

PSYCHOLOGY-ITALY

REPORT

Aim of the study:

- The primary aim of the study is to test the associations of religious orientations: Extrinsic, Intrinsic, Quest; and secularism of state with individuals' attitudes towards pre-implantation genetic diagnosis, embryonic stem cell research, same sex marriage and adoption by same sex couples.
- The other aim of the study is to test the mediating effects of secularism of state on the relationship between religious orientation and PGD.

Relevant population:

The relevant population of our study consists of the Catholics born and living in Italy aged between 18-70 years.

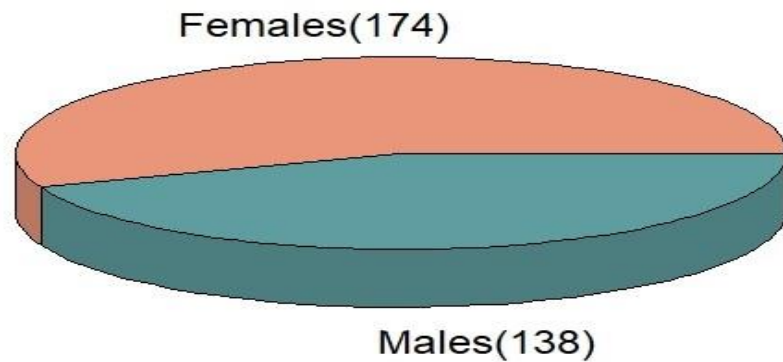
Sample:

The sample consists of 312 Catholics who were individually recruited in different places.

[Note: The work added by us is marked with *.]

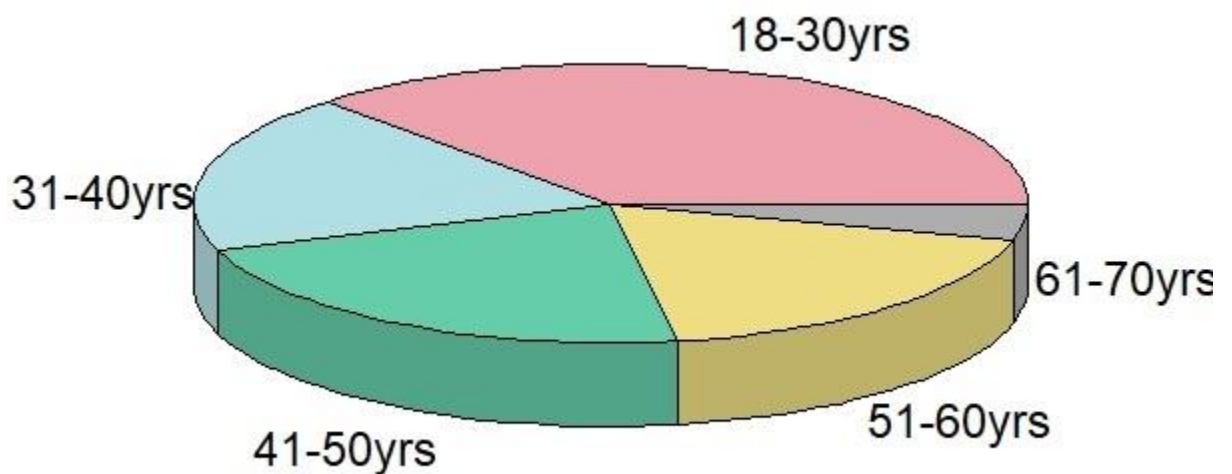
Sample Composition*:

➤ Based on Gender



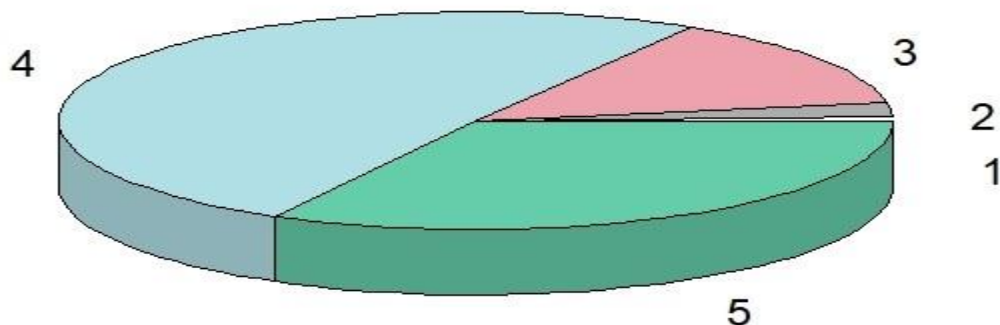
- Our Sample consisted of 174 females(i.e.55.77% of the total sample) and 138 males(i.e.44.33%of the total sample).

➤ Based on Age



- Sample consists of 115 (36.9%) individuals of 18-30 years, 58(18.6%) individuals of 31-40 years, 69(22.1%) individuals of 41-50 years, 57(18.3%) of 51-60 years and 13(4.2%) individuals of 61-70 years.
- Mean age of the sample is 38.50.
- From this pie chart, we can clearly see that the sample is not random, there is a selection bias in the study based on age.
- We hypothesize that this bias must have occurred due to the fact that the data was collected by recruiting individuals at specific places.

➤ Based on Education



- Sample consists of:
 1. 2 (0.6%) have 'No qualification'
 2. 6(1.9%) have 'Primary School Diploma'
 3. 43(13.8%) have 'Secondary School Diploma'
 4. 158(50.6%) have 'High School Diploma'
 5. 103(33.0%) have 'Degree'
- Modal education is '4'.

Data Collection:

- Data was collected using questionnaire.
- To measure each variable, multiple questions were included from different scales.
- Participants provided their answers to each question on a 7-point scale ranging from 1-7 where 1 is 'not describing me at all' and 7 is 'describing me very well.'
- All participants were informed that their responses would remain private.

Measures Included:

1. Data was collected for the following variables:

- Religious orientations
 - Secularism
 - Fundamentalism
 - Desirability
 - Pre-implantation genetic diagnosis (PGD)
 - Same-sex marriage (SSM)
 - Embryonic stem cell research (ESCR)
 - Adoption by same-sex couples
- *Though the data collected included all these variables but the paper only presents analysis of PGD with respect to intrinsic, extrinsic, quest and secularism.*

Now, we will define the different independent variables.

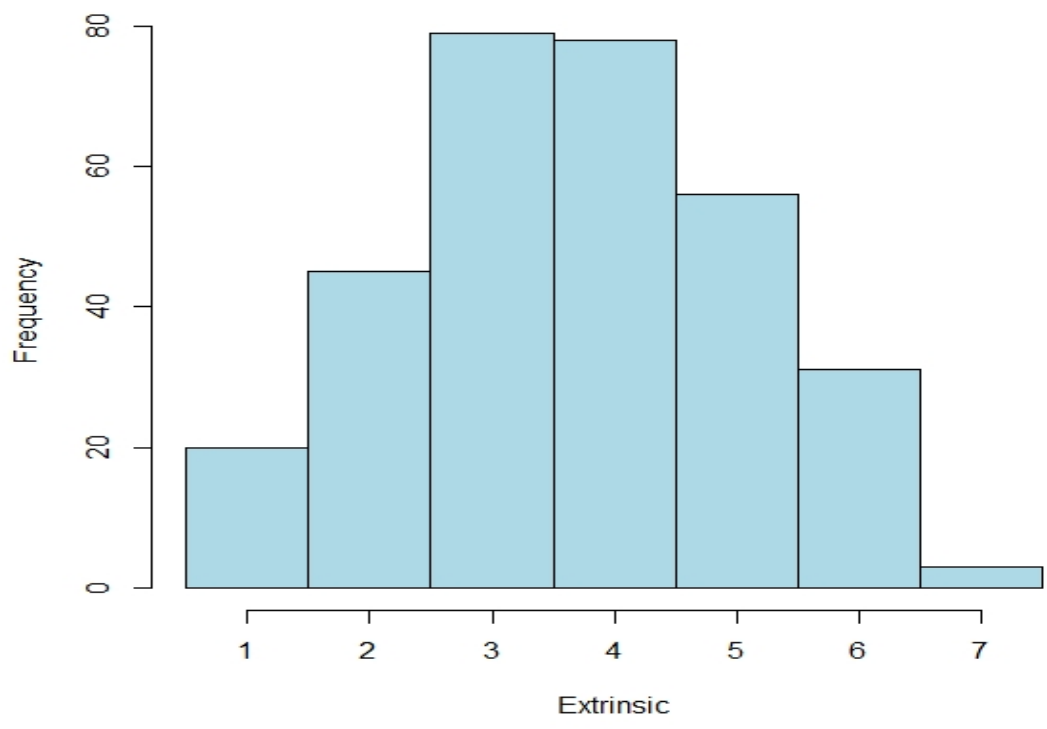
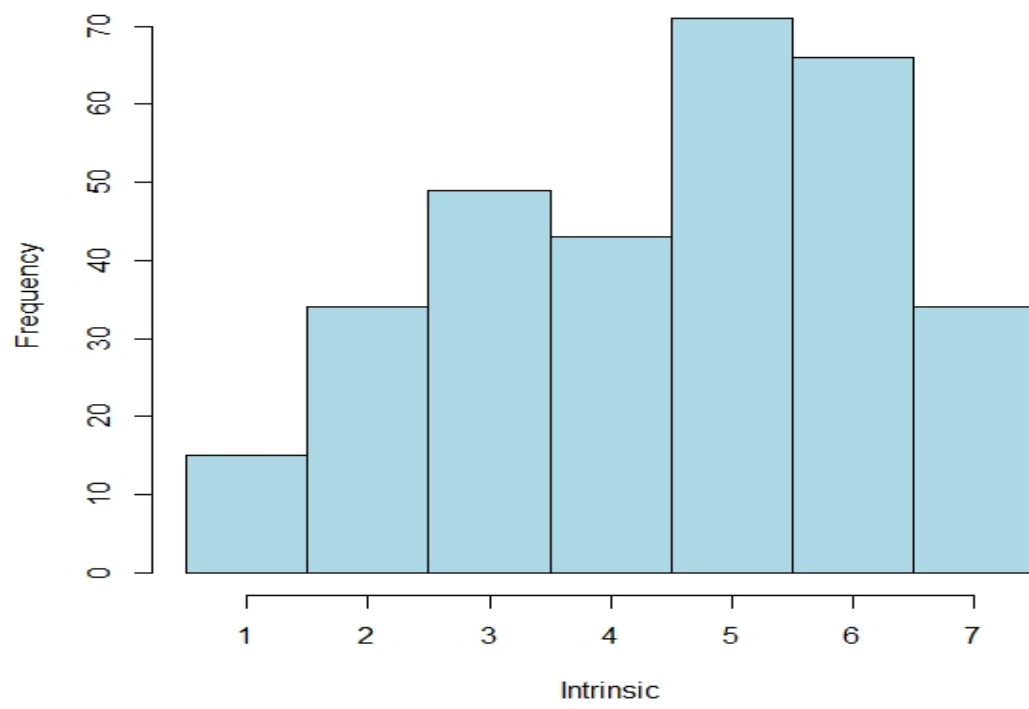
1. Religious Orientations: To understand relationship between religion and other variables, we have considered 3 types of religious orientations:-
 - i. Intrinsic- It is mature and internalized form of religiosity. Such people consider religion as principle reason of their life.
 - ii. Extrinsic-It is an immature form of religion where people use religion to achieve non-religious ends.
 - iii. Quest-This is an open and interrogative approach to religion. People of this dimension recognize that they “do not know” the truth about religious issues.
2. Secularism-This refers to the absence of religious involvement in government matters and the absence of political involvement in religious matters.
3. Fundamentalism-It is a conservative religious belief characterized by the advocacy of strict conformity to sacred texts.
4. Desirability-The idea of doing good to others irrespective of what others do to you is desirability.

