BLOCK 4
STATISTICS PACKAGE FOR SOCIAL SCIENCES

ignou
THE PEOPLE'S
UNIVERSITY

UNIT 10 INTRODUCTION TO STATISTICAL PACKAGE FOR SOCIAL SCIENCES (SPSS)*

Structure

10.0 OBJECTIVES

After reading this unit, you will be able to

- explain statistical analysis using Microsoft Excel; and
- describe Statistical Package for Social Sciences (SPSS).

10.1 INTRODUCTION

A researcher was carrying out a study on Self-concept and Achievement Motivation of Adolescents in relation to their Emotional Intelligence in Mumbai. For the research, the researcher collected data from 1000 adolescents in Mumbai. Given the sheer size of the data, it would be tedious to carry out statistical analysis manually as it would not only take a lot of

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time but there can be errors while calculations are carried out manually. Further, crosschecking the results can also be tedious.

In situations like above and also to carry out statistical analysis quickly and in precise manner, Statistical Package for Social Sciences (SPSS) can be used.

SPSS in 1968 developed by Norman H Nie and C HaldaiHul and in 2009 it was acquired by IBM and is now known as IBM SPSS (Veeraraghavan and Shetgovekar, 2016). The software is mainly used in order to edit and analyse and data. With the help of this software you can analyse data within minutes and make interpretations and inferences. Still, it is important that you know about various statistical techniques and when to use which techniques. Besides, you also need to be well versed with the software mainly how to enter the data, how to analyse it and how to interpret the results.

In the present unit we will study about what SPSS is and will also learn computation of various statistical techniques using SPSS.

Microsoft Excel can also be effectively use to compute statistical analysis. In the present unit we will also explain how statical analysis can be carried out using Microsoft Excel.

We will discuss about statistical analysis using Microsoft Excel and SPSS with the help of following example:

The data consists of scores on Emotional Intelligence (EI) and Achievement Motivation (AM) of 20 participants. The participants have also been categorised on the basis of gender (male and female) and Socio Economic Status (high, medium and low).

Table 10.1: Example of Data for Computation

Sr. No.	Gender	Socio Economic Status	Emotional Intelligence	Achievement Motivation
1	Male	Low	56	34
2	Female	Medium	65	44
3	Male	High	45	33
4	Female	Medium	43	56
5	Female	High	45	76
6	Female	Low	65	78
7	Male	High	55	65
8	Male	Medium	45	67
9	Male	Low	56	65
10	Female	Medium	43	67
11	Female	Low	45	65
12	Male	High	67	56
13	Male	High	65	55

Table 10.1: Example of Data for Computation

14	Male	High	76	55
15	Male	Medium	56	55
16	Female	Medium	77	44
17	Female	Low	65	33
18	Female	Low	45	44
19	Male	Medium	34	55
20	Female	High	23	66

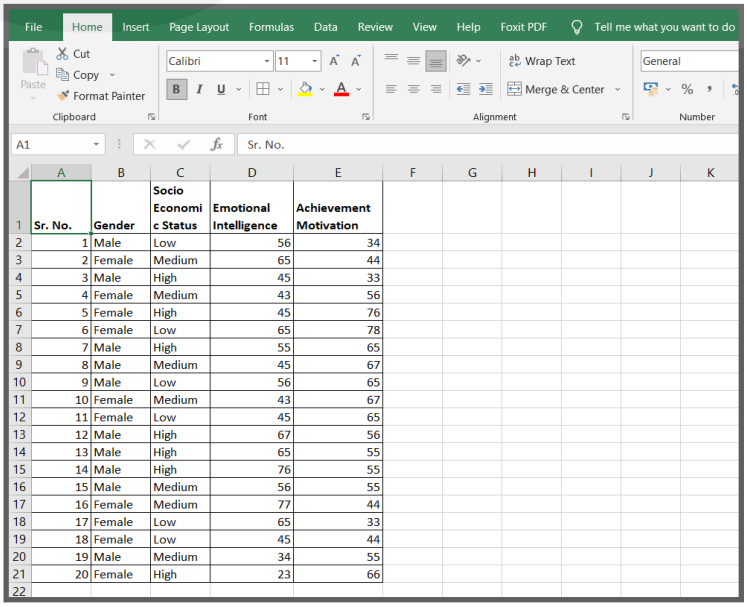
As you can see, there are 5 columns, representing, serial number, gender, Socio Economic Status, Scores on emotional intelligence and achievement motivation. With regard to rows, there are 21 rows including the one for the sub-titles. The details of 20 participants are given in the rows. Variables, emotional intelligence and achievement motivation are continuous variables and the variables, gender and Socio Economic Status are categorical.

10.2 STATISTICAL ANALYSIS USING MICROSOFT EXCEL

Before we proceed to SPSS, we will discuss how certain statistical techniques can be computed with the help of Microsoft Excel.

Once the Excel sheet is opened, the first step would be to enter the data collected by you in the excel sheet and this is to be done in a similar manner as you do in any table (we discussed about tabulation in BPCC104). The raw data for each participant is to be entered so that statistical analysis can be carried out effectively.

An example of data entered in Excel sheet is given in Figure 10.1. Once the data is entered remember to save it with suitable name.



	A	B	C	D	E
1	Sr. No.	Gender	Socio Economic Status	Emotional Intelligence	Achievement Motivation
2	1	Male	Low	56	34
3	2	Female	Medium	65	44
4	3	Male	High	45	33
5	4	Female	Medium	43	56
6	5	Female	High	45	76
7	6	Female	Low	65	78
8	7	Male	High	55	65
9	8	Male	Medium	45	67
10	9	Male	Low	56	65
11	10	Female	Medium	43	67
12	11	Female	Low	45	65
13	12	Male	High	67	56
14	13	Male	High	65	55
15	14	Male	High	76	55
16	15	Male	Medium	56	55
17	16	Female	Medium	77	44
18	17	Female	Low	65	33
19	18	Female	Low	45	44
20	19	Male	Medium	34	55
21	20	Female	High	23	66
22					

Fig. 10.1 Data in Excel Sheet

Let us now have a closer look at the menu of Microsoft Excel (refer to figure 10.2). As can be seen in Menu Bar, there are menus like 'File', 'Home', 'Insert' Page Layout', 'Formulas', 'Data', 'Review' ,'View' and Help'. This may vary depending on the Microsoft Excel version that your using. Though the computation of the statistical techniques will be more or less the same.

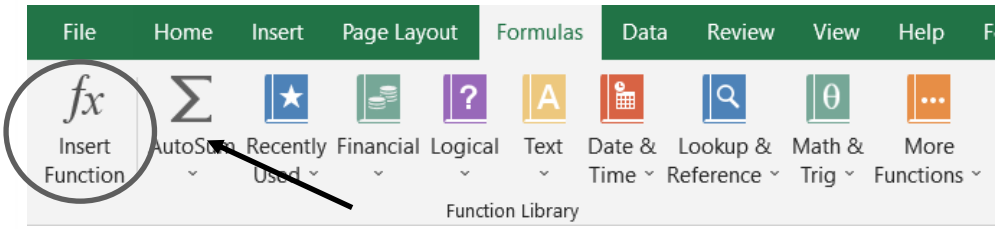


Figure 10.2: Menu Bar of Excel Sheet

In order to compute we will mainly make use of menu ***Formula***, under which you have ***Insert function*** that will help us select the necessary statistical technique. With regard to computation using Microsoft Excel, we will learn how to compute Sum (total), Mean, Correlation and t test.

10.2.1 Computation of Sum (Total)

To compute sum or total for the scores obtained on emotional intelligence and achievement motivation, we will do the following:

1) First select a cell where you would like your answer to be displayed. Then, we will click on the main menu ***Insert function*** and as we do so the ***Insert Function*** dialogue box will open (refer to figure 10.3). In this figure you can click on the button indicated by arrow and either select ***Statistical*** (that will display varied statistical techniques under the space given under Select s function (as can be seen in figure 10.3)

2) As can be seen in the figure 10.3 we have to click on ***Sum*** and then click on ***OK***. Once we do a the dialogue box ***Function Arguments***, as shown in figure 10.4 will open.

3) We then have to drag the scores of emotional intelligence in the space given in front of ***Number 1*** and then click ***OK***.

4) Once we do that we will obtain the total for scores of emotional intelligence. Similar procedure can then be carried out for the other variable that is achievement motivation. The total thus computed is displayed in figure 10. 20 .

Please note that sum can also be easily computed with the help of ***Auto Sum*** that is indicated by an arrow in figure 10.2.

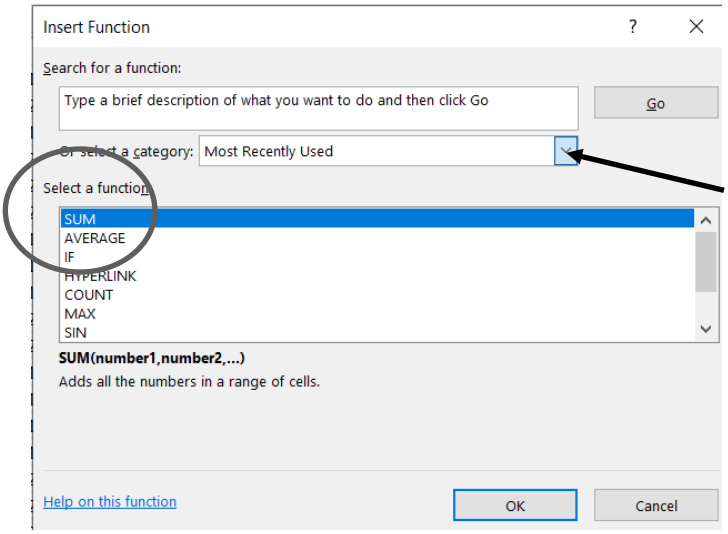


Fig. 10.3: Dialogue Box for Computation of Sum

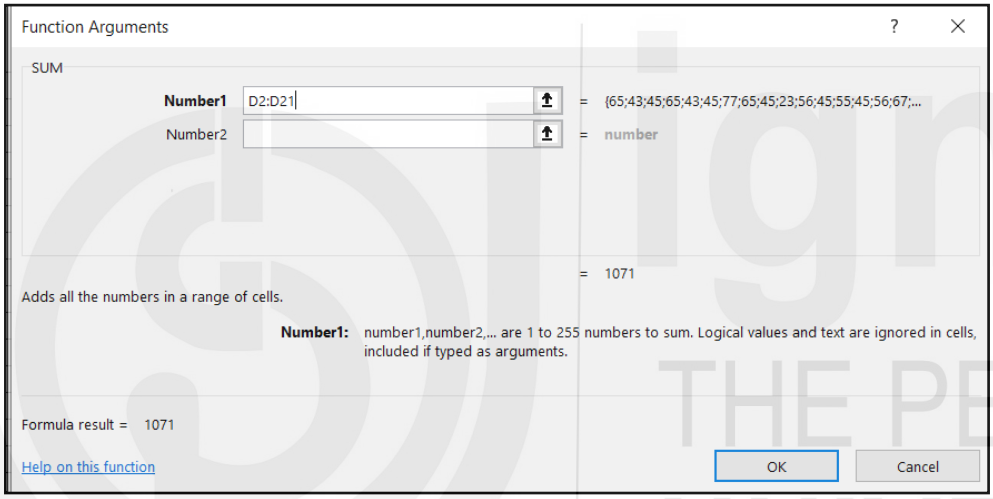


Figure 10.4: Dialogue Box Function Arguments for Sum

10.2.2 Computation of Mean

To compute mean, the following procedure is followed:

1) First select a cell where you need your answer to be displayed.

2) Then click on main menu ***Insert function*** and the **Insert Function** dialogue box will open (refer to figure 10.5). In this figure then you need to search for ***Average*** and click the same. This can be done by clicking on the button denoted by arrow in figure 10.5 and selecting ***Statistical***. You will find most of the relevant statistical techniques under this heading including average or mean, median, mode, percentile, range, quartile deviation, average deviation, standard deviation and so on.

3) Once you click on ***Average***, the ***Function Arguments*** dialogue box given in figure 10.6 will open, this is similar to figure 10.4.

4) To compute mean for emotional intelligence, drag the scores of emotional intelligence in the space given in front of ***Number 1*** and then click ***OK***.

5) Once we do that we will obtain the average or mean for scores of emotional intelligence. Similar procedure can then be carried out for the other variable, that is, achievement motivation. The mean thus computed is displayed in figure 10.20.

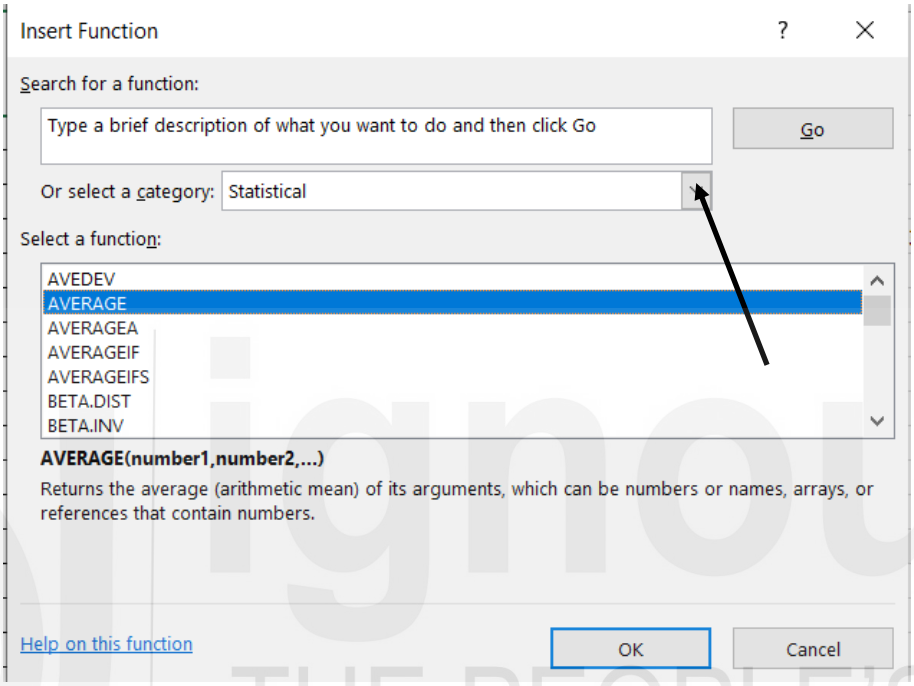


Fig. 10.5: Dialogue Box for Computation of Average

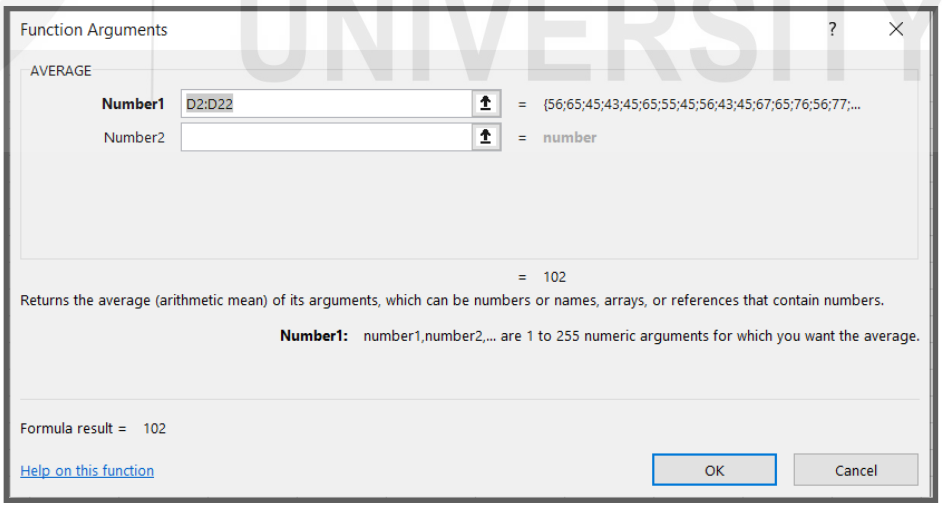


Fig. 10.6: Dialogue Box Function Arguments for Average

The other measures of central tendency, median and mode can be computed in a similar manner. Once you click on the **Insert Function**, then you need to select the required statistical technique and then click ***OK***. Remember to select a cell where the answer is to be displayed.

10.2.3 Computation of Standard Deviation

To compute standard deviation, the following procedure is followed.

1) First select a cell where you need your answer to be displayed.

2) Then click on main menu ***Insert function*** and the ***Insert Function*** dialogue box will open (refer to figure 10.7). In this figure then you need to search for ***STDEVA*** and click the same. This can be done by clicking on the button denoted by arrow in figure 10.7 and selecting ***Statistical*** or by searching for ***STDEVA*** in the space denoted by arrow in figure 10.7.

3) As you click on ***STDEVA***, the ***Function Arguments*** dialogue box given in figure 10.8 will open.

4) To compute standard deviation for emotional intelligence, drag the scores of emotional intelligence in the space given in front of ***Value 1*** and then click ***OK***.

5) Once we do that we will obtain the standard deviation for scores of emotional intelligence. Similar procedure can then be carried out for the other variable, that is, achievement motivation. The standard deviation thus computed is displayed in figure 10. 20.

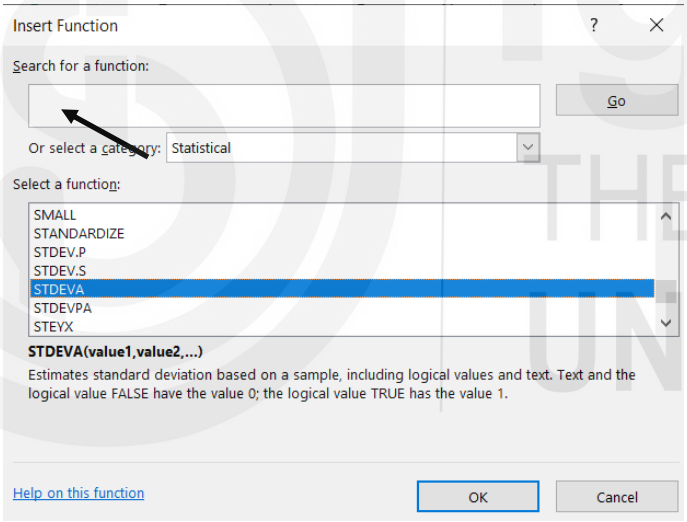


Figure 10.7: Dialogue Box for Computation of Standard Deviation.

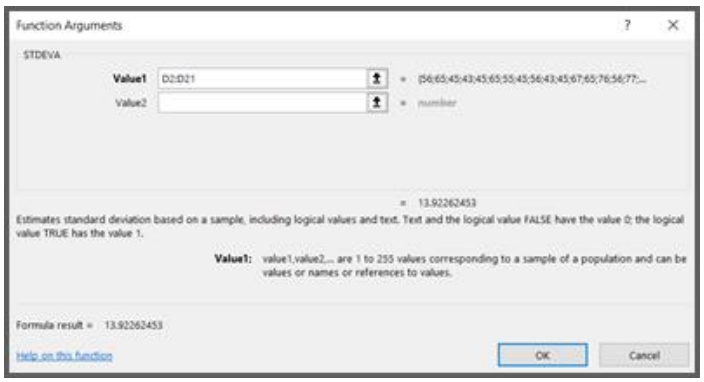


Figure 10.8: Dialogue Box Function Arguments for STDEVA

10.2.4 Graphs in Excel

Graphs can also be easily created with help the of Excel. To create graphs you need to do the following:

1) Go to the main menu ***Insert*** and then select the required chart. Here you need to remember that you may be required to arrange the data in your excel sheet in suitable manner as shown in figure 10.10. In the case of our example, we have taken the mean scores of emotional intelligence (EI) obtained by the participants having high, medium and low Socio Economic Status (as can be seen in figure 10.10).

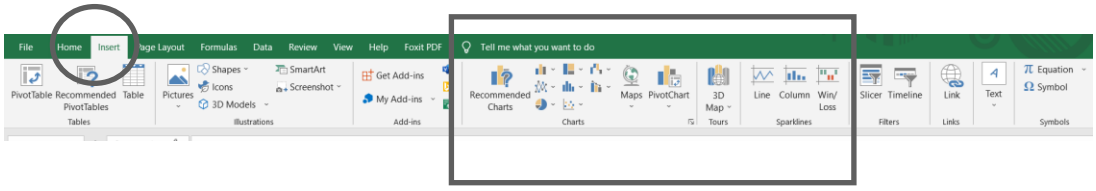


Fig. 10. 9: Menu (under Insert Main Menu on Excel) for Graphs/ Charts.

