

Is Substance Use Related to Gender Identity?

{ Shannon Keenan

{ Gender Identity

- ⌘ Same Sex Gender Identity- How one relates to own gender
- ⌘ Expressivity- “feminine” traits, expressive and communal
- ⌘ Instrumentality- “masculine” traits, competitive, independent
- ⌘ Likert Scale- Personal Attributes Questionnaire

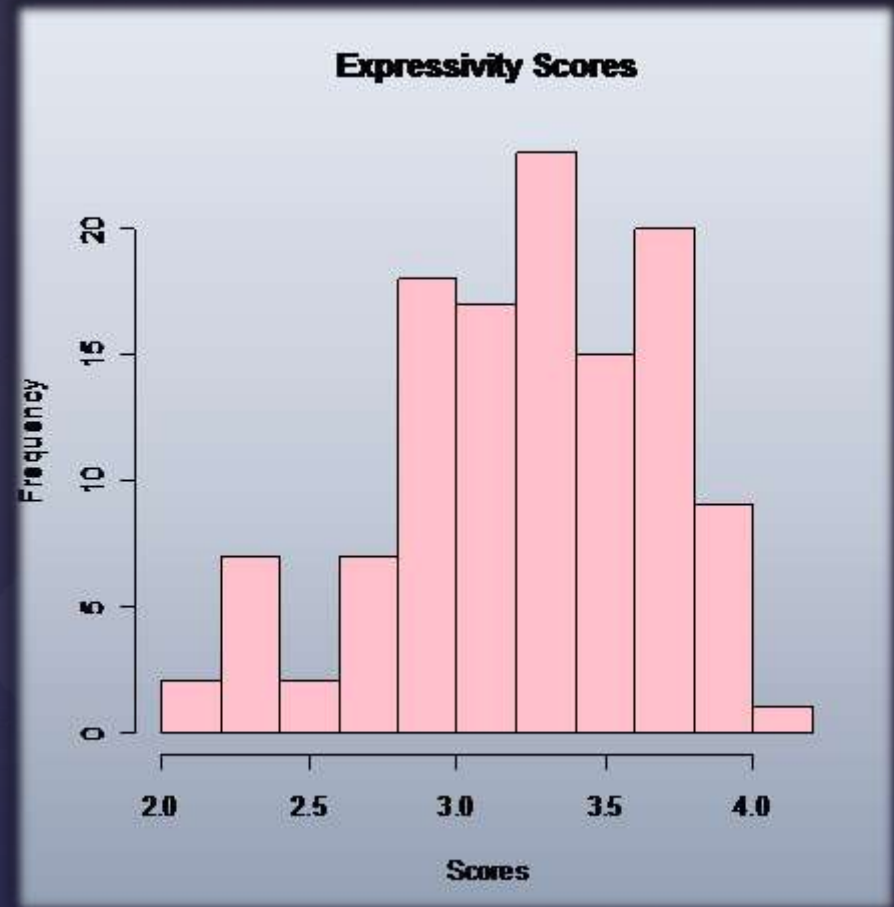
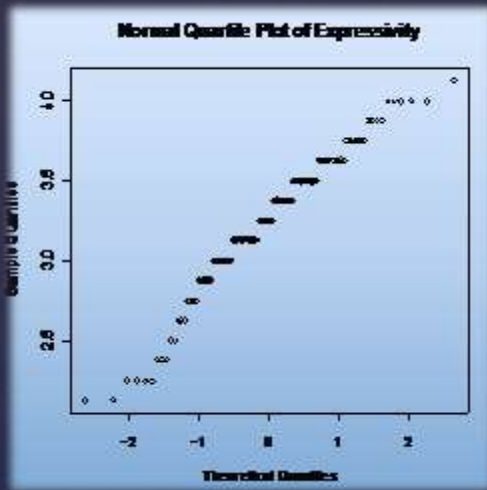
{ Substance Use

- ⌘ Weekly average marijuana use on scale
- ⌘ Weekly average marijuana use write-in
- ⌘ Weekly average alcohol use on scale
- ⌘ Weekly average alcohol use write-in