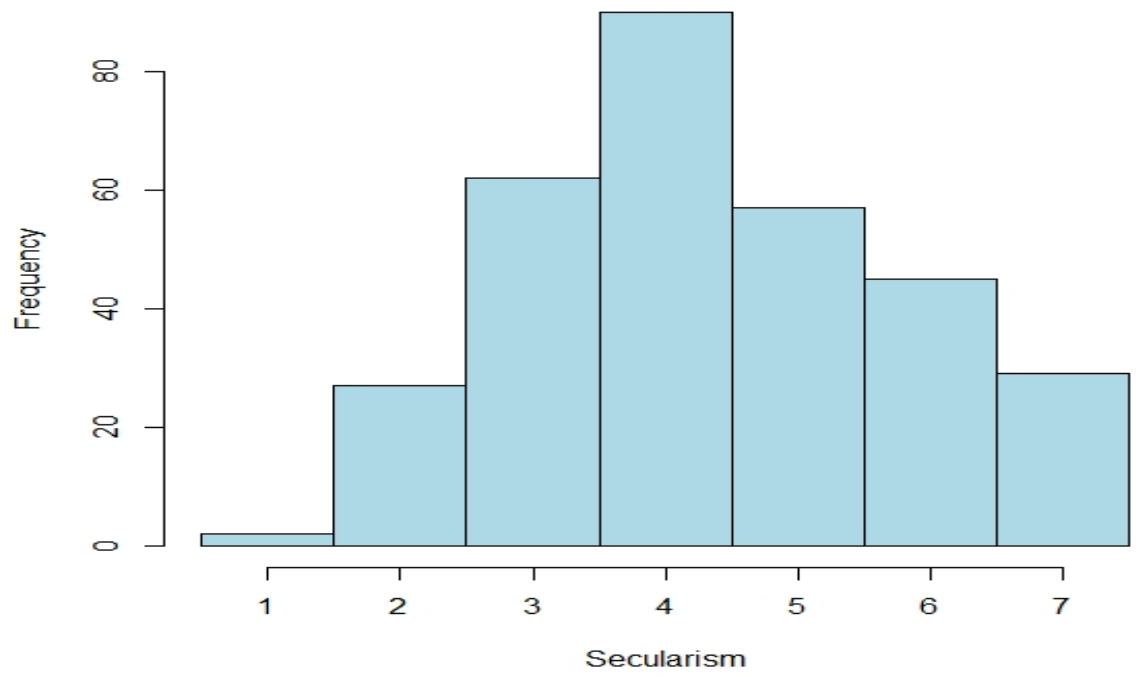
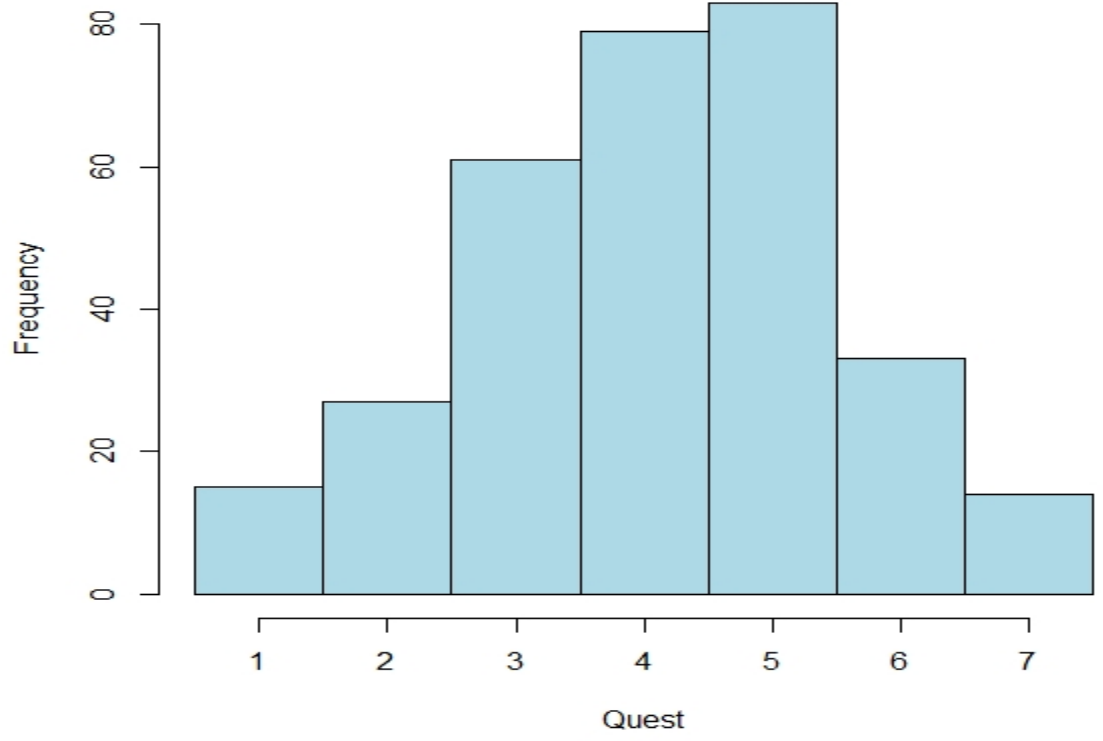
Here, we will consider some datapoints for independent variables: -

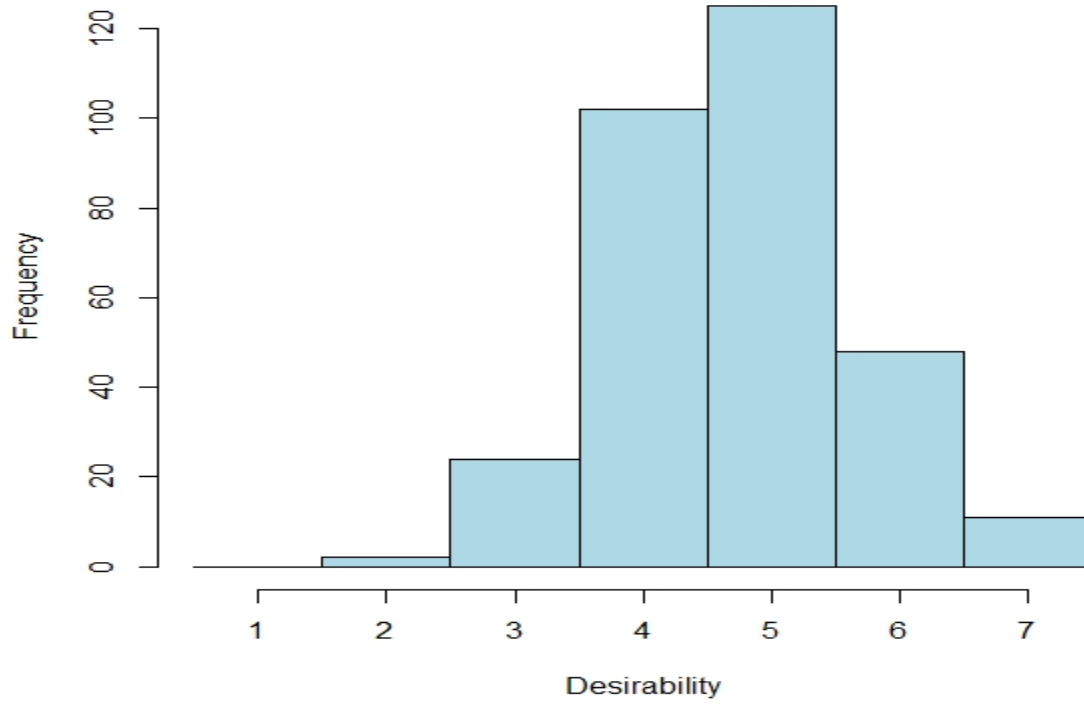
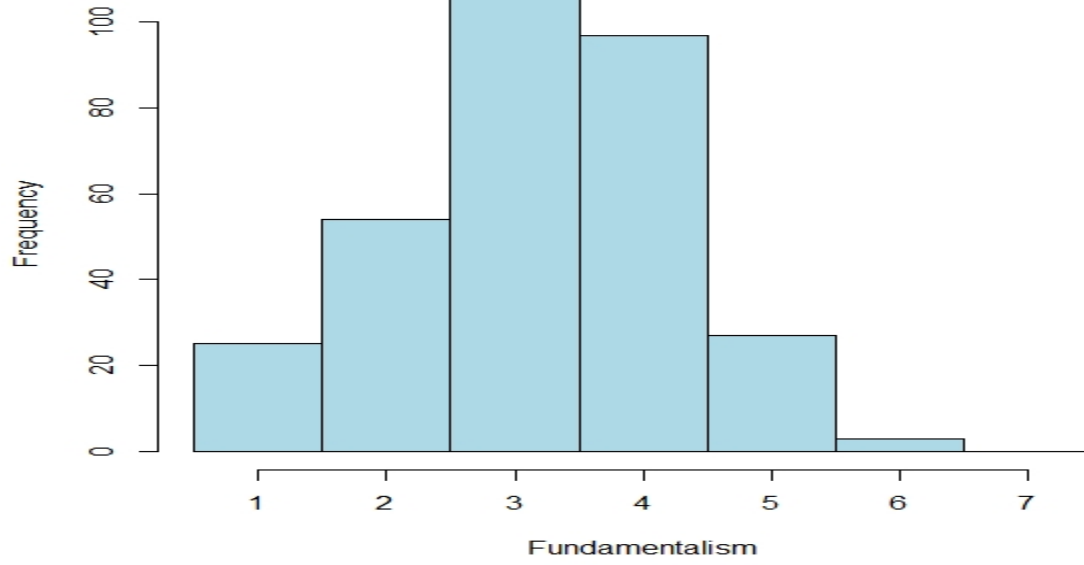
INTRINSIC	EXTRINSIC	QUEST	SECULARISM	FUNDAMENTALISM	DESIRABILITY
5	5	6.25	3.13	2.31	4
4.17	4.25	4.25	4	2.94	6
4	4	4.75	6.75	2.97	5.44
4.5	5	5	4.13	3.72	4.33
3	2.5	6.25	5.5	2.56	3.89
2.5	3.5	3.5	5.88	2.31	5.22
2.67	3.25	3	6.25	2.59	3.78

- The above shown values are the mean of the values of all scales for each variable.

*To get a rough idea about the data we will consider histograms for different independent variables:







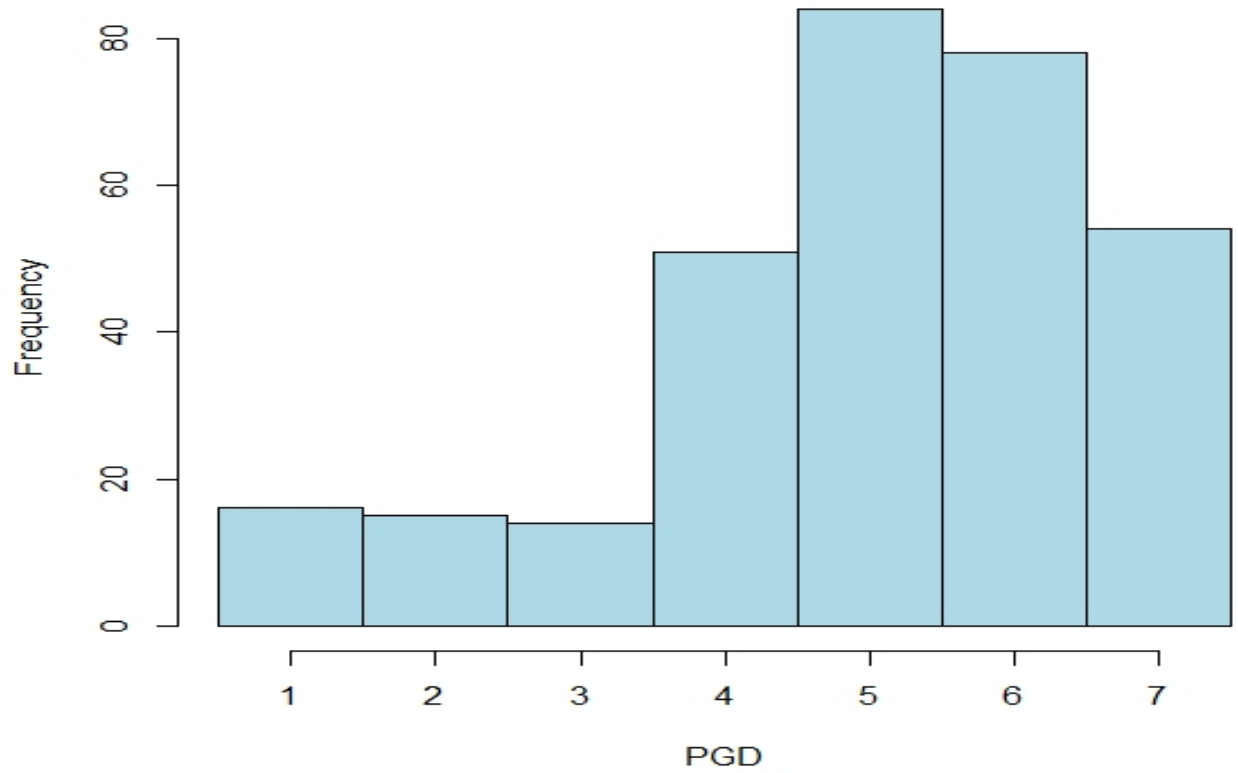
Now, we will define dependent variables:

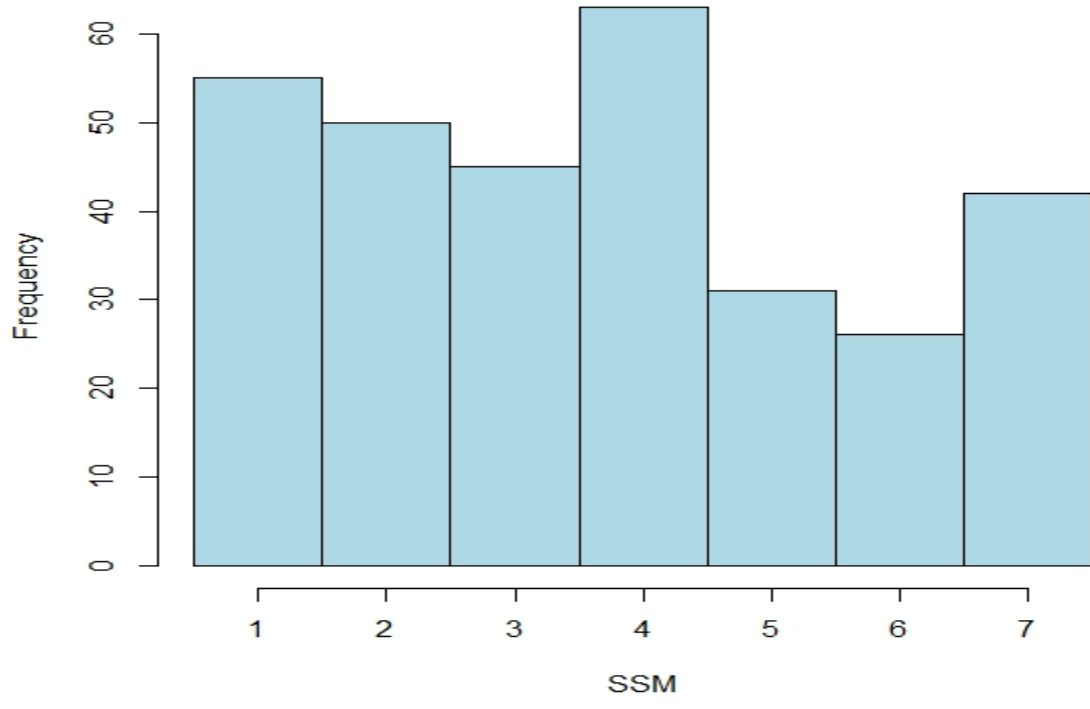
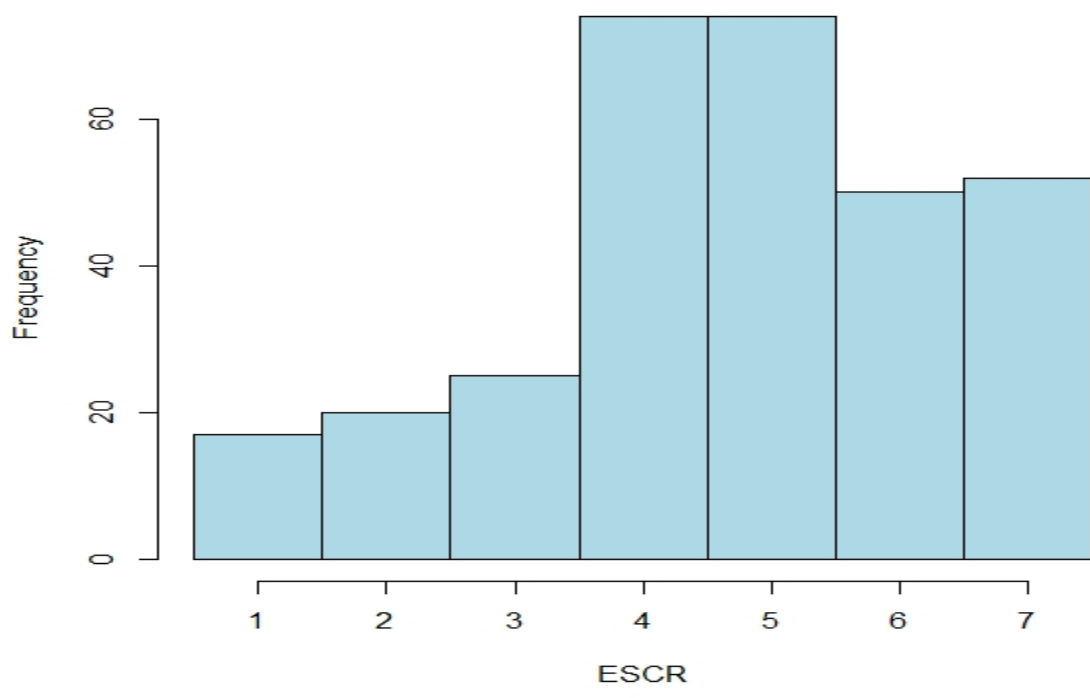
- **PGD**-It is the genetic profiling of embryos before their implantation in the uterus.
- **SSM**- This refers to marrying individual of same gender.
- **ESCR**- Stem cells are derived for research from embryos at a developmental stage before the time that implantation would normally occur in the uterus.
- **ADOPTION**- This refers to adoption by same-sex couples.

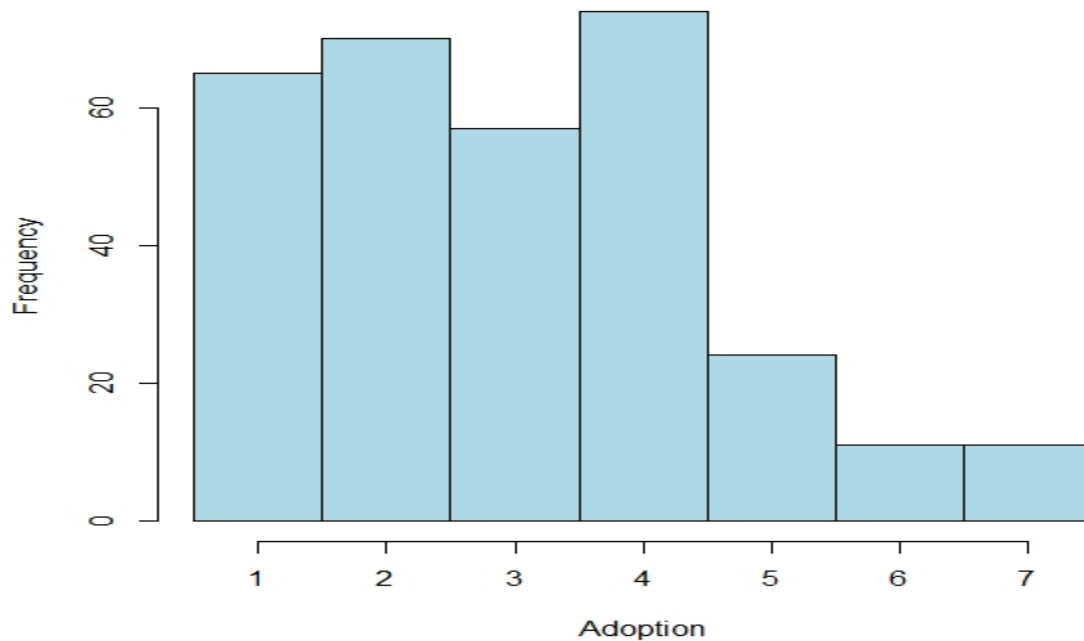
Here, we will consider some datapoints for dependent variables:-

PGD	SSM	ESCR	ADOPTION
5.25	6.75	4.5	5.75
4	4	4	4
5	4	4.5	4
3.75	2	3.75	3.5
4	7	4	4
6	6	6.25	6
7	2.5	7	2.5

*To get a rough idea about the data we will consider histograms for different dependent variables:







- We observe from the histograms that people are against SSM more than PGD, ESCR or Adoption.

Why are these variables related to Religious orientation?

- All these variables depend upon religious orientation as destruction of embryos and marrying individuals of same gender are considered sins in catholic religion.

***Reliability:-**

- Something is said to be highly reliable if it produces the same or similar results when the same individual re-takes the survey, under the same conditions.
- Reliability is measured using Cronbach's alpha which is given by:

$$\alpha = \frac{k \times \bar{c}}{\bar{v} + (k-1)\bar{c}}$$

Where k is the number of scales, \bar{c} is the inter-item covariance and \bar{v} is the average variance.

- It is calculated when data for multiple scales is collected to estimate one variable.
- Cronbach's alpha typically ranges from 0 to 1. Values closer to 1.0 indicate a greater internal consistency of the variables in the scale.

Why are we considering reliability?

- Here, we will present an example of the scales considered for estimating a variable:
 - PGD1 : It is right to perform pre-implantation genetic diagnosis.
 - PGD2 : I am not in favor toward pre-implantation genetic diagnosis.
 - PGD3 : The law should allow pre-implantation genetic diagnosis.
 - PGD4 : Pre-implantation genetic diagnosis should be forbidden by law.

- Intuitively, PGD1 and PGD3 shall be negatively correlated with PGD2 and PGD4 and hence the values of PGD2 and PGD4 shall be considered after subtracting from 8.

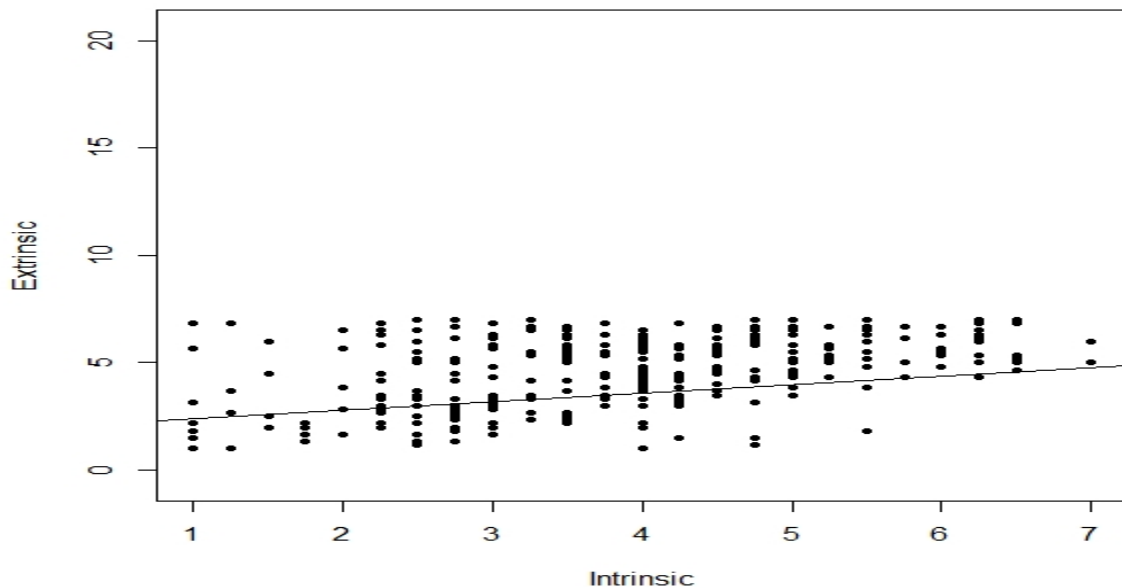
But when we actually calculated this, we found this is not at all the case. Rather the reliability decreases and even show negative values(i.e. the survey is reversely scored) when considered after subtracting from 8.