	High	Medium	Low
Mean EI scores	53.71	55.33	51.86

Fig. 10.10: Rearranged data in Excel for Creating Graphs/ Chart

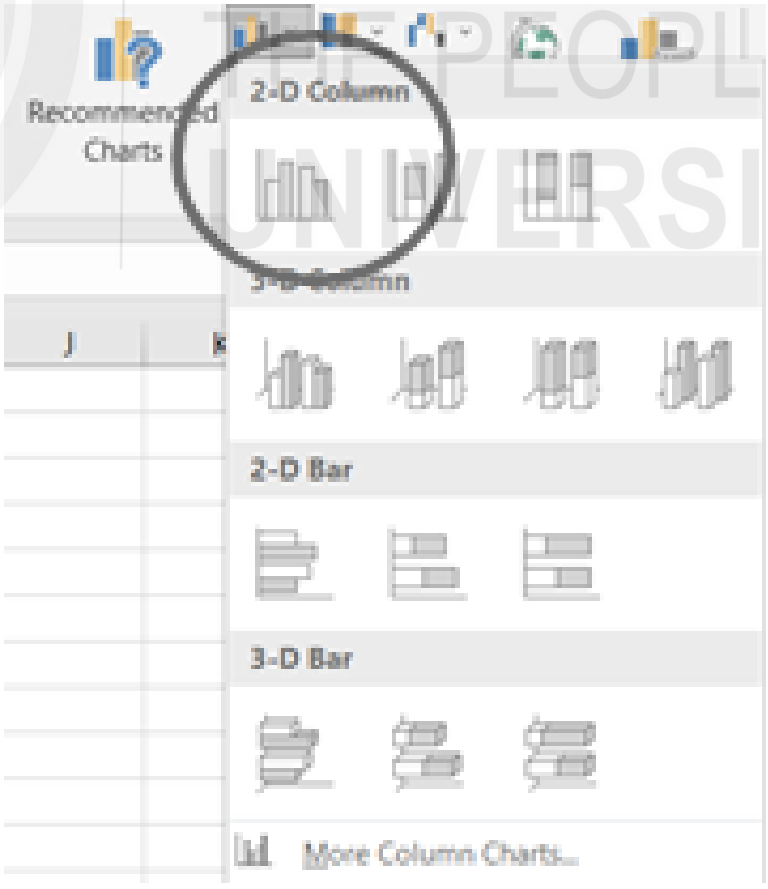


Fig. 10. 11: Chart Details

2) Select the data for graph and then click on the graph that you need. In the case of our example, we have taken the ***2D bar column***. You can select any other graph as per your requirement (refer to figure 10.11).

3) The graph thus obtained is displayed in figure 10. 12.

4) You can also customise the graph, change the colour etc with the help of the ***Format Chart Area*** that will be given on the right had side as you look at the Excel sheet (refer to figure 10.13).

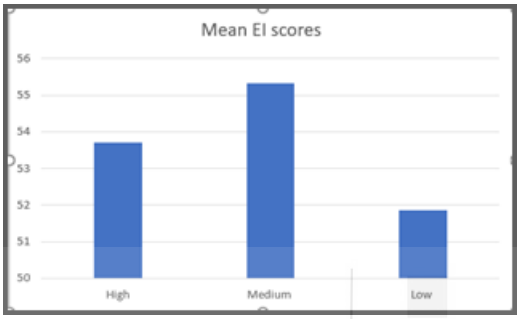


Fig. 10.12: Obtained Graph (2D Column)

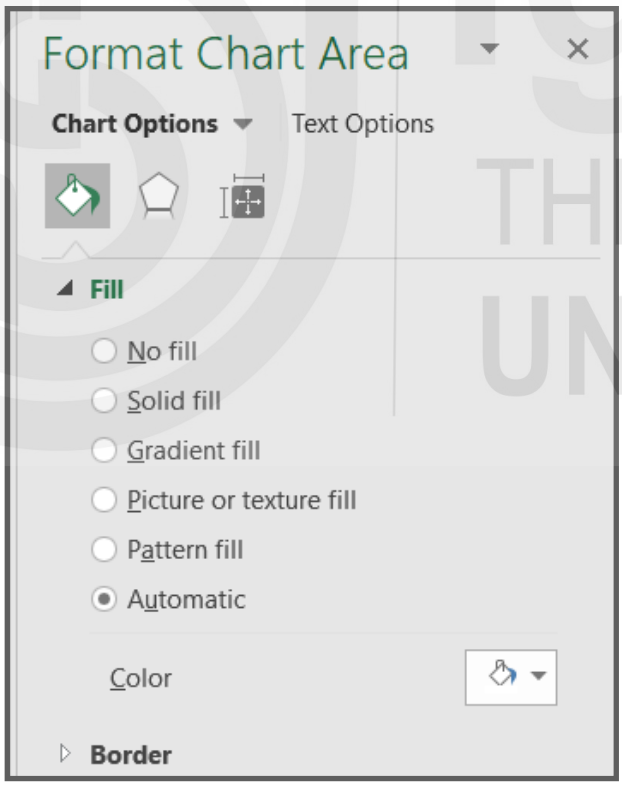


Fig. 10.13: Format Chart Area

10.2.5 Computation of Correlation (Pearson Product Moment Correlation)

Let us now try and understand how correlation can be computed. In our example we can compute correlation between emotional intelligence and achievement motivation. These two variables are continuous in nature and to

study the relationship between the two we will compute Pearson Product Moment Correlation.

To compute Correlation, the following procedure is followed.

1) First select a cell where you need your answer to be displayed.

2) Then click on main menu ***Insert Function*** and the ***Insert Function*** dialogue box (refer to figure 10.14). In this figure you need to search for ***Pearson*** under ***Statistical*** and click the same. This can be also done by searching for ***Pearson*** in the space denoted by arrow as is shown in figure 10.14.

3) As you do so, the ***Function Arguments*** dialogue box given in figure 10.15 will open. To compute correlation between the two variables, we will drag the scores of emotional intelligence under ***Array 1*** and achievement motivation scores in ***Array 2*** (refer to figure 10. 15). Then click ***OK***.

4) The correlation will be displayed in the cell that we had already selected (refer to figure 10.20). The results obtain can then be interpreted.

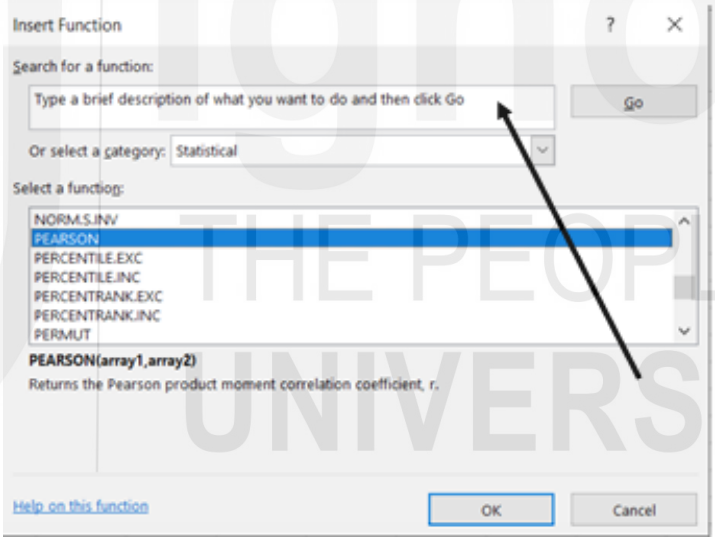


Fig. 10.14: Dialogue Box for Computation of Pearson

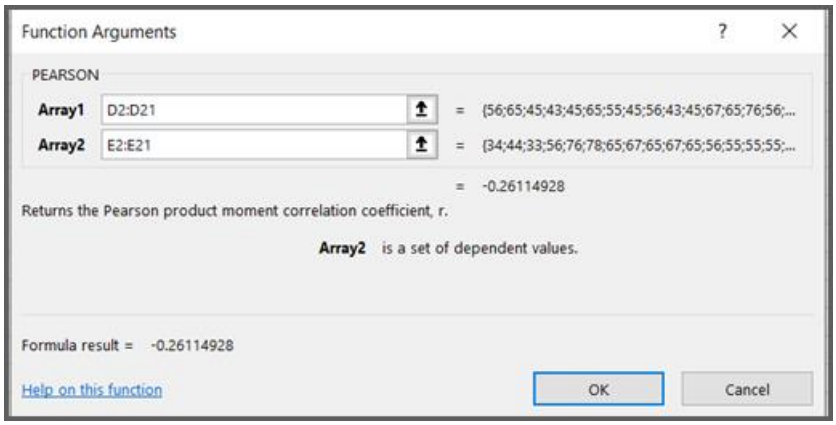


Fig. 10.15: Dialogue Box Function Arguments for Pearson

10.2.6 Computation of Independent t test

Let us now learn how to compute t test.

1) The first thing that you will need to do is rearrange the data as can be seen in figure 10.16 What we have done here is that data is sorted in terms of gender so that we have first ten rows showing scores on the two variables obtained by females and the next ten rows showing scores obtained by males on the two variables. This is to be done so that is is convenient for us to drag the scores in the space given for ***Array 1*** and ***Array 2*** as given in figure 10.18.

Sr. No.	Gender	Socio Economic Status	Emotional Intelligence	Achievement Motivation
2	Female	Medium	65	44
4	Female	Medium	43	56
5	Female	High	45	76
6	Female	Low	65	78
10	Female	Medium	43	67
11	Female	Low	45	65
16	Female	Medium	77	44
17	Female	Low	65	33
18	Female	Low	45	44
20	Female	High	23	66
1	Male	Low	56	34
3	Male	High	45	33
7	Male	High	55	65
8	Male	Medium	45	67
9	Male	Low	56	65
12	Male	High	67	56
13	Male	High	65	55
14	Male	High	76	55
15	Male	Medium	56	55
19	Male	Medium	34	55

Fig.10.16: Data in Excel Sheet Rearranged to Compute t Test

2) Select a cell where you want the answer of the calculation to be displayed. The next step is to click on main menu ***Insert Function*** as we did for computation of other statistical techniques earlier. As we do so, the ***Insert Function*** dialogue box as given in figure 10.17 will open. Here we need to click on ***T Test*** (under ***Statistical***).

3) Once we click on ***T test,*** the ***Function Arguments*** dialogue box as given in figure 10.18 will open.

4) We then need to drag the scores obtained by females on emotional intelligence in ***Array 1*** and the scores obtained by males on emotional

intelligence in ***Array 2***. We also have to mention the ***Tails*** whether one tailed (1) or two tailed(2) and ***Type*** that is, whether there is equal variance (1) or not (2 for unequal variance), as can be seen in figure 10.19. Once all the information is keyed in, we can then click on ***OK***.

5) The results will then be displayed in the cell on Excel sheet selected by us (refer to figure 10. 20. The results obtained are then to be interpreted.

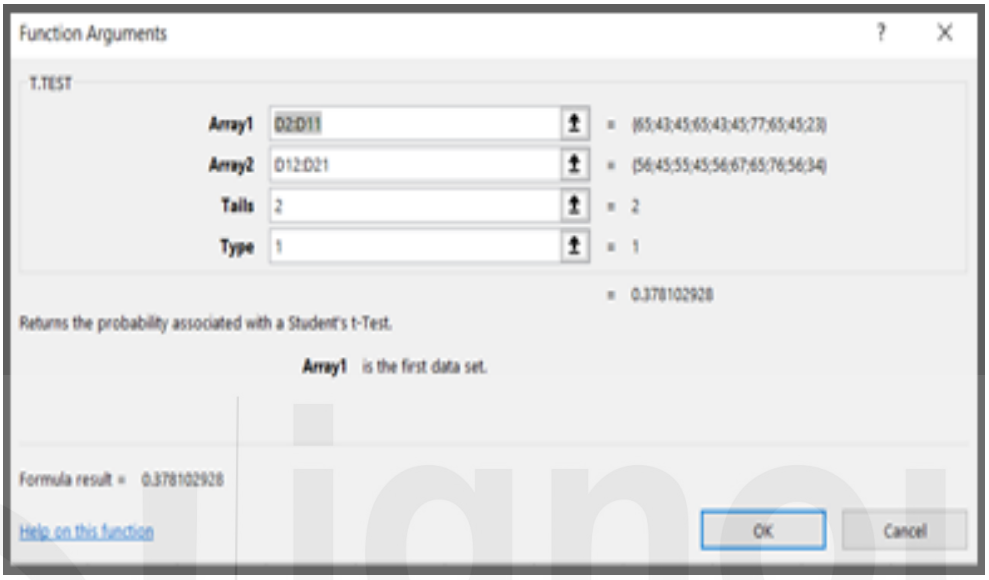


Fig. 10.17: Dialogue Box for Computation of T Test

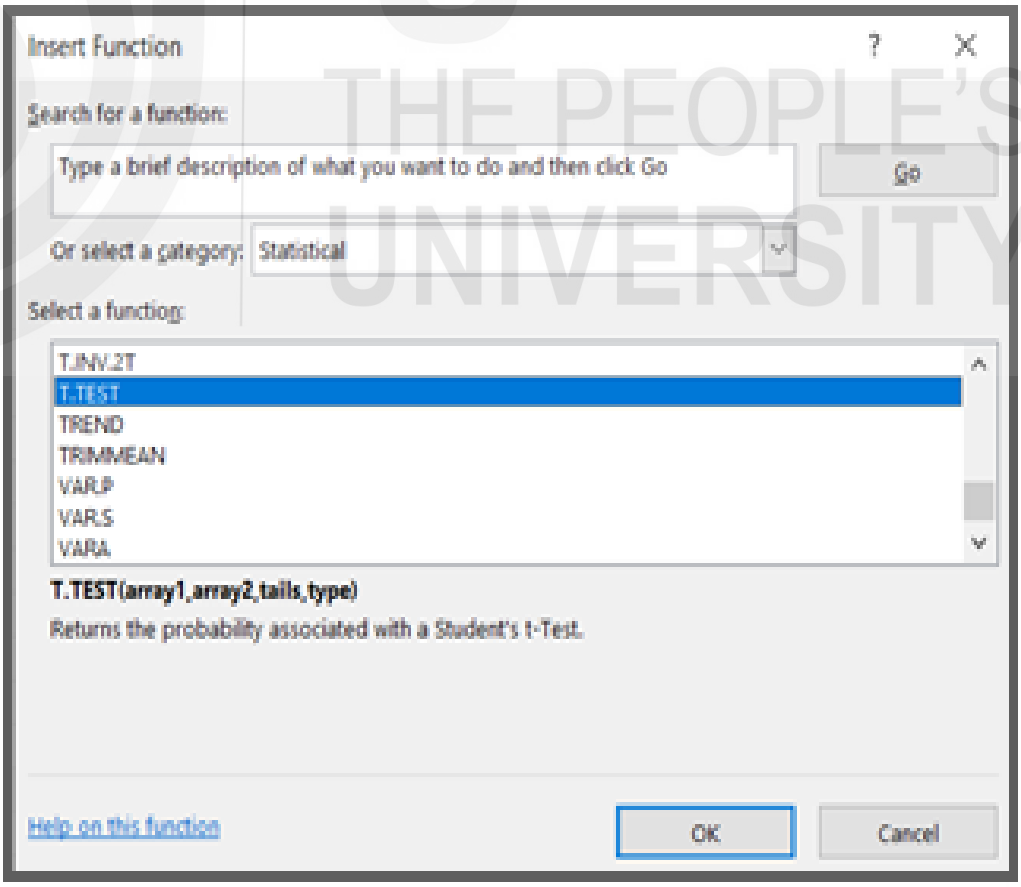


Fig. 10.18: Dialogue Box Function Arguments for T Test

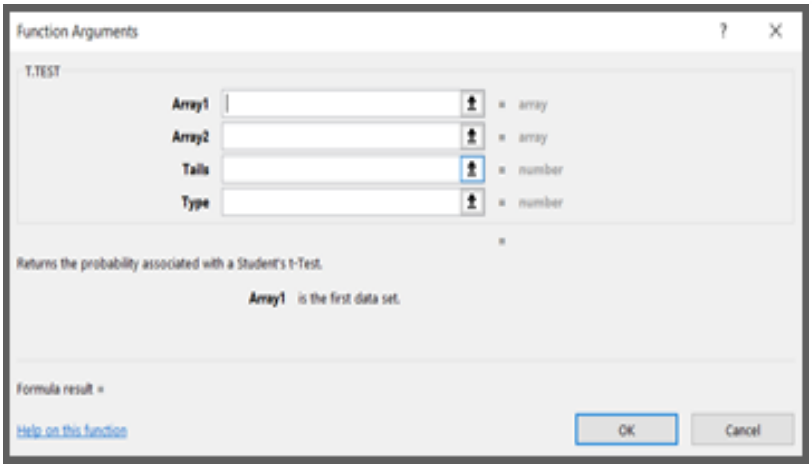


Figure 10.19: Dialogue box for t test with the required data keyed in.

Sr. No.	Gender	Socio Economic Status	Emotional Intelligence	Achievement Motivation
1	Male	Low	56	34
2	Female	Medium	65	44
3	Male	High	45	33
4	Female	Medium	43	56
5	Female	High	45	76
6	Female	Low	65	78
7	Male	High	55	65
8	Male	Medium	45	67
9	Male	Low	56	65
10	Female	Medium	43	67
11	Female	Low	45	65
12	Male	High	67	56
13	Male	High	65	55
14	Male	High	76	55
15	Male	Medium	56	55
16	Female	Medium	77	44
17	Female	Low	65	33
18	Female	Low	45	44
19	Male	Medium	34	55
20	Female	High	23	66
		Total	**1071**	**1113**
		Mean	**53.55**	**55.65**
		Standard Deviation	**13.9226245257211**	**13.4644756772463**
		Correlation	**-0.26115**	
		t value	**0.378103**	**For Gender**

Fig. 10.20: Excel Sheet showing the Computed Total, Mean standard Deviation, Correlation (Pearson) and t value.

Check Your Progress I

1) What are the menus in Microsoft Excel?

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10.3 DATA ENTRY AND CODING IN STATISTICAL PACKAGE FOR SOCIAL SCIENCES (SPSS)

As was mentioned earlier, there are three main aspects in SPSS, the first is DATA ENTRY, the second is DATA ANALYSIS and the third is INTERPRETATION OF RESULTS. In the present section of this unit, we will mainly focus on data entry and later in this unit and the next unit we will learn about computation of various statistical techniques and their interpretation.

Often on the computer (with SPSS software installed), the IBM SPSS Statistics folder will appear in the ***Start Dialogue box*** or you can go the concerned folder as well. Once you open the folder, you can click on the ***IBM SPSS Statistics 23*** (for example, 23 indicates the version of SPSS, it could be some other version as well). Once you do so the SPSS spreadsheet will open (refer to figure 10.27). Now you need to create the SPSS file.

10.3.1 How SPSS file is to be created?

The research process will start with preparation of a synopsis or a proposal, that will lead to the data collection process. Once the data is collected, the same is to be interpreted based on the manual if a psychological test is used and the raw data (that is mainly in terms of numerical) is to be suitably tabulates for each participant so that it can then be subjected to statistical analysis.

There are two ways in which SPSS file can be created:

1) Entering the data directly in SPSS.

2) Entering the data in Microsoft Excel and then importing it in SPSS.

To carry out either of the above you need to first open the SPSS file.

Let us now discuss both the ways in which the SPSS file can be created.

1) Entering the data directly in SPSS

The SPSS spreadsheet looks similar to that of an excel sheet that we discussed in the previous section. But there are ways in which the data is entered and coded, which we will discuss under the section on data entry in SPSS.

2) Entering the data in Microsoft Excel and then importing it in SPSS.

The second way in which the data can be entered in SPSS is by first entering the data in Excel sheet and then importing it in SPSS software. To do the same the following procedure is to be followed:

1) First of all you need to enter the data in Excel sheet. and save it with a file name in a particular folder or on desktop. The data in Excel sheet will look as given in figure 10. 21.

2) Now go to main menu ***File*** of SPSS. Then click on ***Open*** and then on ***Data*** (***File*** **>** ***Open*****>** ***Dat***a).

3) As you click on ***Data,*** the ***Open Data*** dialogue box as can be seen in figure 10.22 will open. In this dialogue box you need to click on the drop down arrow of ***Files of type (as shown by an arrow in figure 10.22)*** and select Excel (that is circled in the figure 10.22) as the type of file.

