Problem Set 1: PSID - Labor Outcomes

Tate Mason

Part 1: Overall Trends:

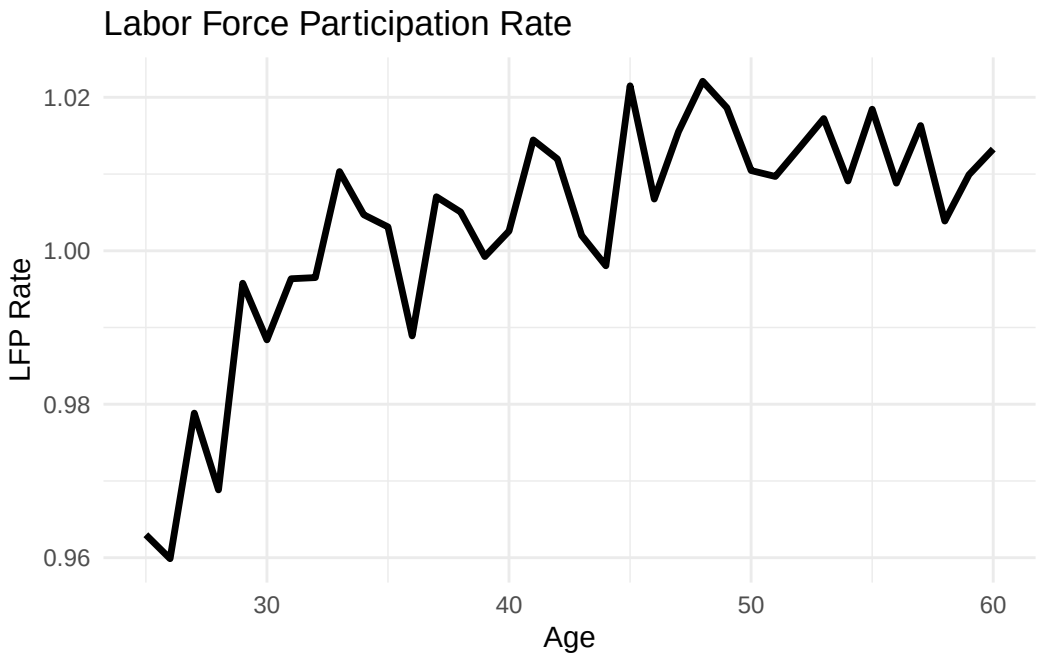
```
library(AER)
library(haven)
library(tidyverse)
library(psych)
library(patchwork)
library(broom)
library(Hmisc)
library(knitr)
```

```
df <- read_dta("~/SchoolWork/Y2S1/Macro/Data/PSID/PSID.dta")
```

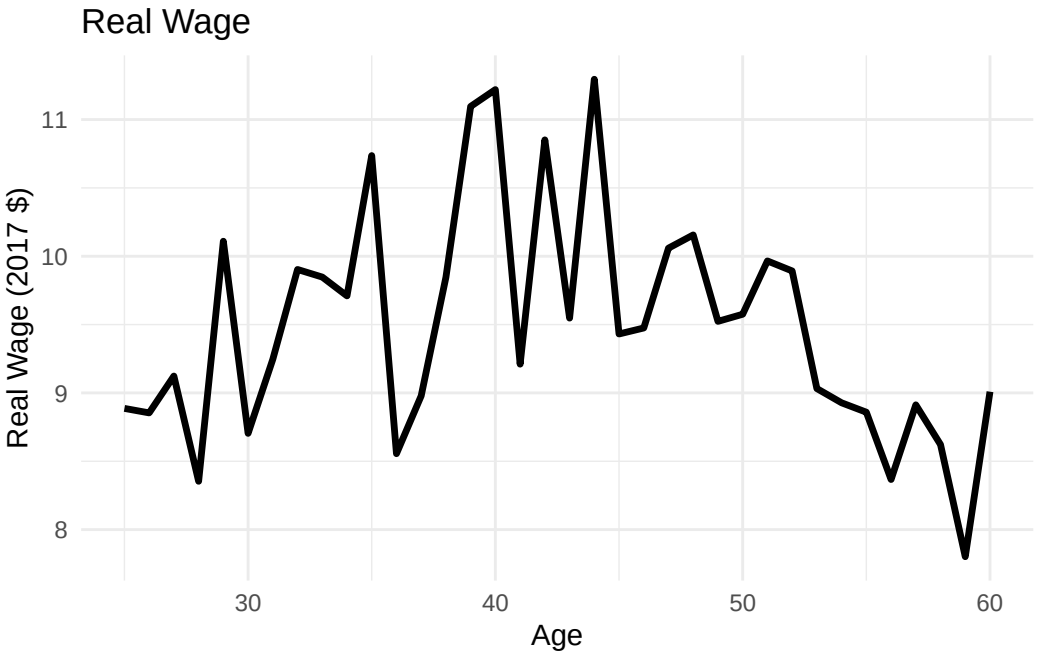
Age profiles

```
ggplot(lfp_age_fe, aes(age, y_m)) +
  geom_line(size = 1.2) +
  labs(
    title = "Labor Force Participation Rate",
    x = "Age",
    y = "LFP Rate"
  ) +
  theme_minimal()
```

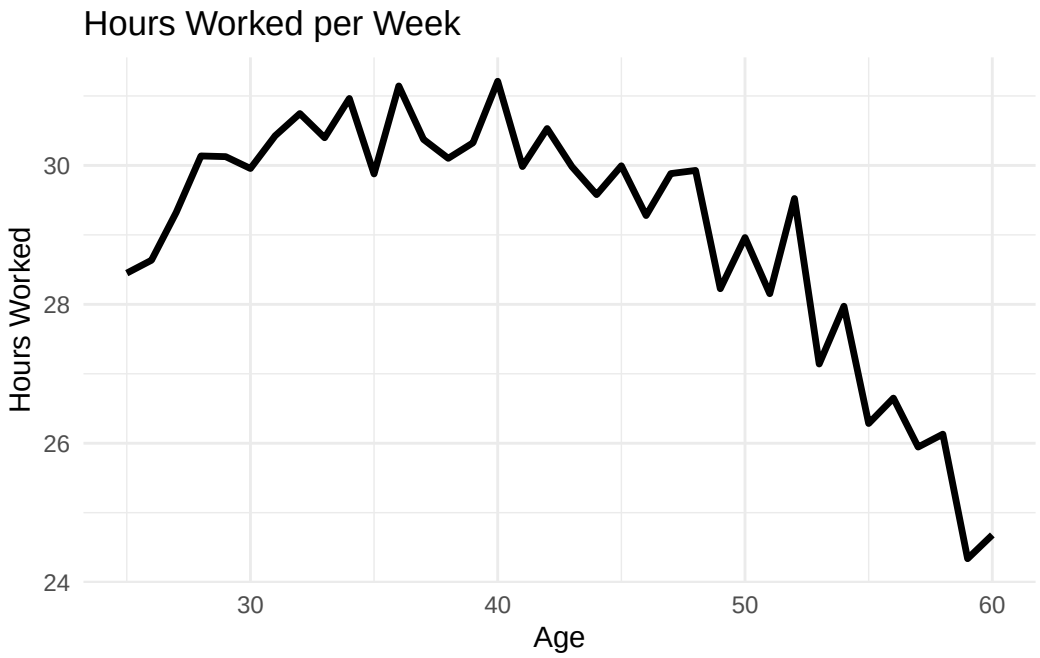
```
Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
i Please use `linewidth` instead.
```



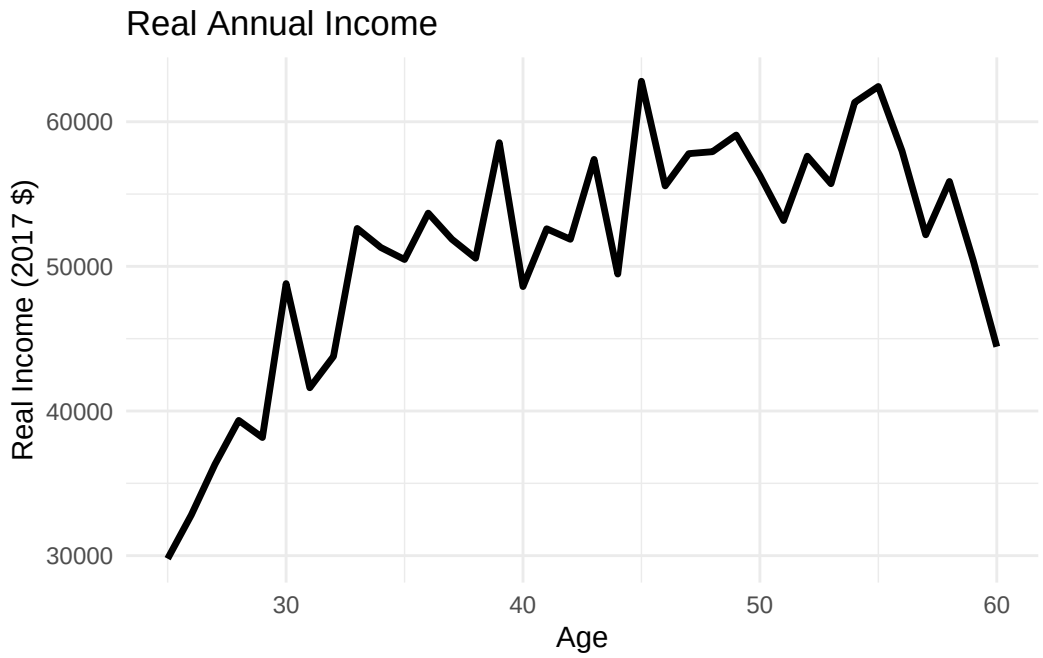

```
ggsave("lfp_age_fe.pdf", width = 6, height = 4)

ggplot(wage_age_fe, aes(age, y_m)) +
  geom_line(size = 1.2) +
  labs(
    title = "Real Wage",
    x = "Age",
    y = "Real Wage (2017 $)"
  ) +
  theme_minimal()
```