- The Cronbach's alpha for different variables are given in the following table:

Variable name	Cronbach's alpha	
	Given data	Changed data
INTRINSIC	0.89	0.02
EXTRINSIC	0.68	0.68
QUEST	0.73	0.73
SECULARISM	0.87	-0.56
FUNDAMENTALISM	0.77	0.29
DESIRABILITY	0.64	-1.3

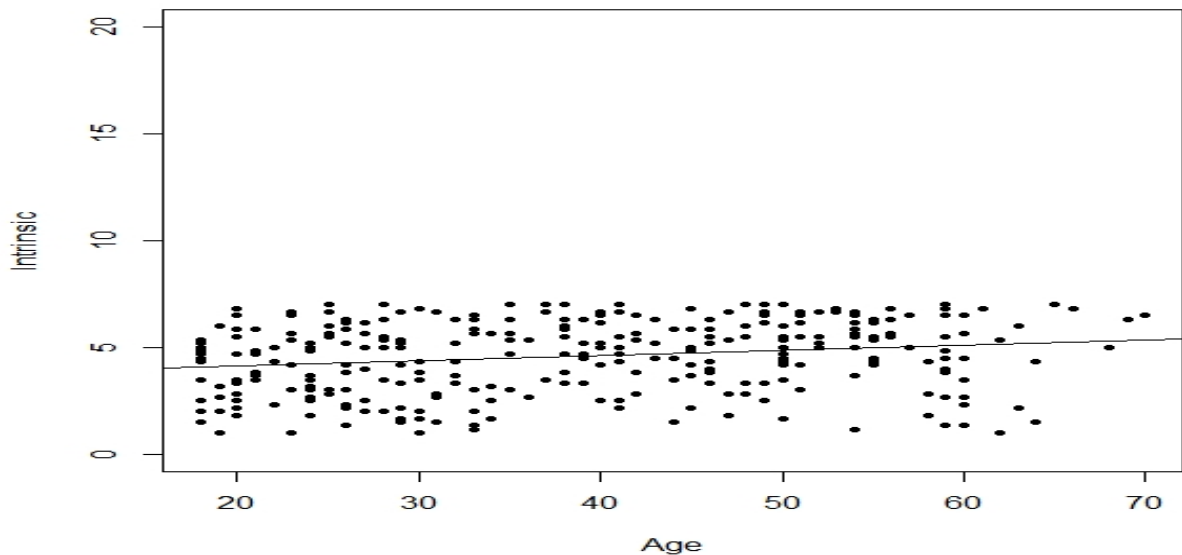
Now, we will use simple linear regression to find some relationships between the variables.

1. Regressing Extrinsic on Intrinsic:



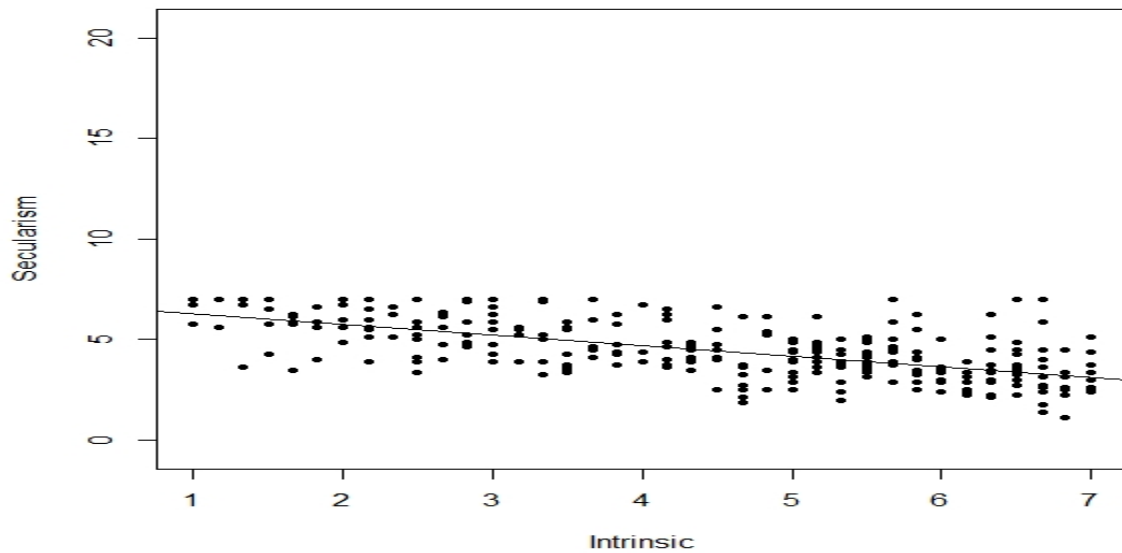
- Correlation of Extrinsic and Intrinsic religious orientation is 0.47.
- Regression line:
$$y = 0.4x + 2.02$$
- Hypothesis testing at $\alpha=0.01$:
 $H_0 : \beta_1 = 0$
 $H_a : \beta_1 \neq 0$
 $t=9.37$ $t_{0.005} = 2.59$
Null hypothesis is rejected.
- Standard residual error; $s = 1.23$

2. *Regressing Intrinsic on Age:



- Correlation of Age and Intrinsic religious orientation is 0.20.
- Regression line:
$$y = 0.02x + 3.62$$
- Hypothesis testing at $\alpha=0.01$:
$$H_0 : \beta_1 = 0$$
$$H_a : \beta_1 \neq 0$$
$$t = 3.62 \quad t_{0.005} = 2.59$$
Null hypothesis is rejected.
- $s = 1.62$
- We also tried to relate Extrinsic, Quest, and Secularism with age but the correlation was very low (0.055 for Extrinsic, -0.04 for Quest, -0.09 for Secularism).

3. Regressing Secularism on Intrinsic:



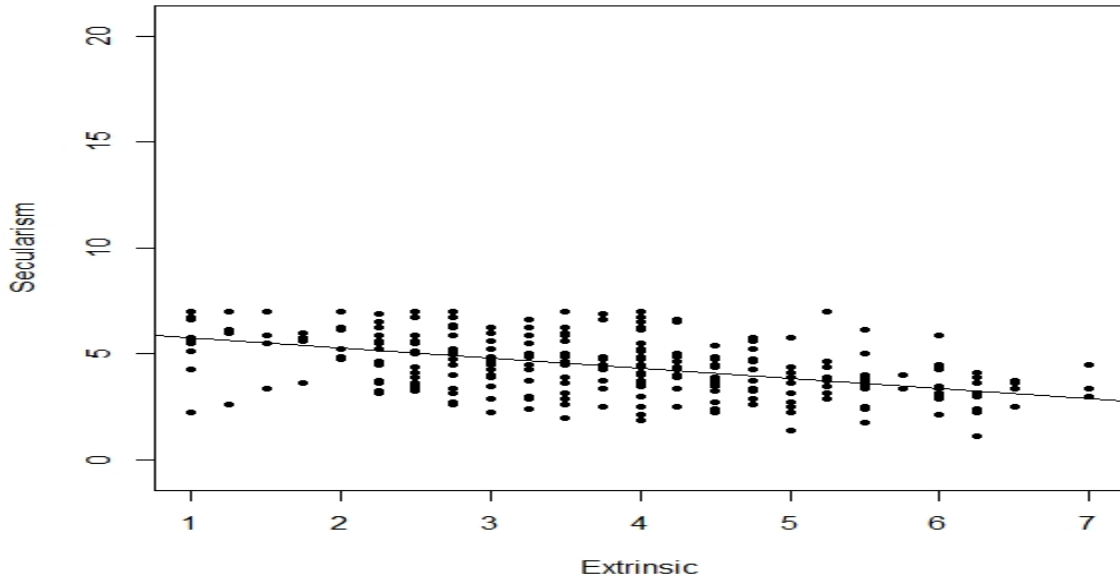
- Correlation of Secularism and Intrinsic is -0.63.
- Regression line:
$$y = -0.52x + 6.8$$
- Hypothesis testing at $\alpha=0.01$:
$$H_0 : \beta_1=0$$

$$H_a : \beta_1 \neq 0$$

$$t = -14.33 \quad t_{0.005} = 2.59$$

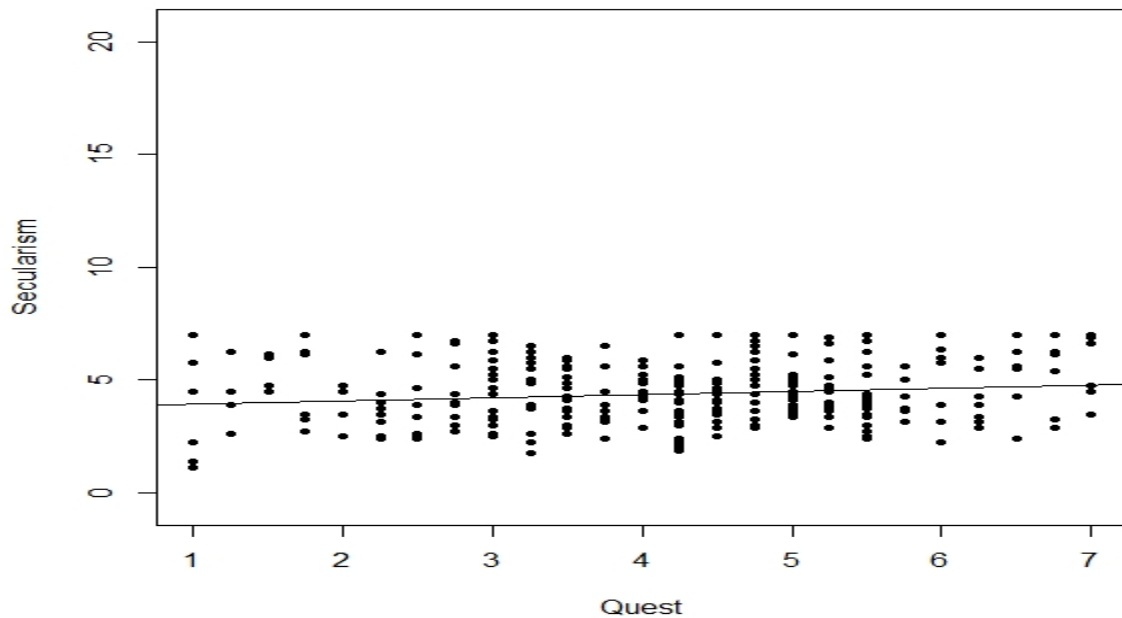
Null hypothesis is rejected.
- Standard residual error; $s = 1.06$.
- Coefficient of determination; $r^2 = 0.40$.

4. Regressing Secularism on Extrinsic:



- Correlation of Secularism and Extrinsic is -0.481.
- Regression line:
$$y = -0.47x + 6.22$$
- Hypothesis Testing at $\alpha=0.01$:
$$H_0 : \beta_1=0$$
$$H_a : \beta_1 \neq 0$$
$$t = -9.66 \quad t_{0.005} = 2.59$$
Null hypothesis is rejected.
- Standard residual error; $s = 1.20$.
- Coefficient of determination; $r^2 = 0.23$.

5. Regressing Secularism on Quest:



- Correlation of Secularism and Quest is 0.15.

- Regression Line:

$$y = 0.14x + 3.81$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

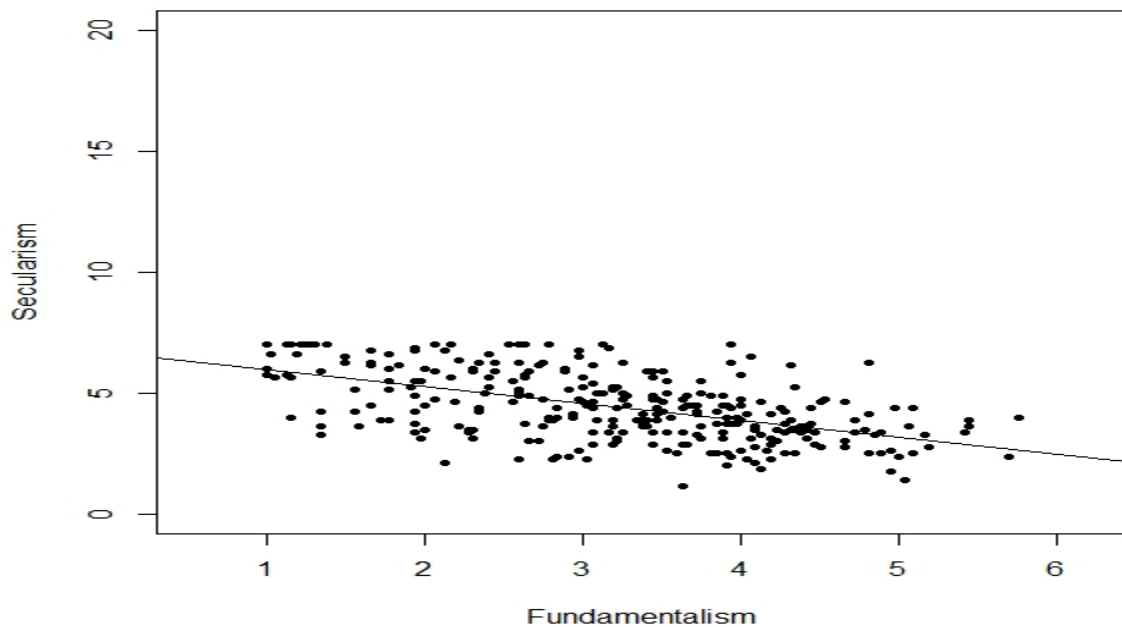
$$H_a : \beta_1 \neq 0$$

$$t = -2.61 \quad t_{0.005} = 2.59$$

Null hypothesis is rejected.

