

Unhappiness is Unpredictability/Instability

Online Appendix (Supplementary Online Material)

Friday 28th November, 2025 13:16

Contents

1 Relationships among variables, and choice of controls	1
1.1 Pairwise correlations	2
1.2 Specification Curves Analysis (SCA)	3
1.3 Additional sensitivity/robustness models	4
1.4 Unpredictability/Instability means by income, health, and occupations	6
1.4.1 Income and health	6
1.4.2 Occupations	6
2 Using personal income instead of family income	7
3 Minor points	10
3.1 Additional Descriptive Statistics: Distributions of Variables	10
3.2 Directionality of effect from health and income to SWB	10

1 Relationships among variables, and choice of controls

We left the original tables in the body of the manuscript, as sequential elaboration of the models with predictors of the dependent variable in addition to main (unpredictability/instability) independent variables is the usual practice. But here we elaborate and use various “robustness” and “sensitivity” checks and provide more discussion.

While overall, some negative effect of the unpredictability/instability measures on SWB often holds, there are many nuances as elaborated here.

Specifically, here we address the editorial by Bartram et al. (2024) as per choice of control variables.

We proceed as follows. We start with pairwise correlations to get an overall sense of relationships. Then we use Specification Curves Analysis (SCA) to find out how model specification affects statistical significance and effect size of the main (unpredictability/instability) independent variables. Then having identified key control variables with pairwise correlations and SCA we focus on these in additional sensitivity/robustness models.

1.1 Pairwise correlations

We take main hours variables from first 2 tables and also 2 main scheduling variables from last 2 tables and control variables from regressions.

In table 1 high correlations are mostly among the main independent variables measuring unpredictability/instability that are in regressions separately¹ Most others are small $|0 - .3|$, with few exceptions:

- income is most correlated with other controls, no wonder it then changes significance a lot when introduced in our—it correlates with following, all as expected:
 - married .4
 - education .4
 - paid by the hour -.4
- paid by the hour correlates with education at -.4, also as expected
- a control we introduce in specification #4 in each table, ‘‘number of hours worked last week’’ correlates highly at .6 to .8 with key unpredictability/instability independent variables based on working hours, as expected: ‘‘most hrs/week worked in past month’’, ‘‘fewest hrs/week worked in past month’’, and ‘‘how many hrs/week do you usually work’’.

Table 1: Cross-correlation table

Variables	SWB	most hrs/week worked in past month	fewest hrs/week worked in past month	how many hrs/week do you usually work	fewest hrs per week past month/usual hours	most hrs per week past month/usual hours	(mosthrs-leasthrs)/usualhrs family income in \$1986, millions	age	age squared	married	highest year of school completed	male	number of persons in household	white	number of hours worked last week	health	decide working hours	paid by the hour
SWB	1.0																	
most hrs/week worked in past month	0.0	1.0																
fewest hrs/week worked in past month	0.1	0.6	1.0															
how many hrs/week do you usually work	0.1	0.7	0.6	1.0														
fewest hrs per week past month/usual hours	0.0	0.1	0.7	-0.1	1.0													
most hrs per week past month/usual hours	-0.0	0.4	0.1	-0.2	0.4	1.0												
(mosthrs-leasthrs)/usualhrs family income in \$1986, millions	-0.1	0.3	-0.5	-0.1	-0.5	0.6	1.0											
age	0.1	-0.2	-0.1	-0.1	0.0	-0.1	-0.1	0.2	1.0									
age squared	0.1	-0.2	-0.1	-0.2	0.0	-0.1	-0.1	0.2	1.0	1.0								
married	0.2	0.0	0.1	0.0	0.1	0.0	-0.0	0.4	0.2	0.2	1.0							
highest year of school completed	0.1	0.1	0.1	0.0	0.0	0.0	0.4	0.1	0.1	0.1	1.0							
male	0.0	0.3	0.2	0.3	0.1	0.1	0.0	0.1	-0.1	-0.1	0.1	-0.1	1.0					
number of persons in household	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	0.2	-0.2	-0.2	0.3	-0.1	0.0	1.0				
white	0.1	-0.0	-0.0	0.0	-0.1	-0.1	-0.0	0.1	0.1	0.1	0.1	0.1	0.0	-0.0	1.0		1.0	
number of hours worked last week	0.1	0.8	0.6	0.8	0.0	0.1	0.0	0.1	-0.0	-0.1	0.0	0.1	0.2	-0.0	0.0	1.0		
health	0.2	-0.0	0.1	-0.0	0.1	0.0	-0.1	0.2	0.0	0.0	0.1	0.2	-0.0	-0.0	0.1	-0.0	1.0	
decide working hours	0.0	0.1	-0.1	0.1	-0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.2	0.1	-0.0	0.0	0.1	0.0	1.0
paid by the hour	-0.2	-0.1	-0.1	-0.2	0.0	0.1	0.0	-0.4	-0.1	-0.0	-0.1	-0.4	-0.1	0.0	-0.1	-0.1	-0.2	-0.2