A	B	C	D	E
Sr. No.	Gender	Socio Economic Status	Emotional Intelligence	Achievement Motivation
1	1	1	56	34
2	2	2	65	44
3	1	3	45	33
4	2	2	43	56
5	2	3	45	76
6	2	1	65	78
7	1	3	55	65
8	1	2	45	67
9	1	1	56	65
10	2	2	43	67
11	2	1	45	65
12	1	3	67	56
13	1	3	65	55
14	1	3	76	55
15	1	2	56	55
16	2	2	77	44
17	2	1	65	33
18	2	1	45	44
19	1	2	34	55
20	2	3	23	66

Fig. 10. 21: Data in Microsoft Excel Sheet

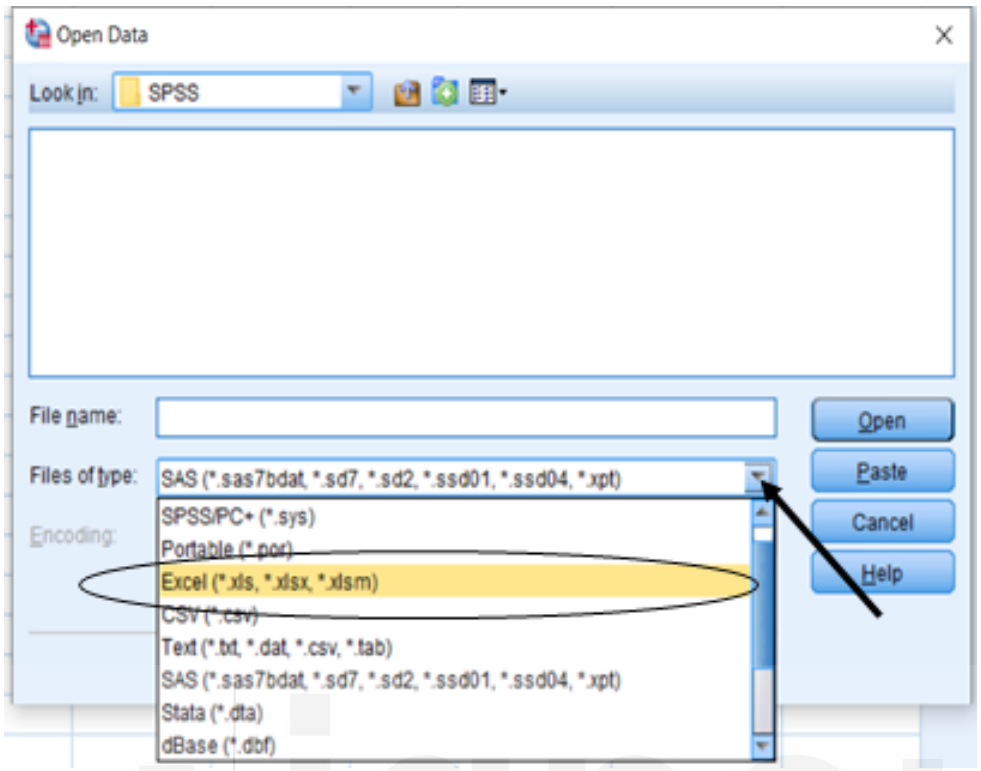


Fig. 10.22: Dialogue Box Open Data

4) As you do that only Excel documents will be visible in the ***Open data*** dialogue box and you can select the file with your data (***Book 1.xlsx***) as can be seen in figure 10.23 and click on ***Open*** that is circled in figure 10.23.

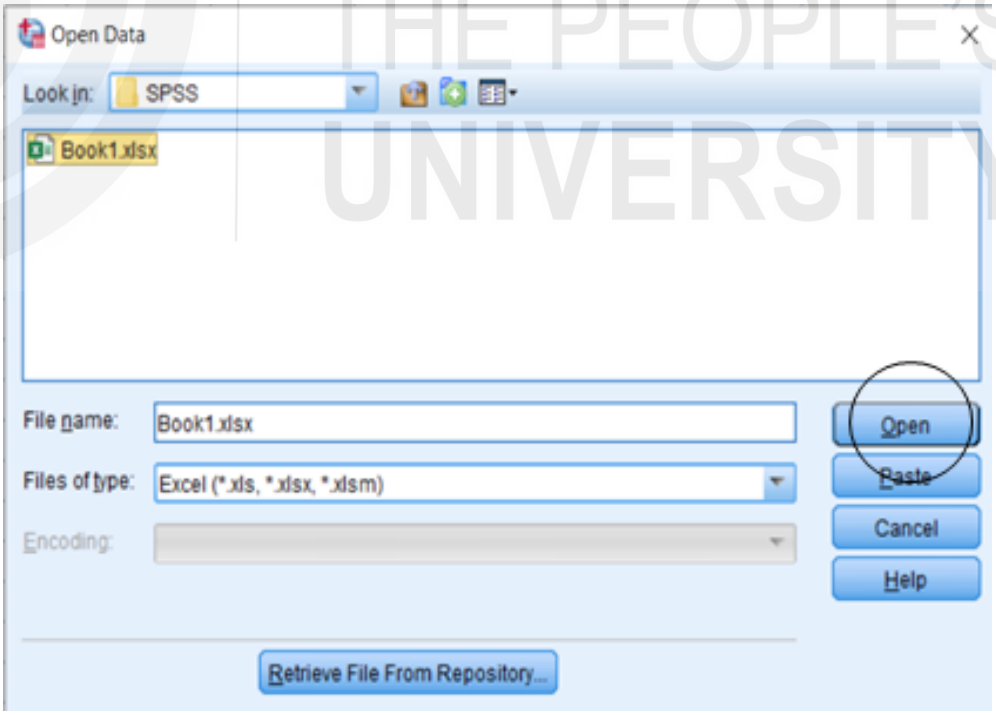


Fig. 10.23: Dialogue box Open Data showing Excel File

5) Once you click on **Open**, the ***Read Excel File*** dialogue box will open (as can be seen in figure 10.24). In this dialogue box you need to fill in necessary details, like the sheet in excel document that needs to be

opened (in case if there are multiple sheets). In case of our example, we will open ***Sheet 1*** as can be seen in figure 10.24 and then click ***OK***.

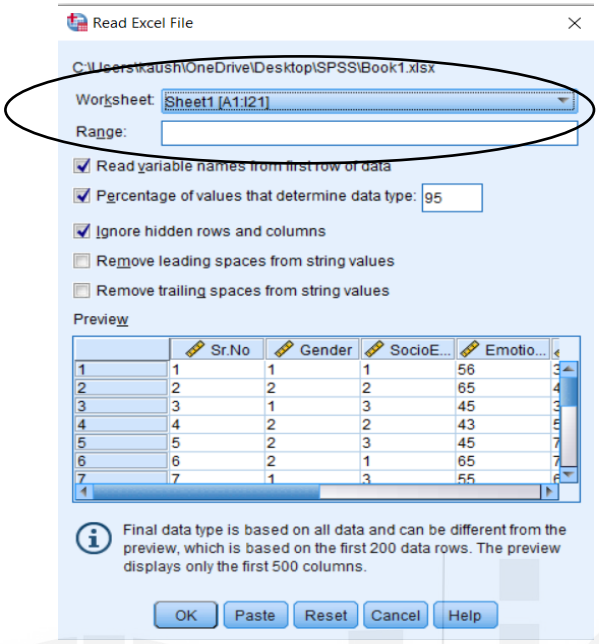


Fig. 10.24: Read Excel File

6) The Excel file will now open in SPSS with your data (refer to figure 10.25). Though this data is not yet ready for analysis and it needs to be coded. The same will be discussed by us under the sub section of this unit on data entry and coding.

	Sr.No	Gender	SocioEconomic Status	EmotionalIntelligence	AchievementMotivation
1	1	1	1	56	34
2	2	2	2	65	44
3	3	1	3	45	33
4	4	2	2	43	56
5	5	2	3	45	76
6	6	2	1	65	78
7	7	1	3	55	65
8	8	1	2	45	67
9	9	1	1	56	65
10	10	2	2	43	67
11	11	2	1	45	65
12	12	1	3	67	56
13	13	1	3	65	55
14	14	1	3	76	55
15	15	1	2	56	55
16	16	2	2	77	44
17	17	2	1	65	33
18	18	2	1	45	44
19	19	1	2	34	55
20	20	2	3	23	66

Fig. 10.25: The data successfully imported in SPSS from Excel.

10.3.2 Menu Bar of SPSS

We have now understood how to key in the data in SPSS or import it from Excel. Let us now discuss about the Menu bar of SPSS (refer to figure 10.26). Some of the shortcuts are given below these menus.

Fig. 10.26: Menu Bar of SPSS

The functions under each of these menus are given in table 10. 26.Though this may be different based on the SPSS version.

Table 10.2: Some relevant Functions in pull down Menus of SPSS

Menu	Functions
File	• New: Where new data, syntax or output can be opened. • Open: Includes data, internet data, syntax, output and script that can be opened. • Save: To save the changes made in the document. • Save as: To save the document in another name as and if required. • Besides the above there are various other functions like Export, Print preview, Print and so on.
Edit	Mainly includes functions like Undo, Redo, Cut, Copy and Paste. It also has two main functions • Go to case: With the help of this the researcher can directly identify certain case in the data. • Go to Variable The researcher can go to a particular variable directly.
View	View will help you to manage the way you can View the status bar, Toolbars, menu editors and so on. It also includes functions like Fonts, Grid lines, Value Labels and Variables view.
Data	Includes functions Define Variable Properties, Set Measurement level for Unknown, Copy data Properties, Define date and time. Define Multiple response sets, Validation, Identify Duplicate cases, Identify Unusual Cases, Compare data sets, Sort Cases, Sort Variables, Transpose, Adjust string widths across files, Merge Files, Restructure, Rake weights, Propensity score matching, Case control matching, Aggregate, Orthogonal Design, Split into File, Copy

Table 10.2: Some relevant Functions in pull down Menus of SPSS

	database, Split files Select Cases and Weight Cases that can be used as and when required.
Transform	Includes Compute variables, Probability transformation, Count values within cases, Shift values, Recode in to same variables, recode in to different variable, Automatic Recode, Create dummy variables, Visual binning, Optimal binning, Prepare data for modelling, Rank cases, date and Time Wizard , Create Time Series, Replace Missing Values, random Number generations and Run pending Transforms
Analyze	Includes Reports, Descriptive Statistics, Bayesian statistics, Tables, Compare Means, General Linear Model, Generalised Linear Model, Mixed model, Correlate, Regression, Loglinear, Neural networks Classify, Dimension reduction, Scale, Non-parametric tests, Forecasting, Survival, Multiple Response, Missing Value Analysis, Multiple imputation, Complex samples, Simulation, Quality control,ROC curve, Spatial and temporal modelling and Direct marketing.
Graphs	Includes Chart builder, Graphboard template chooser, Weibul plot, Compare subgroups and legacy dialogs.
Utilities	Includes Variables, OMS control panel, OMS identifiers, Scoring wizard, Merge Model XML, Calculate with PIVOT table, Data file comments, Define variable macro, Define variable Sets, Censor table , Use variable sets, rShow all variables, Create text output, Spelling, process data files, Run script, production facility, Map conversion utility.
Extensions	Includes, Extension hubs, Install local extension bundle, Custom dialogue builder for extensions and Utilities
Window	Includes Minimise All Windows, Go to designated viewer window, Go to designated syntax window, Reset dialogue sizes and positions. It will also displays the name of the sheet being used presently by the researcher and the output dialogue box of the same.
Help	Includes Topics, SPSS support, SPSS forum, Documentation in PDF format, Command syntax reference, Compatibility report tool, About, Diagnostic tool, IBM SPSS Predictive Analysis Community.

Note that the menu bar could differ depending on the version of SPSS. The menu can also be customised by going to **View** menu.

10.3.3 DataView, Variable View and Output view in SPSS

SPSS has three views namely the Data view, the Variable view and the Output view. Let us discuss each of these.

Data View: ***Data view*** of SPSS can be seen in figure 10.27. The data will be reflected in this view.

As can be seen in the figure 10.27, the sheet is similar to that of an Excel sheet. There are columns and rows that intersect to form cells. The information related to data is to be typed in to these cells. The very first column indicates serial number of the rows, also termed as case number and the cell in first row are labeled as ***'Var'***. Thus, the variables will be displayed in the columns with one column assigned to each variable and in rows the data of each participant will be displayed. Though, serial numbers are displayed in the first column, it is suggested that the serial number are included separately in the second column that could correspond with serial number of each participant.

Variable view: ***Variable view*** can be seen in figure 10.28. From Data view you can easily go to ***Variable view*** by just clicking on ***Variable view*** given in the left side of the SPSS spreadsheet (that is circled in figures 10.27 and 10.28). ***Variable view*** looks similar to data view with rows and columns intersecting to make cells. However, in ***Variable view*** you will notice that though there are serial numbers given in the first column, the first row has titles differently than from those in the data view. The rows here are marked as N***ame, Type, Width, Decimals, Label, Values, Missing, Columns, Align measure and Role***. Under these columns the information related to each variable will be displayed.

You will also notice that the main menu in the variable view remains same as that of ***Data view***, that enables us to compute with the help of statistical analysis even when you are viewing the ***Variable view.***

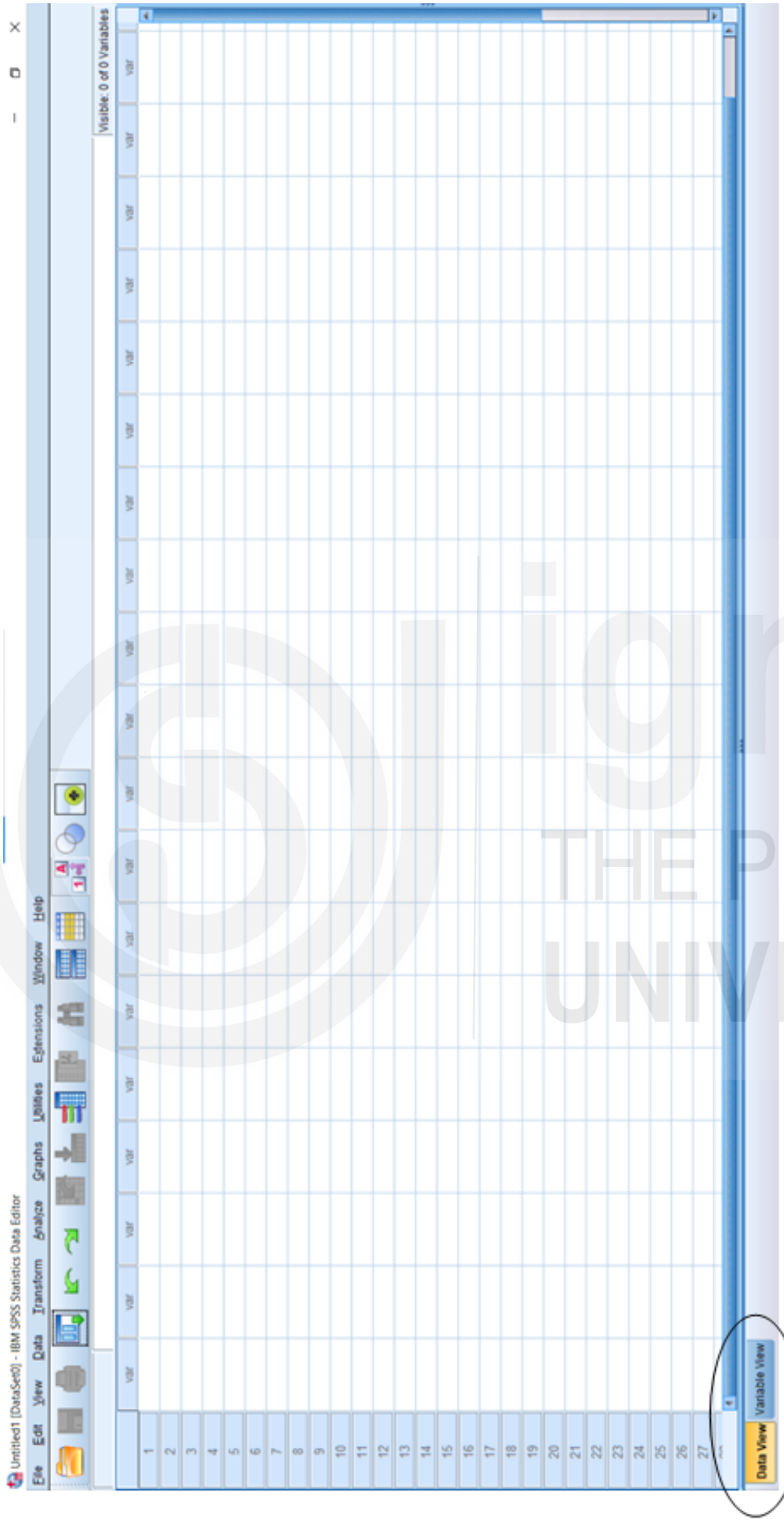


Fig. 10.27: Data View of SPSS

Let us now look at the various labels mentioned in the columns of the variable view of SPSS.

- ***Name*** is the name that is given to the variable. For example, gender, emotional intelligence etc.
- ***Type*** denotes the type of variable, whether its is ***Numeric, Comma, Dot, Scientific notation, Date, Dollar, Custom Currency, String*** and also gives details about the characters that can be changed as per requirement).
- ***Width*** is in the context of the width of the values included under each variable. The width can be decided by the researcher as per requirement.
- Decimals of the values as per the requirement can be decided and mentioned under ***Decimals***.
- ***Label*** denotes the name of the variable that you would like to be displayed in the output table after computation of the statistical analysis.
- ***Values*** denote the codes that are given to the categorical variables in the research. For example, with regard to gender 1 can be allotted to males and 2 can be allotted to females. as such these values do not mean any or do not indicate that one category is better than the other. They are just nominal values.
- ***Missing values*** denote missing value in the raw scores obtained.
- ***Columns*** helps increase or decrease the width of the column.
- ***Align*** pertains to alignment.
- ***Measure*** denote the scales of measurement.
- ***Role*** relates to the role of the variable in the research, whether independent variable, dependent variable or both.

Output view: The ***Output view*** can be seen in figure 10.29. This is where the results or output will be displayed after computation. The ***Output view*** can also be saved or the tables can be copied and pasted in Microsoft word for further presentation and interpretation.

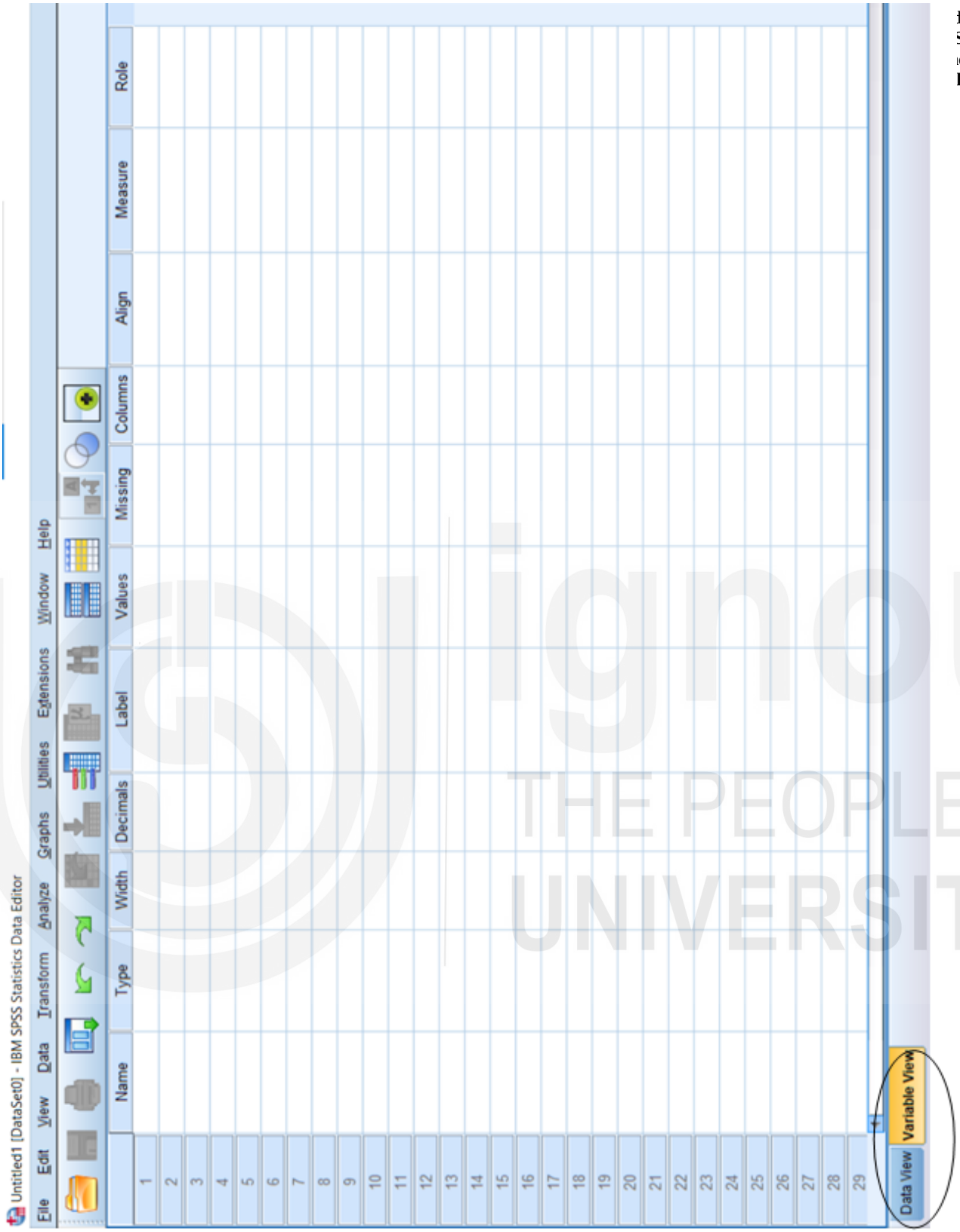


Fig. 10.28: Variable View of SPSS

Fig. 10.29: Output View of SPSS

10.3.4 Data Entry and Coding

We have understood how the SPSS file can be created and we also discussed about the menu bar of SPSS. We also explained the ***Data view, Variable view and Output view*** in SPSS. Now let us go to yet another important aspect that is, data entry and coding. Once we enter the data in SPSS or import it from Excel or any other source, we need to code it so that it can be subjected to computation.