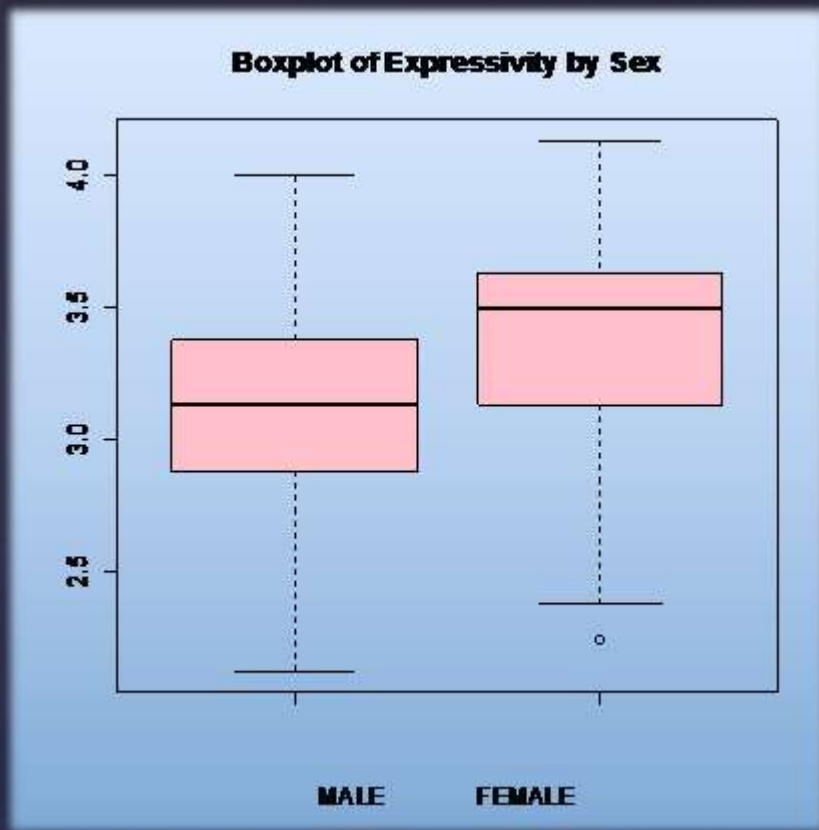
Variables

Expressivity Scores

	N	Mean	Standard Deviation
Female	57	3.377344	0.4004293
Male	64	3.097193	0.4519156