¹With exception of the first regression table, where we have both ‘‘fewest hrs per week past month/usual hours’’ and ‘‘most hrs per week past month/usual hours’’ that correlate at .4.

1.2 Specification Curves Analysis (SCA)

Here we use Stata's speccurve to analyze effect size and statistical significance by specification.

Just to orient discussion, in SCAs below we designate as main in red color middle specification #3, somewhat balancing underfitting and overfitting, from each regression table in the body of the paper.

Figures 1 2 show that family income ‘‘realinc’’ is most important variable—subtraction of income in later specifications across the x axis decreases both significance and effect size most substantially of all variables.

In figure 3—here health decreases significance and effect size as opposed to income earlier, and does so very clearly—once health is added, the drop (towards 0) is clear.

In figure 4 the pattern is more complex—first, dropping health and then income decrease effect size and significance.

To summarize, clearly both health and income matter for unpredictability/instability’s effect and significance and both can make unpredictability/instability more or less bearable (in terms of SWB).

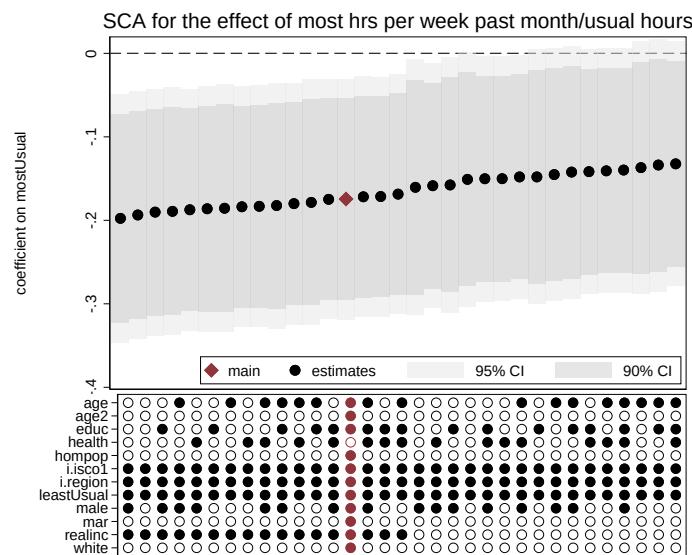


Figure 1

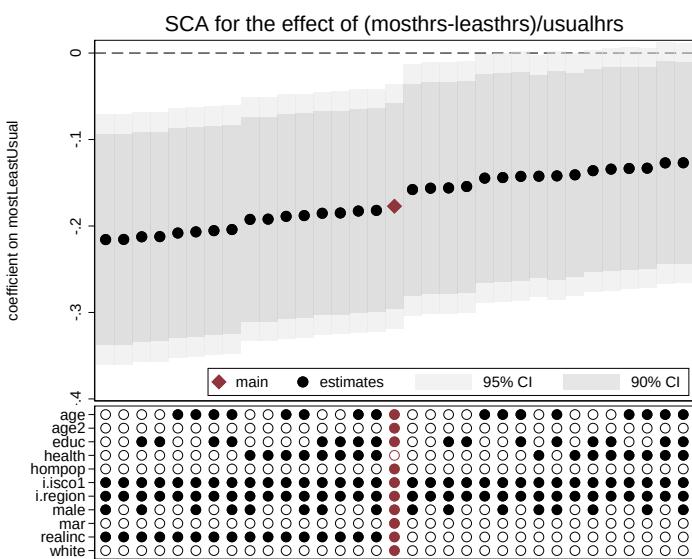


Figure 2

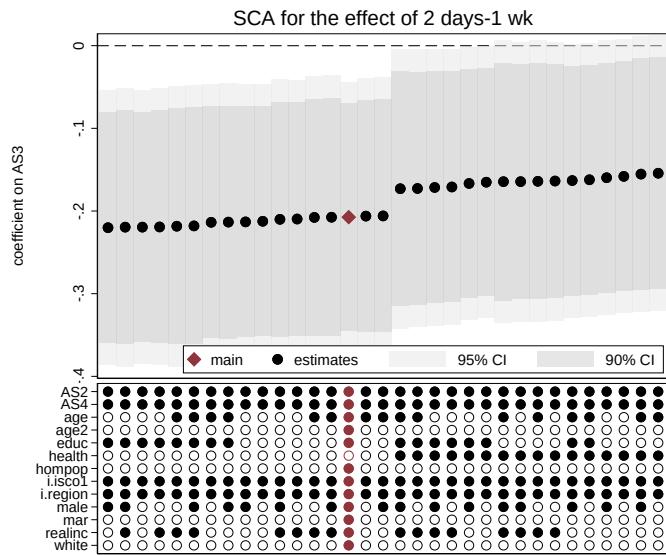


Figure 3

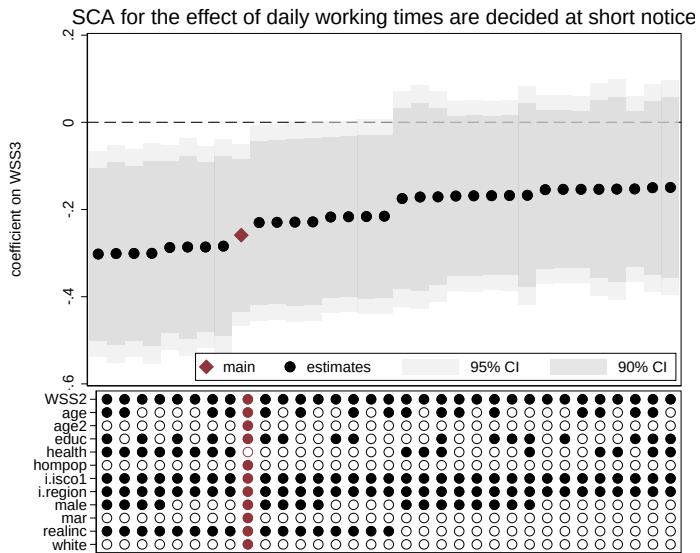


Figure 4

1.3 Additional sensitivity/robustness models

Finally, as per SCA we focus on health and income and rerun regressions from the body below. We also focus on industry dummies here (which are also explored in greater detail in subsequent section).