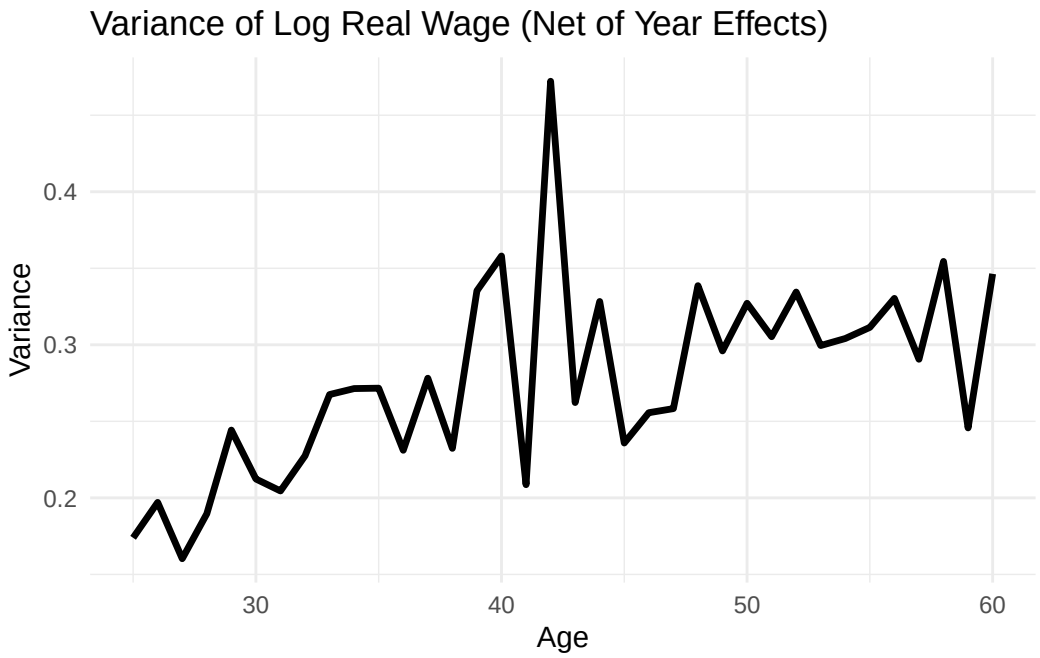

```
ggsave("wage_age_fe.pdf", width = 6, height = 4)

ggplot(hr_age_fe, aes(age, y_m)) +
  geom_line(size = 1.2) +
  labs(
    title = "Hours Worked per Week",
    x = "Age",
    y = "Hours Worked"
  ) +
  theme_minimal()
```



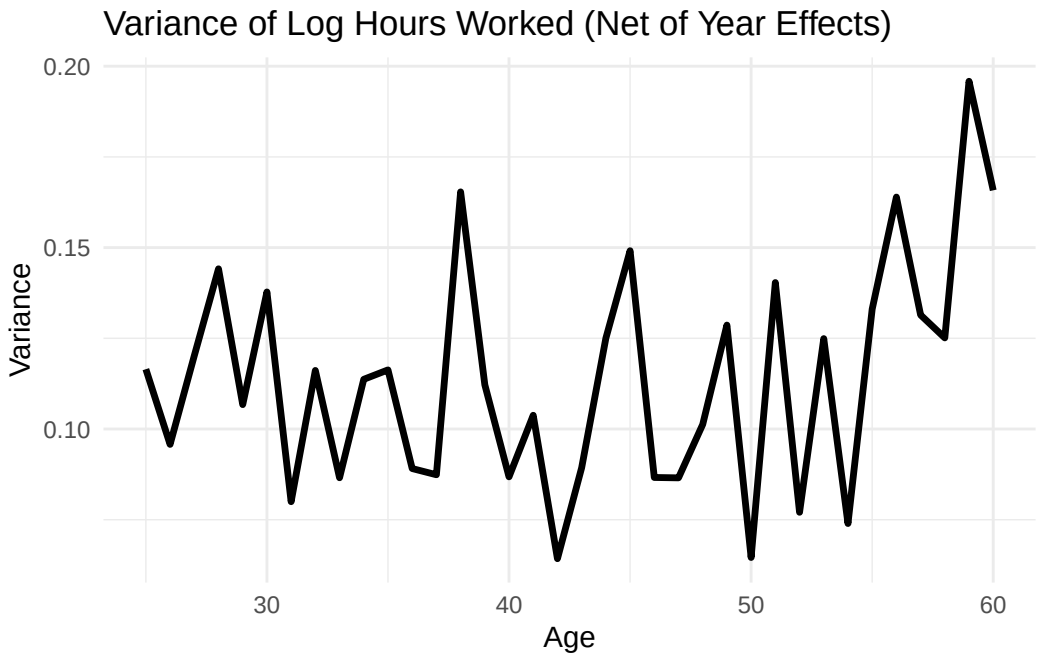

```
ggsave("hr_age_fe.pdf", width = 6, height = 4)

ggplot(inc_age_fe, aes(age, y_m)) +
  geom_line(size = 1.2) +
  labs(
    title = "Real Annual Income",
    x = "Age",
    y = "Real Income (2017 $)"
  ) +
  theme_minimal()
```




```
ggsave("inc_age_fe.pdf", width = 6, height = 4)

ggplot(var_wage_age, aes(age, v)) +
  geom_line(size = 1.2) +
  labs(
    title = "Variance of Log Real Wage (Net of Year Effects)",
    x = "Age",
    y = "Variance"
  ) +
  theme_minimal()
```




```
ggsave("var_wage_age.pdf", width = 6, height = 4)

ggplot(var_hr_age, aes(age, v)) +
  geom_line(size = 1.2) +
  labs(
    title = "Variance of Log Hours Worked (Net of Year Effects)",
    x = "Age",
    y = "Variance"
  ) +
  theme_minimal()
```



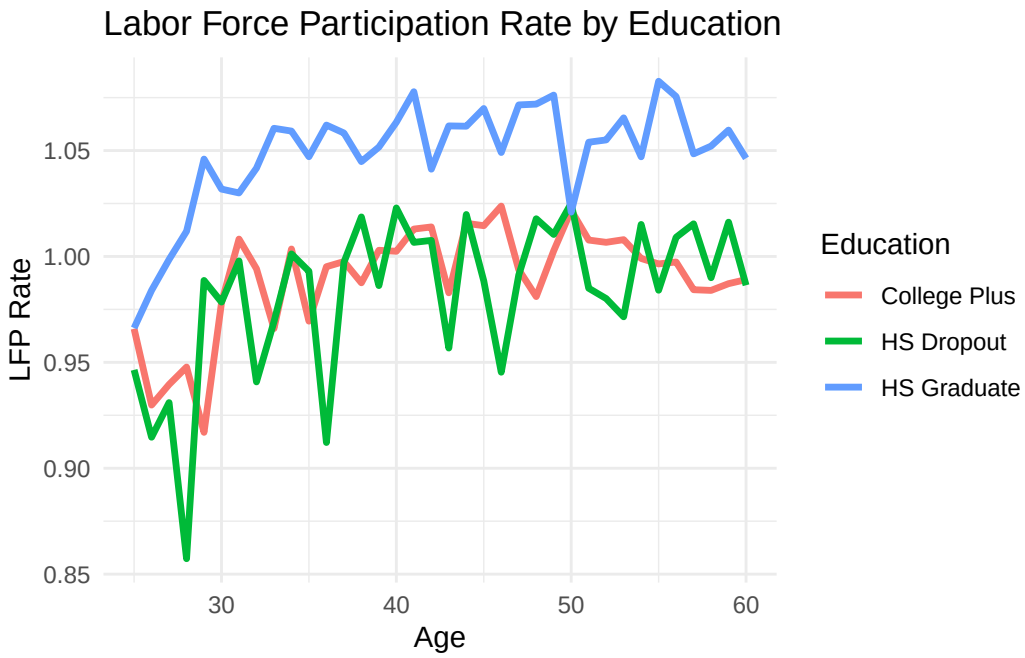

```
ggsave("var_hr_age.pdf", width = 6, height = 4)
```