Expressivity



T-TEST, Expressivity by Sex,

$H_0: \mu_1 = \mu_2$

$H_A: \mu_1 \neq \mu_2$

$t = -3.5904$,

$p\text{-value} = 0.0004903^{***}$,

Reject null hypothesis

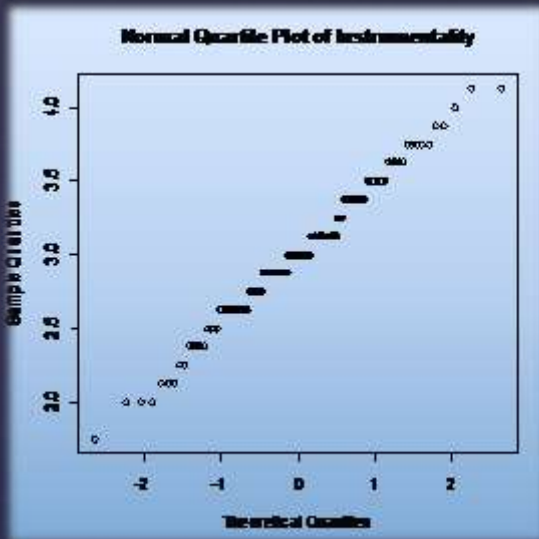
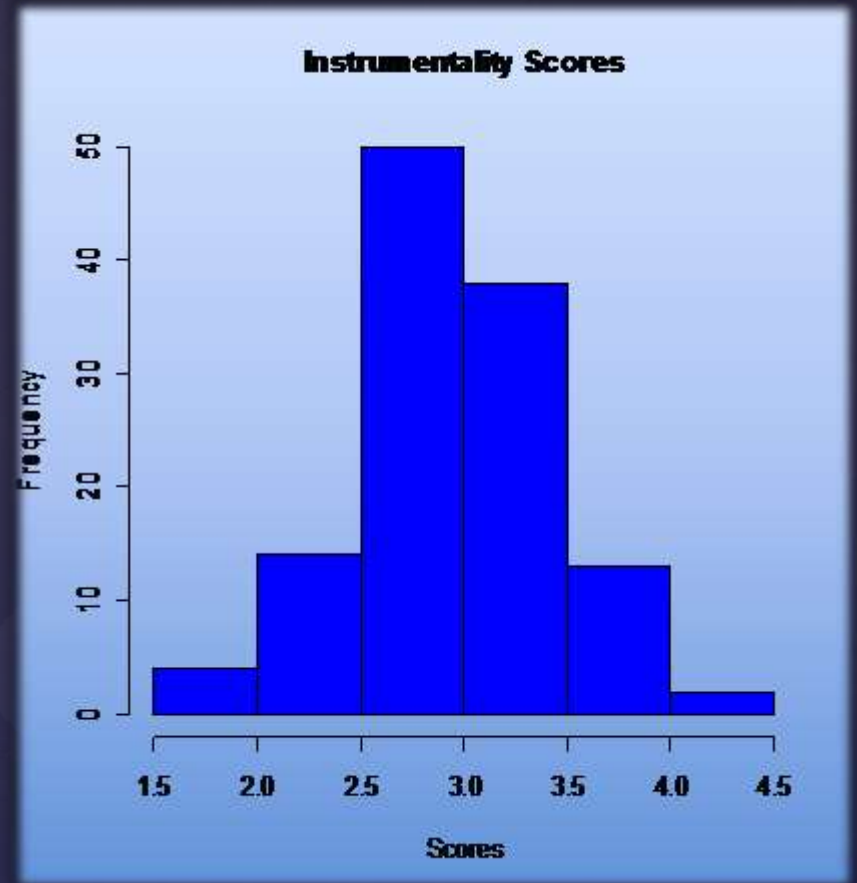
95 percent confidence interval:

$-0.4347419, -0.1255597$

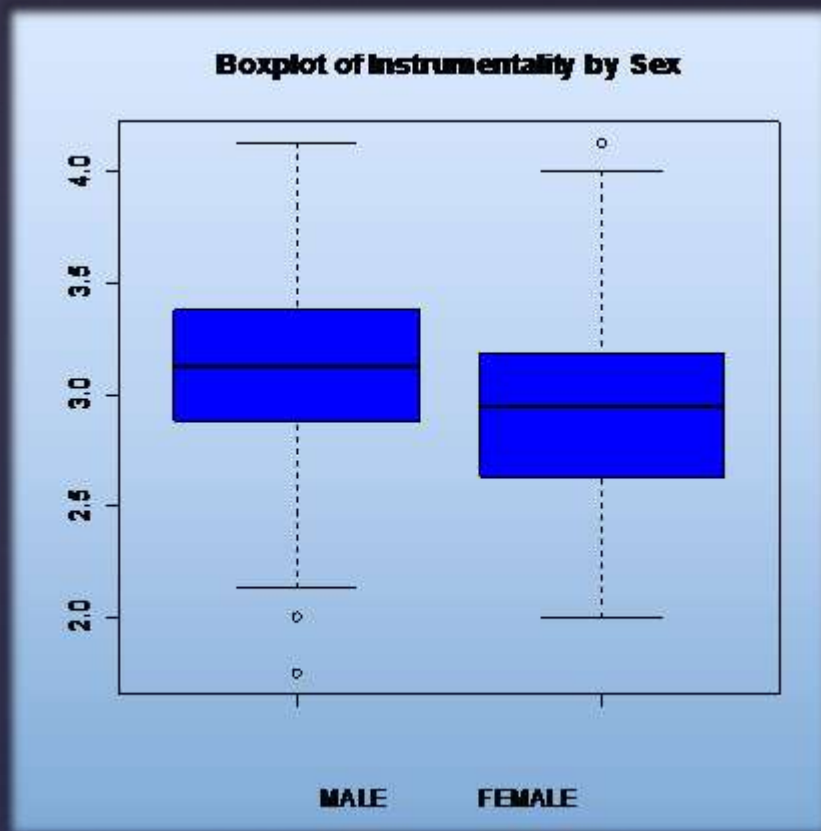
Expressivity

Instrumentality Scores

	N	Mean	Standard Deviation
Female	57	2.947812	0.4594941
Male	64	3.073684	0.4991654