All in all across specifications results from the body mostly hold, but depending on the unpredictability/instability variable, significance and effect sizes vary as discussed below.

In table 2 the range of estimates on ‘‘most hrs per week past month/usual hours’’ is -.14 to -.18 sig at least at 10%. Controlling for industry dummies in e5 doesn't change results much relative to e1.

	e1	e2	e3	e4	e5
fewest hrs per week past month/usual hours	0.13	0.23*	0.08	0.18	0.17
most hrs per week past month/usual hours	-0.14+	-0.18*	-0.14+	-0.16*	-0.15*
family income in \$1986, millions		4.33***		3.52***	
health			0.20***	0.16***	
professional					0.00
administrative/managerial					0.00
clerical					-0.22*
sales					-0.23*
service					-0.14
agriculture					-0.27
production,transport					-0.07
craft, technical					-0.22*
constant	2.26***	2.06***	1.70***	1.63***	2.34***
N	488	461	488	461	484
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err					

Table 2: OLS regressions of life satisfaction.

In table 3 (mosthrs-leasthrs)/usualhrs range -.12 to -.19 sig at least at 10%, except p-value slightly higher at .102 when only controlling for health. Controlling for industry dummies in f5 results slightly stronger than in f1.

	f1	f2	f3	f4	f5
(mosthrs-leasthrs)/usualhrs	-0.14+	-0.19**	-0.12	-0.17*	-0.16*
family income in \$1986, millions		4.31***		3.50***	
health			0.19***	0.16***	
professional					0.00
administrative/managerial					0.00
clerical					-0.22*
sales					-0.23*
service					-0.14
agriculture					-0.27
production,transport					-0.07
craft, technical					-0.22*
constant	2.24***	2.11***	1.65***	1.65***	2.36***
N	488	461	488	461	484
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err					

Table 3: OLS regressions of life satisfaction.