- Standard residual error; $s = 1.36$.
- Coefficient of determination; $r^2 = 0.23$

6. *Regressing Secularism on Fundamentalism:



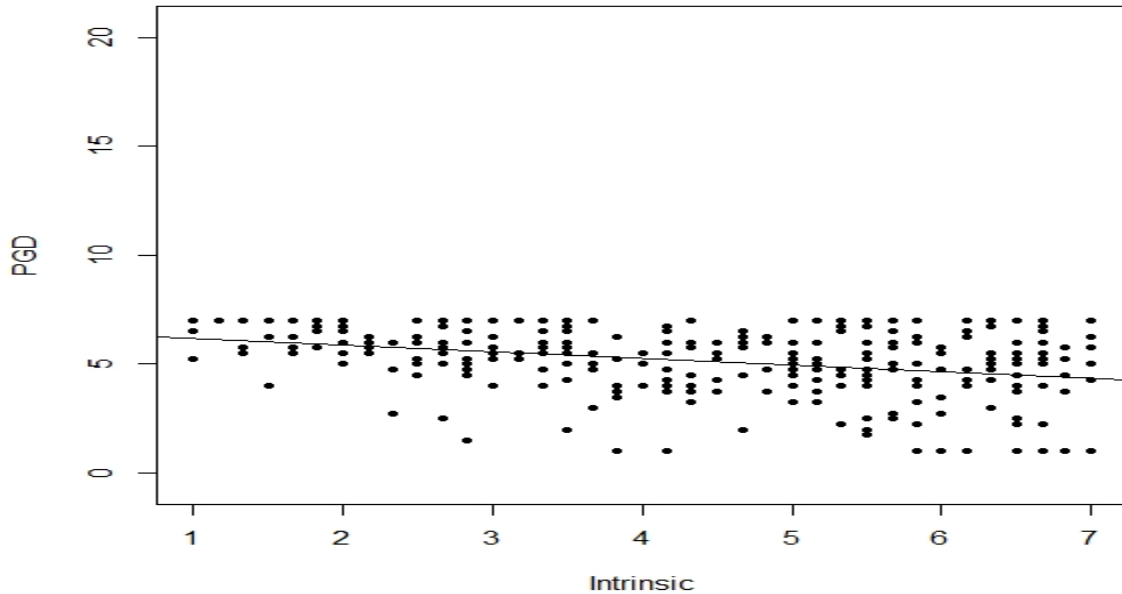
- Correlation of Secularism and Fundamentalism is -0.55.
- Regression line:
$$y = -0.7x + 6.67$$
- Hypothesis Testing at $\alpha=0.01$:
$$H_0 : \beta_1=0$$

$$H_a : \beta_1 \neq 0$$

$$t = -11.62 \quad t_{0.005} = 2.59$$

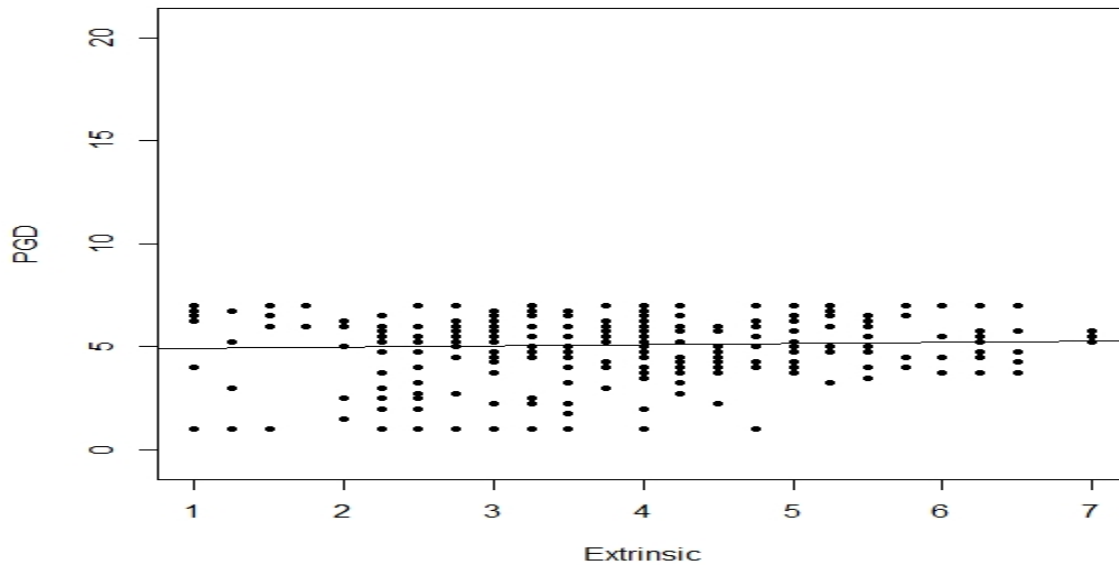
Null hypothesis is rejected.
- Standard residual error; $s = 1.15$.

7. Regressing PGD on Intrinsic:



- Correlation of PGD and Intrinsic is -0.32
- Regression line:
 $y = -0.3x + 6.46$
- Hypothesis Testing at $\alpha=0.01$:
 $H_0 : \beta_1=0$
 $H_a : \beta_1 \neq 0$
 $t = -5.86$ $t_{0.005} = 2.59$
Null hypothesis is rejected.
- Standard residual error; $s = 1.50$.
- Coefficient of determination; $r^2 = 0.10$

8. Regressing PGD on Extrinsic:



- Correlation of PGD and extrinsic is 0.048.
- Regression line:

$$y = 0.055x + 4.87$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

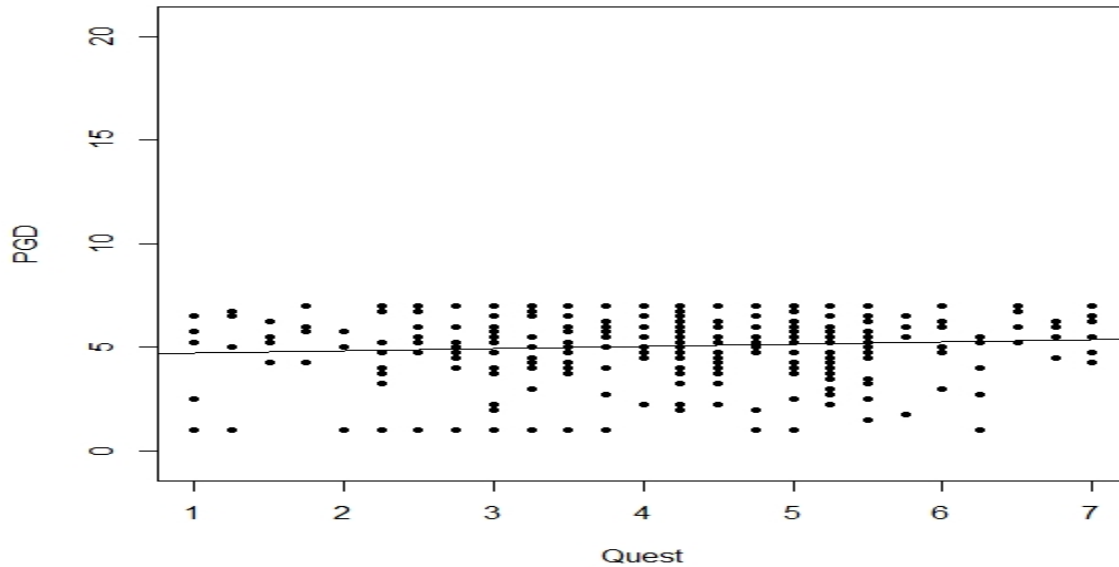
$$H_a : \beta_1 \neq 0$$

$$t = 0.85 \quad t_{0.005} = 2.59$$

Null hypothesis is not rejected.

- Standard residual error; $s = 1.58$.
- Coefficient of determination; $r^2 = 0.03$

9. Regressing PGD on Quest:



- Correlation of PGD and Quest is 0.09.

- Regression line:

$$y = 0.1x + 4.6483$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1 = 0$$

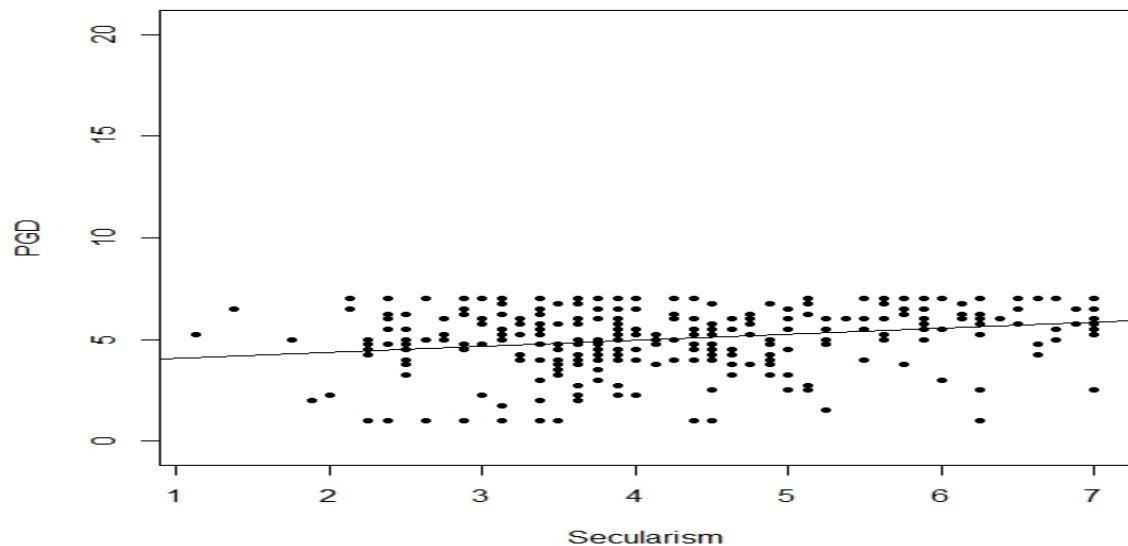
$$H_a : \beta_1 \neq 0$$

$$t = 1.64 \quad t_{0.005} = 2.59$$

Null hypothesis is not rejected.

- Standard residual error; $s = 1.57$.
- Coefficient of determination; $r^2 = 0.009$

10. Regressing PGD on Secularism:



- Correlation of PGD and Secularism is 0.26.