Education groups

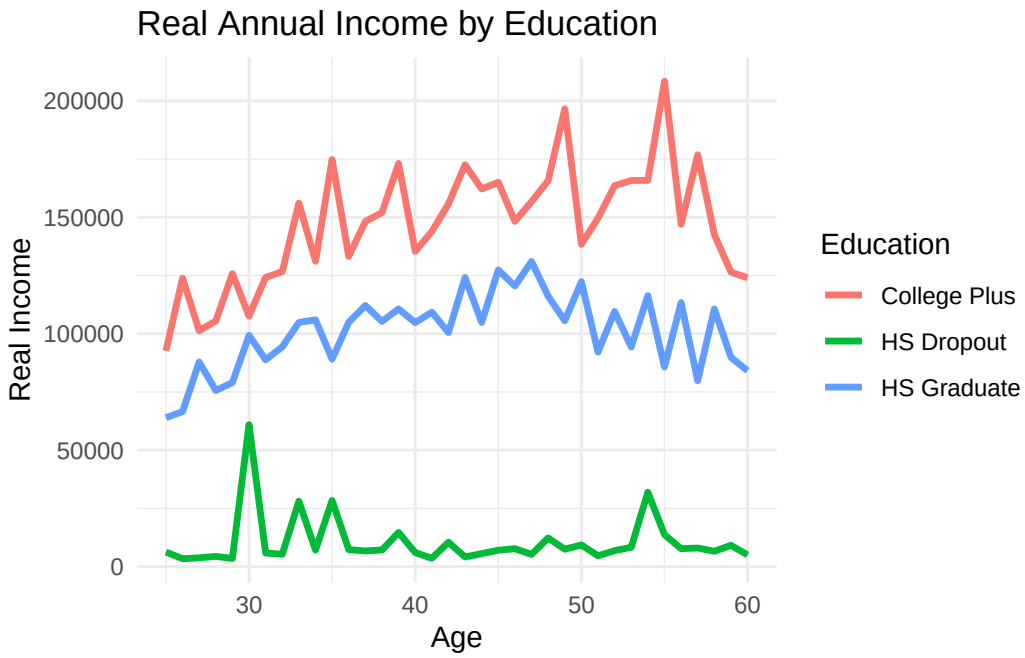
```
wage_age_fe_educ <- psid_m %>%
  filter(!is.na(educ_group)) %>%
  group_by(educ_group) %>%
  group_modify(~ age_profile_fe(.x, wage_real)) %>%
  ungroup()

hour_age_fe_educ <- psid_m %>%
  filter(!is.na(educ_group)) %>%
  group_by(educ_group) %>%
  group_modify(~ age_profile_fe(.x, hr_worked)) %>%
  ungroup()

lfp_age_fe_educ <- psid_m %>%
  filter(!is.na(educ_group)) %>%
  group_by(educ_group) %>%
  group_modify(~ age_profile_fe(.x, lfp)) %>%
  ungroup()
```

```r
inc_age_fe_educ <- psid_m %>%
  filter(!is.na(educ_group)) %>%
  group_by(educ_group) %>%
  group_modify(~ age_profile_fe(.x, inc_real)) %>%
  ungroup()

var_wage_age_educ <- psid_m %>%
  filter(!is.na(educ_group)) %>%
  group_by(educ_group) %>%
  group_modify(~ var_prof_year_net(.x, wage_real)) %>%
  ungroup()

var_hr_age_educ <- psid_m %>%
  filter(!is.na(educ_group)) %>%
  group_by(educ_group) %>%
  group_modify(~ var_prof_year_net(.x, hr_worked)) %>%
  ungroup()
```

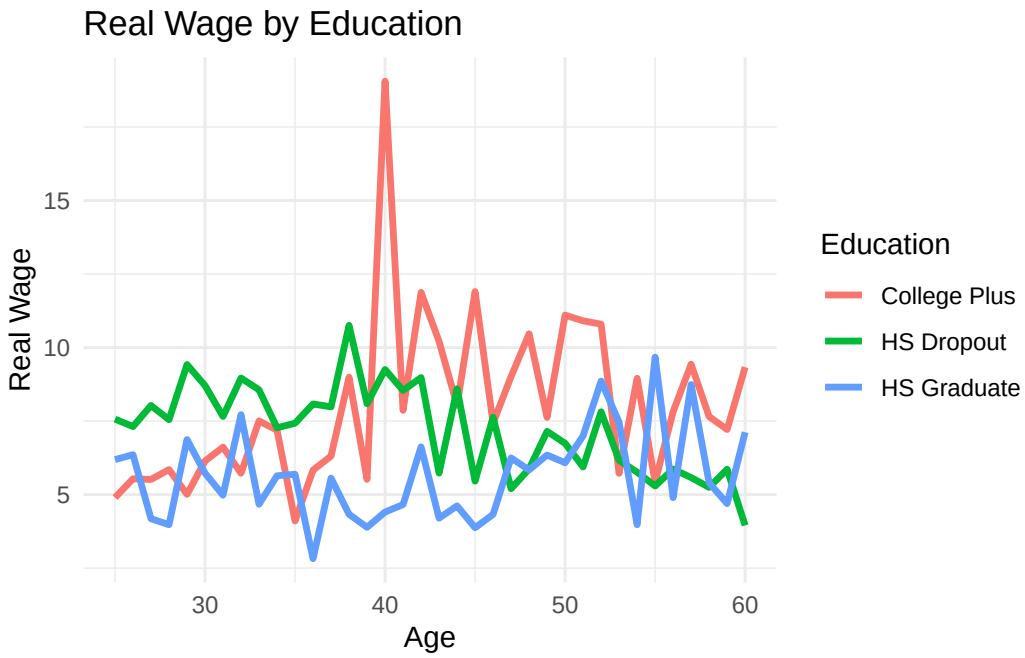
```r
ggplot(lfp_age_fe_educ, aes(age, y_m, color = educ_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Labor Force Participation Rate by Education",
    x = "Age",
    y = "LFP Rate",
    color = "Education"
  ) +
  theme_minimal()
```



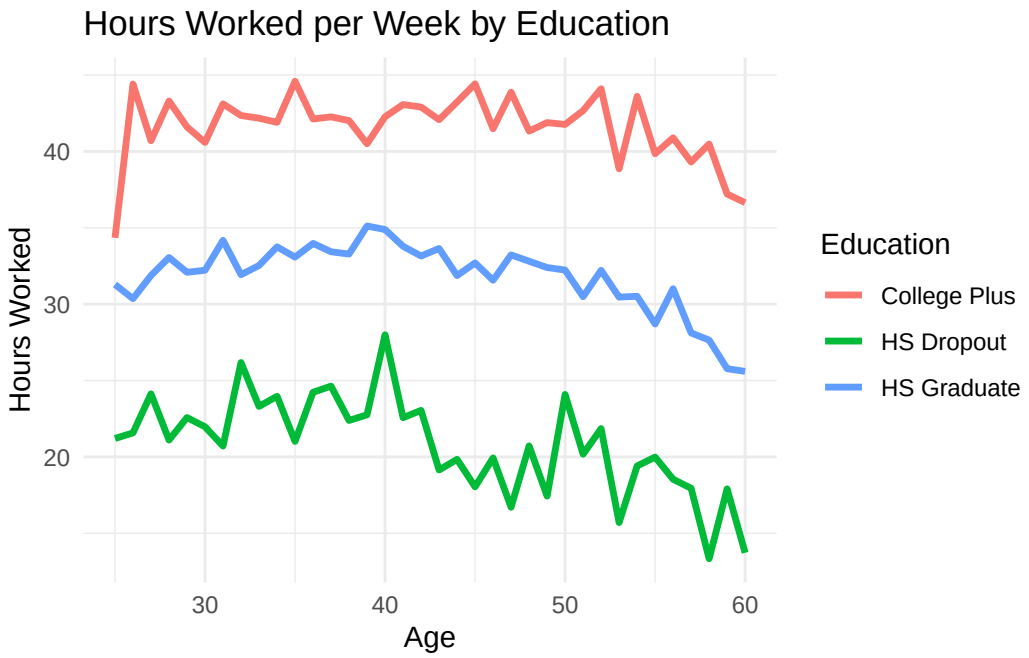

```
ggsave("lfp_age_fe_educ.pdf", width = 6, height = 4)

ggplot(inc_age_fe_educ, aes(age, y_m, color = educ_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Real Annual Income by Education",
    x = "Age",
    y = "Real Income",
    color = "Education"
  ) +
  theme_minimal()
```