In table 4 more unstable as high as .2 without controls, and insignificant controlling for health, or for health and income. Controlling for industry dummies in g5 results similar in g1.

	g1	g2	g3	g4	g5
-1 day	-0.06	-0.03	0.00	0.02	-0.02
2 days-1 wk	-0.20*	-0.16+	-0.13	-0.11	-0.19*
1 wk-	-0.15*	-0.14+	-0.12	-0.11	-0.15*
family income in \$1986, millions		4.20***		3.61***	
health			0.17***	0.14***	
professional					0.00
administrative/managerial					0.00
clerical					-0.22*
sales					-0.23*
service					-0.11
agriculture					-0.38
production,transport					-0.10
craft, technical					-0.22*
constant	2.28***	2.12***	1.73***	1.69***	2.39***
N	497	467	497	467	492
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err					

Table 4: OLS regressions of life satisfaction.

In table 5 here as strong as -.24, controlling for health insig, but controlling both for health and for income back to significance. Industry dummies kill significance in h5 v bivariate h1.

	h1	h5	h2	h3	h4
schedule or shift regularly changes	-0.04	-0.03	-0.04	-0.04	-0.05
daily working times are decided at short notice	-0.20+	-0.16	-0.24*	-0.14	-0.26*
professional	0.00				
administrative/managerial	-0.04				
clerical	-0.20*				
sales	-0.20*				
service	-0.22*				
agriculture	-0.31				
production, transport	-0.13				
craft, technical	-0.30***				
family income in \$1986, millions		4.29***			3.90***
health			0.18***	0.14***	
constant	2.20***	2.35***	2.05***	1.67***	1.65***
N	751	745	705	498	469
+ 0.10 * 0.05 ** 0.01 *** 0.001; robust std err					

Table 5: OLS regressions of life satisfaction.

1.4 Unpredictability/Instability means by income, health, and occupations

Here we provide some additional descriptive statistics. First by income and health. Second, by occupations.

1.4.1 Income and health

Here we split income at median in table 6: realinc2 category # being income above the median. In that category there is slightly less unpredictability/instability on ‘‘most hrs per week past month/usual hours’’, ‘‘most hrs per week past month/usual hours’’, and ‘‘daily working times are decided at short notice’’. And there is a big difference on ‘‘2 days-1 wk’’—it is almost 2x lower for those with income above median—unpredictability/instability on this measure is much lower for high earners.

In table 7, those in good or excellent health (v poor or fair), have actually more instability on first 2 metrics, but slightly less on the following 2, and much less on the last one (‘‘2 days-1 wk’’).

realinc2	fewest hrs per week past month/usual hours	most hrs per week past month/usual hours	most hrs per week past month/usual hours	daily working times are decided at short notice	2 days-1 wk
1	0.85	1.19	0.34	0.05	0.25
2	0.85	1.16	0.31	0.04	0.13

Table 6

gooExchHea	fewest hrs per week past month/usual hours	most hrs per week past month/usual hours	most hrs per week past month/usual hours	daily working times are decided at short notice	2 days-1 wk
0.8	1.15	0.34	0.06	0.29	
1	0.86	1.2	0.33	0.05	0.18

Table 7

1.4.2 Occupations

Here we use International Standard Classification of Occupations (ISCO) that we collapsed to 1-digit groupings.

Clearly unpredictability/instability is an attribute of occupations. Hence, it is a key variable to consider here. While in the body of the paper we do include more elaborate specifications these dummies, here we provide more information: means (and counts) of each unpredictability/instability measure by occupation.

Note, there are very few people in agriculture—can’t interpret agriculture.

On leastUI “fewest hrs per week past month/usual hours” not much difference except that service is slightly lower. So service varies more than others—the lowest hours for service are lower than elsewhere relative to usual hours.