The data in SPSS will appear as given in figure 10.25. As you can see in figure 10.25, there are five columns, The first is the S***r.no. (Serial Number)***, the second is ***Gender*** that is displayed in terms of 1 (male) and 2 (female). Then we have the ***Socio Economic Status*** that is displayed in terms of 1 (high), 2 (medium) and 3 (low) and then we have the variables ***Emotional Intelligence*** and ***Achievement Motivation*** in columns 4 and 5.

To code the data, we will go to the ***Variable view***. The data in ***Variable view*** will look as shown in figure 10. 30. This data now needs to be coded as per our requirement. As can be seen in the figure, there are five rows, the first is ***srno (Serial Number)***, followed by ***gender, ses (Socio Economic Status), ei (Emotional Intelligence) and am (Achievement Motivation).*** You can see the complete name in the Label column. In our example, we will code the gender and Socio Economic Status variables.

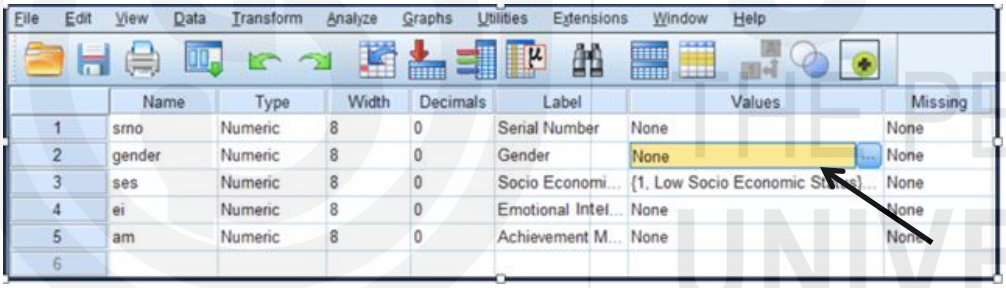


Fig. 10.30: Variable View with Data.

To code the variables following is to be done.

1) As can be seen in the figure 10.30, you need to click on the ***tab*** (indicated by arrow) that you can see in the cell for ***gender*** (row) and ***values*** (column).

2) Once you click on this ***tab***, the ***Value Labels*** dialogue box will open as can be seen in figure 10. 31. Here you need to put 1 in the space in front of ***Value*** and then type ***Male*** in the space in front of the ***Label*** and then click ***Add***. We will do similar for females, we will put 2 in front of ***Value*** and then ***Female*** in space given in front of the ***Label*** and then click ***Add***. If there are more categories to added, same procedure can be continued. We have to remember that these values are nominal and for convenience in computation. Similar procedure can be carried for Socio Economic Status as well.

3) Once the coding is carried out the ***Data view*** will look as given in figure 10.32. Here you can see that all the values 1 have been replaced by ***Male*** and all values 2 have been replaced by ***Females*** and similar can be seen for Socio Economic Status variable. If you wish to see the values then you simply have to click on ***Value Labels*** button shown with arrow in figure 10.32.

4) Also ensure that you adjust the width of the cells as required. Decimals can also be indicated. If you don't want decimals then you can indicate it as zero as can be seen in figure 10.32, where there are no decimal points for any of the scores or values.

Once you fill in all the information as required, the data is ready for analysis. In case of our example, the data is much less and the variables as well are few. But when you carry out actual research there could be many more variables and the sample size could also be big. You need to focus on the nature of each and every variable and then accordingly put the necessary information in the ***Variable view***.

In the main menu of SPSS, there is drop down menu ***Transform***, under which you have ***Recode in to same variable*** and ***Recode in to different variable***. This can also be adequately used to transform the variable (s). For example, emotional intelligence is a continuous variable but it can be transformed in to categories (20 to 29, 30 to 39, 40 to 49, 50 to 59 and so on). The variable can be transformed in to another variable for example, the label could be EI categories or in to same variable. If you transform in to another variable, another column by name **EI categories** will appear in your ***Data View*** and another row will be added in your **Variable view** by name **EI categories**. In ***Variable view*** then you can also give V***alue labels*** for the categories (as we did for gender). It could be very low EI for category 20 to 29, low for 30 to 39 and so on as required. If you recode in to same variable, the present emotional intelligence column in your ***Data view*** and the row with label emotional intelligence in **Variable view** will be replaced and then you will carryout coding based on the requirement.

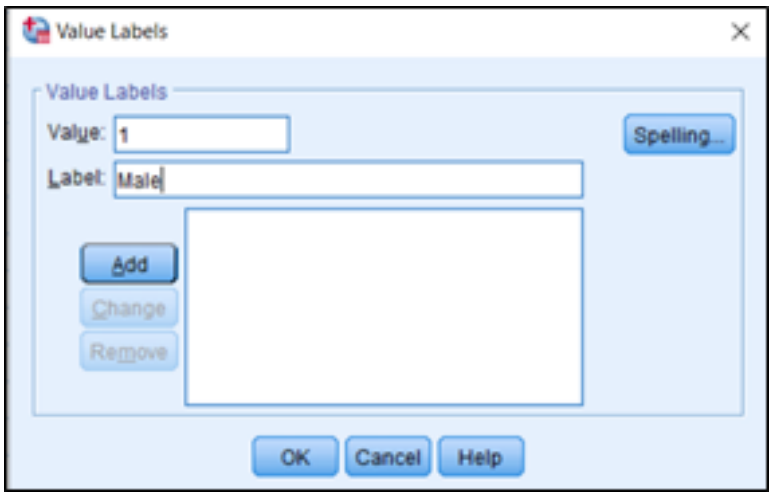
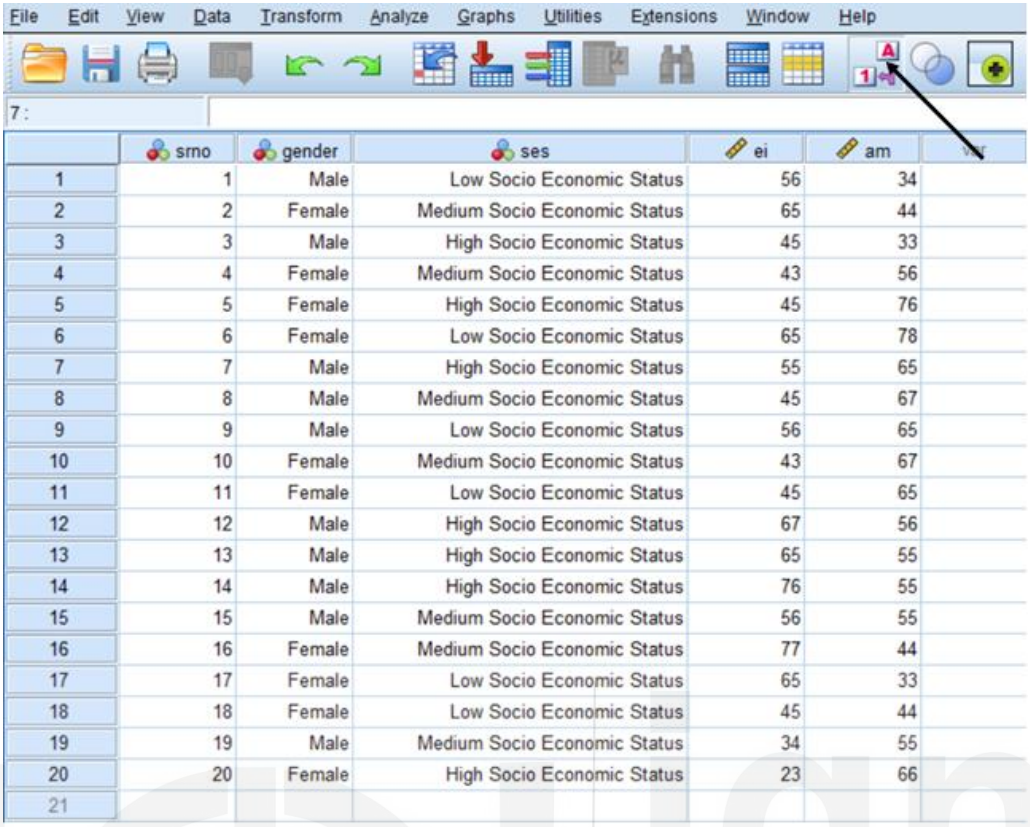


Fig. 10.31: Value Labels Window



	srno	gender	ses	ei	am	var
1	1	Male	Low Socio Economic Status	56	34	
2	2	Female	Medium Socio Economic Status	65	44	
3	3	Male	High Socio Economic Status	45	33	
4	4	Female	Medium Socio Economic Status	43	56	
5	5	Female	High Socio Economic Status	45	76	
6	6	Female	Low Socio Economic Status	65	78	
7	7	Male	High Socio Economic Status	55	65	
8	8	Male	Medium Socio Economic Status	45	67	
9	9	Male	Low Socio Economic Status	56	65	
10	10	Female	Medium Socio Economic Status	43	67	
11	11	Female	Low Socio Economic Status	45	65	
12	12	Male	High Socio Economic Status	67	56	
13	13	Male	High Socio Economic Status	65	55	
14	14	Male	High Socio Economic Status	76	55	
15	15	Male	Medium Socio Economic Status	56	55	
16	16	Female	Medium Socio Economic Status	77	44	
17	17	Female	Low Socio Economic Status	65	33	
18	18	Female	Low Socio Economic Status	45	44	
19	19	Male	Medium Socio Economic Status	34	55	
20	20	Female	High Socio Economic Status	23	66	
21						

Fig. 10: 32: Data View of SPSS after Coding

The data is now ready for analysis. Ensure that you save your data with appropriate file name.

Check Your Progress II

1) How can the SPSS file be created?

……

……

……

10.4 LET US SUM UP

In the present unit we discussed about statistical analysis using Microsoft Excel. We explained computation of sum (Total), computation of mean and computation of standard deviation with help of figures. We also discussed about how to create graphs or charts. Computation of correlation (Pearson product moment correlation) and computation of independent t test were also discussed with the help of figures. We then explained about SPSS and focused on how SPSS file is created. We further explained the menu bar of SPSS and discussed the data view, variable view and output view in SPSS. Lastly we discussed about data entry and coding.

In the next unit we will discuss about the computation of descriptive statistics using SPSS.

10.5 REFERENCES

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10.6 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress I

1) What are the menus in Microsoft Excel?

   The menus in Microsoft Excel are ‘File’, ‘Home’, ‘Insert’ Page Layout’, ‘Formulas’, ‘Data’, ‘Review’ ,’View’ and Help’.

Check Your Progress II

1) How can the SPSS file be created?

   There are two ways in which SPSS file can be created:

1) Entering the data directly in SPSS
2) Entering the data in Microsoft Excel and then importing it in SPSS.

10.7 UNIT END QUESTIONS

1) Explain the procedure for computing mean and standard deviation in excel.
2) Discuss the procedure in computation of t test.
3) Explain various labels mentioned in the columns of the variable view of SPSS.
4) Briefly explain the three views in SPSS.
5) Describe the procedure for data entry and coding in SPSS.

10.8 ACTIVITY

Collect data from 30 graduate individuals by asking them age at which competed their graduation. The data be suitably arranged in a Microsoft Excel sheet and compute total, mean, median, mode and standard deviation.

UNIT 11 COMPUTATION OF DESCRIPTIVE STATISTICS USING SPSS*

Structure

11.0 OBJECTIVES

After reading this unit, you will be able to,

- Discuss computation of frequency using SPSS;
- describe computation of descriptive statistics using SPSS;
- explain computation of Crosstabs using SPSS; and
- discuss the graphs in SPSS.

11.1 INTRODUCTION

In the previous unit, we discussed about how SPSS file is created. We also explained the menu bar of SPSS and discussed the data view, variable view and output view in SPSS. In the present unit, we will discuss about computation of descriptive statistics using SPSS with the help of figures.

11.2 COMPUTATION OF FREQUENCY USING SPSS

To compute frequency using SPSS, the following procedure is to be followed:

1) Go to the main menu ***Analyze*** and the click on ***Descriptive Statistics*** and then on ***Frequencies*** (**Analyze > Descriptive Statistics> Frequencies**) as can be seen in figure 11.1.

* Prof. Suhas Shetgovekar, Faculty, Discipline of Psychology, SOSS, IGNOU, Delhi

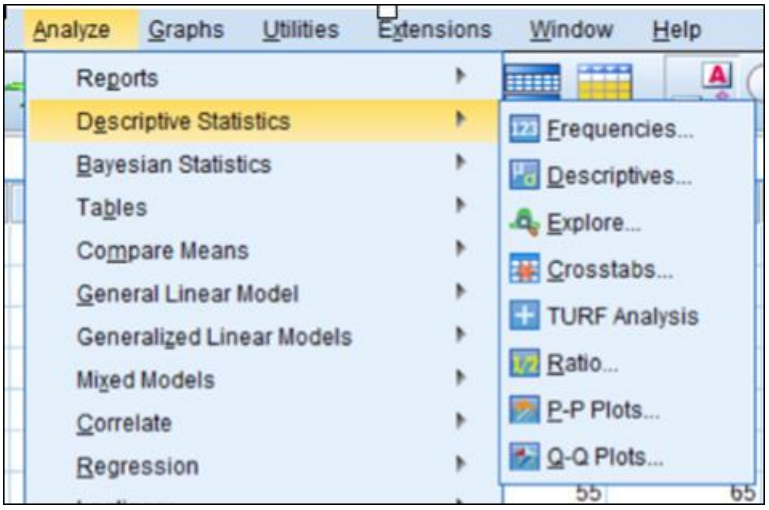

Fig. 11.1: Partial Screenshot of Main Menu Analyze> Descriptive Statistics

2) Once we click on ***Frequencies***, the dialogue box labeled **F*requencies*** as displayed in figure 11.2 will open.

3) Now what we need to do is select and transfer the variables for which we need to compute frequency from the white space on the left side to the white space on the right side (as can be seen in figure 11.2) with the help of the arrow given in the middle (that is circled) of the two white spaces. You can even transfer back a variable to the white space on the left side with the help of the same arrow if you decide that you don't want to continue with computation for that variable.

4) If further computations are required, ***Statistics*** can be clicked on ***Frequencies*** dialogue box. As that is done another dialogue box labeled ***Frequencies: Statistics*** will open (as can be seen in figure 11.3). In this dialogue box, we can select whichever statistics that we need to compute and then click on ***Continue***.

5) If we need charts, we can click on ***Charts*** as well in ***Frequencies*** dialogue box (figure 11.2). That will lead to the opening of dialogue box titled ***Frequencies:*** as can be seen in figure 11.4. Select the chart as per the requirement and also click on whether you need the charts in F***requency or Percentage*** and click on ***Continue***.

6) Once you click ***OK*** on the ***Frequencies*** dialogue box, the results will be displayed in the ***Output view*** of SPSS(the results can be seen in Box 11.1). The graph will also be displayed in the ***Output view*** of SPSS. the graph thus obtained can be seen in figure 11.5. In the example we have computed various statistical techniques for learning purpose. But you need to compute the statistical techniques as required based on your objectives and hypothesis/es. Please ensure that the table is not copied as it is but is done in the way that is applicable for your Results and Discussion chapter of your dissertation or part of your research paper. Ensure that you follow the points we discussed in BPCC104 regarding tabulation. Do not forget to provide appropriate titles and numbers to your tables and figures.

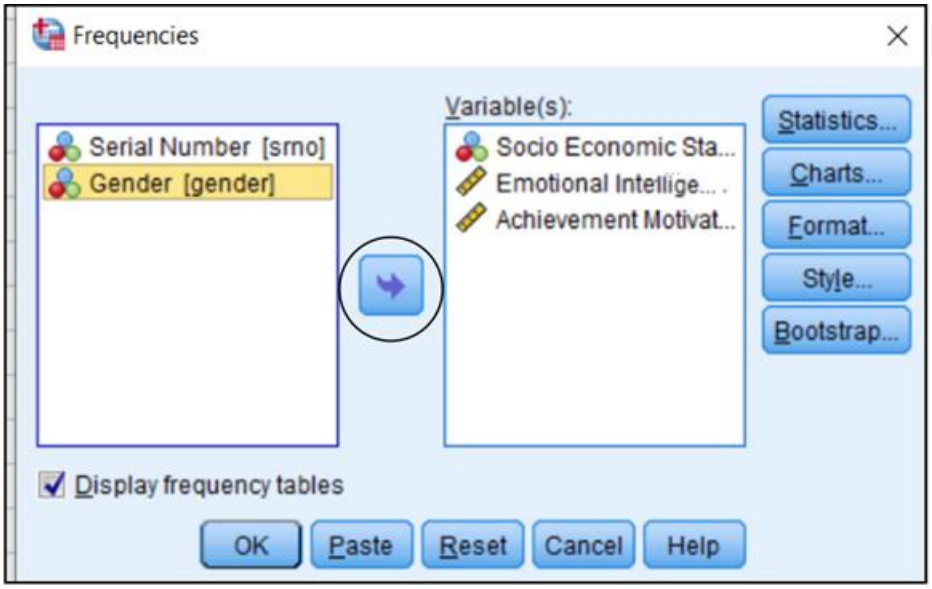

Fig. 11. 2: Frequencies Dialogue Box

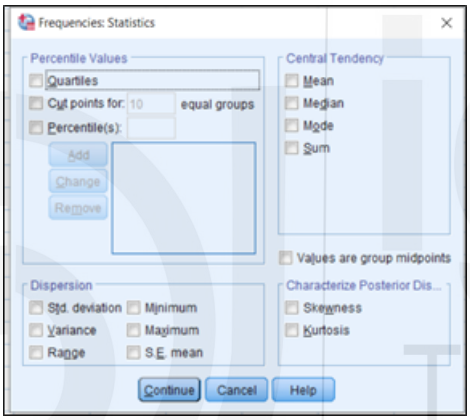

Fig. 11. 3: Dialogue Box Frequencies: Statistics

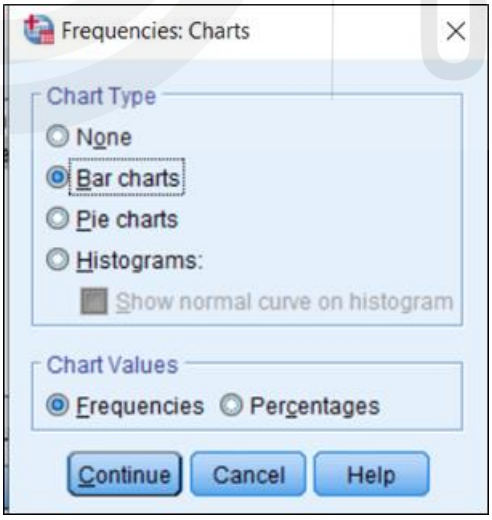

Fig. 11. 4: Dialogue Box Frequencies: Charts

Box 11.1: Results obtained after Computation of Frequencies

Statistics

			Gender	Socio Economic Status	Emotional Intelligence	Achievement Motivation
N	Valid		20	20	20	20
	Missing		0	0	0	0
Mean			1.50	2.05	53.55	55.65
Median			1.50	2.00	55.50	55.50
Mode			1[a]	2[a]	45	55
Std. Deviation			.513	.826	13.923	13.464
Skewness			.000	-.098	-.190	-.289
Std. Error of Skewness			.512	.512	.512	.512
Kurtosis			-2.235	-1.518	-.220	-.704
Std. Error of Kurtosis			.992	.992	.992	.992
Minimum			1	1	23	33
Maximum			2	3	77	78
Sum			30	41	1071	1113

a. Multiple modes exist. The smallest value is shown

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	10	50.0	50.0	50.0
	Female	10	50.0	50.0	100.0
	Total	20	100.0	100.0	

Socio Economic Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low Socio Economic Status	6	30.0	30.0	30.0
	Medium Socio Economic Status	7	35.0	35.0	65.0
	High Socio Economic Status	7	35.0	35.0	100.0
	Total	20	100.0	100.0	

Emotional Intelligence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	23	1	5.0	5.0	5.0
	34	1	5.0	5.0	10.0
	43	2	10.0	10.0	20.0
	45	5	25.0	25.0	45.0
	55	1	5.0	5.0	50.0
	56	3	15.0	15.0	65.0
	65	4	20.0	20.0	85.0
	67	1	5.0	5.0	90.0
	76	1	5.0	5.0	95.0
	77	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

Achievement Motivation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	33	2	10.0	10.0	10.0
	34	1	5.0	5.0	15.0
	44	3	15.0	15.0	30.0

	55	4	20.0	20.0	50.0
	56	2	10.0	10.0	60.0
	65	3	15.0	15.0	75.0
	66	1	5.0	5.0	80.0
	67	2	10.0	10.0	90.0
	76	1	5.0	5.0	95.0
	78	1	5.0	5.0	100.0
	Total	20	100.0	100.0	

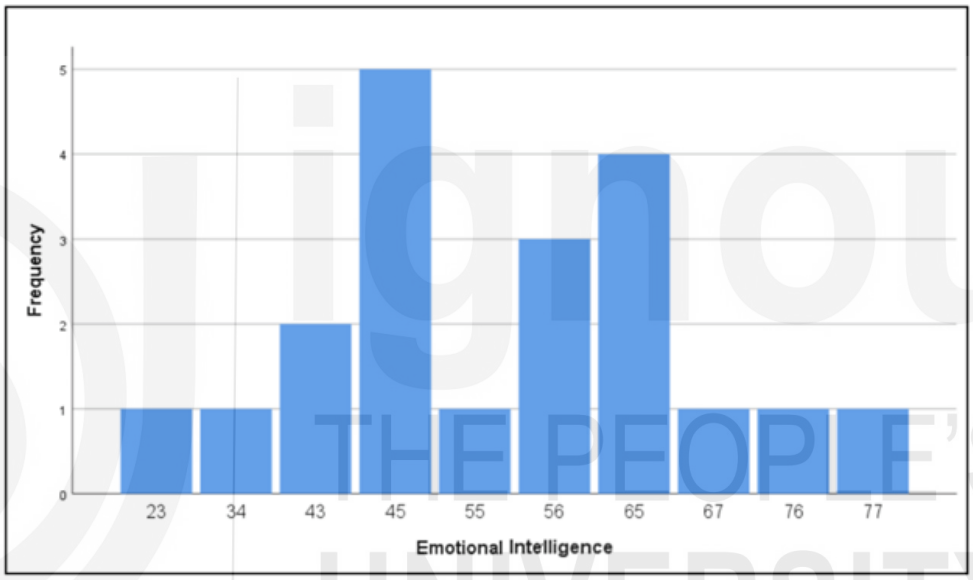

Fig. 11.5: Chart displayed in the Output View

Check Your Progress I

1) What is the first step in computation of frequencies in SPSS?

