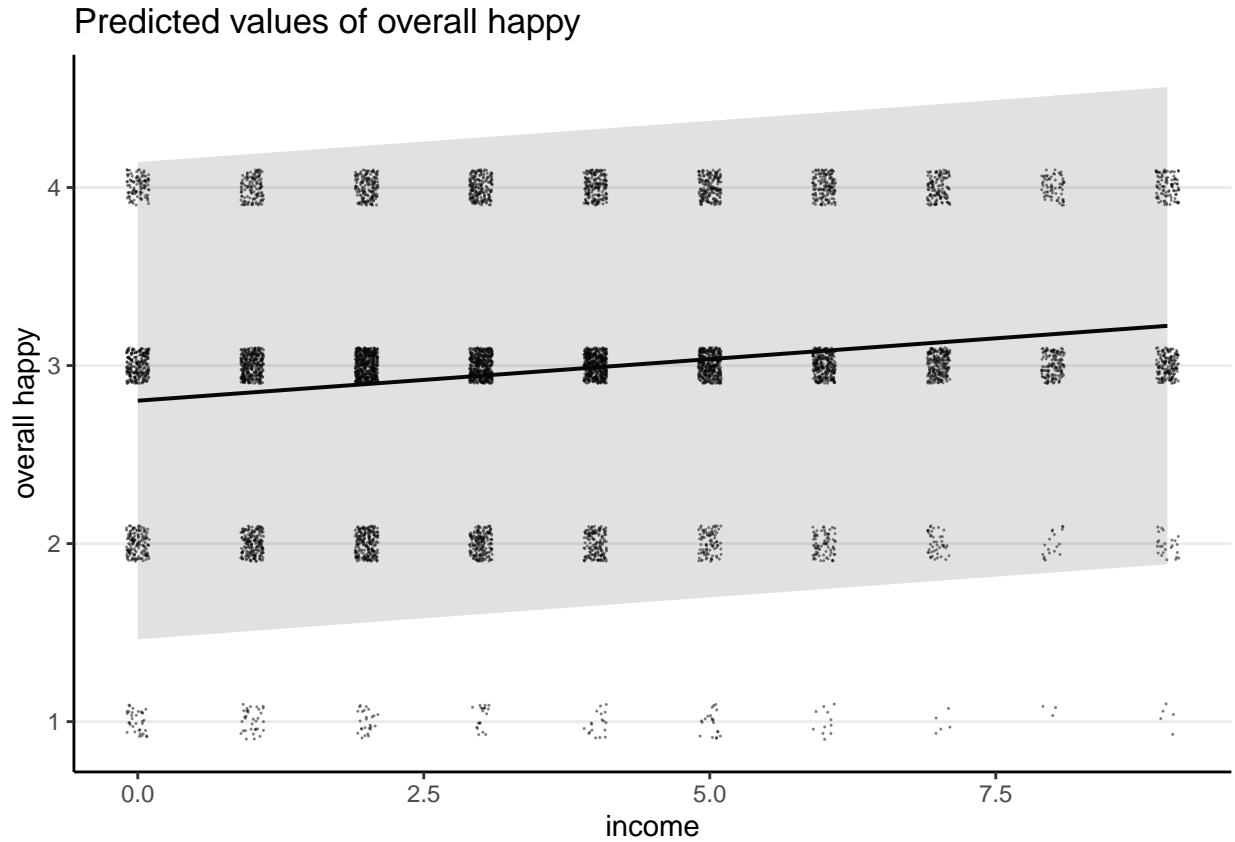|		Model 1
fixed	(Intercept)	2.580 [2.260, 2.899]
	income	0.047 [0.032, 0.062]
	income_cm	0.060 [−0.019, 0.139]
random	SD (Intercept country)	0.324
	SD (income country)	0.039
	Cor (Intercept~income country)	−0.719
	SD (Observations)	0.682
	Num.Obs.	5926
	R2 Marg.	0.037
	R2 Cond.	0.159
	AIC	12 458.7
	BIC	12 505.5
	ICC	0.1
	RMSE	0.68

Predicted values of overall happy

Table 1 shows the fixed-effect coefficients. We found evidence for the positive association, averaged across countries, between income and happiness at the individual level, $\gamma_{10} = 0.047$, $SE = 0.0077$, $t(35) = 6.06$, $p < .001$. The contextual effect was not significant, $\gamma_{01} = 0.06$, $SE = 0.04$, $t(38) = 1.49$, $p = .144$ (see the Figure). The marginal R^2 (Nakagawa et al., 2017) for the model was estimated to be 0.037, 95% bootstrap CI [0.02, 0.07].