On mostUsl “most hrs per week past month/usual hours” and mostLel “(mosthrs-leasthrs)/usualhrs” not much difference, but production/transport is slightly higher. Production/transport hours highest hours are higher than for other occupations relative to usual hours. And in production/transport there is also bigger difference between most and least hours relative to usual hours ((mosthrs-leasthrs)/usualhrs) versus other occupations.

On WSS3 “daily working times are decided at short notice”: production/transport and especially craft/technical are much higher, 2x or more than the rest.

On AS3 “2 days-1 wk” is higher on professional and craft/technical, but especially on service, 2x or more higher.

Thus while there are different patterns across unpredictability/instability metrics, production/transport, craft/technical, and service show different levels. Most if not all of these are probably as expected. We do not make too much out of it as occupational sectors are not the focus of the paper, rather a control variable; and cell sizes are quite small in the table below

```
. tabstat leastUsual mostUsual mostLeastUsual WSS3 AS3, by(isco1)format(%9.2f)noto stat(mean n)
```

Summary statistics: Mean, N
Group variable: isco1 (1 digit occupation)

isco1	leastU1	mostUsl	mostLel	WSS3	AS3
professional	0.83 74	1.16 74	0.34 74	0.03 110	0.24 74
administrative/ managerial	0.83 107	1.20 107	0.34 106	0.04 159	0.14 108
clerical	0.88 86	1.18 85	0.30 85	0.04 128	0.16 85
sales	0.88 53	1.16 53	0.28 53	0.04 79	0.19 53
service	0.78 61	1.16 62	0.38 61	0.04 94	0.36 66
agriculture	0.68 3	1.28 3	0.60 3	0.25 4	0 3
production/transpo	0.88 39	1.28 39	0.39 39	0.07 69	0.15 39
craft/technical	0.87 65	1.17 64	0.30 64	0.11 103	0.22 65

2 Using personal income instead of family income

Here we focus on the 2 incomes: person and family (they corr at .7)

Note that using family income as opposed to person's income is adjusted by controlling for size of the household.

Note the correlation between person's income and family income is .62.

Results on “most hrs per week past month/usual hours” are cut by as much as half. Still the sign is the same, but we mostly lost the statistical significance.

anyway these 2 tables below suck, we want to cry, nothing significant

	a1	a2	a3	a4	a5
fewest hrs per week past month/usual hours	0.13	0.08	0.06	0.04	0.02
most hrs per week past month/usual hours	-0.14+	-0.09	-0.11	-0.10	-0.08
r's income in constant usd	0.00+	0.00	0.00	0.00	-0.00
age					
age squared			-0.00	-0.00	-0.00
married			0.34***	0.31***	0.33***
highest year of school completed			-0.02	-0.03*	-0.04**
male			0.09	0.08	0.07
number of persons in household			-0.02	-0.02	-0.02
white			0.04	0.03	0.03
professional			0.00	0.00	0.00
administrative/managerial			-0.02	-0.01	0.01
clerical			-0.14	-0.17	-0.11
sales			-0.23+	-0.25*	-0.19+
service			-0.14	-0.11	-0.08
agriculture			-0.16	-0.04	0.04
production,transport			-0.12	-0.10	0.02
craft, technical			-0.18	-0.18	-0.16
new england			0.00	0.00	0.00
middle atlantic			-0.11	-0.05	-0.03
east north central			-0.31*	-0.23+	-0.24+
west north central			-0.34*	-0.31*	-0.33*
south atlantic			-0.30*	-0.28*	-0.28*
east south atlantic			-0.21	-0.12	-0.10
west south central			-0.19	-0.13	-0.13
mountain			-0.11	-0.06	-0.03
pacific			-0.29*	-0.18	-0.17
number of hours worked last week			0.00	0.00	0.00
health				0.19***	0.19***
decide working hours					-0.01
paid by the hour					-0.18*
constant	2.26***	2.19***	2.58***	2.07***	2.29***
N	488	415	412	412	396

+ 0.10 * 0.05 ** 0.01 *** 0.001; robust
std err

Table 8: OLS regressions of life satisfaction.