……

……

……

11.3 COMPUTATION OF DESCRIPTIVE STATISTICS USING SPSS

Computation of descriptive statistics is similar to that of frequencies. You need to go to the main menu **Analyze** of SPSS and then click on ***Descriptive Statistics*** and then on ***Descriptives*** (refer to figure 11.1). Thus, ***Analyse*** > ***Descriptive Statistics*** > ***Descriptives.***

The following procedure is then to be followed:

1) As you click on ***Descriptives***, the dialogue box labeled ***Descriptives*** will open. This can be seen in figure 11.6.

2) Then we follow a similar procedure as we did for ***Frequencies*** dialogue box, where we drag the variables emotional intelligence and achievement motivation from the white space on the left in the ***Descriptives*** dialogue box to the white space on the right with the help of the arrow given in the middle of the two spaces. You can even transfer back a variable to the left space with the help of the same arrow if you decide that you don't want to continue with computation for that variable.

3) In the ***Descriptives*** dialogue box you can also click on ***Option*** tab, and as you do so the dialogue box with label ***Descriptives: Options*** will open (refer to figure 11.7). This gives you various options of descriptive statistical techniques that you can click as per your requirement and then click on ***Continue***.

4) Do not forget to click ***OK*** on the ***Descriptives*** dialogue box so that the computation is carried out.

5) The results will then appear in the ***Output view*** of SPSS. The table will look as can be seen in box 11.2.

6) The results obtained can be suitably tabulated and interpreted based on the objectives of the research.

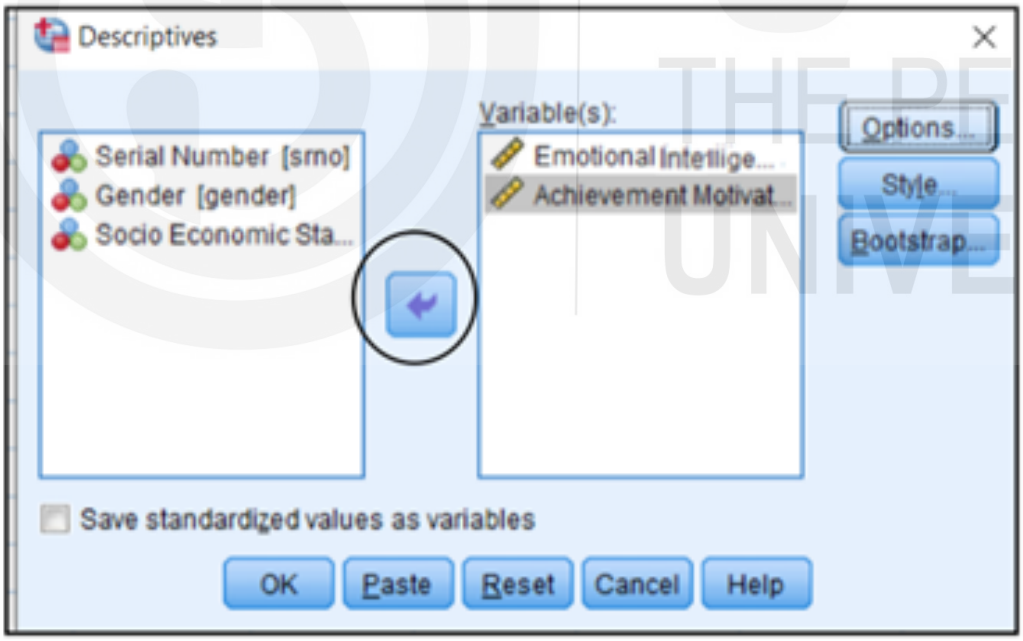

Fig. 11.6: Dialogue Box forDescriptives

Fig. 11.7: Dialogue Box for Descriptives: Options

Box 11.2: Results obtained for Descriptive Statistics

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Emotional Intelligence	20	54	23	77	53.55	3.113	13.923	193.839	-.190	.512	-.220	.992
Achievement Motivation	20	45	33	78	55.65	3.011	13.464	181.292	-.289	.512	-.704	.992
Valid N (listwise)	20											

Check Your Progress II

1) In Box 11,2, what is the range and mean obtained for variable emotional intelligence?

Range: _____ Mean: _____

11.4 COMPUTATION OF CROSSTABS USING SPSS

Computation of ***Crosstabs*** is similar to that of frequencies and descriptive statistics. You need to go to the main menu ***Analyze*** of SPSS and then click on ***Descriptive Statistics*** and then on ***Crosstabs*** (refer to figure 11.1). Thus, **Analyze > Descriptive Statistics> Crosstabs**.

The following procedure is then to be followed:

1) As you click on **Crosstabs**, a dialogue box with same name will open. This can be seen in figure 11.8. One question that may come to your mind is what is a crosstabs. Crosstabs can be used in order to create tables that show interaction between two variables that are categorical in nature.

2) As can be seen in figure 11.8, we have already entered our categorical variables, gender under ***Rows*** and Socio Economic Status under ***Columns***.

3) You can also click on ***Statistics*** on the ***Crosstabs*** dialogue box. As you do so, the ***Crosstabs: Statistics*** dialogue box will open (refer to figure 11.9). Here you can click the statistics as per your requirement. Chi-square can also be clicked in case you want to compute the same. Though this will be discussed by us in the next unit. When you have finished selecting the required necessary,, do not forget to click on ***Continue*** button.

4) On the ***Crosstabs*** dialogue box you can also click on ***Cell Display***, that will lead to opening of dialogue box labeled ***Crosstabs: Cell display*** (refer to figure 11.10). As per your requirement you can mark the required checkboxes. In our example we have clicked on ***Observed*** under ***Counts***. Click ***Continue*** on the dialogue box ***Crosstabs: Cell Display***.

5) Lastly, remember to click ***OK*** on ***Crosstabs*** dialogue box. And as you do so the results will be displayed in the ***Output View*** of SPSS (as can be seen in Box 11.3). The same can be tabulated and then interpreted as per requirement. As can be seen in the box 11.3, we have a contingency table that shows an interaction between gender and Socio Economic Status.

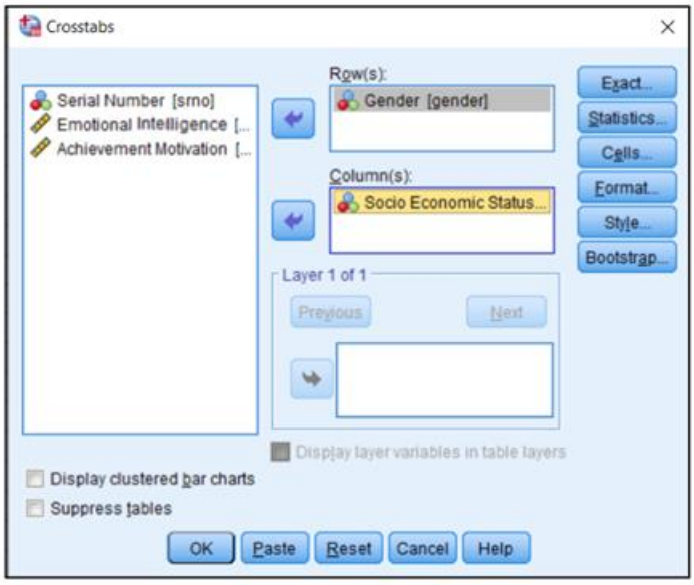

Fig. 11.8 : Crosstab

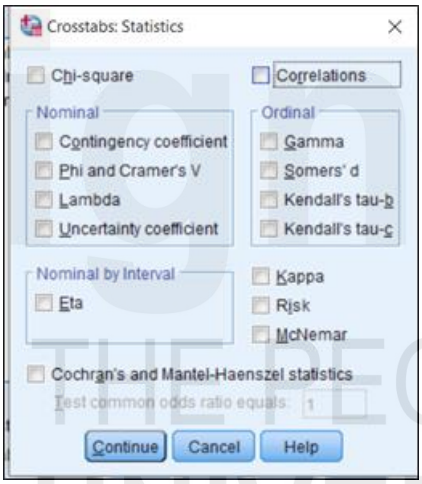

Fig. 11.9 : Crosstab: Statistics Dialogue box

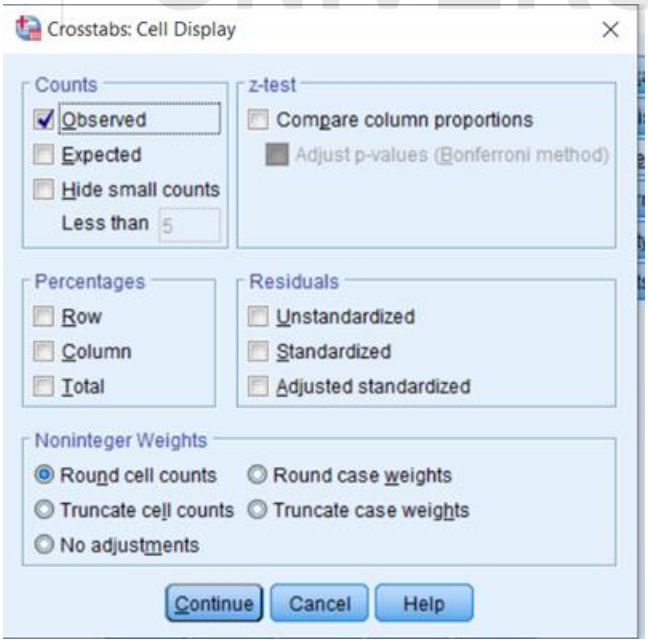

Figure 11.10: Crosstab: Cell Display Dialogue box

Box 11.3: Results obtained from Crosstabs

Gender * Socio Economic Status Crosstabulation

Count

		Socio Economic Status			
		Low Socio Economic Status	Medium Socio Economic Status	High Socio Economic Status	Total
Gender	Male	2	3	5	10
	Female	4	4	2	10
Total		6	7	7	20

Check Your Progress III

1) What is the use of Crosstabs?

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11.5 GRAPHS IN SPSS

In BPCC104, we discussed about graphs. As you know graphs help us present the data in simple and concise manner and that is the reason why in your research paper or report you need to include graphs as and when necessary. Graphs can also be created with the help of SPSS and let us now discuss how that is to be done.

1) On SPSS main menu, you need to click on ***Graphs*** and then on ***Chart Builder***. Thus, ***Graph*** > ***Chart Builder***. (Refer to figure 11.11).

2) As you click on ***Chart Builder***, the dialogue box ***Chart Builder*** will open (as can be seen in figure 11. 12). On this dialogue box, you can click on **Define Variable Properties** tab. And as you do so, the ***Define Variable Properties*** dialogue box will open as can be seen in figure 11.13. Here you can select your nominal or ordinal variable from the space given under ***Variables*** to the space given under ***Variables to Scan*** with the help of the arrow given between the two spaces. Then click on ***Continue*** button. Once the ***Continue*** button is clicked, the **Define Variable Properties dialogue box** with scanned variable list (as can be seen in figure 11.14) will open**.** In this enter the details as required and then click on ***OK.***

3) Then again click on ***Graphs*** and then on ***Chart Builder,*** the dialogue box that will open is labeled ***Chart Builder*** and can be seen in figure 11.15. Let us try to understand this dialogue box better before we go on to creating charts. As can be seen in this dialogue box you have ***Variables*** on the left side under which all the variables that we have typed in SPSS spreadsheet appear. You also have ***Chart preview***, where the chart will be displayed as you fill in the data. Below you have ***Gallery, Basic elements, Groups/ Point ID and Tiles and Footnotes*** that can be used as and when required.

4) The very first thing you will be required to do is drag the graph type (either bar or line graph etc.) from the ***Gallery*** in the ***Chart preview***. As has been shown with the help of the arrow in figure 11.15. In the case of our example, we have taken the simple bar graph.

5) Axis and elements can be chosen by clicking on basic elements as can be seen in figure 11.16.

6) We then drag the variable gender in x axis in ***Chart preview*** and the variable emotional intelligence under ***Axis label*** on the right hand side as can be seen in figure 11.17. You can also go to chart appearance and change the colour of the graph. Chart appearance can be seen in figure 11.17.

7) Once all the information is filled in as per the requirement, we need to click ***OK***.

8) The graph will then be displayed in ***output view*** and will look like figure 11.18. The same can then be included in your research report or paper.

Yet another example of bar graph is given in figure 11.19. This is a cluster graph and as can be seen in the figure, we have dragged gender to the upper left side of the ***chart preview***, Socio Economic Status on the x axis and emotional intelligence (with mean, as can be seen on the right side in figure 11.16). The graph thus obtained is given in figure 11.19.

Thus, graphs and charts can be created as per requirement in order to enhance the presentation of our research report or paper.