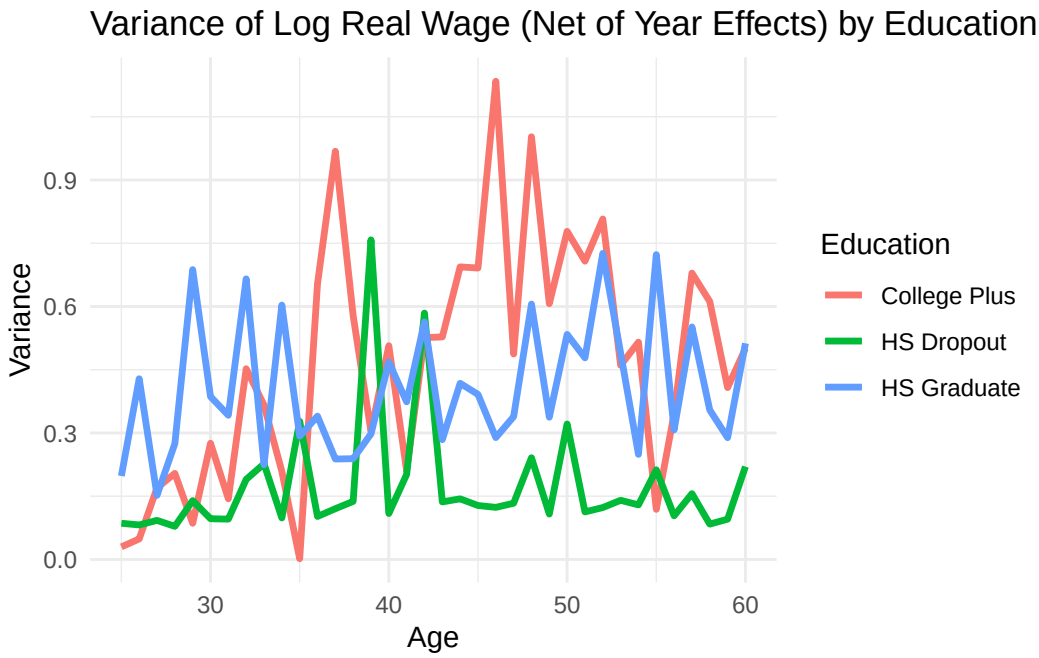

```
ggsave("inc_age_fe_educ.pdf", width = 6, height = 4)

ggplot(wage_age_fe_educ, aes(age, y_m, color = educ_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Real Wage by Education",
    x = "Age",
    y = "Real Wage",
    color = "Education"
  ) +
  theme_minimal()
```



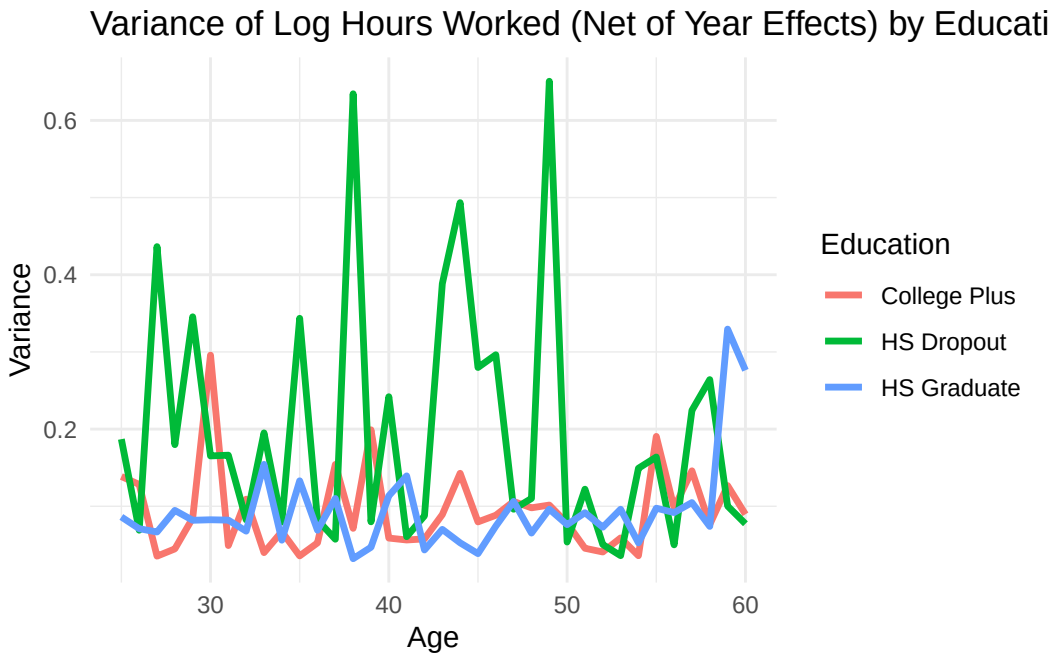

```
ggsave("wage_age_fe_educ.pdf", width = 6, height = 4)

ggplot(hour_age_fe_educ, aes(age, y_m, color = educ_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Hours Worked per Week by Education",
    x = "Age",
    y = "Hours Worked",
    color = "Education"
  ) +
  theme_minimal()
```




```
ggsave("hr_age_fe_educ.pdf", width = 6, height = 4)

ggplot(var_wage_age_educ, aes(age, v, color = educ_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Variance of Log Real Wage (Net of Year Effects) by Education",
    x = "Age",
    y = "Variance",
    color = "Education"
  ) +
  theme_minimal()
```




```
ggsave("var_wage_age_educ.pdf", width = 6, height = 4)

ggplot(var_hr_age_educ, aes(age, v, color = educ_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Variance of Log Hours Worked (Net of Year Effects) by Education",
    x = "Age",
    y = "Variance",
    color = "Education"
  ) +
  theme_minimal()
```

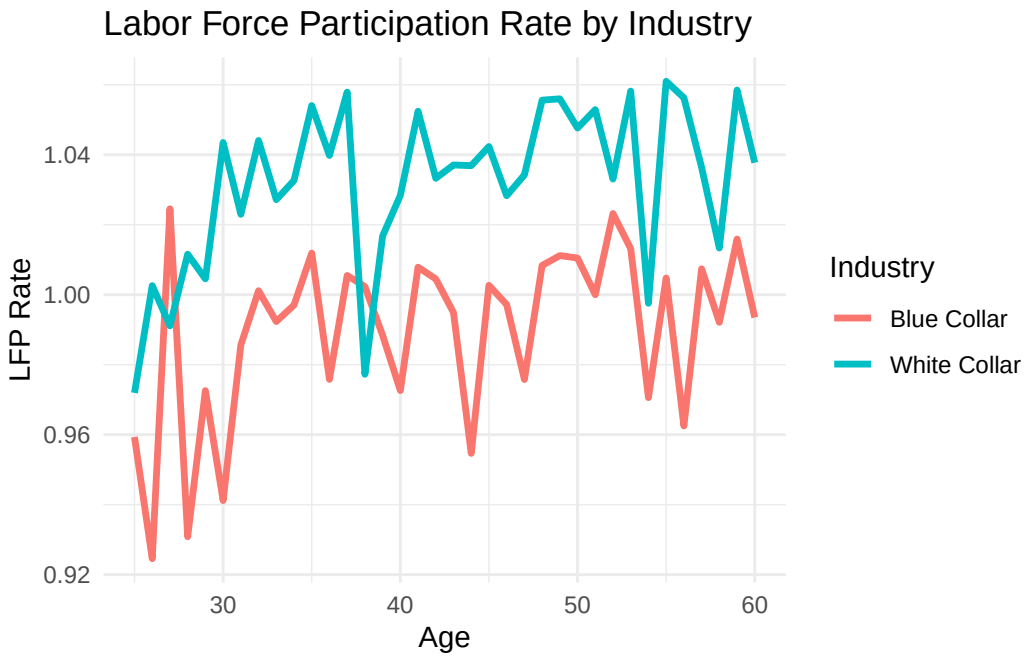



```
ggsave("var_hr_age_educ.pdf", width = 6, height = 4)
```

