

Olivia Larsen, Robin Park, Jacob Watt-Morse

BUT... here are some **limitations** to our study:

1. We assumed that people choose how to spend their free time.
• Is it a accurate measure of introversion?
2. Is there another factor that is correlated with both introversion and wages?
• Controlling?
3. What if introverts are worth more, but are bad at negotiation?

Population Model

log of stages = $\frac{0.0}{100}$ + incubation phase $\frac{100}{100}$ + progression of pathogen $\frac{100}{100}$ + lesions develop $\frac{0}{100}$ + time since attack $\frac{0}{100}$ + log of chance $\frac{0}{100}$ + disease severity $\frac{0}{100}$ + host plant $\frac{0}{100}$ + pathogen/number of children $\frac{0}{100}$ + age $\frac{0}{100}$ + age $\frac{0}{100}$ = 0.0000000000

- **Values** (shaped for national shape of wage curve) are affected by
 - **non-work minutes spent alone** (as measure of intervention)
- **Interventions** (to increase control for)
 - **losses of family** (partner/spouse, children)
 - **Education** (American Bar highest level of ed)
 - **Age** (age, age-squared) and **gender**
 - **Time spent alone at work** and **hours worked per week**

Broad Questions

- Are introverts more successful in the labor market than extroverts?
- Do introverts possess career-enhancing traits that extroverts lack?

We examine:

- Free time spent alone - measure of introversion
- Wages - measure of labor market value

Next Steps

To refine our current research:

- Gives the same test, race, age, level of education, and experience, what causes wage disparities?

The Motivation

Susan Cain, Author of Quiet, says:

- "There's zero correlation between being the best talker and having the best ideas"
- "If you're an introvert, you also know that the bias against quiet can cause deep psychic pain."

The Hidden Advantages of Quiet Bosses

12 Signs You're An Introvert

Summary

The implications of our findings are:

Extraverts do not have an inherent advantage over introverts in the labor market

About the Sample

Source: American Time Use Survey (2010).

- U.S. Census Bureau
- Random sample of Americans

Size: 6654 individuals

- Dropped those who do not have income/did not report wages (not in labor market)
- New size: 3381 individuals

Our Approach

Strengths:

- Randomly sampled data
 - Weights
 - Is time alone an accurate proxy for intervention?
- Predominant trait of intervents: voluntary time alone**

Weaknesses:

- Can we realistically measure social skills
 - Might be correlated with time spent alone and wages
- Can we take non-work time to be chosen to be spent by an individual?
 - What about other obligations?

Results

Analysis	Study and Publication	Significance (p-value)
Frequency of visits (patients)	0.0000	0.0000
Frequency of visits (physicians)	0.0000	0.0000
Frequency of visits (patients)	0.0000	0.0000
Frequency of visits (physicians)	0.0000	0.0000
Frequency of visits (patients)	0.0000	0.0000
Frequency of visits (physicians)	0.0000	0.0000

Summary Table

表 1 各縣(市)人口、人口密度、人口增長率、人口自然增長率、人口總量、人口總量增長率、人口總量自然增長率						
縣(市)	人口總量	人口總量增長率	人口總量自然增長率	人口總量	人口總量增長率	人口總量自然增長率
總計	117,450,000	1.15%	0.75%	117,450,000	1.15%	0.75%
北京市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
天津市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
上海市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
重慶市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
成都市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
長沙市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
武汉市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
南京市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
杭州市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
蘇州市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
無錫市	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
鎮江	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
揚州	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
南通	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
徐州	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
蚌埠	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
蕪湖	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
安慶	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
九江	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
南昌	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
長沙	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
衡陽	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
常德	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
益陽	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
湘潭	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
株洲	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
衡陽	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
邵陽	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
岳陽	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
常德	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
益陽	1,174,500	1.15%	0.75%	1,174,500	1.15%	0.75%
湘潭	1,174,500	1.15%	0.75%	1		

Regression Table

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Constant	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Age	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Gender	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Marital status	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Income	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Education	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Health	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Religion	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Occupation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Family size	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Urban/rural	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Region	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Time	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Adjusted R ²	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Introversion in Economics