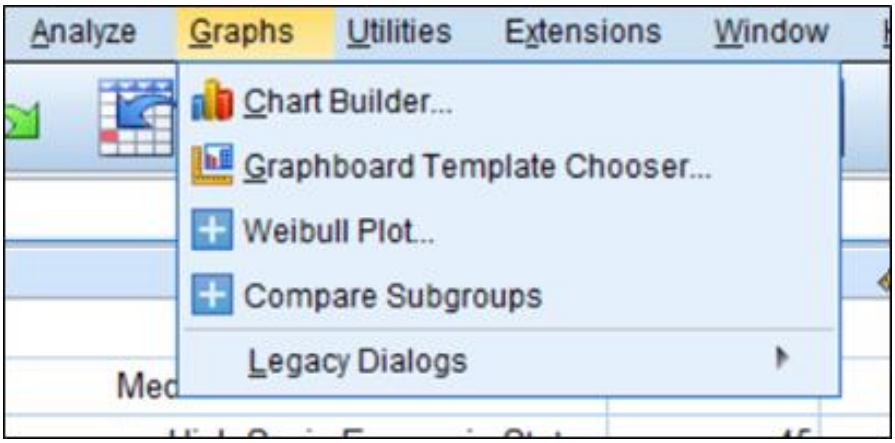

Fig. 11.11: Screenshot of Main Menu Graphs> Chart Builder

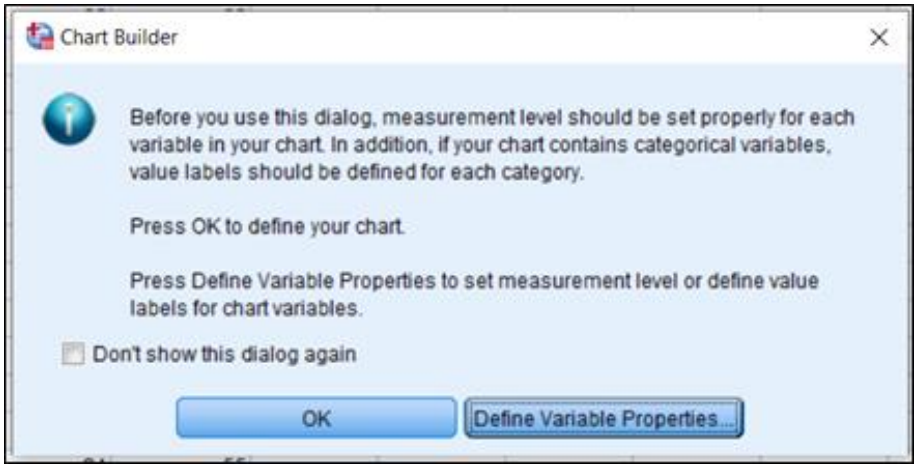

Fig. 11. 12: Chart Builder Dialogue Box

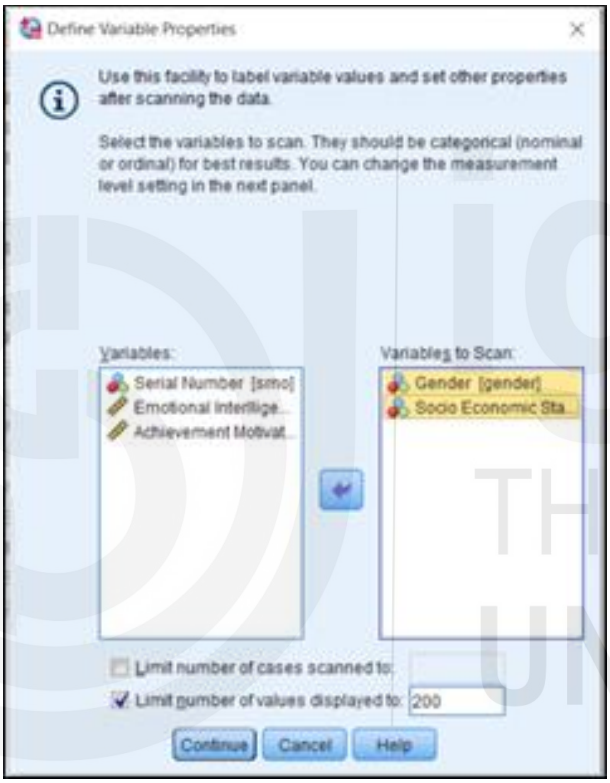

Fig. 11. 13: Define Variable Properties Dialogue Box

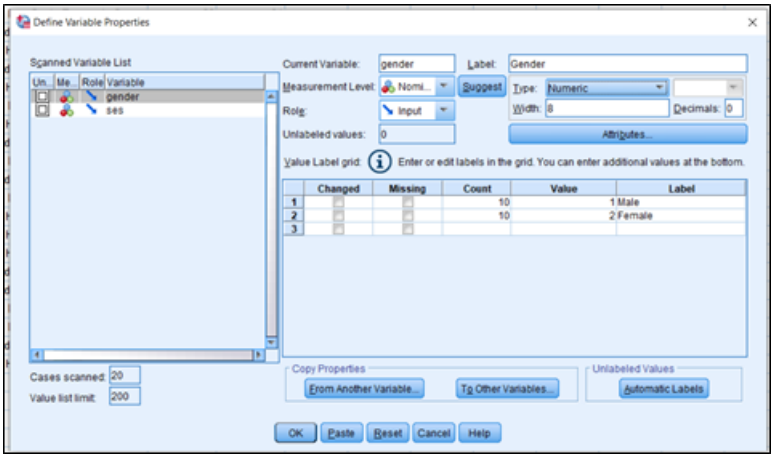

Fig. 11. 14: Define Variable Properties Dialogue Box with Scanned Variable List

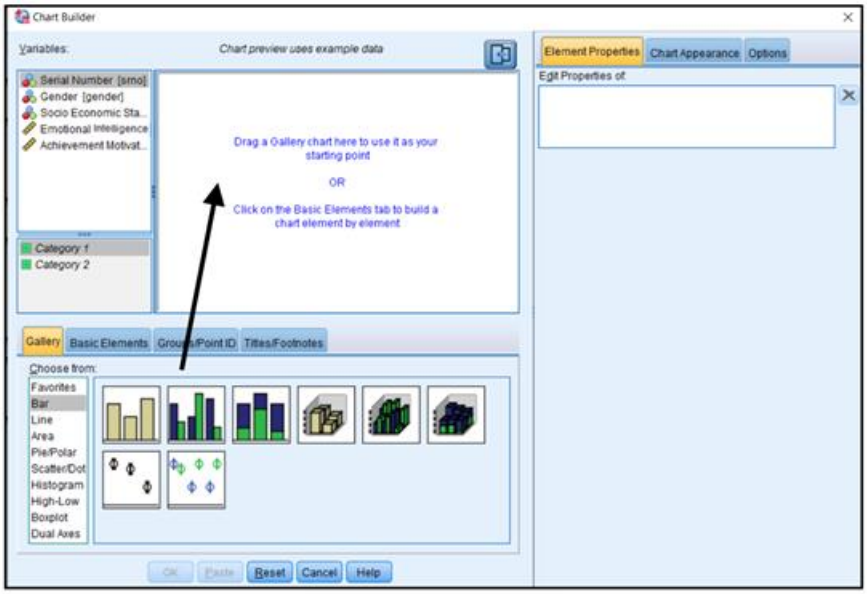

Fig. 11.15: Chart Builder

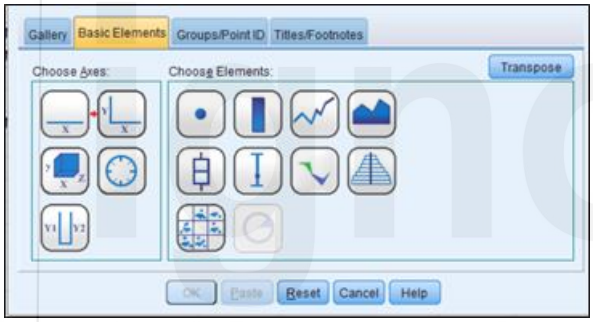

Fig. 11.16: Basic Elements

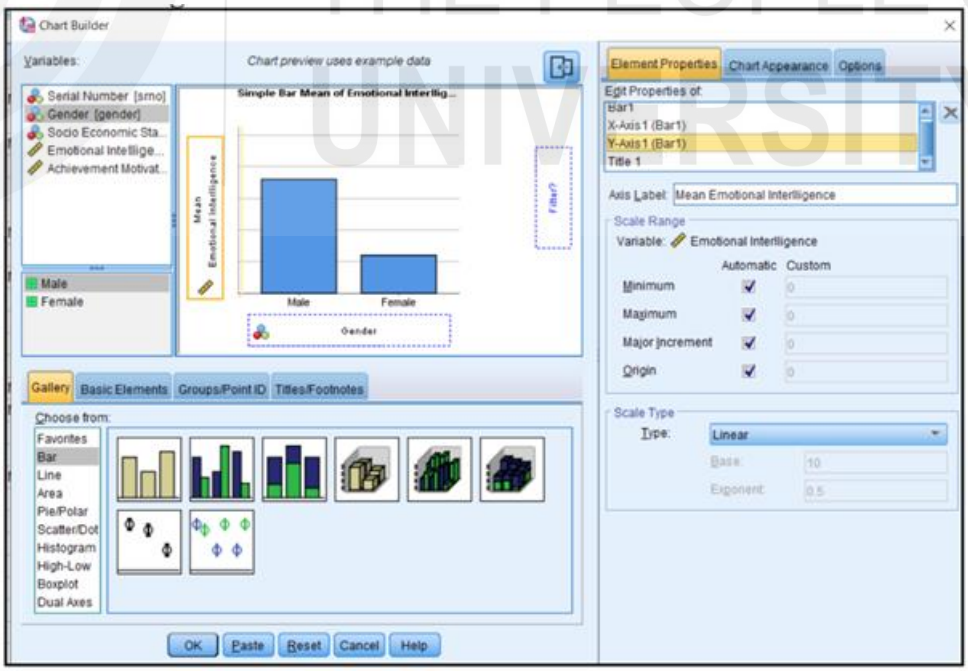

Fig. 11. 17: Chart Builderafter Data is entered.

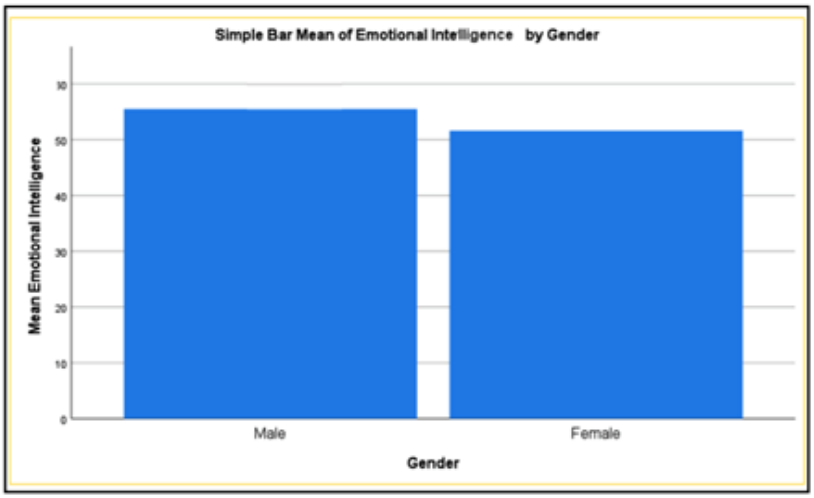

Fig. 11.18 : Bar Graph obtained in SPSS

Fig. 11.19: Cluster Bar Graph in SPSS

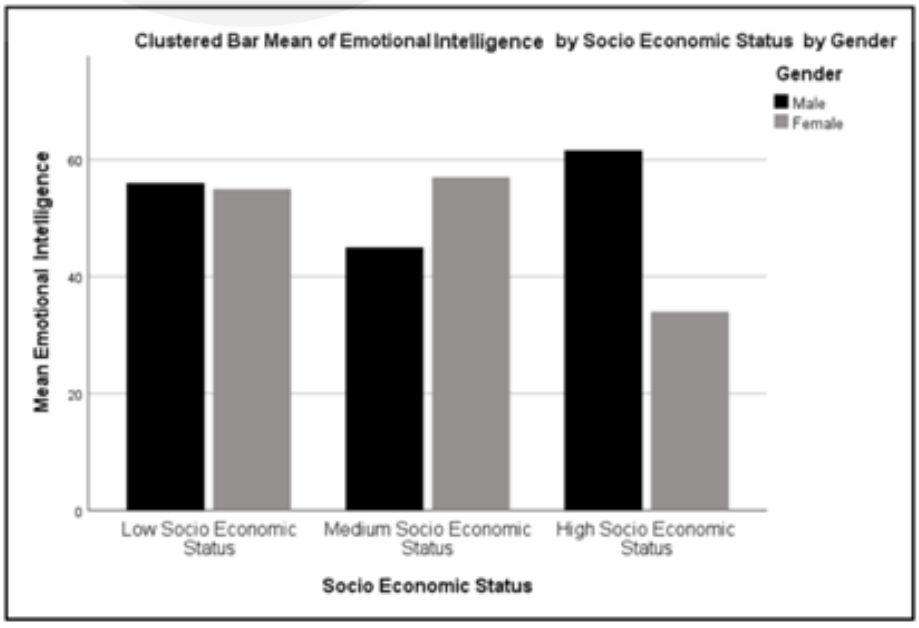

Fig. 11.20: Cluster Bar Graph obtained in SPSS

Check Your Progress IV

1) Look at the graph given in figure 11.20 and answer the following questions:

a) What do the black bars denote?

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b) What do the grey bars denote?

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c) Which sample sub group has the highest mean emotional intelligence?

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d) Which sample sub group has the lowest mean emotional intelligence?

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11.6 LET US SUM UP

To sum up, in the present unit, we discussed about computation of frequency, descriptive statistics and ***Crosstabs*** using SPSS. We also discussed about graphs in SPSS. This was done by us with the help of figures.

11.7 REFERENCES

Brace, N; Kemp, R; Snelgar, R (2003) SPSS for Psychologists: A Guide o data Analysis using SPSS for Windows (Second Edition). New York: Palgrave Macmillian.

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Rasch, Dieter; Kubinger, K. D and Yanagida, Takuya. (2011). Statiststics in Psychology Using R and SPSS. United Kingdoms: John Wiley & Sons Ltd.

Mclean, P. (2018). *Spss*. US: Tritech Digital Media.

11.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress I

1) What is the first step in computation of frequencies in SPSS?

   Go to the pulldown menu ***Analyze*** and the click on ***Descriptive Statistics*** and then on ***Frequencyies*** (Analyze > Descriptive Statistics> Frequencies).

Check Your Progress II

1) In box 11. 2, what is the range and mean obtained for variable emotional intelligence?

   Range: 54 Mean: 53, 55

Check Your Progress III

1) What is the use of Crosstabs?

   Crosstabs can be used in order to create tabled that sown interaction between two variables that are categorical in nature.

Check Your Progress IV

1) Look at the graph given in figure 11.20 and answer the following questions:

a) What do the black bars denote?

   Male

a) What do the grey bars denote?

   Female

b) Which sample sub group has the highest mean emotional intelligence?

   High Socio Economic Status Males

c) Which sample sub group has the lowest mean emotional intelligence?

   High Socio Economic Status Females

11.8 UNIT END QUESTIONS

1) Describe how to compute frequency using SPSS.
2) Discuss the procedure involved in descriptive statistics.
3) Explain what is crosstabs and discuss the procedure to create crosstabs using SPSS.
4) Explain the procedure to draw graphs in SPSS.

UNIT 12 COMPUTATION OF PARAMETRIC AND NON-PARAMETRIC STATISTICS USING SPSS*

Structure

12.0 OBJECTIVES

After reading this unit, you will be able to,

- computation of various parametric and non-parametric statistical techniques like correlation, t test, one way ANOVA, chi-square, Mann Whitney U test and Kruskal- Wallis ANOVA using SPSS.

12.1 INTRODUCTION

In the previous unit, we discussed about how descriptive statistics can be computed with the help of SPSS. In the present unit, we will learn how to compute various parametric and non-parametric statistics like correlation, t test, one way ANOVA, Chi-Square, Mann Whitney U test and Kruskal Wallis ANOVA using SPSS.

When it comes to descriptive statistics, there is no inferences to be made. However, interpretation and then inference is relevant when we discuss about various parametric and non-parametric statistics.

* Prof. Suhas Shetgovekar, Faculty, Discipline of Psychology, IGNOU, Delhi

12.2 COMPUTATION OF CORRELATION USING SPSS

Here when we say correlation, we are mainly referring to the bivariate correlation, that is, correlationship between two variables. Also we will compute correlation for two continuous variables and thus we will be using Pearson's Product Moment Correlation, Spearman's Rank Order Correlation and Kendall tau. Pearson's Product Moment Correlation, as you may be aware, is a parametric statistical technique and Spearman's Rank Order Correlation and Kendall tau are non-parametric techniques.

To compute correlation, we will first go to the menu ***Analyze***, and then click on ***Correlate*** and then on ***Bivariate*** (as can be seen in figure 12.1). Thus, **Analyze> Correlate> Bivariate**.

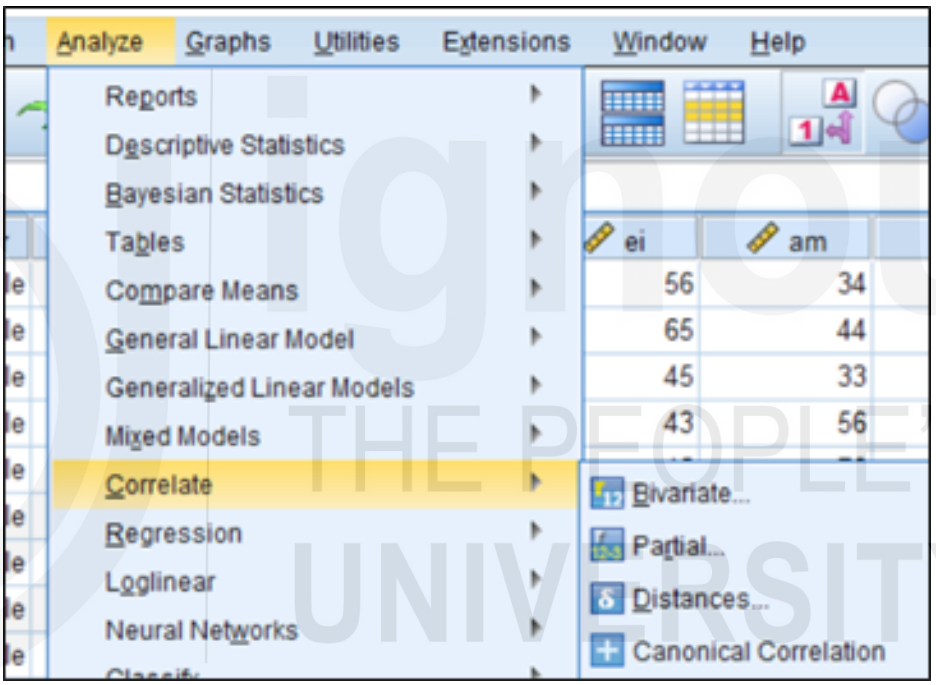

Fig. 12.1: Partial Screenshot of Menu Analyze > Correlate

Let us now look at the procedure for computation of correlation.

1) As you click on Bivariate the dialogue box labeled ***Bivariate Correlations*** will open, that can be seen in figure 12.2. In this dialogue box you can see that we have dragged the two continuous variables, emotional intelligence and achievement motivation in the white space on the right side in the dialogue box with the help of the arrow in the middle.

2) Below in the dialogue box we can see ***Correlations coefficients.*** Here we have marked all the three correlation coefficients for the sake of learning. Though when you actually carry out research you can mark whichever is relevant for your research. Two tailed and one tailed test of significance can also be selected as per the requirement.

3) You can also go to ***Options*** that can be seen in the dialogue box and as you click on ***Options, Bivariate Correlations: Options*** dialogue box will open, as can be seen in figure 12.12. Here we have selected mean and standard deviations and then we click ***Continue***.

4) Do not forget to click ***OK*** on the ***Bivariate Correlation*** dialogue box once you have entered in all of the information.

5) The results that will be obtained are displayed in Box 12.1.

Figure 12.2: Dialogue Box for Bivariate Correlations

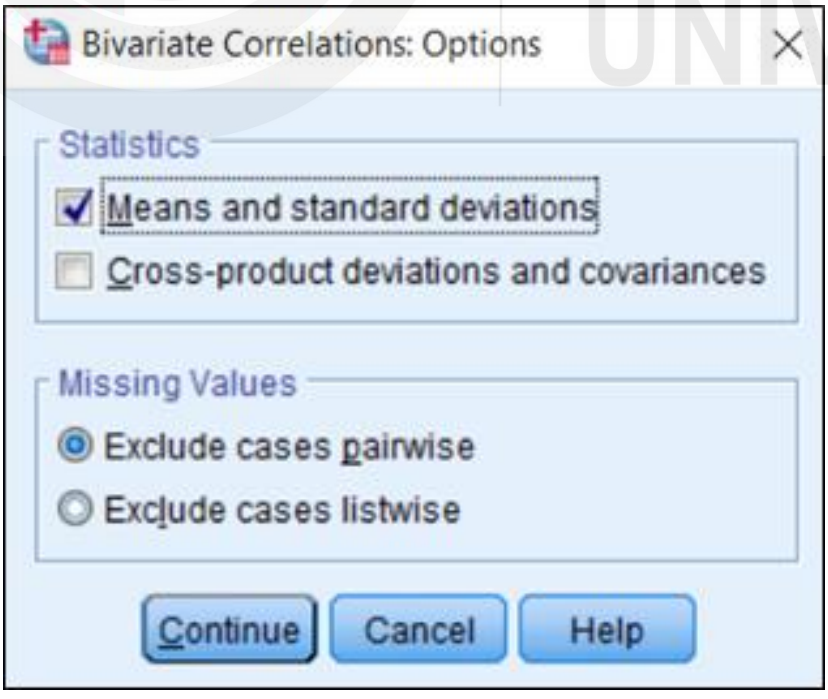

Figure 12.3: Dialogue Box Bivariate Correlation: Options

Box 12.1: Results obtained for Correlation using SPSS

Descriptive Statistics

	Mean	Std. Deviation	N
Emotional Intelligence	53.55	13.923	20
Achievement Motivation	55.65	13.464	20

Correlations

		Emotional Intelligence	Achievement Motivation
Emotional Intelligence	Pearson Correlation	1	-.261
	Sig. (2-tailed)		.266
	N	20	20
Achievement Motivation	Pearson Correlation	-.261	1
	Sig. (2-tailed)	.266	
	N	20	20

Correlations

			Emotional Intelligence	Achievement Motivation
Kendall's tau_b	Emotional Intelligence	Correlation Coefficient	1.000	-.238
		Sig. (2-tailed)	.	.172
		N	20	20
	Achievement Motivation	Correlation Coefficient	-.238	1.000
		Sig. (2-tailed)	.172	.
		N	20	20
Spearman's rho	Emotional Intelligence	Correlation Coefficient	1.000	-.329
		Sig. (2-tailed)	.	.156
		N	20	20
	Achievement Motivation	Correlation Coefficient	-.329	1.000
		Sig. (2-tailed)	.156	.
		N	20	20

Interpretation: Let us now interpret the results obtained that can be seen in box 12.1. The very first table has to do with descriptive statistics and mainly mean and standard deviation for emotional intelligence and achievement motivation have been displayed in this table.

The second table shows correlation obtained between emotional intelligence and achievement motivation with the help of Pearson's Product Moment Correlation. The r is obtained as -.261 and the significance is 0.266. Since the significance value is more than 0.01 and 0.05, it can be said that there is no significant correlationship between emotional intelligence and achievement motivation.

The third table displays the correlation coefficient obtained with the help of Kendall's tau and Spearman's rho. With the help of Kendall' s tau, the correlation coefficient obtained is -.238 and the significance value is .172. As the significance value is more than 0.01 and 0.05, it can be said that there there is no significant correlationship between emotional intelligence and achievement motivation. With reference to Spearman's rho the correlation coefficient is obtained as -.329 and significance value is .156. As the significance value is more than 0.01 and 0.05, it can be said that there is no significant relationship between emotional intelligence and achievement motivation. For the obtained correlation coefficient to be significant at 0.01 level, the significance value needs to be below 0.01 level of significance and for the obtained correlation coefficient to be significant at 0.05 level, the significance value needs to be below 0.05 level of significance. In the case of our example as the significant value (for all three correlation coefficients) are below the significance value and thus we can say that, there is no significant relationship between emotional intelligence and achievement motivation.

Ensure that you do not copy and paste the tables as it is but tabulate the obtained data in a suitable manner as per the requirement of your research and its objectives.

Check Your Progress I

1) What is the first step in computation of correlation in SPSS?

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12.3 COMPUTATION OF INDEPENDENT T TEST USING SPSS

To compute independent t test , we will first go to the menu ***Analyse*** and then click on ***Compare Means*** and then on ***Independent- Samples T Test*** (as can be seen in figure 12.4). Thus, **Analyse> Compare Means> Independent-Sample T Test.**

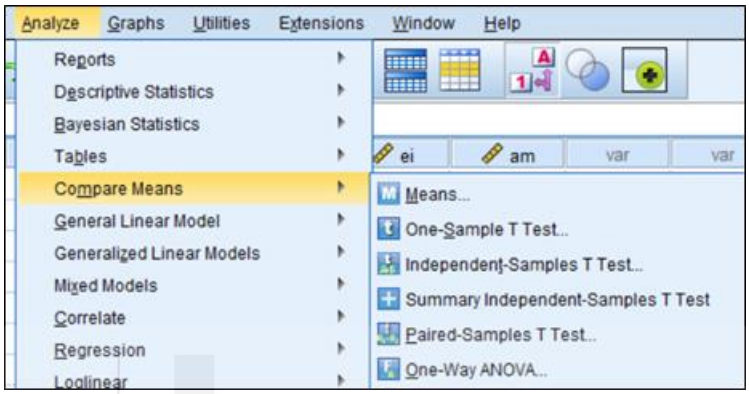


Fig. 12. 4: Partial Screenshot of Main Menu Analyze > Compare Means

Let us now look at the procedure for computation of independent t test.