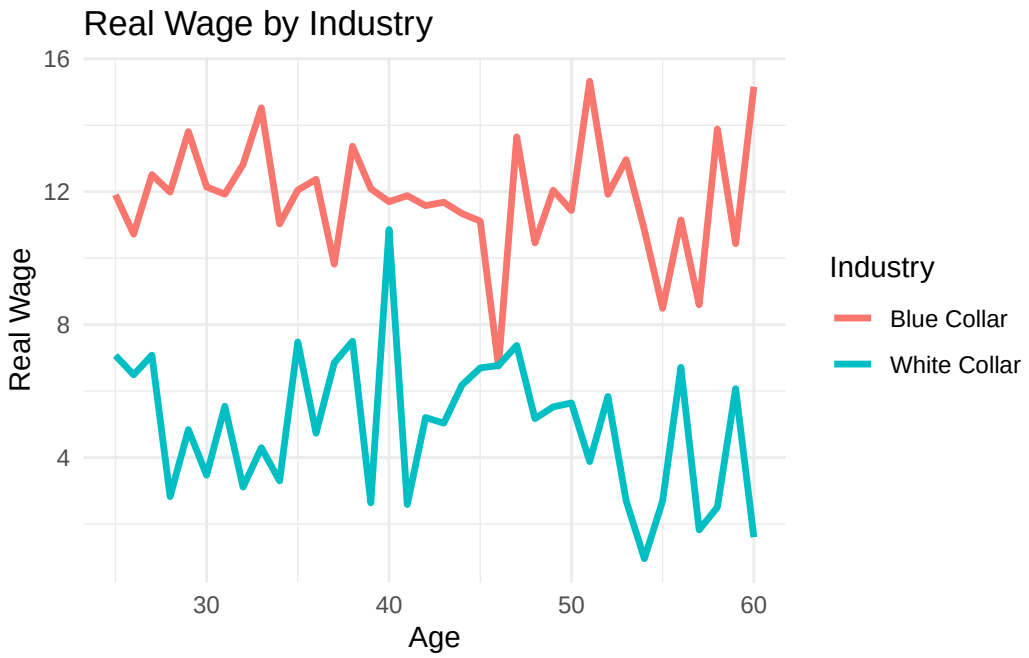
Industry groups

```
wage_age_fe_ind <- psid_m %>%
  filter(!is.na(ind_group)) %>%
  group_by(ind_group) %>%
  group_modify(~ age_profile_fe(.x, wage_real)) %>%
  ungroup()

hour_age_fe_ind <- psid_m %>%
  filter(!is.na(ind_group)) %>%
  group_by(ind_group) %>%
  group_modify(~ age_profile_fe(.x, hr_worked)) %>%
  ungroup()

inc_age_fe_ind <- psid_m %>%
  filter(!is.na(ind_group)) %>%
  group_by(ind_group) %>%
  group_modify(~ age_profile_fe(.x, inc_real)) %>%
  ungroup()
```

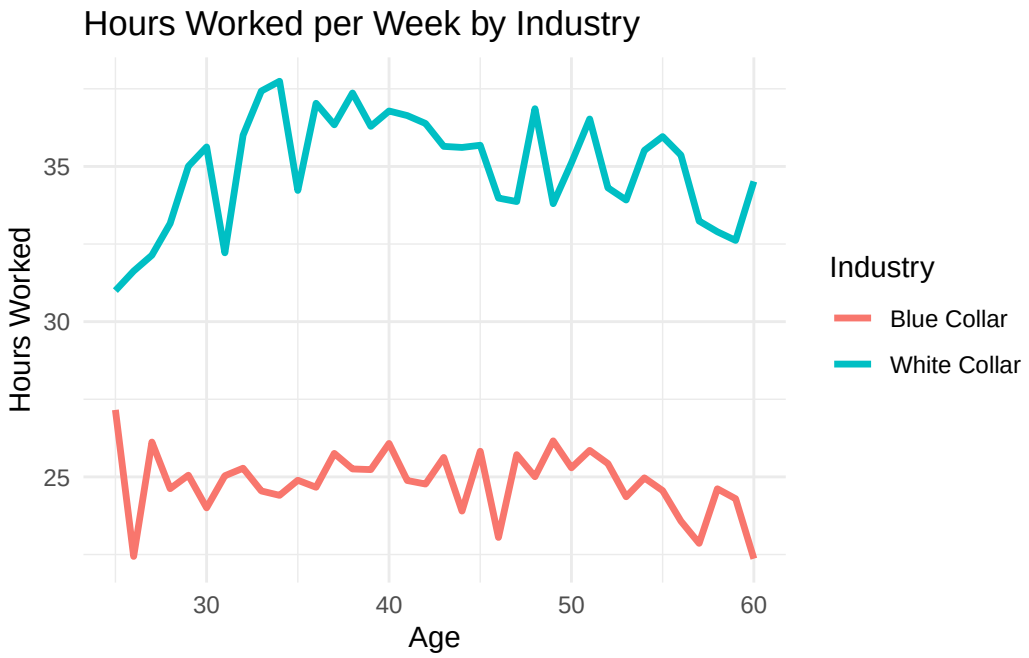
```r
lfp_age_fe_ind <- psid_m %>%
  filter(!is.na(ind_group)) %>%
  group_by(ind_group) %>%
  group_modify(~ age_profile_fe(.x, lfp)) %>%
  ungroup()

var_wage_age_ind <- psid_m %>%
  filter(!is.na(ind_group)) %>%
  group_by(ind_group) %>%
  group_modify(~ var_prof_year_net(.x, wage_real)) %>%
  ungroup()

var_hr_age_ind <- psid_m %>%
  filter(!is.na(ind_group)) %>%
  group_by(ind_group) %>%
  group_modify(~ var_prof_year_net(.x, hr_worked)) %>%
  ungroup()

ggplot(lfp_age_fe_ind, aes(age, y_m, color = ind_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Labor Force Participation Rate by Industry",
    x = "Age",
    y = "LFP Rate",
    color = "Industry"
  ) +
  theme_minimal()
```



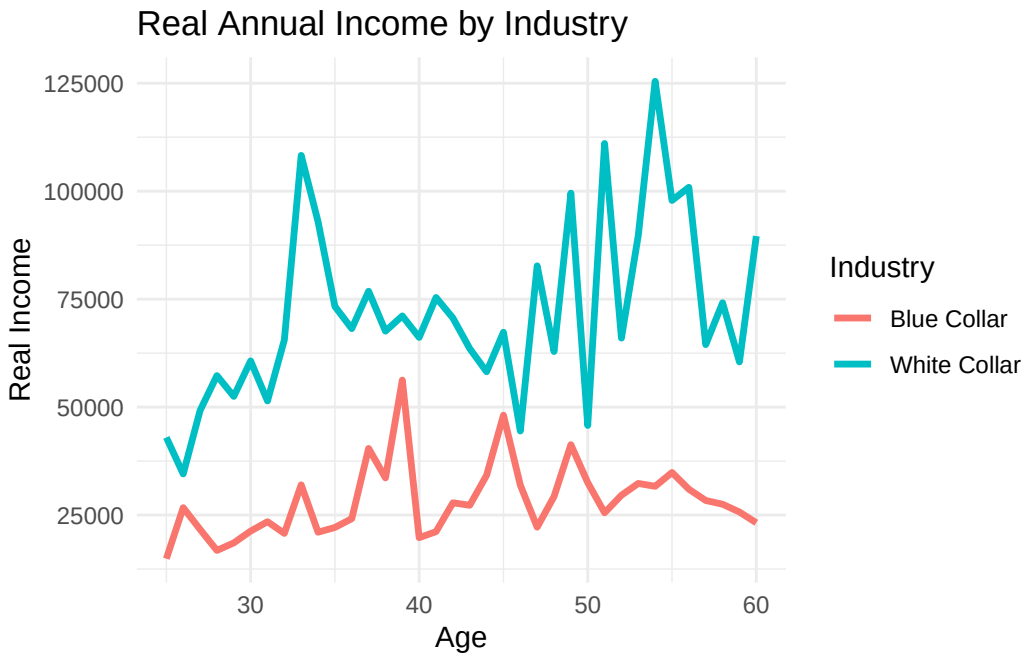

```
ggsave("lfp_age_fe_ind.pdf", width = 6, height = 4)

ggplot(wage_age_fe_ind, aes(age, y_m, color = ind_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Real Wage by Industry",
    x = "Age",
    y = "Real Wage",
    color = "Industry"
  ) +
  theme_minimal()
```