	b1	b2	b3	b4	b5
(mosthrs-leasthrs)/usualhrs	-0.14+	-0.09	-0.09	-0.08	-0.05
r's income in constant usd	0.00+	0.00	0.00	0.00	-0.00
age			0.00	0.00	0.01
age squared			-0.00	-0.00	-0.00
married			0.34***	0.31***	0.33***
highest year of school completed			-0.02	-0.03*	-0.04**
male			0.09	0.08	0.07
number of persons in household			-0.02	-0.01	-0.02
white			0.05	0.04	0.03
professional			0.00	0.00	0.00
administrative/managerial			-0.02	-0.02	0.00
clerical			-0.15	-0.17	-0.11
sales			-0.23+	-0.25*	-0.20+
service			-0.14	-0.11	-0.08
agriculture			-0.15	-0.03	0.05
production,transport			-0.13	-0.11	0.02
craft, technical			-0.18	-0.18	-0.17
new england			0.00	0.00	0.00
middle atlantic			-0.11	-0.05	-0.04
east north central			-0.31*	-0.23+	-0.24+
west north central			-0.34*	-0.31*	-0.34*
south atlantic			-0.29*	-0.28*	-0.28*
east south atlantic			-0.20	-0.12	-0.10
west south central			-0.20	-0.13	-0.14
mountain			-0.11	-0.06	-0.03
pacific			-0.29*	-0.18	-0.18
number of hours worked last week			0.00	0.00	0.00
health				0.19***	0.19***
decide working hours					-0.01
paid by the hour					-0.18*
constant	2.24***	2.18***	2.54***	2.02***	2.24***
N	488	415	412	412	396

+ 0.10 * 0.05 ** 0.01 *** 0.001; robust
std err

Table 9: OLS regressions of life satisfaction.

but now we are cooking with gas, these next two are even more significant, think why, lonnie?

in table 10 2 days-1 wk more sig than with family income

	c1	c2	c3	c4	c5
never	0.00	0.00	0.00	0.00	0.00
-1 day	-0.06	-0.02	-0.02	0.01	0.02
2 days-1 wk	-0.20*	-0.21*	-0.24**	-0.20*	-0.21*
1 wks-	-0.15*	-0.15+	-0.15+	-0.12	-0.08
r's income in constant usd		0.00+	0.00	0.00	-0.00
age			-0.01	-0.01	0.00
age squared		0.00	0.00	-0.00	
married			0.33***	0.31***	0.32***
highest year of school completed			-0.02+	-0.03**	-0.04**
male		0.09	0.08	0.07	
number of persons in household		-0.01	-0.01	-0.01	
white		0.06	0.05	0.05	
professional		0.00	0.00	0.00	
administrative/managerial		0.00	0.01	0.02	
clerical		-0.13	-0.16	-0.11	
sales		-0.26*	-0.27*	-0.22+	
service		-0.14	-0.12	-0.07	
agriculture		-0.22	-0.11	-0.02	
production,transport		-0.17	-0.16	-0.02	
craft, technical		-0.20	-0.21+	-0.18	
new england		0.00	0.00	0.00	
middle atlantic		-0.08	-0.03	-0.01	
east north central		-0.30*	-0.23+	-0.24+	
west north central		-0.38*	-0.36*	-0.33*	
south atlantic		-0.30*	-0.28*	-0.27*	
east south atlantic		-0.19	-0.11	-0.07	
west south central		-0.17	-0.12	-0.12	
mountain		-0.09	-0.05	-0.01	
pacific		-0.29*	-0.19	-0.18	
number of hours worked last week			0.00	0.00	
health				0.18***	0.19***
decide working hours					-0.01
paid by the hour					-0.18*
constant	2.28***	2.23***	2.85***	2.35***	2.42***
N	497	418	415	415	399

+ 0.10 * 0.05 ** 0.01 *** 0.001; robust

std err

Table 10: OLS regressions of life satisfaction.