Instrumentality



T-Test Instrumentality by Sex

$H_0: \mu_1 = \mu_2$

$H_A: \mu_1 \neq \mu_2$

$t = 1.4496,$

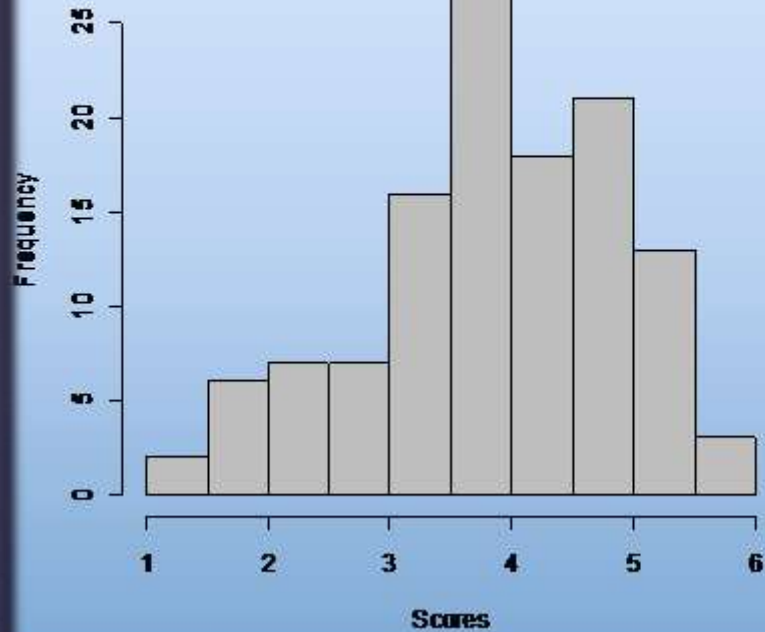
$p\text{-value} = 0.1499,$ fail to reject H_0

95 percent confidence interval:

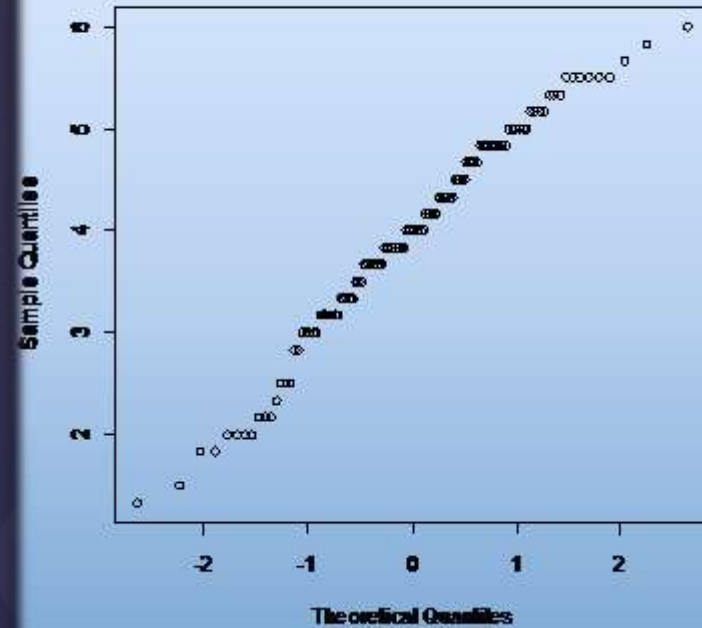
$-0.04612362, 0.29786704$

Instrumentality

Same Sex Gender Identity Scores



Normal Quartile Plot of Same Sex Gender Identity



Same Sex Gender Identity

Marijuana Use By Sex		
MJ Weekly Use	MALE	FEMALE
0	29	45
1	5	9
2	3	4
3	3	2
>3 times	17	4