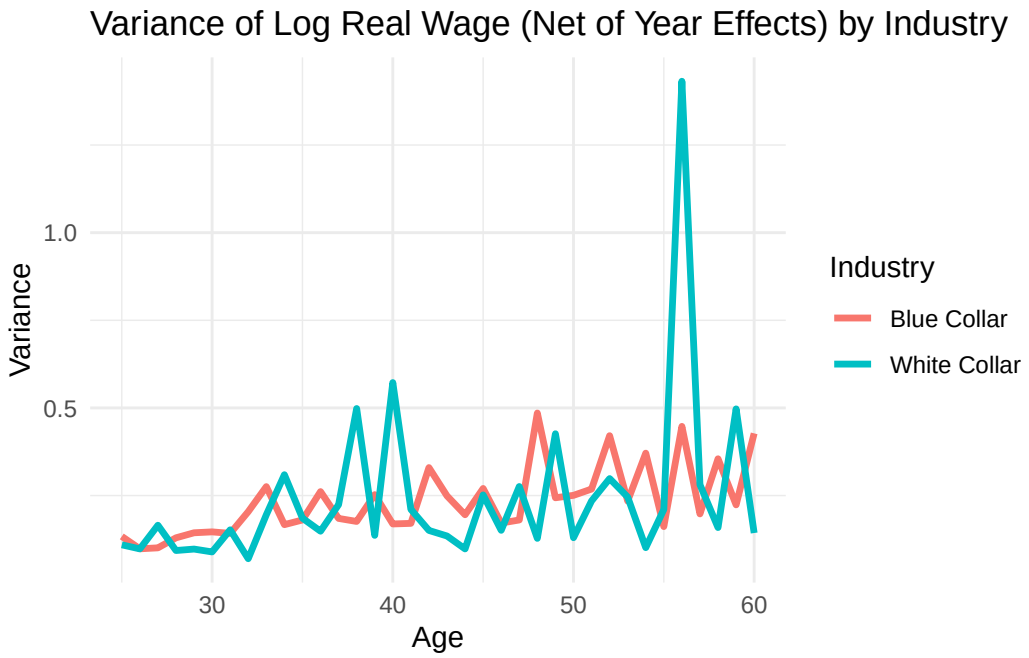

```
ggsave("wage_age_fe_ind.pdf", width = 6, height = 4)

ggplot(hour_age_fe_ind, aes(age, y_m, color = ind_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Hours Worked per Week by Industry",
    x = "Age",
    y = "Hours Worked",
    color = "Industry"
  ) +
  theme_minimal()
```



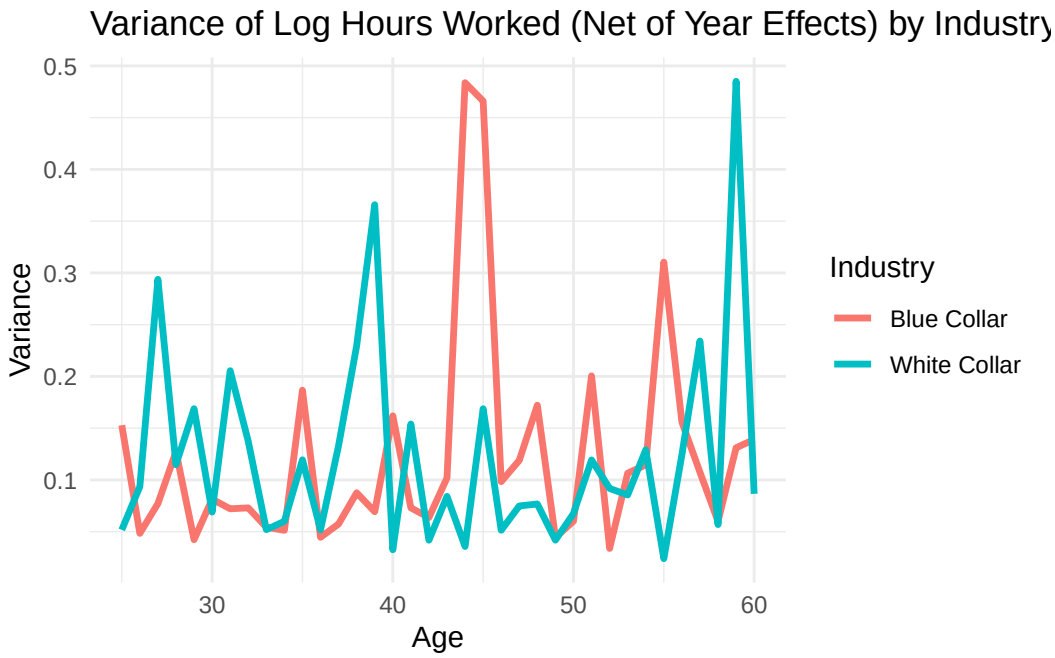

```
ggsave("hr_age_fe_ind.pdf", width = 6, height = 4)

ggplot(inc_age_fe_ind, aes(age, y_m, color = ind_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Real Annual Income by Industry",
    x = "Age",
    y = "Real Income",
    color = "Industry"
  ) +
  theme_minimal()
```




```
ggsave("inc_age_fe_ind.pdf", width = 6, height = 4)

ggplot(var_wage_age_ind, aes(age, v, color = ind_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Variance of Log Real Wage (Net of Year Effects) by Industry",
    x = "Age",
    y = "Variance",
    color = "Industry"
  ) +
  theme_minimal()
```




```
ggsave("var_wage_age_ind.pdf", width = 6, height = 4)

ggplot(var_hr_age_ind, aes(age, v, color = ind_group)) +
  geom_line(size = 1.2) +
  labs(
    title = "Variance of Log Hours Worked (Net of Year Effects) by Industry",
    x = "Age",
    y = "Variance",
    color = "Industry"
  ) +
  theme_minimal()
```

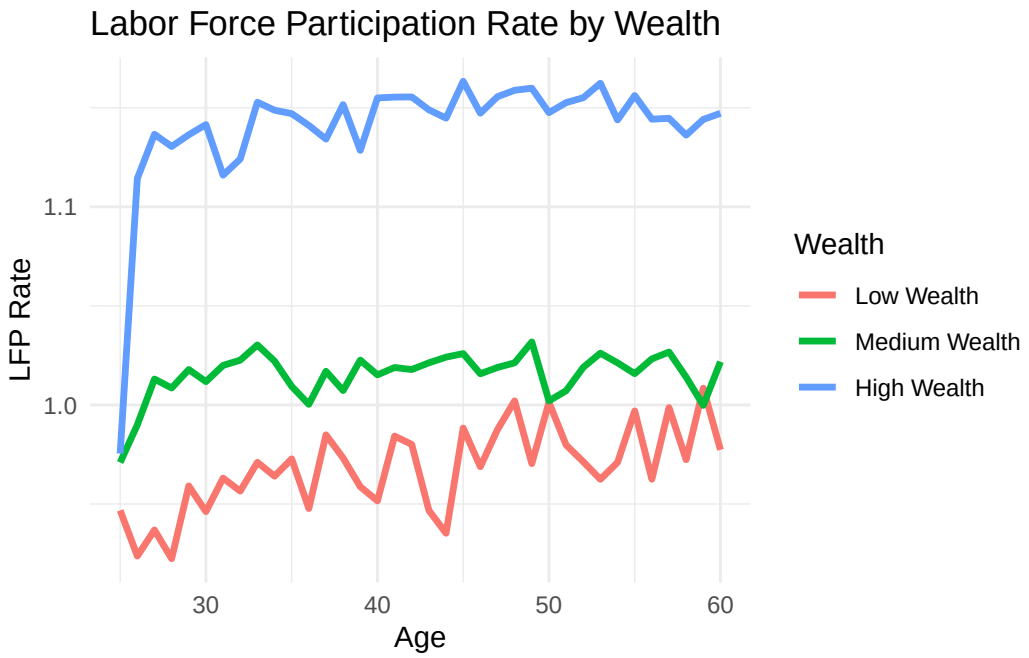



```
ggsave("var_hr_age_ind.pdf", width = 6, height = 4)
```

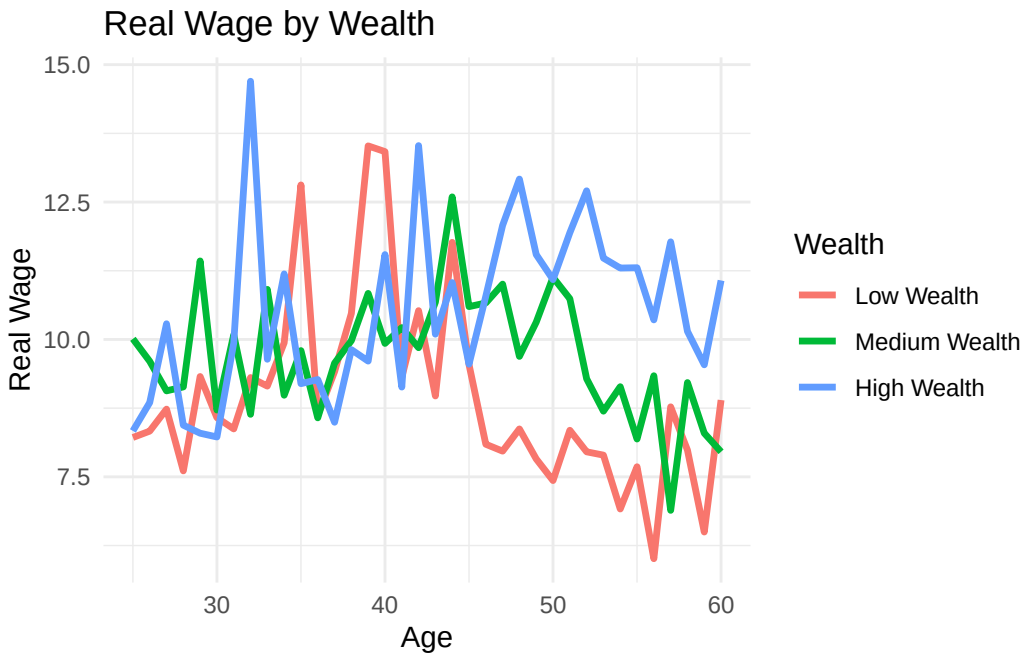
Wealth groups

```
wage_age_fe_wealth <- psid_m %>%
  filter(!is.na(wealth_tectile)) %>%
  group_by(wealth_tectile) %>%
  group_modify(~ age_profile_fe(.x, wage_real)) %>%
  ungroup()

hour_age_fe_wealth <- psid_m %>%
  filter(!is.na(wealth_tectile)) %>%
  group_by(wealth_tectile) %>%
  group_modify(~ age_profile_fe(.x, hr_worked)) %>%
  ungroup()

inc_age_fe_wealth <- psid_m %>%
  filter(!is.na(wealth_tectile)) %>%
  group_by(wealth_tectile) %>%
  group_modify(~ age_profile_fe(.x, inc_real)) %>%
  ungroup()
```