1) Once you click on the ***Independent-Samples T Test*** as given in the figure 12.4, the dialogue box labeled ***Independent-Samples T Test***, as can be seen in figure 12. 5 will open, As you can see in the figure, we have dragged our continuous variables in the white space on the right under ***Test Variable(s)*** with the help of the arrow in the centre and we have dragged gender (that has two levels, males and females) with the help of the arrow under ***Grouping variable.***

2) Now we will have to define groups and thus we will click on the tab titled ***Define Groups*** in figure 12.5. Once you do so the dialogue box ***Define Groups*** will open. As you have learnerd in this course that t test is computed for two sample sub groups. Thus, we need to define groups as it is possible that the grouping variables has more than two sample sub groups and we want to compare any two of them. For example, if the grouping variable was Socio Economic Status, as we know in our example, we have three levels of Socio Economic Status (low, medium and high). If we want to compute t test to study if significant difference exists in low and medium Socio Economic Status then we will define groups as 1 (code in our example for low SES) and 2 (code in our example for medium SES) and if we want to compute t test to study if significant difference exists in low and high Socio Economic Status then we will define groups as 1 (code in our example for low SES) and 3 (code in our example for high SES). In case of our example, we have taken gender as our grouping variable and the levels are 1 (code for males) and 2 (code for females) and we will enter the same in our ***Define Group*** dialogue box (as can be seen in figure). After you put in the information as required in the ***Define Groups*** dialogue

box, click ***Continue*** and then click ***OK*** on the ***Independent-Samples T Test*** dialogue box.

3) The results will then be displayed in the ***Output View*** of SPSS. They can be seen in Box 12.2. The same can then be suitably tabulated for your research report or paper and interpreted.

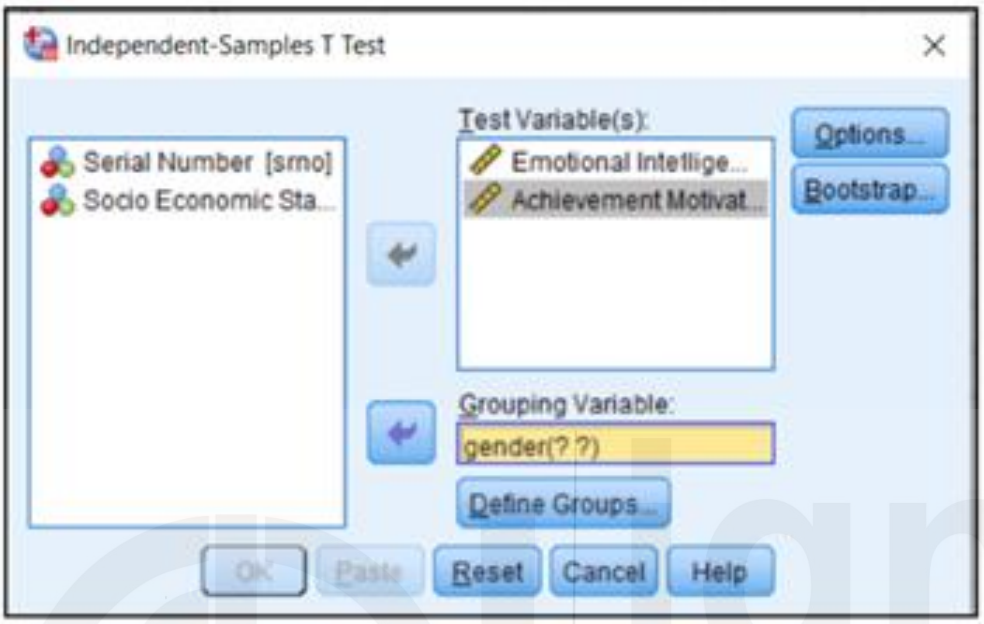
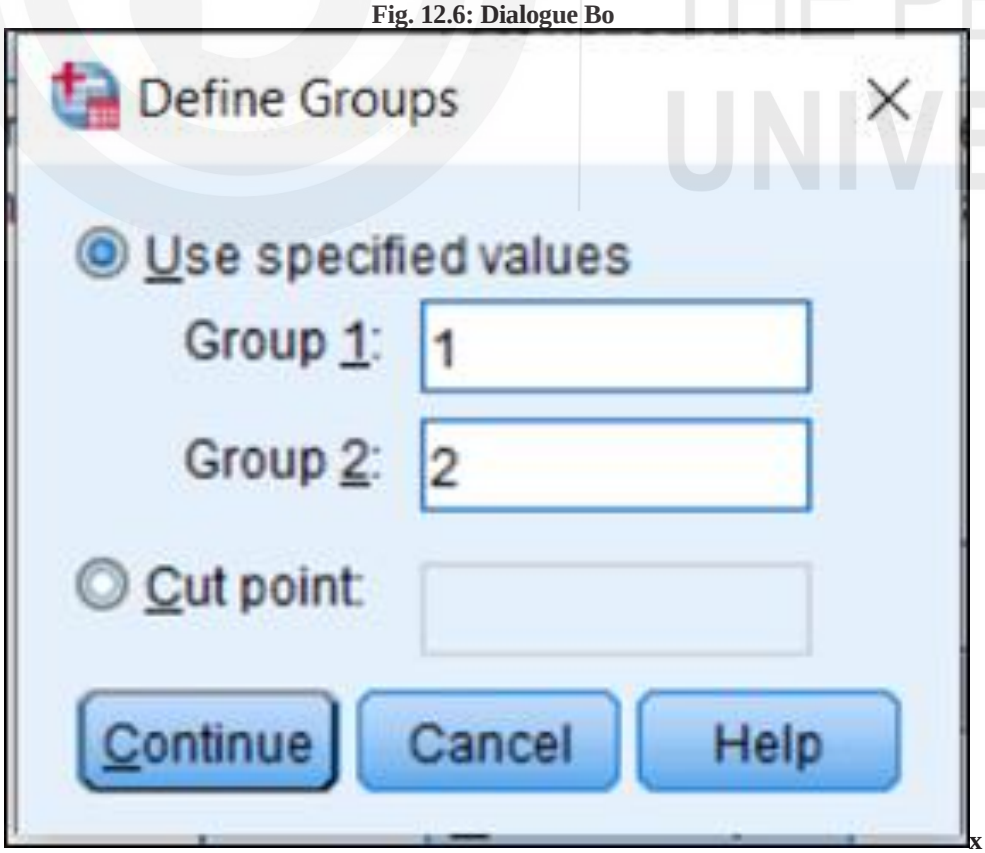


Fig. 12.5: Dialogue box for Independent-Samples T Test

Fig. 12.6: Dialogue Bo



x

for Define Groups

Box 12.2 Results obtained for Independent t Test in SPSS

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Emotional Intelligence	Male	10	55.50	12.140	3.839
	Female	10	51.60	15.918	5.034
Achievement Motivation	Male	10	54.00	11.832	3.742
	Female	10	57.30	15.384	4.865

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95 I
Emotional Intelligence	Equal variances assumed	1.605	.221	.616	18	.546	3.900	6.331	-9.
	Equal variances not assumed			.616	16.823	.546	3.900	6.331	-9.
Achievement Motivation	Equal variances assumed	2.157	.159	-.538	18	.597	-3.300	6.137	16.
	Equal variances not assumed			-.538	16.888	.598	-3.300	6.137	16.

Interpretation: The first table in box 12.2 provides us with mainly mean and standard deviations for emotional intelligence and achievement motivation. The second table provides us with t value. As can be seen in this table for each variable (emotional intelligence and achievement motivation), there are two rows, one with label equal variances assumed and equal variance not assumed and t value has been given in both the rows. So the question is which row and

the t value to select. For this, we first look at the significance provided for the F value that is circled in the table. In this if the significance value is greater than 0.05, it denotes that the variability in your two conditions is about the same. In other words, it denotes equal variances assumed and thus the upper row and the t value can be taken, if the significance value for F is lower than 0.05, it denotes that the variability in your two conditions is not same. In other words, it denotes equal variances not assumed and thus the lower row and the t value can be taken.

In the case of our example, for both the variables the significance value for F are greater than 0.05, thus we will take the upper row. The t value obtained for emotional intelligence is .616 which has significance value of .546. This significance value is greater than 0.01 and 0.05. Thus, it can be said that there is no gender difference with regard to emotional intelligence. Though a glance at mean for males and females as given in the first table of box 12, 2 shows that the mean emotional intelligence or males is more than than of females but the difference is not statistically significant. If the differences were statistically significant, mean value would have helped us decide whether males have higher emotional intelligence of females. To elaborate in this regard, if we had a directional hypothesis that males have higher emotional intelligence than females and the t value obtained by us in this regard was significant. Based on the mean value of emotional intelligence obtained by males and females we would accept or not accept our directional hypothesis.

With regard to achievement motivation as well, t value is obtained as -.538 (here the negative sign can be ignored) which is not found to be significant as the significance value is .597 that is more than 0.01 and 0.05. Thus there no gender difference with regard to achievement motivation in our example.

Check Your Progress II

1) When do we consider the t value in the row labeled 'Equal variances not assumed'?

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12.4 COMPUTATION OF ONE-WAY ANOVA USING SPSS

To compute One Way ANOVA, we will first go to the menu ***Analyse*** and then click on ***Compare Means*** and then on **Independent- Samples T Test** (as can be seen in figure 12.4). Thus, **Analyze> Compare Means> One-way ANOVA.**

Let us now look at the procedure for computation of One Way ANOVA.

1) Once you click on the ***One-Way ANOVA*** as given in the figure 12.4, the dialogue box labeled ***One-Way ANOVA***, as can be seen in figure 12. 7 will open, As you can see in the figure, we have dragged our continuous variables in the white space on the right under ***Dependent List*** with the help of the arrow in the centre and we have dragged Socio Economic Status (that has three levels, low, medium and high) with the help of the arrow under ***Factor***. As we have learnt in the present course, t test cannot be used for variables that have more than two categories, thus to study if significant difference exists in emotional intelligence and achievement motivation with regard to Socio Economic Status, we cannot use t test but will use one way ANOVA.

2) We can also click on ***Options*** tab, in which case, ***One Way ANOVA: Options*** (as can be seen in figure 12.8 will open. In this dialogue box we can click on the required statistics based on our research objectives. In case of our example, we have clicked ***Descriptive***. Once the required statistics are clicked, click on ***Continue***. On the ***One-way ANOVA*** dialogue box, you can then click on ***OK***.

3) The results will then appear in the ***Output view*** of SPSS and will look like the tables given in box 12.3. The same can then be tabulated as per your requirement and interpretations can be made.

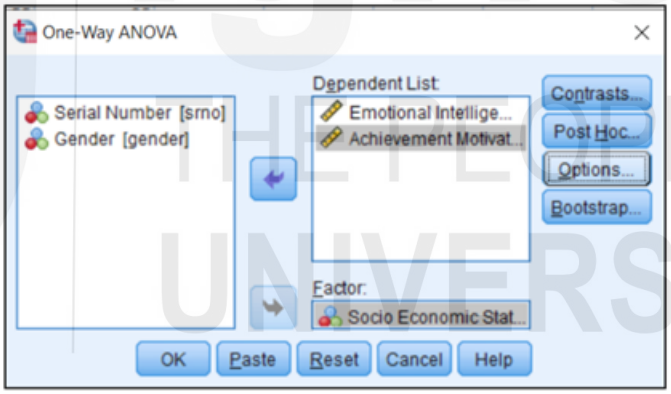

Fig. 12.7: Dialogue Box for One-Way ANOVA

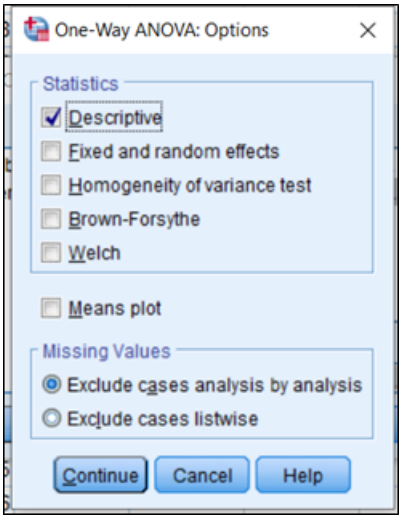

Fig. 12.8: One-Way ANOVA: Options Dialogue Box

Box 12.13: Results obtained after Computation or One Way ANOVA in SPSS

Descriptives

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Emotional Intelligence	Low Socio Economic Status	6	55.33	8.959	3.658	45.93	64.74	45	65
	Medium Socio Economic Status	7	51.86	14.971	5.659	38.01	65.70	34	77
	High Socio Economic Status	7	53.71	17.783	6.721	37.27	70.16	23	76
	Total	20	53.55	13.923	3.113	47.03	60.07	23	77
Achievement Motivation	Low Socio Economic Status	6	53.17	18.734	7.648	33.51	72.83	33	78
	Medium Socio Economic Status	7	55.43	9.396	3.551	46.74	64.12	44	67
	High Socio Economic Status	7	58.00	13.441	5.080	45.57	70.43	33	76
	Total	20	55.65	13.464	3.011	49.35	61.95	33	78

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
Emotional Intelligence	Between Groups	39.331	2	19.665	.092	.913
	Within Groups	3643.619	17	214.331		
	Total	3682.950	19			
Achievement Motivation	Between Groups	76.002	2	38.001	.192	.827
	Within Groups	3368.548	17	198.150		
	Total	3444.550	19			

Interpretations: As can be seen in box 12. 3, the first table provides us with descriptives. There are mainly means and standard deviations for the three categories of Socio Economic Status for emotional intelligence and achievement motivation. The second table provides us with the F ratio. The F ratio obtained for emotional intelligence is .092 and the significance value is .913. As the significance value is more than 0.01 and 0.05, it can be said that there is no significant difference in emotional intelligence with regard to Socio Economic Status of the participants. The same is also true in case of achievement motivation. If there was a significant difference and if we wanted to find out exactly where the difference lies we could have done so with the help of statistics given in the post-hoc tab on the ***One-Way ANOVA*** dialogue box. If the post-hoc tab is clicked, the dialogue box ***One-Way ANOVA: Post Hoc Multiple Comparisons***, as shown in figure 12.9 will open and suitable statistics can then be selected.

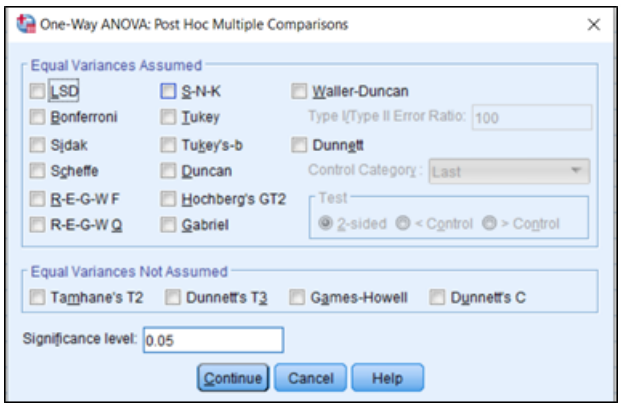

Fig. 12.9: Dialogue box for One-Way ANOVA: Post Hoc Multiple Comparisons

Check Your Progress III

1) Look at the first table in box 12.3 and answer the following questions.

a) Which category of Socio Economic Status has the highest mean emotional intelligence?

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b) Which category of Socio Economic Status has the lowest mean achievement motivation?

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c) What is the standard deviation for high Socio Economic Status category on emotional intelligence?

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12.5 COMPUTATION OF CHI SQUARE USING SPSS

In earlier sections, we discussed about t test and ANOVA that are parametric statistical techniques. Let us us now discuss about one of the non-parametric techniques, that is, chi-square.

To compute chi-square, we will go to the main menu **Analyze** and then click on ***Descriptive Statistics*** and then on ***Crosstabs*** (refer to figure 12.10). Thus, **Analyze> Descriptive Statistics> Crosstabs.**

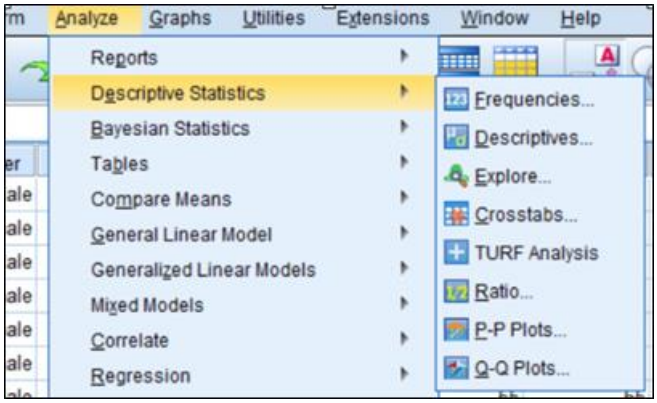

Fig. 12.10: Partial Screenshot of Main Menu Analyze> Descriptive Statistics

Let us now look at the procedure for computation of chi-square.

1) As you click on ***Crosstabs***, the dialogue box labeled ***Crosstabs*** as can be seen in figure 12.11 will open. As can be seen in figure 12.11, we have dragged the variable Gender in the white space given under ***Row (s)*** and Socio Economic Status in the white space given under ***Column(s)***. You can do the reverse as well and gender can be put under ***Column(s)*** and Socio Economic Status can be put under ***Row(s)*** as per the requirement. We have taken these two variables, as they are categorical. If you want to take emotional intelligence or achievement motivation, we will first have to covert or recode them in to categorical variable so that we can compute chi-square. The selection of variables and the statistical techniques will depend on the objectives of the research.

2) You can then click on the ***Statistics*** tab given in the cross tab dialogue box (as can beseen in figure 12.11). On the ***Crosstabs: Statistics*** dialogue box (as can be seen in figure 12.12) we need to tick or check on the ***Chi-square*** and then click ***Continue*** and then ***OK*** on the main ***Crosstabs*** dialogue box.

3) The results will then be displayed in the ***output view*** of SPSS and are displayed in Box 12.4.

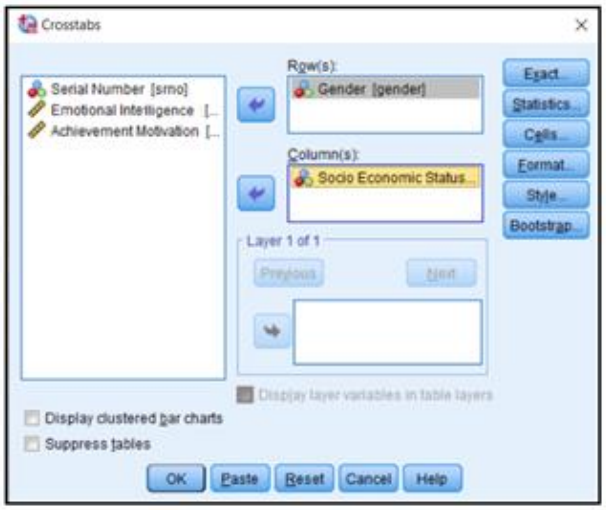

Fig. 12.11: Crosstabs Window

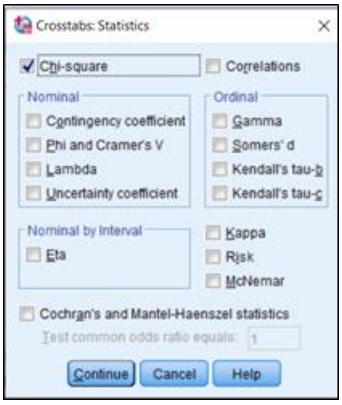

Fig. 12.12: Dialogue box for Crosstabs: Statistics

Box 12.4 Results for Chi-square obtained by using SPSS

Gender * Socio Economic Status Crosstabulation

Count

		Socio Economic Status			
		Low Socio Economic Status	Medium Socio Economic Status	High Socio Economic Status	Total
Gender	Male	2	3	5	10
	Female	4	4	2	10
Total		6	7	7	20

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	2.095[a]	2	.351
Likelihood Ratio	2.151	2	.341
Linear-by-Linear Association	1.834	1	.176
N of Valid Cases	20		

a. 6 cells (100.0%) have expected count less than 5. The minimum expected count is 3.00.

Interpretation: As can be seen in box 12.4, the first table provides us with the crosstabulation of our two variables gender and Socio Economic Status. The main table that we need to focus on is the second table that shows the chi-square

results. As can be seen the chi-square value obtained is 2.095 (that appears as Pearson chi-square). And the significance value for the same is .351. As the significance value is more than 0.01 or 0.05, the chi-square value obtained can be termed as not significant.

Check Your Progress IV

1) Which main menu do we click on for computation of chi-square?