Measures in all four categories:

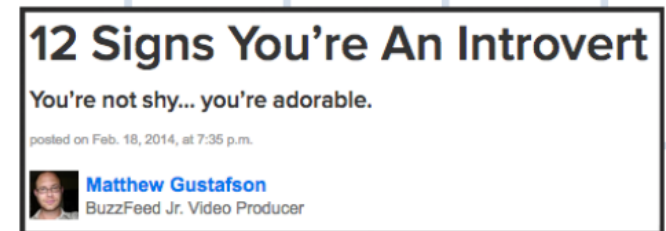
- Get study over questionable data for intervention for time spent alone

The Motivation

Susan Cain, Author of Quiet, says:

- *"There's zero correlation between being the best talker and having the best ideas"*
- *"If you're an introvert, you also know that the bias against quiet can cause deep psychic pain."*

But recently...



(Buzzfeed)



(inc.com)

Introversion in Economics

Measures in other research:

- Myers-Briggs (Ziegert and Sullivan 1999)
- Surveys (Monahan, Shah, and Jochum 2013)
- "Big Five" surveys (Lenton 2014, Mueller and Plug 2006, Nyhus and Pons 2005)

Our study uses quantifiable data for introversion: free time spent alone

Broad Questions

- *Are introverts more successful in the labor market than extroverts?*
- *Do introverts possess career-enhancing traits that extroverts lack?*

We examine:

Free time spent alone - measure of introversion

Wages - measure of labor market value

Population Model

$\log \text{ of wages} = \beta_0 + \text{minutes alone} * \beta_1 + \text{presence of partner} * \beta_2 + \text{hours worked} * \beta_3 + \text{time alone at work} * \beta_4 + \text{high school} * \beta_5 + \text{associates} * \beta_6 + \text{bachelors} * \beta_7 + \text{presence/number of children} * \beta_8 + \text{age} * \beta_9 + \text{age}^2 * \beta_{10} + \text{sex} * \beta_{11} + u$

We are interested in

- **wages** (logged for natural shape of wage curve)
as affected by
- **non-work minutes spent alone** (as measure of introversion)

We control for

- **Presence of family** (partner/spouse, children)
- **Education** (dummies for highest level of educ)
- **Age** (age, age-squared) and **gender**
- **Time spent alone at work** and **hours worked per week**

About the Sample

Data: **American Time Use Survey (2010)**

- **U.S. Census Bureau**
- **Random sample of Americans**

Size: **6654 individuals**

- **Dropped those who do not have income/did not report wages (not in labor market)**
- *New size:* **3381 individuals**

Our Approach

Strengths:

- Randomly sampled data
- Weights
- Is *time alone* an accurate proxy for introversion?

Predominant trait of introverts: voluntary time alone

Weaknesses:

- Cannot holistically measure social skills

Might be correlated with time spent alone and wages

- Can we take non-work time to be *chosen* to be spent by an individual?

What about other obligations?

Results

Variables	Coefficient	Standard Error	Significant at 0.05?
<i>Time spent alone (without age)</i>	0.000178	5.11e-05	YES
<i>Time spent alone (with age)</i>	2.63e-05	5.05e-05	NO
<i>Time spent alone (female)</i>	-1.53e-05	7.25e-05	NO
<i>Time spent alone (male)</i>	7.82e-05	7.10e-05	NO

Null Hypothesis:
Time spent alone
has no affect on
wages

Summary

The implications of our findings are:

Introversion does not affect wages

Introverts do not have an inherent advantage over extroverts in the labor market

*BUT...here are some **limitations** to our study:*

1. We assumed that people choose how to spend their free time.

- Is it an accurate measure of introversion?

2. Is there another factor that is correlated with both introversion and wages?

- Overcontrolling?

3. What if introverts are worth more, but are bad at negotiation?

Next Steps

To refine our current research:

- Control for other personality traits (such as confidence or beauty)

An even broader question (what we ultimately want to know):

- Given the same sex, race, age, level of education, and experience, what causes wage disparities?