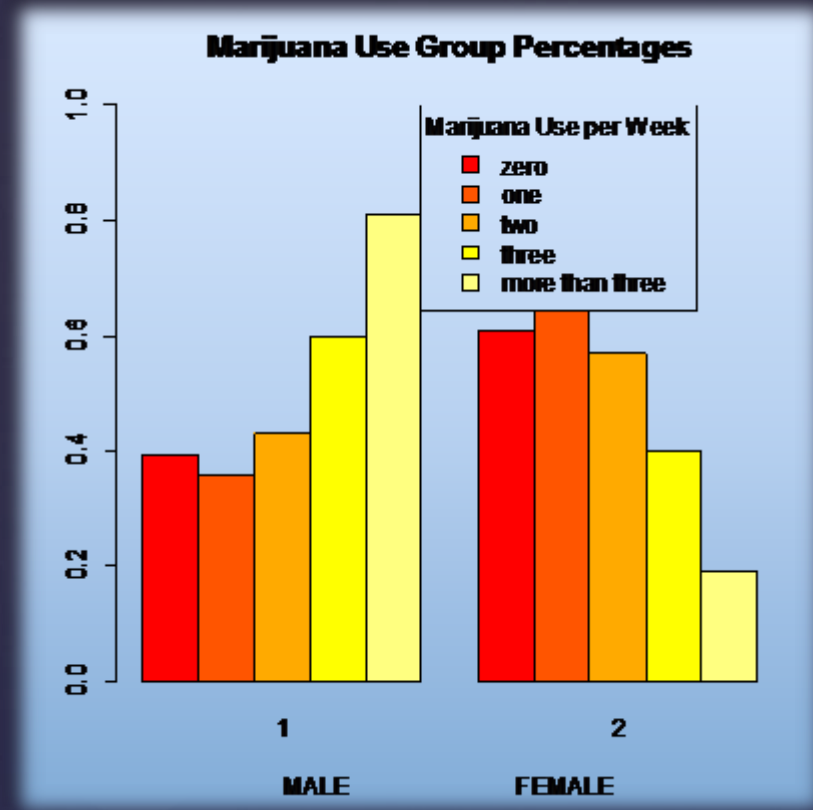
Exact Test for Count Data

H₀: relative proportions of variables are independent

H_a: relative proportions of variables are not independent

p-value = 0.008275**

reject null hypothesis



Weekly Marijuana Use by Sex

Alcohol Use By Sex		
MJ Weekly Use	MALE	FEMALE
0	19	27
1	16	22
2	9	9
3	11	6
>3 times	2	0

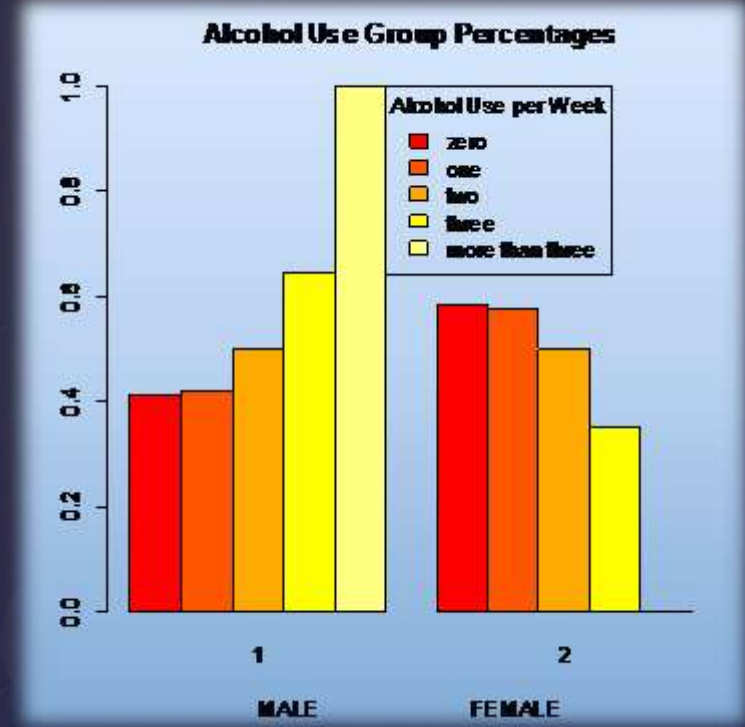
Exact Test

H₀: relative proportions
independent

H_a: relative proportions not
independent

p-value = 0.271

fail to reject null hypothesis



Weekly Alcohol Use by Sex

- ⌘ T-Test :Weekly Substance Use by Sex
- ⌘ $H_0: \mu_1 = \mu_2$
 $H_A: \mu_1 \neq \mu_2$
- ⌘ $t = 3.9091$,
p-value = 0.0002207
reject null hypothesis