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12.6 COMPUTATION OF MANN- WHITNEY U TEST USING SPSS

In order to compute Mann-Whitney U test, we need to go to the menu ***Analyze*** and then click on ***Non-parametric tests*** and then on ***Legacy Dialogs*** and then on ***2 Independent Samples*** (refer to figure 12.13). Thus, **Analyse>Nonparametric Tests> Legacy Dialogs> 2 Independent Samples.**

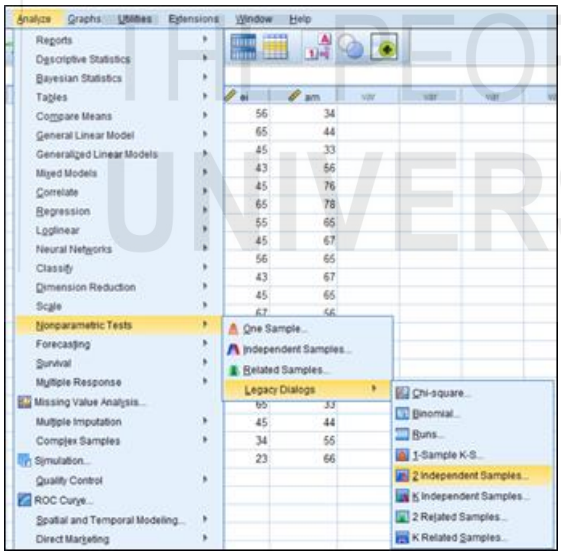

Fig. 12.13: Partial Screenshot of Main Menu Analyse>Nonparametric Tests> Legacy Dialogs

Let us now look at the procedure for computation of Mann-Whitney U test.

1) As you click on ***2 Independent Samples***, the dialogue box labeled ***Two Independent-Sample Tests*** as can be seen in 12.14 will open. You may notice that this dialogue box is similar to that of t test. Here we have dragged the continuous variables emotional intelligence and achievement

motivation under ***Test Variable List*** and Gender under ***Grouping Variable*** (as can be seen in figure 12.14).

2) You the have to click on ***Define Groups*** as was done under t test. Thus as we click on ***Define Groups*** tab, the dialogue box as can be seen in figure 12.15 will open. Here we will define ***Group 1*** as 1 denoting the code for males and will define ***Group 2*** as 2 denoting the code for females. Then we will click on ***Continue***.

3) On the main dialogue box of ***Two-Independent-Samples***, we will also click on ***Option*** tab. As we do so, the dialogue box as can be seen in figure 12.16 will open. In this we can click on descriptive and then click on ***Continue***.

4) After all the information is keyed in, we can click ***OK*** on the main ***Two Independent Samples*** dialogue box. The results will be displayed in the ***Output View*** of SPSS and can be seen in box 12.5

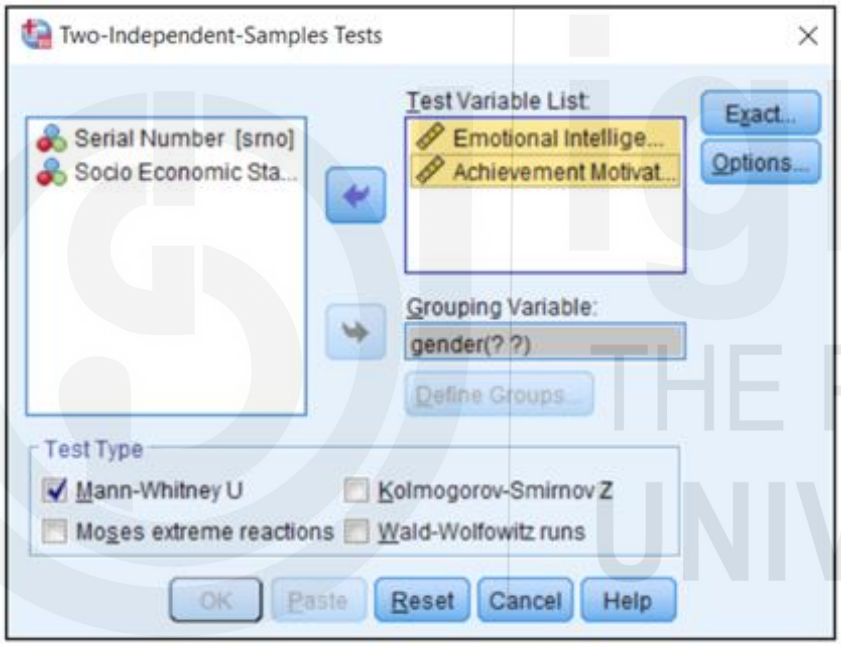

Fig. 12.14: Dialogue Box for Two Independent Samples Tests

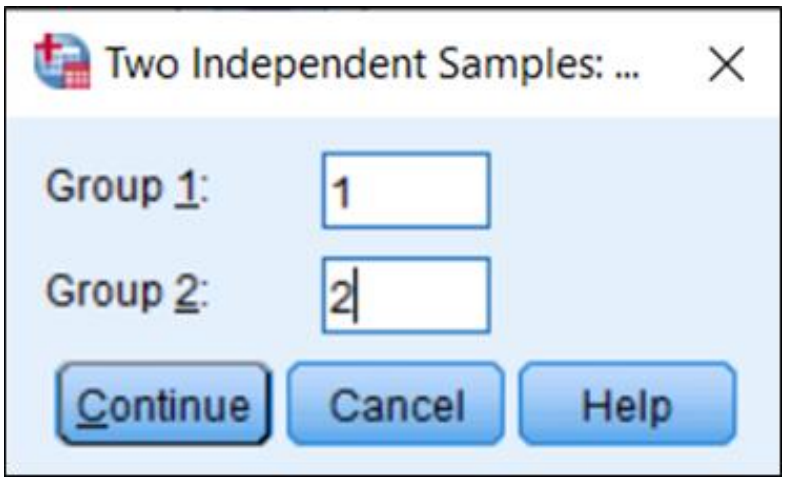

Figure 12.15: Define Groups

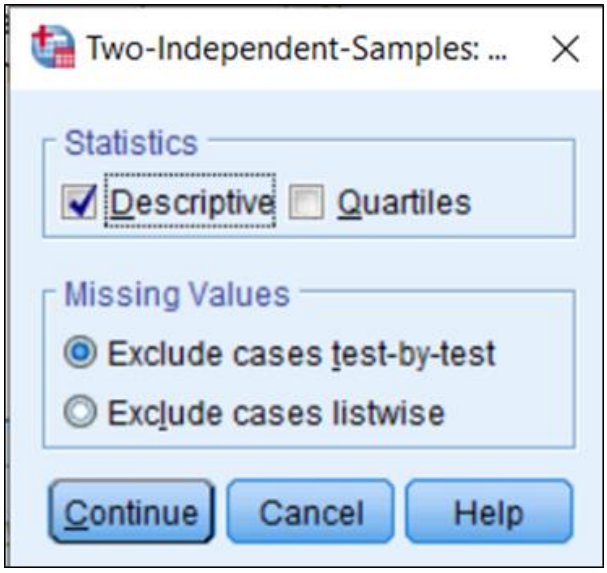

Fig. 12.16: Dialogue box for Two- Independent-Samples: Options

Box 12.5 Results for Mann- Whitney U Test obtained by using SPSS.

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Emotional Intelligence	20	53.55	13.923	23	77
Achievement Motivation	20	55.65	13.464	33	78
Gender	20	1.50	.513	1	2

Ranks

	Gender	N	Mean Rank	Sum of Ranks
Emotional Intelligence	Male	10	11.45	114.50
	Female	10	9.55	95.50
	Total	20		
Achievement Motivation	Male	10	9.55	95.50
	Female	10	11.45	114.50
	Total	20		

Test Statistics[a]

	Emotional Intelligence	Achievement Motivation
Mann-Whitney U	40.500	40.500
Wilcoxon W	95.500	95.500
Z	-.728	-.724
Asymp. Sig. (2-tailed)	.467	.469
Exact Sig. [2*(1-tailed Sig.)]	.481[b]	.481[b]

a. Grouping Variable: Gender

b. Not corrected for ties.

Interpretation: As can be seen in box 12.5, the very first table provides us with descriptive statistics for all the three variables. Though we will not consider the mean and standard deviation provided for Gender as we know that the values for this variable were nominal in nature. The second table provides us with ranks for emotional intelligence and achievement motivation. The last table provides us with the Mann- Whitney U for both emotional intelligence and achievement motivation. The Mann- Whitney U obtained for both emotional intelligence and achievement motivation is 40.500, both are not found to be significant at 0.01 or 0.015 levels of significance as the significance value is .481 for both which is above 0.01 and 0.05. Thus, it can be said that there is no significant difference in emotional intelligence and achievement motivation with regard to gender.

If the significance value was less than 0.05, the Mann Whitney U would have been significant at 0.05 level and if it was less than 0.01, it would have been significant at 0.01 level of significance.

Check Your Progress V

1) How do we define groups in Mann- Whitney U test?

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12.7 COMPUTATION OF KRUSKAL- WALLIS ANOVA USING SPSS

In order to compute Kruskal- Wallis ANOVA, we need to go to the menu ***Analyze*** and then click on ***Nonparametric Tests*** and then on ***Legacy Dialogs*** and then on **K Independent Samples** (refer to figure 12.17). Thus, **Analyze>Nonparametric Tests>Legacy Dialogs>K Independent Samples.**

Let us now look at the procedure for computing Kruskal- Wallis ANOVA.

1) As you click on ***K Independent Samples***, the dialogue box labeled ***Tests for Several Independent Sample*** as can be seen in 12.18 will open. Here we have dragged the continuous variables emotional intelligence and achievement motivation under ***Test Variable List*** and Socio Economic Status under ***Grouping Variable*** (as can be seen in figure 12.18).

2) You the have to click on ***Define Range***. Here we have to mention the highest and lowest codes we have provided for the categories of our

grouping variable. In case of our example, the grouping variable Socio Economic Status (SES) has three categories(1 low SES, 2 medium SES and 3 high SES). Thus as can be seen in figure 12.18, we will put minimum as 1 and maximum as 3 and then click on***Continue***. The range will vary as per the grouping variable and number of its categories in your research.

3) On the main dialogue box of ***Several Independent Samples***, we will also click on ***Option*** tab. As we do so, the dialogue box as can be seen in figure 12.19 will open. In this we can click on ***Descriptive*** and then click on ***Continue***.

4) After all the information is keyed in, we can click ***OK*** on the main K **Independent Samples** dialogue box. The results will be displayed in the ***Output View*** of SPSS and can be seen in box 12.6.

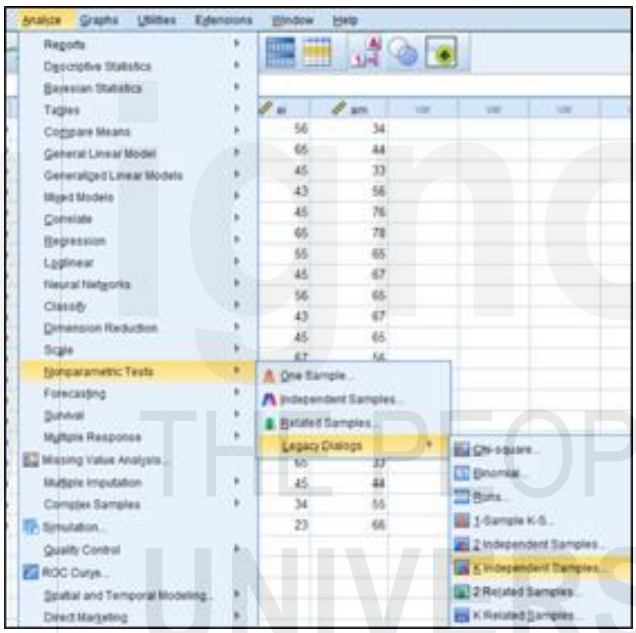

Fig.12.17: Partial Screenshot of Analyze> Nonparametric Tests>Legacy Dialogs

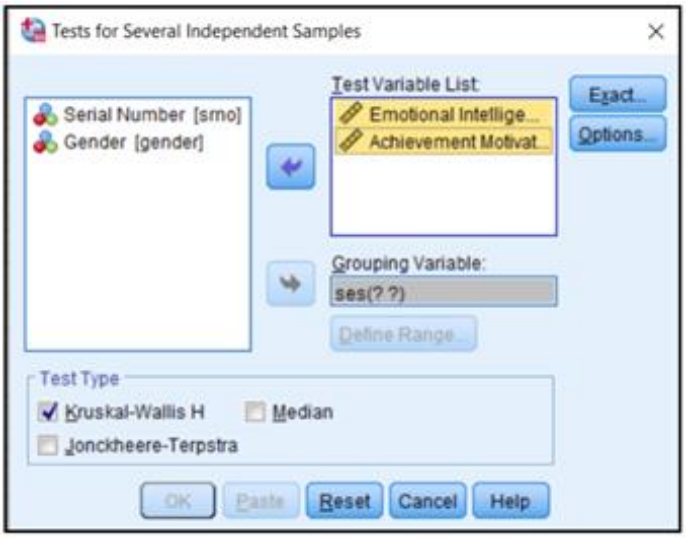

Fig. 12.18: Dialogue Box for Tests for Several Independent Samples

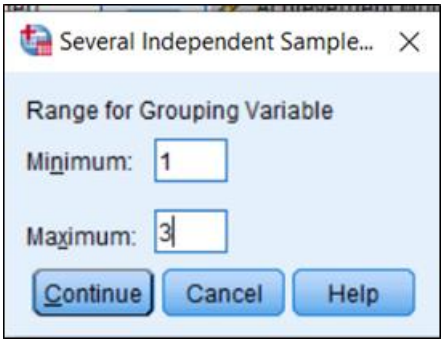

Fig. 12.19: Define Range Dialogue box

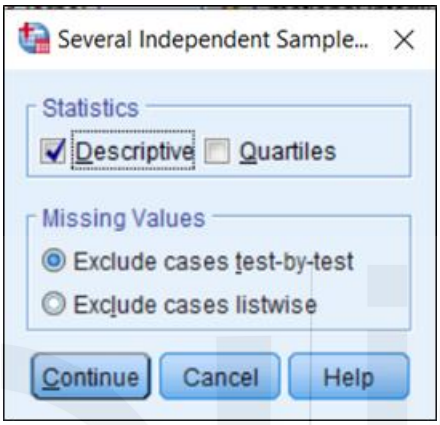

Fig. 12.20: Dialogue box for Several Independent Samples: Options

Box 12.6: Results for Kruskall- Wallis ANOVA obtained by using SPSS.

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Emotional Intelligence	20	53.55	13.923	23	77
Achievement Motivation	20	55.65	13.464	33	78
Socio Economic Status	20	2.05	.826	1	3

Ranks

	Socio Economic Status	N	Mean Rank
Emotional Intelligence	Low Socio Economic Status	6	11.50
	Medium Socio Economic Status	7	9.07
	High Socio Economic Status	7	11.07
	Total	20	

Achievement Motivation	Low Socio Economic Status	6	9.58
	Medium Socio Economic Status	7	10.50
	High Socio Economic Status	7	11.29
	Total	20	

Test Statistics[a,b]

	Emotional Intelligence	Achievement Motivation
Kruskal-Wallis H	.662	.272
df	2	2
Asymp. Sig.	.718	.873

a. Kruskal Wallis Test

b. Grouping Variable: Socio Economic Status

Interpretation: As can be seen in box 12.6, the very first table provides us with descriptive statistics for for all the three variables. Though we will not consider the mean and standard deviation provided for Socio Economic Status as we know that the values for this variable were nominal in nature. The second table provides us with ranks for emotional intelligence and achievement motivation. The last table provides us with the Kruskal- Wallis H for both emotional intelligence and achievement motivation. The Kruskal-Wallis H obtained for emotional intelligence is .662 with significance value .718 which is more than 0.01 and 0.05 and Kruskal- Wallis H obtained for achievement motivation is .272 with significance value .873 which is more than 0.01 and 0.05. Thus, it can be said that there is no significant difference in emotional intelligence and achievement motivation with regard to Socio economic Status.

Check Your Progress VI

1) Why is mean for Socio Economic Status not considered as given in the first table of Box 12.6?

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Box 12.7: Important Tip

It is important that while using Microsoft Excel or SPSS we select suitable statistical techniques based on the objectives and hypothesis of our research. You also need to focus on the nature of variable included in your study, whether they are continuous or categorical and so on. Also the nature of sample whether it is normally distributed or not and whether the assumptions of parametric statistics are full-filled or not for a given data also need to be considered.

In case if you have any difficulty in computation in Excel, you can make use of the Help menu and with regard to SPSS, tutorials are also available. Further, various videos are also available on how to carry out computation in Excel and SPSS.

Besides Microsoft Excel and SPSS, there are also calculators available online that can be used to carry out calculations for smaller data.

12.8 LET US SUM UP

To sum up, in the present unit, we discussed about computation of various parametric and non-parametric statistical techniques like correlation, t-test, one way ANOVA, Chi-Square, Mann Whitney U test and Kruskal Wallis ANOVA using SPSSusing SPSS.

12.9 REFERENCES

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Mclean, P. (2018). *Spss*. US: Tritech Digital Media.

12.10 ANSWERS TO CHECK YOUR PROGRESS

Check your Progress I

1) What is the first step in computation of correlation in SPSS?

To compute correlation, we will first go to the menu Analyze and then click on Correlate and then on Bivariate Thus, Analyze> Correlate> Bivariate.

Check Your Progress II

1) When do we consider the t value in the row labeled 'Equal variances not assumed'?

   If the significance value for F is lower than .05, it denotes that the variability in your two conditions is not same, denoting equal variances not assumed and thus the t value in the row labeled 'Equal variances not assumed' is taken.

Check Your Progress III

1) Look at the first table in box 12.3 and answer the following questions.

b) Which category of Socio Economic Status has the highest mean emotional intelligence?

Low Socio Economic Status

c) Which category of Socio Economic Status has the lowest mean achievement motivation?

Low Socio Economic Status

d) What is the standard deviation for high Socio Economic Status category on emotional intelligence?

17.783

Check Your Progress IV

1) Which main menu do we click on for computation of chi-square?

   We click on pulldown menu Analyze and then click on descriptive Statistics and then on Crosstabs. Thus, Analyze> Descriptive Statistucs > Crosstabs.

Check Your Progress V

1) How do we define groups in Mann- Whitney U test?

   We denote Group 1 as 1 that is the code for males and will define Group 2 ad 2 denoting the code for females.

Check Your Progress VI

1) Why is mean for Socio Economic Status not considered as given in the first table of Box 12.6?

   we will not consider the mean and standard deviation provided for Socio Economic Status as we know that the values for this variable were nominal in nature.

12.12 UNIT END QUESTIONS

1) Explain the procedure for computation of correlation in SPSS.

1) State the procedure for computation of t test in SPSS.

2) What is the procedure for computation of One-Way ANOVA.

3) How is the computation of t test different from computation of Mann-Whitney U test in SPSS.

APPENDIX I REFERENCES FOR TABLE VALUES

Statistical technique	Book	Details
Normal probability	Veeraraghavan, V. and Shetgovekar, S. (2016). Text book of Parametric and non parametric statistics, Sage publications, New Delhi.	Table A I
	Mangal, S. K. (2002). Statistics in psychology and education. New Delhi: HI Learning Private.	Table C, page number 375
	Mohanty, B and Misra S (2016). Statistics for Behavioural and Social Sciences. Delhi: Sage.	Table A
t test	Veeraraghavan, V. and Shetgovekar, S. (2016). Text book of Parametric and non parametric statistics, Sage publications, New Delhi.	Table A IV
	Mohanty, B and Misra S (2016). Statistics for Behavioural and Social Sciences. Delhi: Sage.	Table C
	Mangal, S. K. (2002). Statistics in psychology and education. New Delhi: HI Learning Private.	Table C, page number 376
Chi- square	Veeraraghavan, V. and Shetgovekar, S. (2016). Text book of Parametric and non parametric statistics, Sage	Table A. VII

	publications, New Delhi.	
	Mohanty, B and Misra S (2016). Statistics for Behavioural and Social Sciences. Delhi: Sage.	Table L
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Mann- Whitney U test	Veeraraghavan, V. and Shetgovekar, S. (2016). Text book of Parametric and non parametric statistics, Sage publications, New Delhi.	A. X
	Mohanty, B and Misra S (2016). Statistics for Behavioural and Social Sciences. Delhi: Sage.	Table U and table V
	Mangal, S. K. (2002). Statistics in psychology and education. New Delhi: HI Learning Private.	Table M, page numbers 385 to 388
F	Veeraraghavan, V. and Shetgovekar, S. (2016). Text book of Parametric and non parametric statistics, Sage publications, New Delhi.	Table A. V

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Kruskal- Wallis H	Veeraraghavan, V. and Shetgovekar, S. (2016). Text book of Parametric and non parametric statistics, Sage publications, New Delhi.	Table A.XII
z	Veeraraghavan, V. and Shetgovekar, S. (2016). Text book of Parametric and non parametric statistics, Sage publications, New Delhi.	Table AXV

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Guilford, J. P. and Fruchter, B. (1988). Fundamental statistics in psychology and education. New Delhi: McGraw-Hill.

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