Summary Table

Table 2: Weighted Summary Statistics

Variable	Obs	Weight	Mean	Std. Dev	Min	Max
log of hourly wage	3381	2.3522e+10	2.637	.522	0	4.605
minutes per day spent alone	3381	2.3522e+10	239.498	204.459	0	1260
total hours usually worked per week	3381	2.3522e+10	37.291	11.567	0	100
minutes per day spent alone at work	3381	2.3522e+10	56.117	152.248	0	990
1 if high school degree is highest educational attainment	3381	2.3522e+10	.582	.493	0	1
1 if associate's degree is highest educational attainment	3381	2.3522e+10	.108	.310	0	1
1 if received bachelor's degree or higher	3381	2.3522e+10	.196	.397	0	1
1 if male	3381	2.3522e+10	.503	.500	0	1
1 if partner or spouse is in household	3381	2.3522e+10	.551	.497	0	1
number of children in household	3381	2.3522e+10	.844	1.166	0	10
1 if child is in household	3381	2.3522e+10	.448	.497	0	1
Age	3381	2.3522e+10	38.330	12.935	18	64
Age squared	3381	2.3522e+10	1636.432	1031.212	324	4096

Regression Table

Variables	(1) log hourly wage	(2) log hourly wage	(3) log hourly wage	(4) log hourly wage	(5) log hourly wage	(6) log hourly wage female	(7) log hourly wage male
time spent alone	0.000186*** (3.89e-05)	0.000178*** (5.11e-05)	3.82e-05 (5.07e-05)	2.63e-05 (5.05e-05)	3.28e-05 (5.06e-05)	-1.53e-05 (7.25e-05)	7.82e-05 (7.10e-05)
weekly hours worked	0.00788*** (0.000736)	0.00994*** (0.00103)	0.00842*** (0.00102)	0.00757*** (0.00104)	0.00760*** (0.00104)	0.00682*** (0.00164)	0.00799*** (0.00129)
time spent alone at work	5.25e-05 (5.79e-05)	0.000121* (6.64e-05)	7.01e-05 (7.14e-05)	6.21e-05 (7.19e-05)	6.30e-05 (7.22e-05)	6.82e-05 (8.79e-05)	7.69e-05 (0.000102)
age			0.00959*** (0.000949)	0.0395*** (0.00538)	0.0384*** (0.00534)	0.0396*** (0.00747)	0.0381*** (0.00770)
age squared				-0.000376*** (6.53e-05)	-0.000360*** (6.46e-05)	-0.000373*** (9.00e-05)	-0.000355*** (9.47e-05)
highest education high school	0.216*** (0.0276)	0.209*** (0.0258)	0.214*** (0.0254)	0.208*** (0.0260)	0.213*** (0.0257)	0.197*** (0.0355)	0.230*** (0.0359)
highest education associate's degree	0.435*** (0.0335)	0.402*** (0.0402)	0.388*** (0.0398)	0.372*** (0.0400)	0.376*** (0.0399)	0.430*** (0.0491)	0.306*** (0.0652)
graduated with bachelor's degree	0.626*** (0.0309)	0.605*** (0.0361)	0.623*** (0.0357)	0.602*** (0.0362)	0.609*** (0.0358)	0.656*** (0.0473)	0.557*** (0.0523)
sex	0.114*** (0.0169)	0.0810*** (0.0212)	0.105*** (0.0208)	0.104*** (0.0207)	0.105*** (0.0209)		
partner in home dummy	0.157*** (0.0174)	0.206*** (0.0228)	0.107*** (0.0243)	0.0868*** (0.0241)	0.0820*** (0.0242)	0.0551* (0.0316)	0.0962*** (0.0369)
number of children	-0.00728 (0.00751)	-0.0169* (0.00950)	0.00622 (0.0102)	-0.00556 (0.00972)			
household child dummy					0.00815 (0.0228)	-0.0338 (0.0342)	0.0408 (0.0310)
Constant	1.896*** (0.0407)	1.793*** (0.0489)	1.537*** (0.0559)	1.073*** (0.102)	1.073*** (0.103)	1.115*** (0.153)	1.136*** (0.135)
Observations	3,381	3,381	3,381	3,381	3,381	1,886	1,495
R-squared	0.215	0.247	0.290	0.299	0.299	0.314	0.284

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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The Effect of Introversion on Income

Olivia Larsen, Robin Park, Jacob Watt-Morse

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→ Is it an accurate measure of introversion?
2. Is there another factor that is correlated with both introversion and wages?
→ Overcontrolling?
3. What if introverts are worth more, but are bad at negotiation?