in table 11 about same sig as with fam income

	d1	d2	d3	d4	d5
schedule or shift regularly changes	-0.04	0.01	-0.00	-0.02	-0.06
daily working times are decided at short notice	-0.20+	-0.26*	-0.30**	-0.28*	-0.30**
r's income in constant usd	0.00**	0.00	0.00	-0.00	
age		-0.01	-0.01	-0.00	
age squared		0.00	0.00	0.00	
married		0.33***	0.31***	0.32***	
highest year of school completed		-0.02	-0.03*	-0.04**	
male		0.08	0.11+	0.09	
number of persons in household		-0.03	-0.01	-0.01	
white		0.00	0.02	0.03	
professional		0.00	0.00	0.00	
administrative/managerial		-0.08	-0.01	0.01	
clerical		-0.16+	-0.18+	-0.13	
sales		-0.19+	-0.23*	-0.21+	
service		-0.19+	-0.16	-0.12	
agriculture		-0.00	0.06	0.16	
production,transport		-0.21*	-0.12	0.01	
craft, technical		-0.22*	-0.18	-0.17	
new england		0.00	0.00	0.00	
middle atlantic		-0.01	-0.05	-0.03	
east north central		-0.22*	-0.24+	-0.24+	
west north central		-0.17	-0.38*	-0.37*	
south atlantic		-0.13	-0.29*	-0.28*	
east south atlantic		-0.10	-0.13	-0.11	
west south central		-0.17	-0.12	-0.14	
mountain		0.07	-0.07	-0.04	
pacific		-0.19+	-0.21	-0.19	
number of hours worked last week			0.00	-0.00	
health				0.18***	0.18***
decide working hours					-0.01
paid by the hour					-0.21**
constant	2.20***	2.14***	2.73***	2.24***	2.50***
N	751	632	628	418	396

+ 0.10 * 0.05 ** 0.01 *** 0.001; robust

std err

Table 11: OLS regressions of life satisfaction.

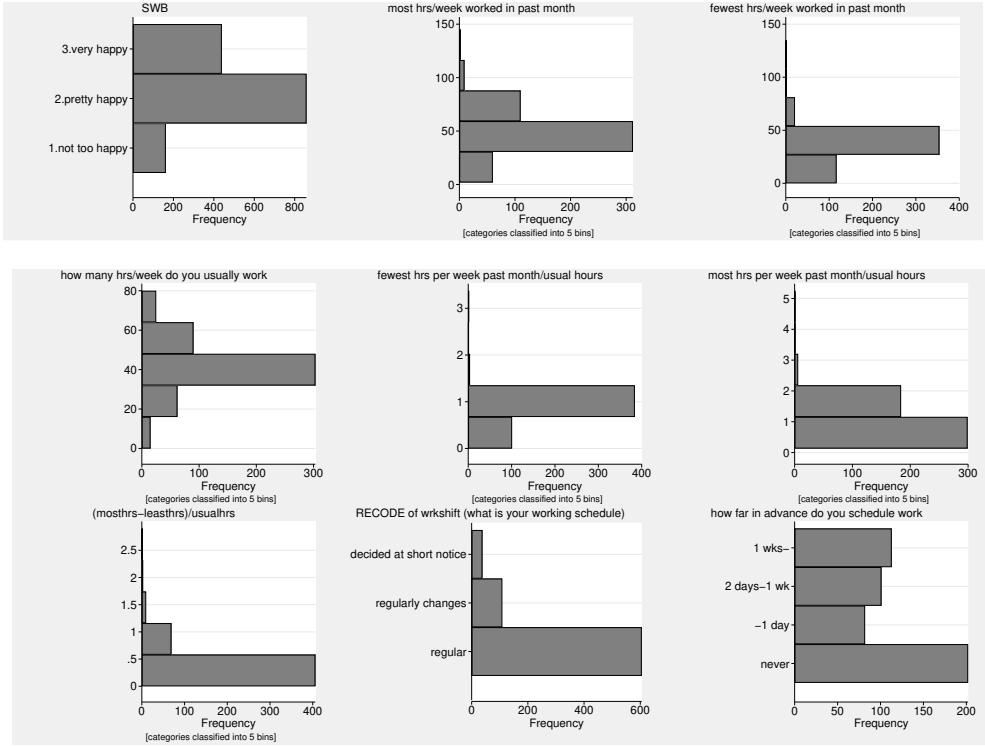


Figure 5: Variables' distribution.

3 Minor points

3.1 Additional Descriptive Statistics: Distributions of Variables

3.2 Directionality of effect from health and income to SWB

The direction of causality of some SWB determinants such as health may be disputed, i.e., whether health predicts happiness or happiness predicts health (Diener 2015). But recent evidence supports our assumption that health causing happiness is predominant (Liu et al. 2016). The same logic applies to the role of income in SWB estimation and whether it is income that predicts SWB or vice versa (Easterlin 1974, Helliwell et al. 2004). While in general it is assumed that income predicts SWB (e.g., Okulicz-Kozaryn 2011, 2016), longitudinal and (quasi) experimental designs are recommended to tackle reverse causality (Diener 1994, Helliwell et al. 2004).