- Regression line:

$$y=0.297+3.774x$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

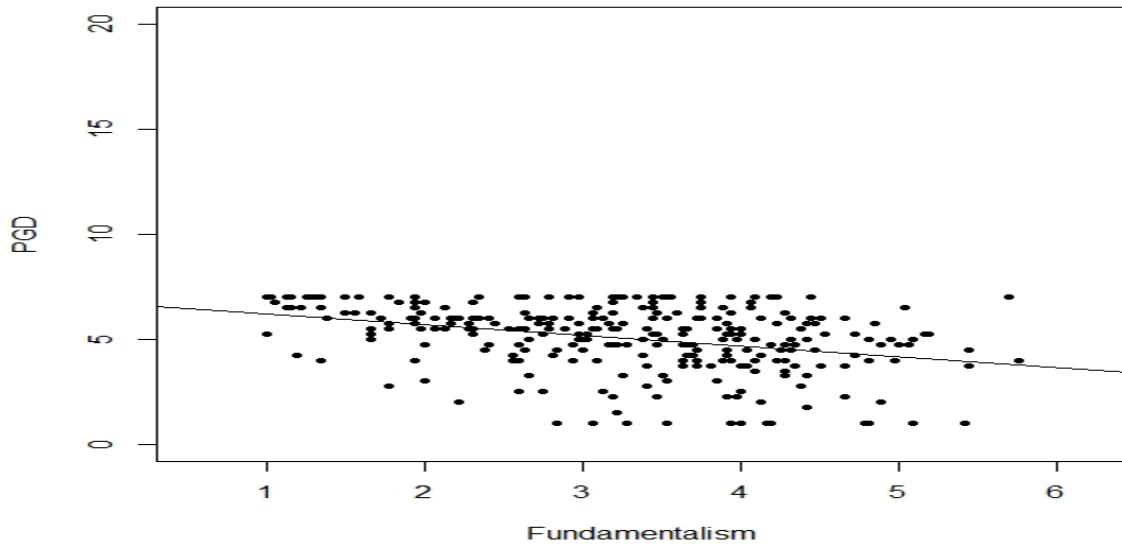
$$H_a : \beta_1 \neq 0$$

$$t = 4.71 \quad t_{0.005} = 2.59$$

Null hypothesis is rejected.

- Standard residual error; $s = 1.53$
- Coefficient of determination; $r^2 = 0.07$

11. Regressing PGD on Fundamentalism:



- Correlation of PGD and Fundamentalism is -0.35

- Regression Line:

$$y = -0.51x + 6.74$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

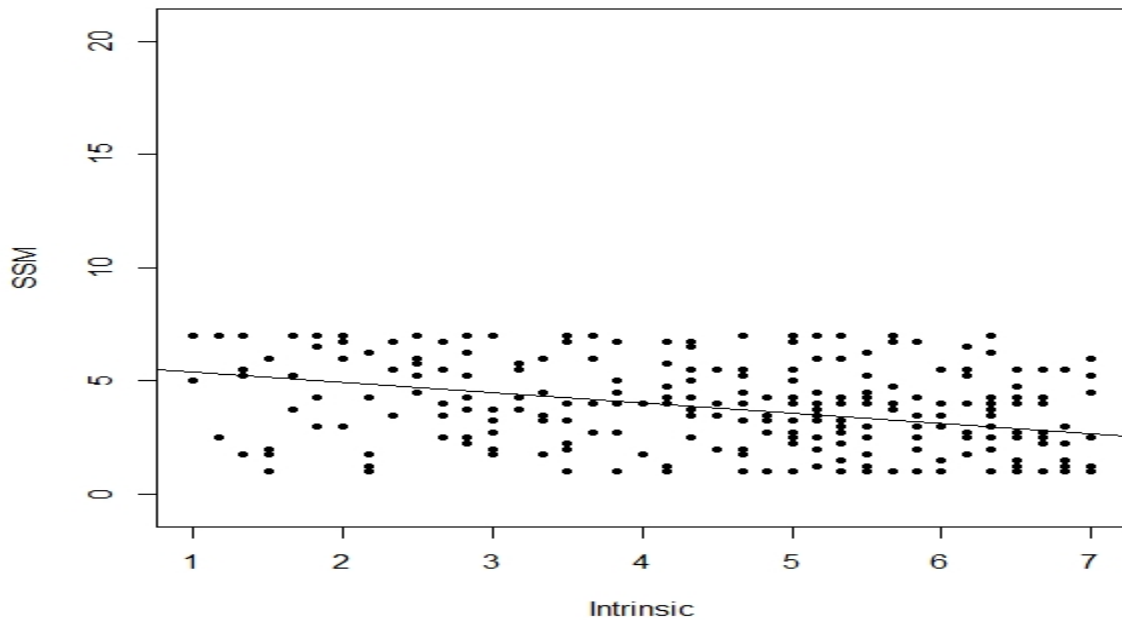
$$H_a : \beta_1 \neq 0$$

$$t = -6.60 \quad t_{0.005} = 2.59$$

Null hypothesis is rejected.

- Standard residual error; $s = 1.48$.

12. *Regressing SSM on Intrinsic:



- Correlation of SSM and Intrinsic is -0.39.

- Regression line:

$$y = -0.46x + 5.88.$$

- Hypothesis Testing at $\alpha = 0.01$:

$$H_0 : \beta_1 = 0$$

$$H_a : \beta_1 \neq 0$$

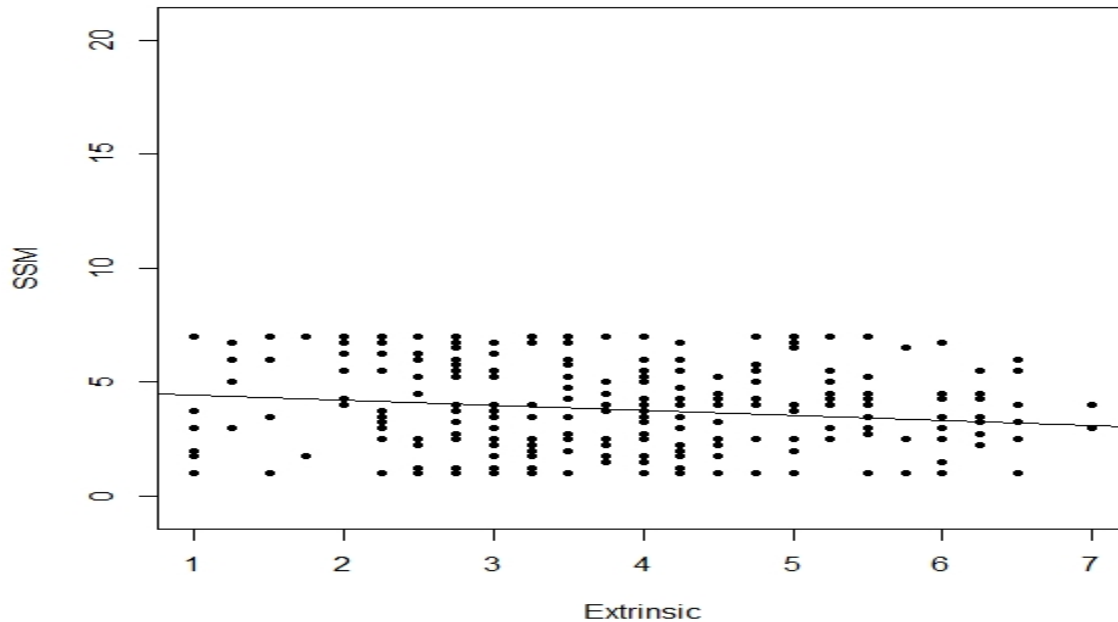
$$t = -7.39$$

$$t_{0.005} = 2.59$$

Null hypothesis is rejected.

- Standard residual error; $s = 1.81$

13. *Regressing SSM on Extrinsic:



- Correlation of SSM and Extrinsic is -0.16.

- Regression line:

$$y = -0.22x + 6.67$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

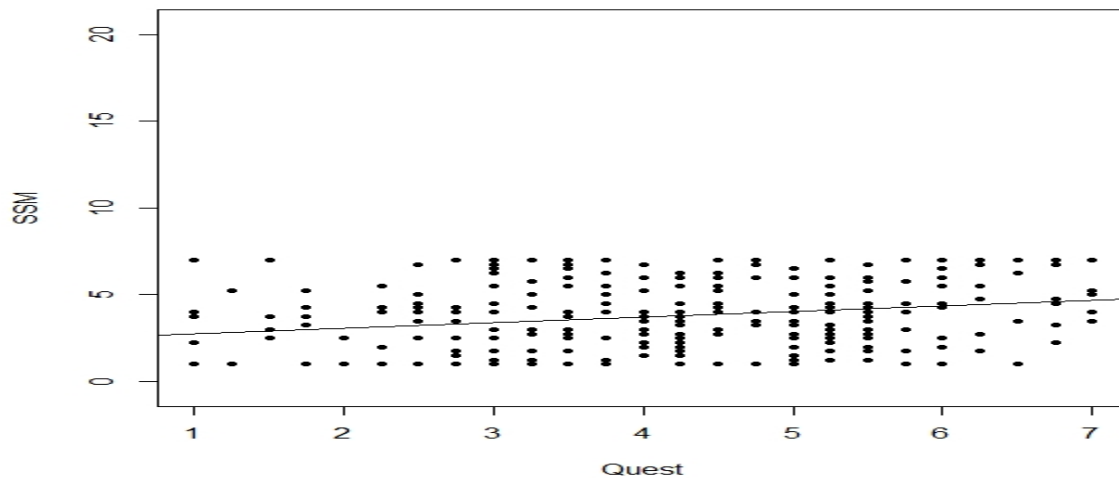
$$H_a : \beta_1 \neq 0$$

$$t = -2.82 \quad t_{0.005} = 2.59$$

Null hypothesis is rejected.

- Standard residual error; $s = 1.93$

14. *Regressing SSM on Quest:



- Correlation of SSM and Quest is 0.23.

- Regression line:

$$y = 0.32x + 2.45$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

$$H_a : \beta_1 \neq 0$$

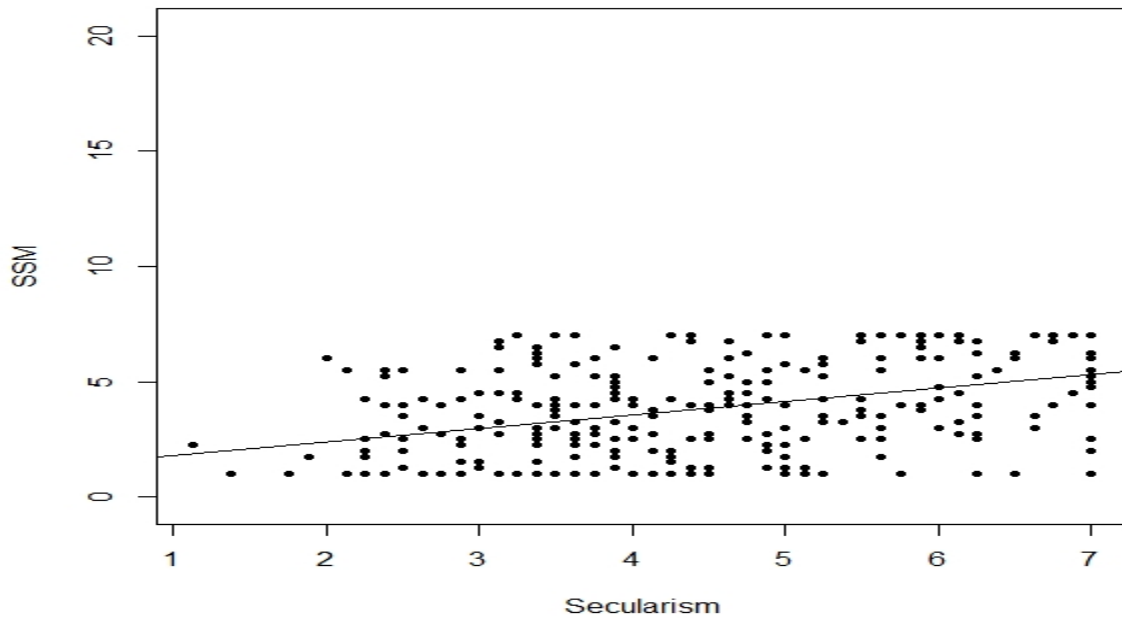
$$t = 4.16$$

$$t_{0.005} = 2.59$$

Null hypothesis is rejected.

- Standard residual error; $s = 1.91$.

15. *Regressing SSM on Secularism:



- Correlation of SSM and Secularism is 0.41.