Substance Use by Sex			
	N	Mean	Std. Dev.
Male	64	5.3509	6.912
Female	57	1.6094	2.2083



Substance Use by Sex

Multiple Linear Regression:

Weekly Marijuana Use = $8.4970 - 1.0727 * \text{Same Sex Gender ID} - 3.8785 * \text{Gender}$

Male = 0, female = 1

Summary of Multiple Regression						
	Intercept	Standard Error	t-value	p-value	Lower bound 95%	Upper bound 95%
Intercept	8.497	1.8491	4.595	0.00001	4.835243	12.158773
Same Sex Gender ID	-1.0727	0.4057	-2.644	0.0093	-1.876104	-0.2693592
Sex	-3.87885	0.833	-4.656	0.000008	-5.528047	-2.2288918

Predicting Weekly Marijuana Use

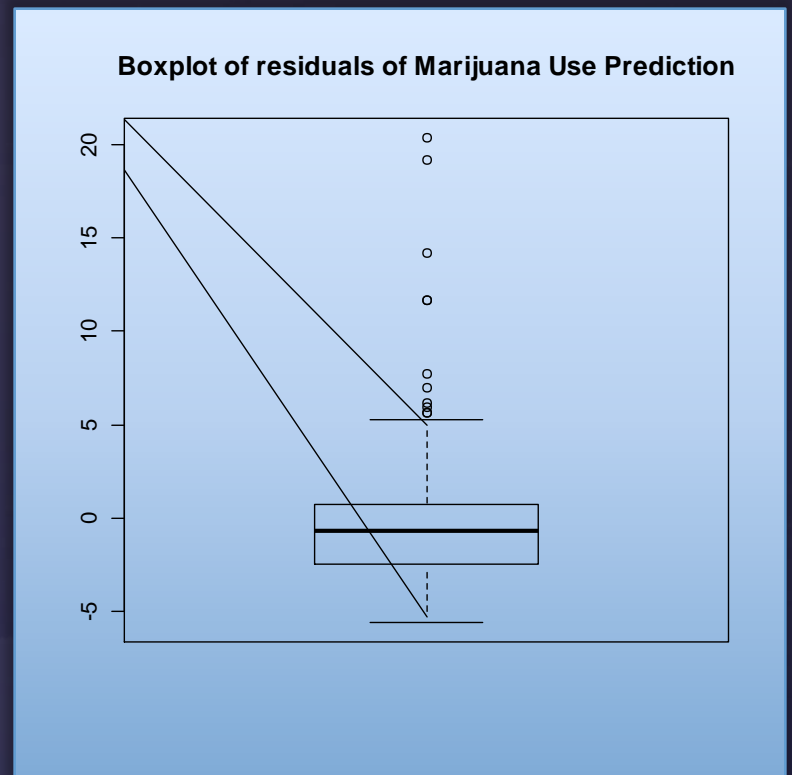
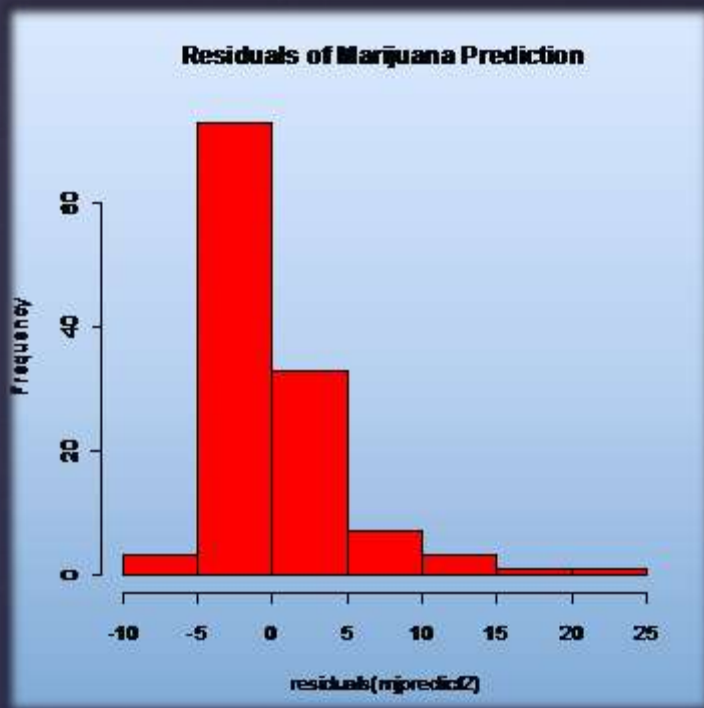
Multiple R-squared: 0.1618,