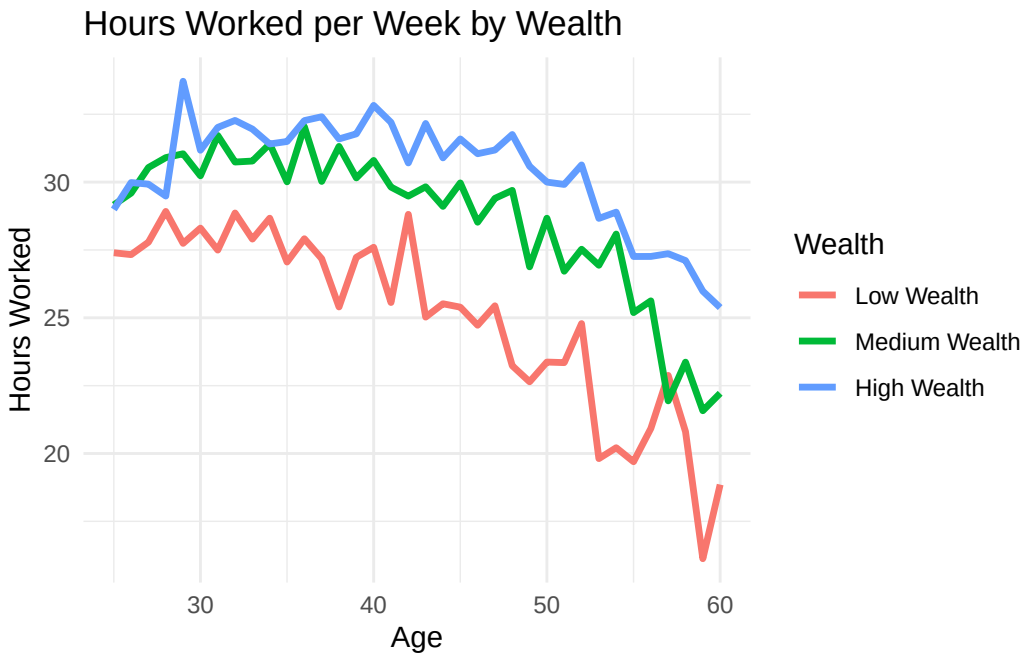
```r
lfp_age_fe_wealth <- psid_m %>%
  filter(!is.na(wealth_tectile)) %>%
  group_by(wealth_tectile) %>%
  group_modify(~ age_profile_fe(.x, lfp)) %>%
  ungroup()

var_wage_age_wealth <- psid_m %>%
  filter(!is.na(wealth_tectile)) %>%
  group_by(wealth_tectile) %>%
  group_modify(~ var_prof_year_net(.x, wage_real)) %>%
  ungroup()

var_hr_age_wealth <- psid_m %>%
  filter(!is.na(wealth_tectile)) %>%
  group_by(wealth_tectile) %>%
  group_modify(~ var_prof_year_net(.x, hr_worked)) %>%
  ungroup()

ggplot(lfp_age_fe_wealth, aes(age, y_m, color = wealth_tectile)) +
  geom_line(size = 1.2) +
  labs(
    title = "Labor Force Participation Rate by Wealth",
    x = "Age",
    y = "LFP Rate",
    color = "Wealth"
  ) +
  theme_minimal()
```



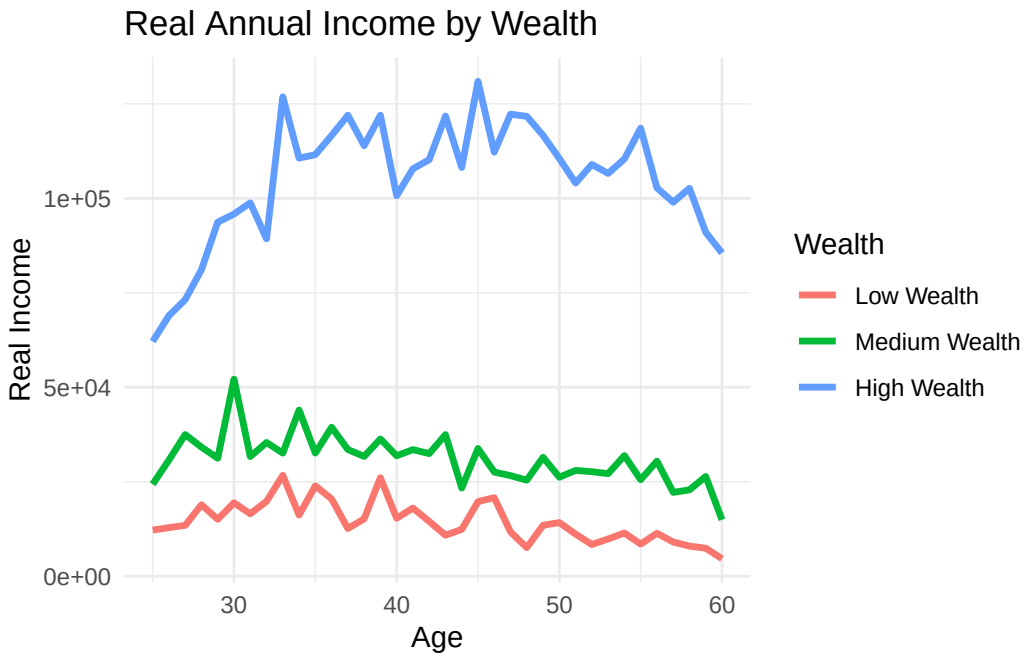

```
ggsave("lfp_age_fe_wealth.pdf", width = 6, height = 4)

ggplot(wage_age_fe_wealth, aes(age, y_m, color = wealth_tectile)) +
  geom_line(size = 1.2) +
  labs(
    title = "Real Wage by Wealth",
    x = "Age",
    y = "Real Wage",
    color = "Wealth"
  ) +
  theme_minimal()
```



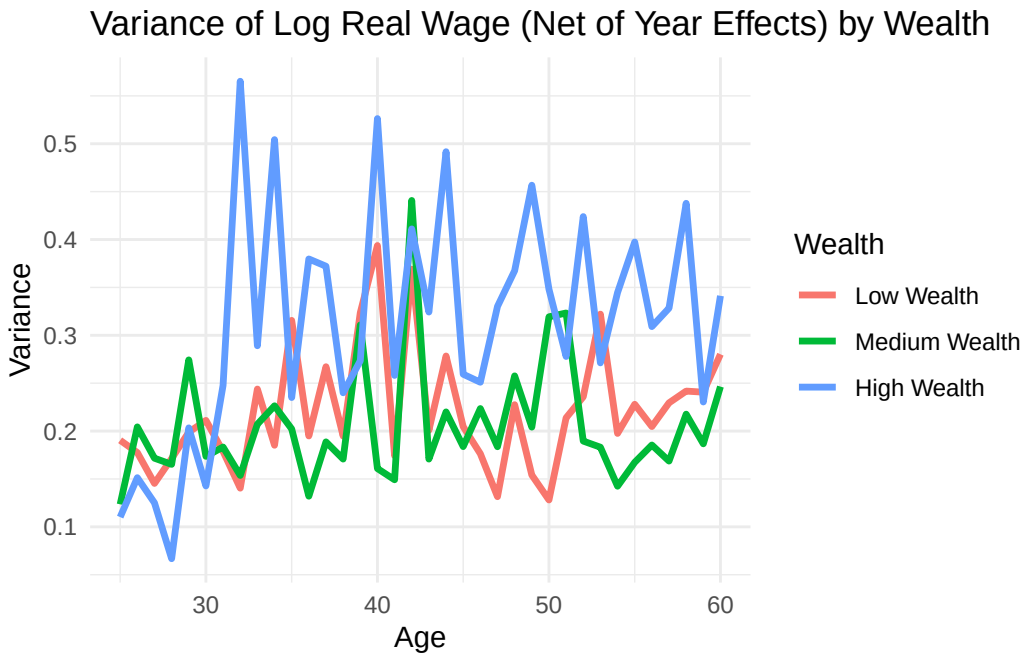

```
ggsave("wage_age_fe_wealth.pdf", width = 6, height = 4)

ggplot(hour_age_fe_wealth, aes(age, y_m, color = wealth_tectile)) +
  geom_line(size = 1.2) +
  labs(
    title = "Hours Worked per Week by Wealth",
    x = "Age",
    y = "Hours Worked",
    color = "Wealth"
  ) +
  theme_minimal()
```