- Regression line:

$$y = 0.58x + 1.23$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

$$H_a : \beta_1 \neq 0$$

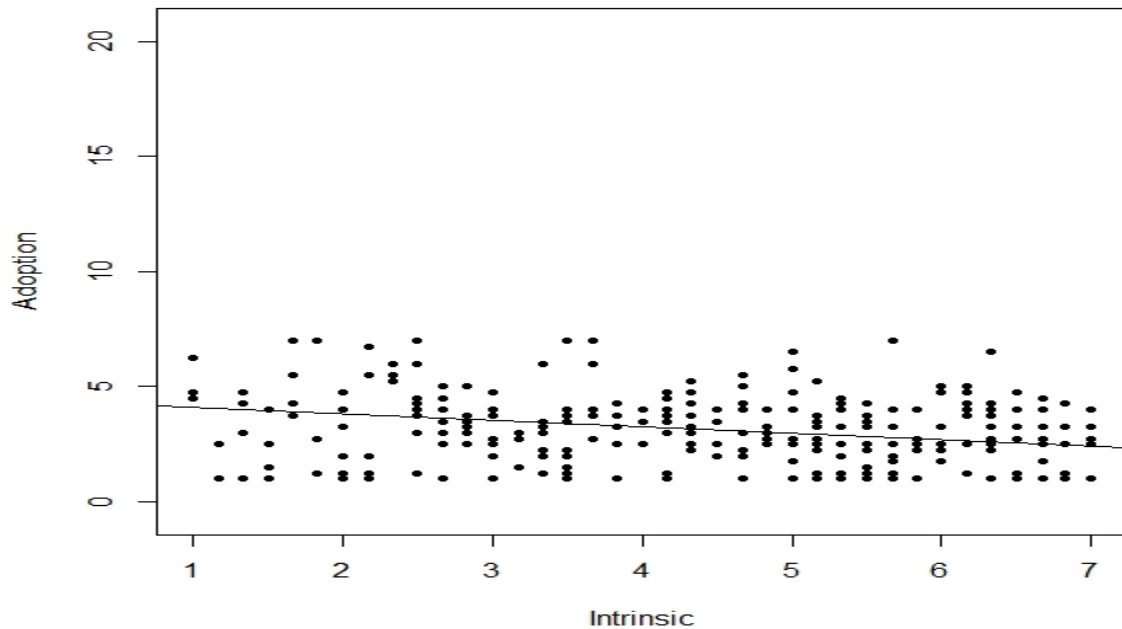
$$t = 7.85$$

$$t_{0.005} = 2.59$$

Null hypothesis is rejected.

- Standard residual error; $s = 1.79$

16. *Regressing Adoption on Intrinsic:



- Correlation of Adoption and Intrinsic is -0.25.

- Regression line:

$$y = -0.24x + 5.89$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

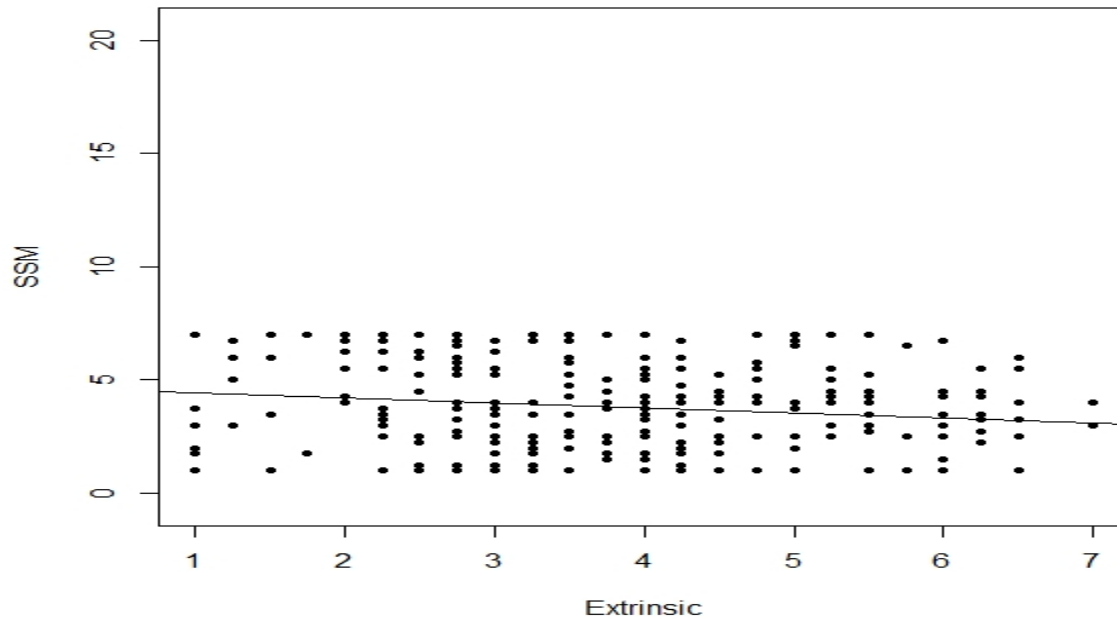
$$H_a : \beta_1 \neq 0$$

$$t = -4.48 \quad t_{0.005} = 2.59$$

Null hypothesis is rejected.

- Standard residual error; $s = 1.58$.

17. *Regressing Adoption on Extrinsic:



- Correlation of Adoption and Extrinsic is -0.018.

- Regression line:

$$y = -0.02x + 4.86$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

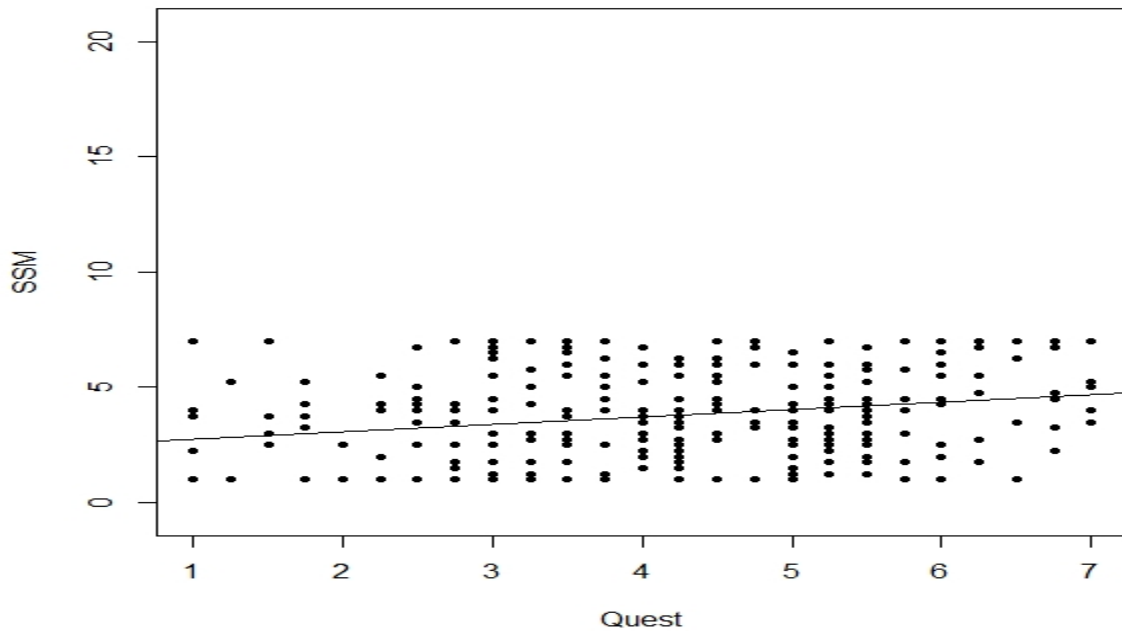
$$H_a : \beta_1 \neq 0$$

$$t = -0.31 \quad t_{0.005} = 2.59$$

Null hypothesis is not rejected.

- Standard residual error; $s = 1.63$

18. *Regressing Adoption on Quest:



- Correlation of Adoption and Quest is 0.09.

- Regression line:

$$y = 0.11x + 4.33$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

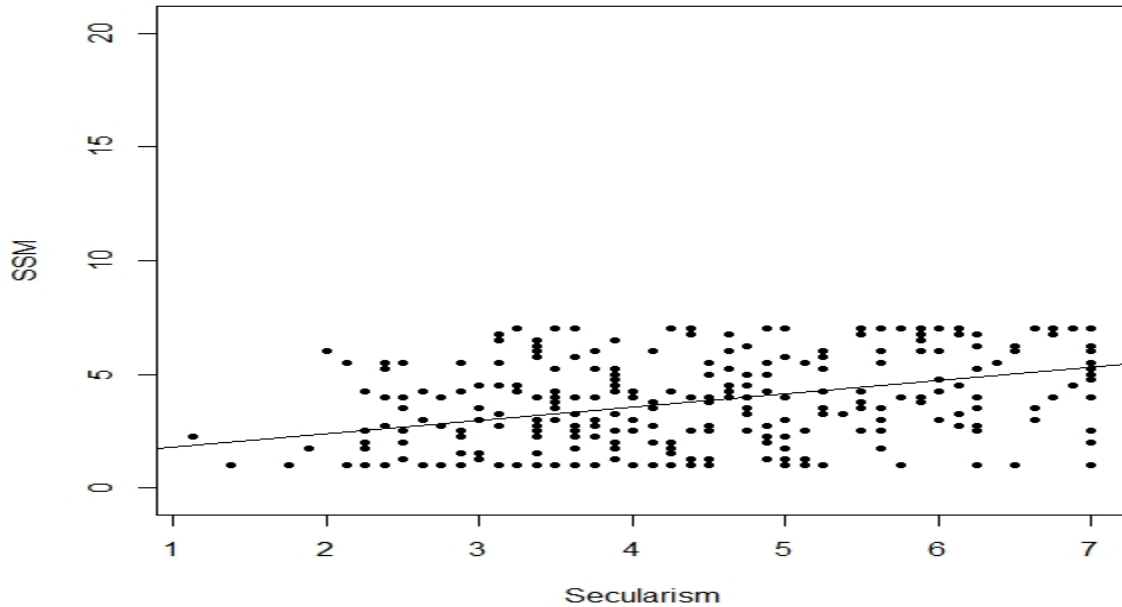
$$H_a : \beta_1 \neq 0$$

$$t = 1.64 \quad t_{0.005} = 2.59$$

Null hypothesis is not rejected.

- Standard residual error; $s = 1.63$

19. *Regressing Adoption on Secularism:



- Correlation of Adoption and Secularism is 0.25.

- Regression line:

$$y = 0.29x + 3.49$$

- Hypothesis Testing at $\alpha=0.01$:

$$H_0 : \beta_1=0$$

$$H_a : \beta_1 \neq 0$$

$$t = 4.46 \quad t_{0.005} = 2.59$$

Null hypothesis is rejected.

- Standard residual error; $s = 1.58$.

- *We also regressed all the variables with desirability but received very weak results.
- *Also, we regressed males and females differently but the regression did not improve.

MULTIPLE REGRESSION

- Sometimes, it is better to predict dependent variable from two or more independent variables rather than one . This is called multiple linear regression.
- The regression equation is:

$$\hat{y} = b_0 + b_1x_1 + b_2x_2 + \dots + b_{k-1}x_{k-1} + b_kx_k$$

where \hat{y} is the predicted value of the dependent variable, $x_1, x_2, x_3, \dots, x_k$ are k independent variables and $b_0, b_1, b_2, \dots, b_k$ are regression coefficients .