H_0 : all $B_1 = B_2 = 0$

H_a : at least one B_i does not equal 0

F-statistic: = 1.39

p-value: $2.996e-05$, reject null



Predicting Weekly Marijuana Use

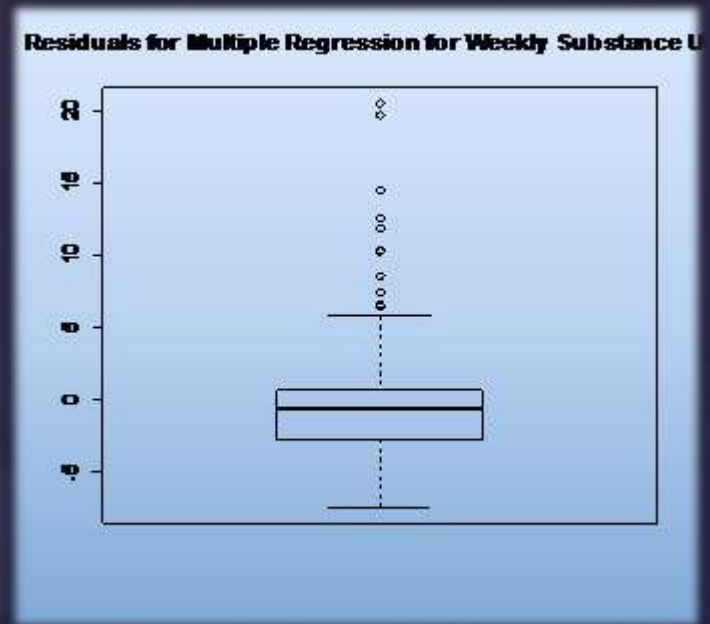
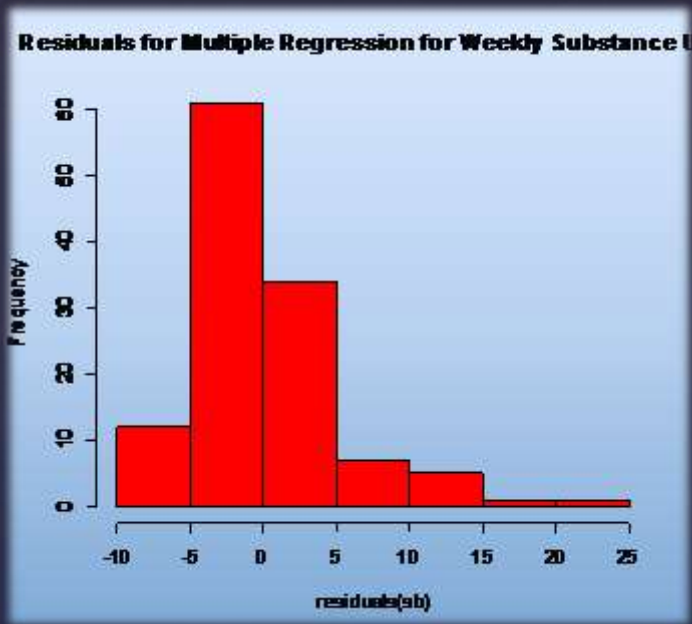
Weekly substance use = $16.4183 - 1.2150 * (\text{Same Sex Gender ID}) - 1.8854 * (\text{Instrumentality}) - 4.8695 * (\text{Sex})$