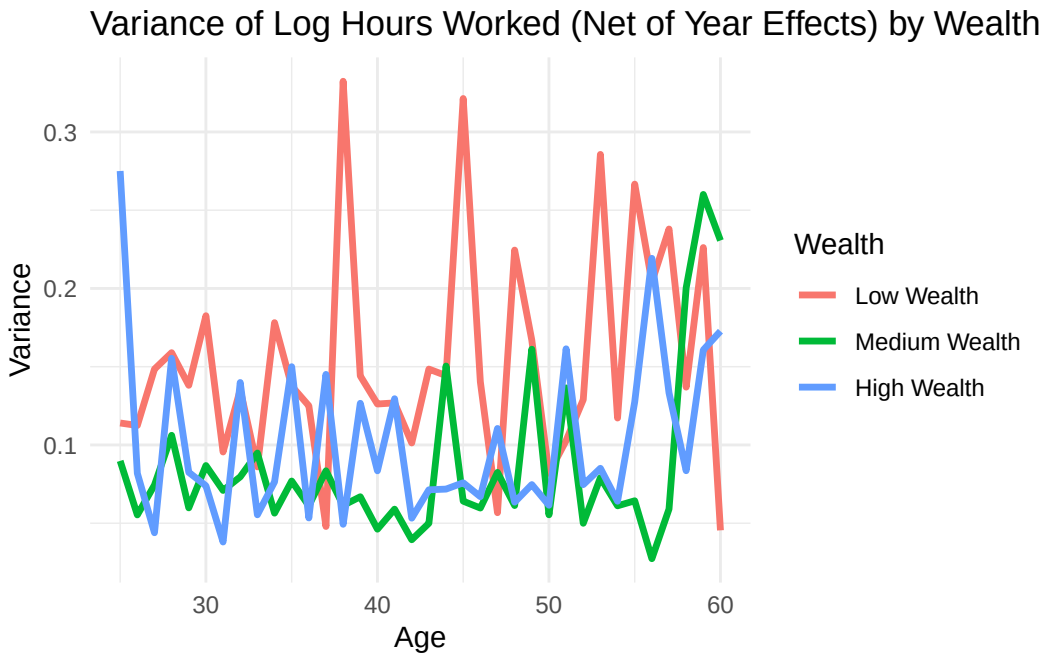

```
ggsave("hr_age_fe_wealth.pdf", width = 6, height = 4)

ggplot(inc_age_fe_wealth, aes(age, y_m, color = wealth_tectile)) +
  geom_line(size = 1.2) +
  labs(
    title = "Real Annual Income by Wealth",
    x = "Age",
    y = "Real Income",
    color = "Wealth"
  ) +
  theme_minimal()
```




```
ggsave("inc_age_fe_wealth.pdf", width = 6, height = 4)

ggplot(var_wage_age_wealth, aes(age, v, color = wealth_tectile)) +
  geom_line(size = 1.2) +
  labs(
    title = "Variance of Log Real Wage (Net of Year Effects) by Wealth",
    x = "Age",
    y = "Variance",
    color = "Wealth"
  ) +
  theme_minimal()
```




```
ggsave("var_wage_age_wealth.pdf", width = 6, height = 4)

ggplot(var_hr_age_wealth, aes(age, v, color = wealth_tectile)) +
  geom_line(size = 1.2) +
  labs(
    title = "Variance of Log Hours Worked (Net of Year Effects) by Wealth",
    x = "Age",
    y = "Variance",
    color = "Wealth"
  ) +
  theme_minimal()
```




```
ggsave("var_hr_age_wealth.pdf", width = 6, height = 4)
```

Year	Group	Category	Sample Size	Observations	College (%)	White Collar (%)
1999	All	All	1847	3795	22.6	57
	Education	HS Dropout	807	1288		
	Education	HS Grad	873	1288		
	Education	College +	873	1288		
	Industry	Blue Collar	507	629		
	Industry	White Collar	507	629		
	Wealth	Bottom 25%	1847	3795		
	Wealth	Middle 50%	1847	3795		
	Wealth	Top 25%	1847	3795		
2001	All	All	1855	4078	24.1	55.7
	Education	HS Dropout	883	1358		
	Education	HS Grad	883	1358		
	Education	College +	883	1358		
	Industry	Blue Collar	541	646		
	Industry	White Collar	541	646		
	Wealth	Bottom 25%	1855	4078		
	Wealth	Middle 50%	1855	4078		
	Wealth	Top 25%	1855	4078		
2003	All	All	1844	4209	24.1	28.2

Year	Group	Category	Sample Size	Observations	College (%)	White Collar (%)
	Education	HS Dropout	892	1384		
	Education	HS Grad	892	1384		
	Education	College +	892	1384		
	Industry	Blue Collar	597	773		
	Industry	White Collar	597	773		
	Wealth	Bottom 25%	1844	4209		
	Wealth	Middle 50%	1844	4209		
	Wealth	Top 25%	1844	4209		
2005	All	All	1814	4231	22.1	26.4
	Education	HS Dropout	872	1380		
	Education	HS Grad	872	1380		
	Education	College +	872	1380		
	Industry	Blue Collar	607	793		
	Industry	White Collar	607	793		
	Wealth	Bottom 25%	1814	4231		
	Wealth	Middle 50%	1814	4231		
	Wealth	Top 25%	1814	4231		
2007	All	All	1799	4349	21.2	25.0
	Education	HS Dropout	866	1387		
	Education	HS Grad	866	1387		
	Education	College +	866	1387		
	Industry	Blue Collar	642	839		
	Industry	White Collar	642	839		
	Wealth	Bottom 25%	1799	4349		
	Wealth	Middle 50%	1799	4349		
	Wealth	Top 25%	1799	4349		
2009	All	All	1767	4421	29.3	26.2
	Education	HS Dropout	929	1522		
	Education	HS Grad	929	1522		
	Education	College +	929	1522		
	Industry	Blue Collar	627	856		
	Industry	White Collar	627	856		
	Wealth	Bottom 25%	1767	4421		
	Wealth	Middle 50%	1767	4421		
	Wealth	Top 25%	1767	4421		
2011	All	All	1713	4441	28.0	27.5
	Education	HS Dropout	921	1536		
	Education	HS Grad	921	1536		
	Education	College +	921	1536		
	Industry	Blue Collar	557	777		
	Industry	White Collar	557	777		

Year	Group	Category	Sample Size	Observations	College (%)	White Collar (%)
	Wealth	Bottom 25%	1713	4441		
	Wealth	Middle 50%	1713	4441		
	Wealth	Top 25%	1713	4441		
2013	All	All	1701	4475	27.8	27.6
	Education	HS Dropout	928	1555		
	Education	HS Grad	928	1555		
	Education	College +	928	1555		
	Industry	Blue Collar	566	782		
	Industry	White Collar	566	782		
	Wealth	Bottom 25%	1701	4475		
	Wealth	Middle 50%	1701	4475		
	Wealth	Top 25%	1701	4475		
2015	All	All	1650	4365	27.3	28.1
	Education	HS Dropout	921	1512		
	Education	HS Grad	921	1512		
	Education	College +	921	1512		
	Industry	Blue Collar	566	782		
	Industry	White Collar	566	782		
	Wealth	Bottom 25%	1650	4365		
	Wealth	Middle 50%	1650	4365		
	Wealth	Top 25%	1650	4365		
2017	All	All	1908	4684	49.3	NA
	Education	HS Dropout	880	1399		
	Education	HS Grad	880	1399		
	Education	College +	880	1399		
	Industry	Blue Collar	551	764		
	Industry	White Collar	551	764		
	Wealth	Bottom 25%	1908	4684		
	Wealth	Middle 50%	1908	4684		
	Wealth	Top 25%	1908	4684		