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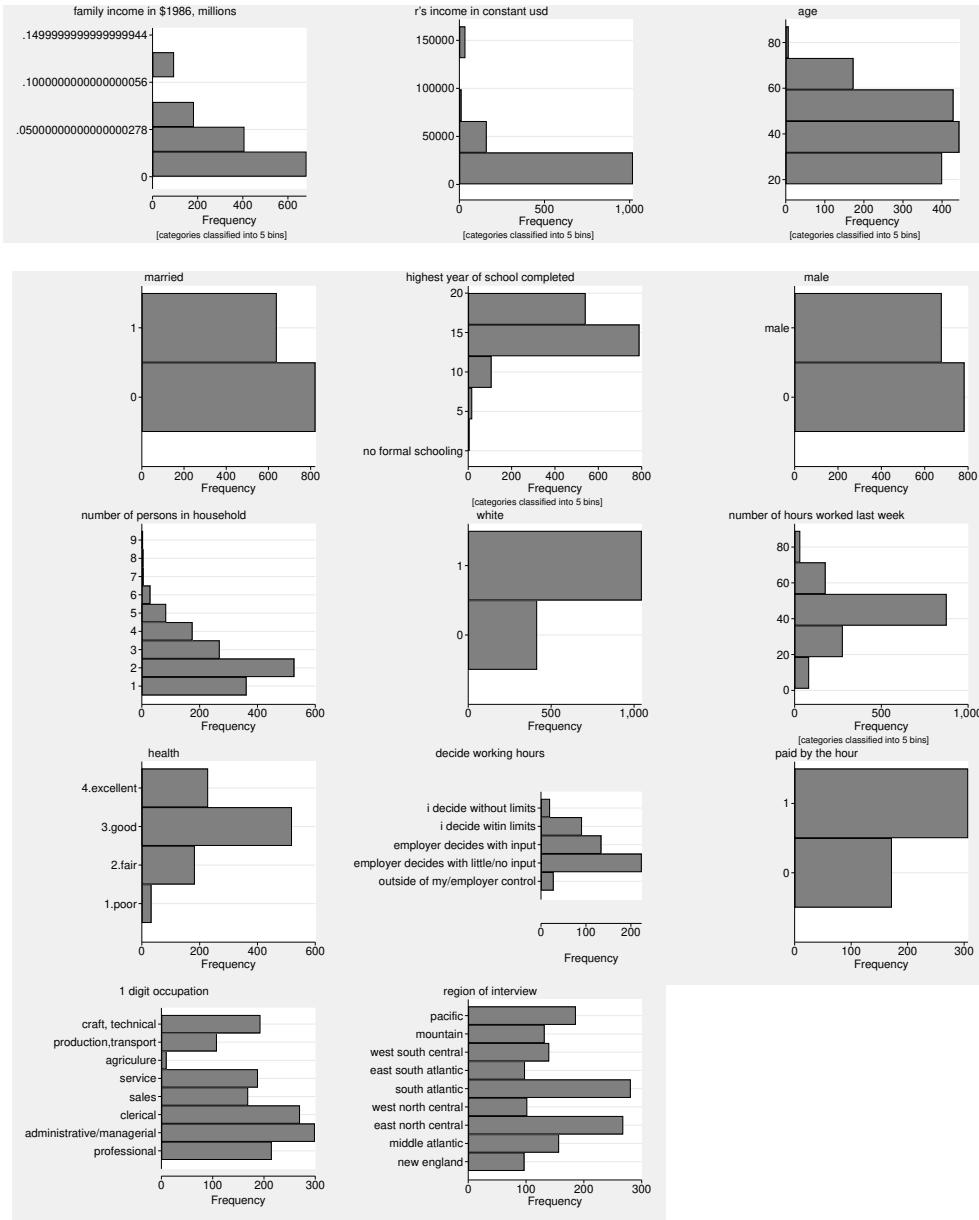


Figure 6: Variables' distribution.

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