Summary of Multiple Regression						
	Estimate	Std. Error	t-value	P-Value	Lower bound 95%	Upper bound, 95%
Intercept	16.4183	3.588	4.576	0.0000119	9.385921	23.4506436
Same Sex Gender ID	-1.215	-1.215	0.4592	0.00927	-2.115013	-0.3150017
Sex	-4.8695	0.9509	-5.121	0.00000121	-6.733214	-3.0057455
Instrumentality	-1.8854	0.9335	-2.02	0.04569	-3.714994	-0.0558069

Predicting Weekly Substance Use

Multiple R-squared: 0.1981,
 $H_0: B_1 = B_2 = B_3 = 0$
 H_a : at least one B_i does not equal 0
 F-statistic: 9.633
 p-value: $9.845e-06$, reject H_0

Weekly substance use = $16.4183 - 1.2150 * (\text{Same Sex Gender ID}) - 1.8854 * (\text{Instrumentality}) - 4.8695 * (\text{Sex})$



Predicting Weekly Substance Use

$\ln(\text{odds}) = 1.173 - 0.10051 * \text{Same Sex Gender ID} - 0.21677 * \text{Sex}$
 Male=0, Female=1

Logistic Regression Summary				
	Estimate	Std. Error	Z-value	Z-value
Intercept	2.4417	0.9825	2.485	0.012947
Same Sex Gender ID	-0.5364	0.2157	-2.486	0.012903
Sex	-1.508	0.4492	-3.356	0.000792

$$P = \frac{1}{1 + e^{-1.173 - 0.10051 * \text{Same Sex Gender ID} - 0.21677 * \text{Sex}}}$$

Multiple Logistic Regression for Marijuana User

Odds of using
 Marijuana = 0.6575342

$\text{Log(odds)} = 3.1558 - 0.4804 * (\text{Same Sex Gender ID}) - 1.0203 * \text{Sex}$
 Male=0, Female=1

Logistic Regression Summary				
	Estimate	Std. Error	t-value	P-value
Intercept	3.1558	1.0304	3.063	0.00219
Same Sex Gender ID	-0.4804	0.2182	-2.182	0.02772
Sex	-1.0203	0.4387	-2.326	0.02004

$$P = \frac{1}{1 + e^{-3.1558 - 0.4804 * (\text{Same Sex Gender ID}) - 1.0203 * \text{Sex}}}$$

Multiple Logistic Regression for Substance User

Odds of being a substance user = 1.95122

Log(odds)=3.8862-0.4804*(instrumentality)-1.6769*(Sex)
 Male=0,female=1

Logistic Regression Summary				
	Estimate	Std. Error	t-value	P-value
Intercept	3.8862	2.0263	1.916	0.05513
Instrumentality	-0.4804	1.0796	-3.099	0.00194
Sex	-1.6769	0.6845	-2.45	0.0143

$$P = \frac{1}{1 + e^{-3.8862 - 0.4804 * (\text{instrumentality}) - 1.6769 * (\text{Sex})}}$$

Multiple Logistic Regression for High Marijuana Use

Odds of using marijuana more than 7 times per week
 = 0.1415094

⌘ **No Simple Linear Regression:**

in the presence of other variables Expressivity, Sex and Same Sex Gender Identity are good predictors;
not on their own

⌘ **Hard to predict alcohol use**

⌘ **No significant ANOVA** creating categories within the explanatory variables shows no significant conclusion

⌘ **No Significant Rank Test**

Unsuccessful Models

- ⌘ Multiple models show an increase in Same Sex Gender ID decreases substance use
- ⌘ Multiple models show significant difference in substance use by sex
- ⌘ An increase in instrumentality score predicts lower substance use
- ⌘ Combining marijuana and alcohol to get substance use can provide insight

Conclusions

Thank you!

- ⌘ Dr. Clare Mehta
- ⌘ Dr. Yulia Dementieva
- ⌘ <http://luna.cas.usf.edu/~mbrannic/files/regression/Logistic.html>
- ⌘ <http://www.myoops.org/twocw/jhsph/courses/StatisticalReasoning2/PDFs/Lecture8.pdf>