- Here, we will assign value of regression coefficients using *principle of least squares*,
i.e. by minimizing $\sum [y_i - (b_0 + b_1x_{1i} + b_2x_{2i} + \dots + b_kx_{ki})]^2$.
- We will do this using matrix algebra. Consider the following matrices:

$$\mathbf{Y} = \begin{bmatrix} y_1 \\ y_2 \\ \cdot \\ \cdot \\ \cdot \\ y_n \end{bmatrix}$$

$$\mathbf{b} = \begin{bmatrix} b_0 \\ b_1 \\ \cdot \\ \cdot \\ \cdot \\ b_k \end{bmatrix}$$

$$\mathbf{X} = \begin{bmatrix} 1 & X_{1,1} & X_{1,2} & \cdot & \cdot & \cdot & X_{1,k} \\ 1 & X_{2,1} & X_{2,2} & \cdot & \cdot & \cdot & X_{2,k} \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\ 1 & X_{n,1} & X_{n,2} & \cdot & \cdot & \cdot & X_{n,k} \end{bmatrix}$$

- Considering these matrices, regression equation can be represented as:

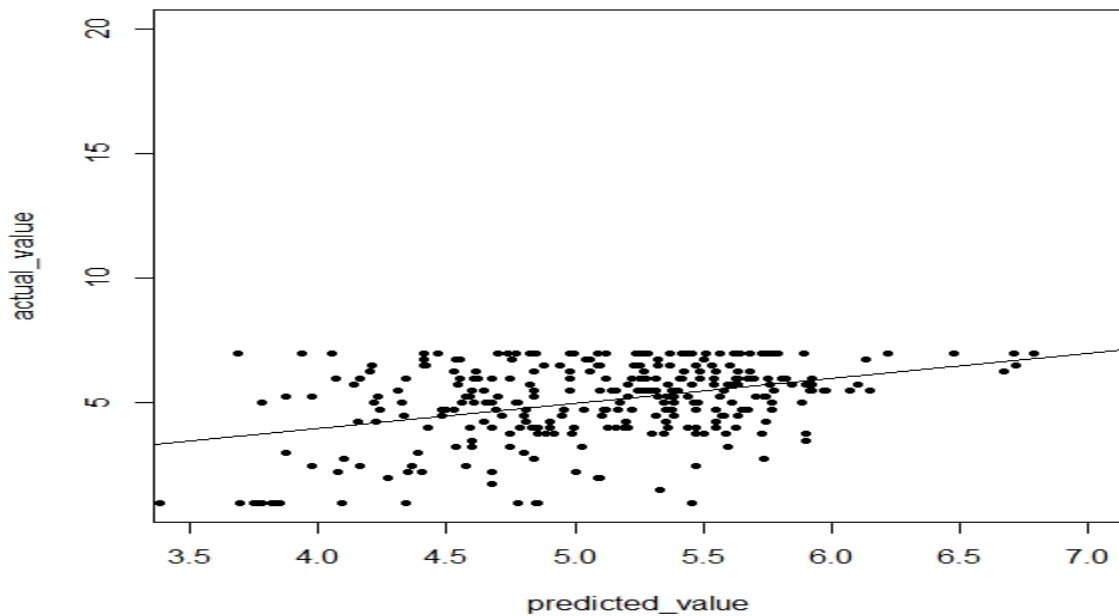
$$\mathbf{Y} = \mathbf{Xb}$$

- By using the least squares method, we can find the value of regression coefficients by solving the following equation:

$$\mathbf{X}'\mathbf{Y} = (\mathbf{X}'\mathbf{X})\mathbf{b}$$

- Solving this, we get $\mathbf{b} = (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{Y}$.
where \mathbf{X}' is the transpose of \mathbf{X} and $(\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{X} = \mathbf{I}$.

20. Regressing PGD on religious orientations:



- Regressing line:

$$y = 5.68 + 0.04x_1 + 0.28x_2 - 0.41x_3$$

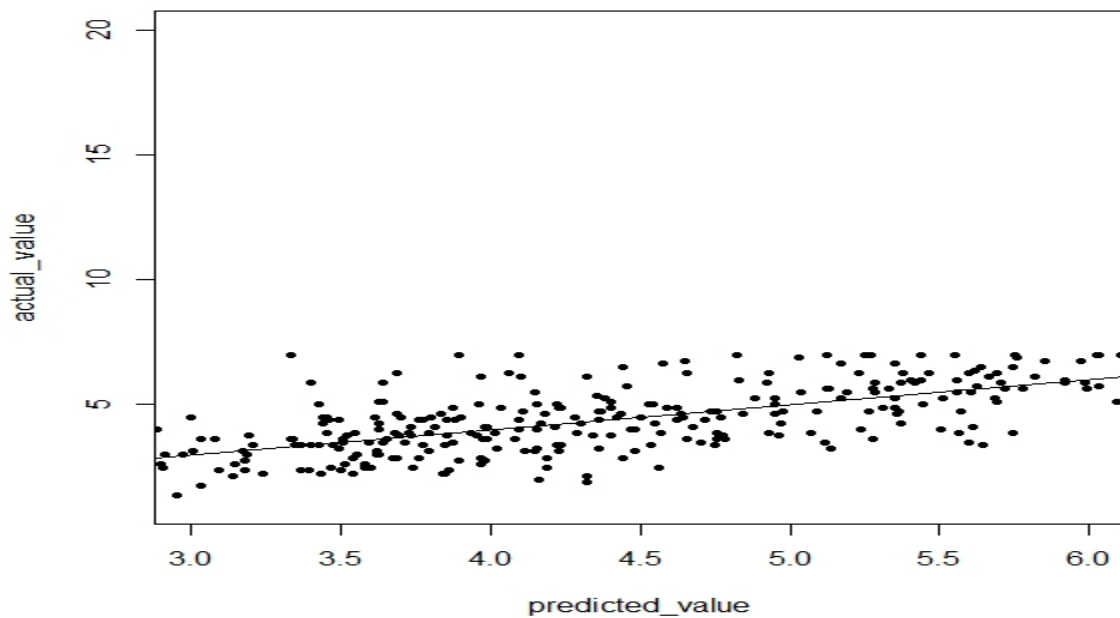
where $x_1 = \text{Quest}$

$x_2 = \text{Extrinsic}$

$x_3 = \text{Intrinsic}$

- Standard residual error; $s = 1.46$
- Coefficient of determination; $r^2 = 0.15$
- The coefficient of determination has increased.

21. Regressing Secularism on Religious orientations:



- Regressing line:

$$y = 6.87 + 0.09x_1 - 0.24x_2 - 0.42x_3$$

where $x_1 = \text{Quest}$

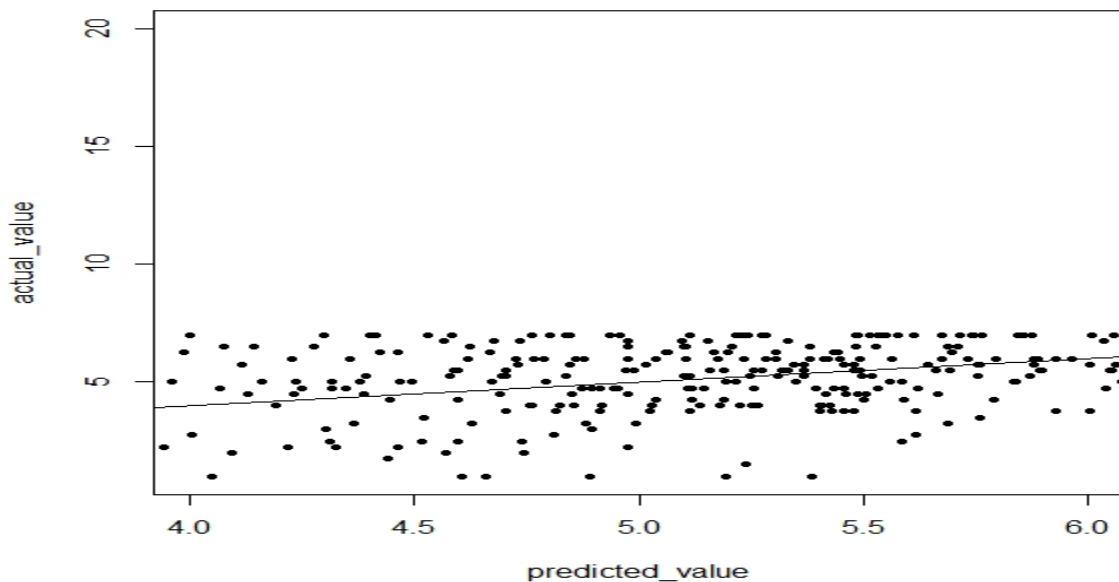
$x_2 = \text{Extrinsic}$

$x_3 = \text{Intrinsic}$

- Standard residual error; $s = 1.02$

- Coefficient of determination; $r^2 = 0.45$
- The coefficient of determination has increased.

22. Regressing PGD on Religious orientations and Secularism:



- Regressing line:

$$y = 4.22 + 0.03x_1 + 0.33x_2 - 0.32x_3 + 0.21x_4$$
 where $x_1 = \text{Quest}$
 $x_2 = \text{Extrinsic}$
 $x_3 = \text{Intrinsic}$
 $x_4 = \text{Secularism}$
- Standard residual error; $s = 1.45$
- Coefficient of determination; $r^2 = 0.17$
- The coefficient of determination has increased.

Mediation Analysis

- Mediating variable is the variable that explains the underlying mechanism of the relationship between independent and dependent variable.
- Mediation analysis comprises of three steps:
 - Step-1 Regressing dependent variable on independent variables.
 - Step-2 Regressing mediating variable on independent variables.
 - Step-3 Regressing dependent variable on independent and mediating variables.
- If the effect of independent variable on dependent variable completely disappears in step-3, then mediating variable fully mediates between dependent and independent variable (*full mediation*). If the effect of independent variable on dependent variable still exists, but in a smaller magnitude, we say M partially mediates between X and Y i.e. *partial mediation*.
- The three regression equations:
 - Step-1 $y = 5.68 + 0.04x_1 + 0.28x_2 - 0.41x_3$
 - Step-2 $y = 6.87 + 0.09x_1 - 0.24x_2 - 0.42x_3$
 - Step-3 $y = 4.22 + 0.03x_1 + 0.33x_2 - 0.32x_3 + 0.21x_4$
- As we can see from the above equations, the regression coefficients in step-3 are smaller than that in step-1 (except

for coefficient of Extrinsic), hence secularism partially mediates PGD and religious orientations.

- The abnormality in the coefficient of extrinsic orientation would be explained further.

Partial Correlation

- As we have seen in previous slides, Intrinsic orientation is correlated with PGD as well as Extrinsic orientation.
- Hence, rather than finding correlation of Extrinsic and PGD, it would be better to find partial correlation of Extrinsic and PGD .
- Partial correlation is a method used to describe the relationship between two variables whilst taking away the effects of another variable.
- The partial correlation of A and B adjusted for C is:

$$r_{ABC} = \frac{r_{AB} - r_{AC}r_{BC}}{\sqrt{(1 - r_{AC}^2)(1 - r_{BC}^2)}}$$

- Partial correlation of Extrinsic and PGD controlling Intrinsic orientation is:

$$r_{\text{extrinsic,PGD,intrinsic}} = \frac{0.048 - (0.47 * (-0.32))}{\sqrt{((1-(0.47)^2) * 1-(-0.32)^2)}}$$
$$= 0.24$$

i.e. the correlation of Extrinsic and PGD increases when we control Intrinsic orientation.

CONCLUSIONS

- We conclude that the intrinsic dimension contributes to rejection of PGD, SSM, ESCR and Adoption by same sex couples while the extrinsic dimension contributes to the acceptance of PGD, SSM, ESCR and Adoption by same sex couples.
- We also observe that the quest orientation is not correlated with PGD, SSM, ESCR and Adoption by same sex couples.
- It can also be concluded that acceptance of secularism is related positively to the acceptance of these ideas.
- *We can also observe that people reject SSM more than PGD, ESCR and Adoption.
- *One other important takeaway which we can conclude from the histograms is that for most of the variables, people do not have extreme opinions.

WHY THIS STUDY?

- The results of this study may be useful for policymakers and also the general public, to make clear the role played by religion in influencing public attitude towards PGD, SSM, ESCR and Adoption by same sex couples.
- It may also help in planning and promoting public campaigns aimed to spread awareness about these issues.
- *The results of this study also show that even the people living in secular states do not completely accept the idea of secularism.

- *Also, this study shows that younger generation believes less in religiosity and hence support these ideas more.

LIMITATIONS OF THE STUDY

- The most important limitation of the study is that the independent random variables used in regression are correlated to each other.
- The other limitation of the study is that the sample contains only willing respondents thus introducing a bias.
- Also, the sample only contains Catholic Italians hence, the study cannot be generalized.
- Moreover, this study did not take into account the effects of knowledge about PGD which can greatly influence the attitude towards it.

Note-The paper includes mediation analysis of PGD and partial correlation of Intrinsic and Extrinsic. It also includes correlation coefficients of PGD with Independent and mediating variables. All other analysis is done by our group.

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- GROUP(PSYCHOLOGY-ITALY)

RESOURCES

2. Websites referred:

- <https://stattrek.com/tutorials/regressiontutorial.aspx>
- <https://data.library.virginia.edu/introduction-to-mediation-analysis/>
- <https://mattchoward.com/introduction-tocronbachs-alpha/>
- <https://www.mtab.com/how-cronbachs-alpha-can-strengthen-your-survey/>
- https://www.statsdirect.com/help/regression_and_correlation/partial_correlation.htm

3. R-packages used:

- “plotrix”
- “Corrplot”
- “psych”