Population Model

$\log(\text{wages}) = \beta_0 + \beta_1 \text{introversion} + \beta_2 \text{personality} + \beta_3 \text{hours worked} + \beta_4 \text{time spent alone} + \beta_5 \text{time spent with others} + \beta_6 \text{education} + \beta_7 \text{experience} + \beta_8 \text{age} + \beta_9 \text{gender} + \epsilon$

- We are interested in:
- wages (logged for natural shape of wage curves)
 - introversion (as measured by time spent alone vs. time spent with others)
 - non-work introversion (as measure of introversion)
- We control for:
- Presence of family (partner/spouse, children)
 - Education (dummy for highest level of ed)
 - Age (age, age squared) and gender
 - Time spent alone at work and hours worked per week

Broad Questions

- Are introverts more successful in the labor market than extroverts?
- Do introverts possess career-enhancing traits that extroverts lack?

We examine:

Free time spent alone - measure of introversion
Wages - measure of labor market value

Next Steps

- To refine our current research:
- Control for other personality traits (such as confidence or beauty)
- An even broader question (what we ultimately want to know):
- Given the same sex, race, age, level of education, and experience, what causes wage disparities?

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Susan Cain, Author of Quiet, says:

- "There's zero correlation between being the best talker and having the best ideas"
- "If you're an introvert, you also know that the bias against quiet can cause deep psychic pain."

But recently...

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by Susan Cain, author of Quiet

12 Signs You're An Introvert
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It Turns Out Introverts Make Better Mothers
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Summary

The implications of our findings are:

Introversion does not affect wages
Introverts do not have an inherent advantage over extroverts in the labor market

About the Sample

Data: American Time Use Survey (2010)

- U.S. Census Bureau
- Random sample of Americans

Size: 6654 individuals

- Dropped those who do not have income/did not report wages (not in labor market)
- New size: 3381 individuals

Summary Table

Table 1: Project Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.
log(wages)	3.82	0.18	2.50	4.50
introversion	0.15	0.35	0.00	1.00
personality	0.15	0.35	0.00	1.00
hours worked	35.00	10.00	0.00	70.00
time spent alone	1.50	1.50	0.00	7.00
time spent with others	5.50	1.50	0.00	7.00
education	12.00	2.00	0.00	16.00
experience	10.00	5.00	0.00	30.00
age	35.00	10.00	0.00	70.00
gender	0.50	0.50	0.00	1.00

Our Approach

Strengths:

- Randomly sampled data
- Weights
- Is time alone an accurate proxy for introversion?

Predominant trait of introverts: voluntary time alone

Weaknesses:

- Cannot holistically measure social skills
- Might be correlated with time spent alone and wages
- Can we take non-work time to be chosen to be spent by an individual? What about other obligations?

Results

Variable	Coefficient	Standard Error	Significant at 0.001
log(wages)	0.200176	0.110455	YES
introversion	-0.000000	0.000000	NO
personality	-0.000000	0.000000	NO
hours worked	0.000000	0.000000	NO
time spent alone	0.000000	0.000000	NO
time spent with others	0.000000	0.000000	NO
education	0.000000	0.000000	NO
experience	0.000000	0.000000	NO
age	0.000000	0.000000	NO
gender	0.000000	0.000000	NO

Null Hypothesis:
Time spent alone has no effect on wages

Introversion in Economics

- Measures in other research:
- Myers-Diogen and Sullivan (1999)
- Myers-Diogen, Shih, and Sullivan (2008)
- "Big Five" survey (Sutton 2004, Mueller and Papp 2005, Hyman and Pines 2005)

Our study uses quantifiable data for introversion: free time spent alone