Chapter 5

Frequency Polygon

***Learning objectives*:**

1. Create a frequency polygon using SPSS Statistics.
2. Distinguish between the terms *statistical figure* and *statistical table*.
3. Format an SPSS Statistics frequency polygon for presentation in a research report.
4. Create a polygon showing percentages instead of frequencies.

Definition of *Frequency Polygon*

A *frequency polygon* is a line drawing that shows the frequency (i.e., number of cases) for each score in a distribution. It shows the same information as a histogram (see Chapter 4) but does so with lines instead of bars.

Note that frequency polygons should be created only for scale variables.

Creating an SPSS Statistics Frequency Polygon

Step 1: Start SPSS Statistics.

Step 2: Click "New Dataset," and then click "OK."

Step 3: Click the "Variable View" tab to be sure you are in the "Variable View" screen.

Step 4: Name the variable **Social**, label it **Social Anxiety**, and change the level of measurement from "Unknown" to "Scale."

Step 5: Click the "Data View" tab at the bottom left of the "Data Editor."

Table 5.1
Social Anxiety Scores on a Scale From 10 to 20 for 20 Clients

10	19	20	13	13	14	15	14	17	16
18	11	12	16	15	14	17	16	20	18

Step 6: Enter the scores from Table 5.1.

Step 7: Save the data file.

Step 8: Click "Graphs."

See the arrow for Step 8 in Figure 5.1.

Step 9: Click "Chart Builder..." from the drop-down menu.

See the arrow for Step 9 in Figure 5.1.

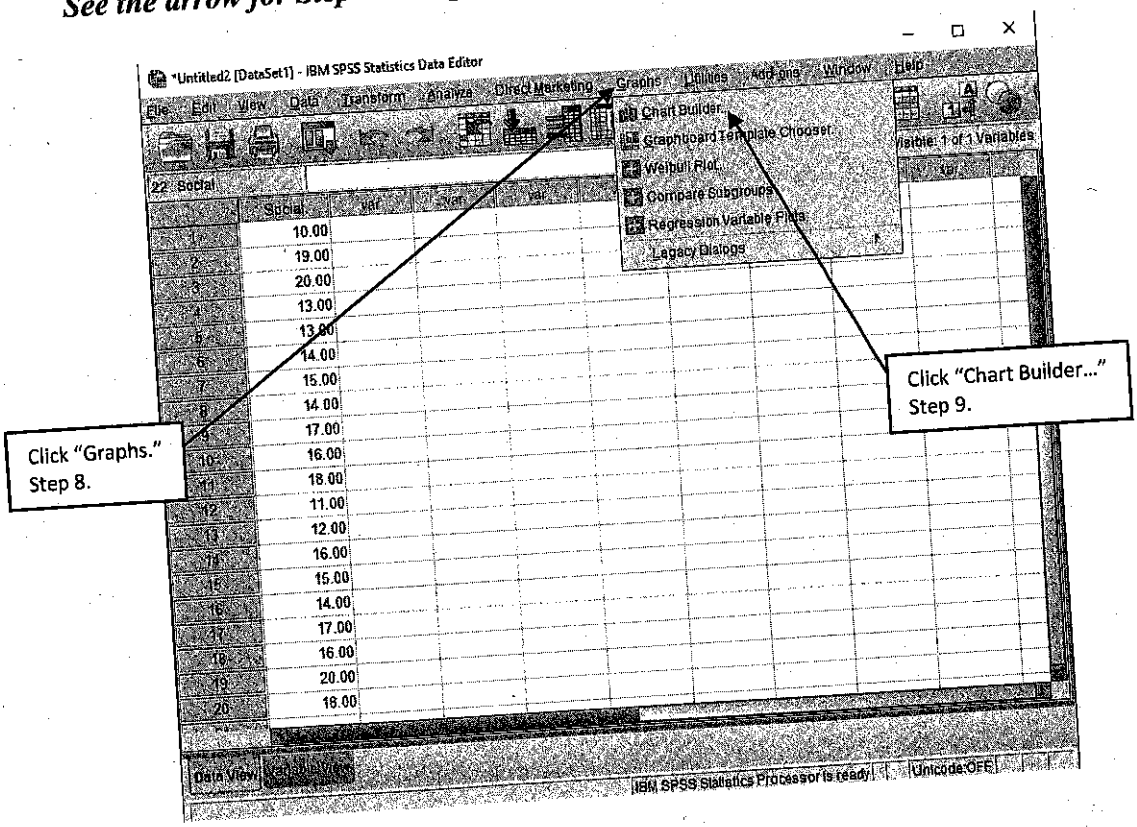

Figure 5.1. Steps 8 and 9.

After executing Step 9, the "Chart Builder" reminder dialog box shown in Figure 4.5 on page 31 will appear. This simply reminds you to be sure that measurement levels are set properly and value labels are defined before proceeding. Click "OK" to continue.[1]

If you have not specifically selected "Scale" in the column labeled "Measure" in "Variable View" (by default it indicates "Unknown"), a second advisory screen will appear, as in Figure 5.2. In this case, you may choose "Scan Data" to have SPSS automatically assign the appropriate level of measurement for the variable (in this case, "Scale").[2]

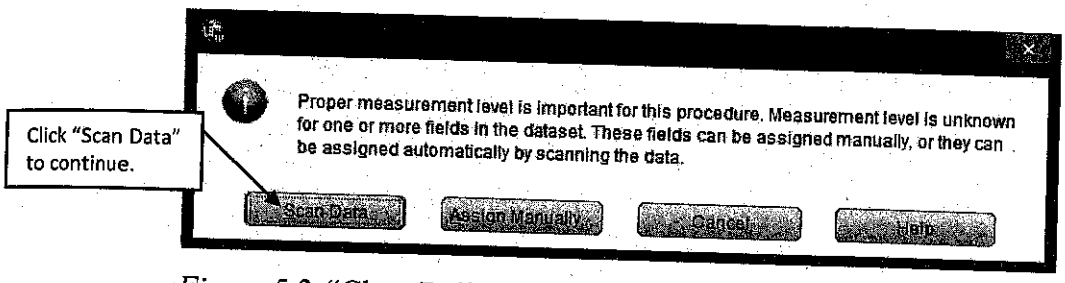

Figure 5.2. "Chart Builder" reminder dialog box.

After clicking "OK," the main "Chart Builder" window shown in Figure 5.3 on the next page will appear.

Step 10: Click "Line" to select available "Line" chart types.

See the arrow in Figure 5.3 on the next page. Note that when the window opens, SPSS Statistics displays 10 "Bar" chart choices by default.

[1] Note: When you are familiar with using Chart Builder, you may wish to check the "Don't show this dialog again" box. Be aware that you cannot undo this choice. SPSS Statistics does not provide the option to restore this reminder.

[2] When creating a variable, SPSS Statistics may default the level of measurement to "Unknown" or to "Scale." If you prefer to *manually* make this assignment, you can either choose "Cancel" and make the change yourself in the "Variable View" window, and then repeat Steps 3 and 4 on page 41, or you may click the "Assign Manually" button. This will open a new window in which you may choose to assign the variable one of three levels of measurement—"Nominal," "Ordinal," or "Continuous" (alternate term for "Scale"). This will return you to the "Variable View" screen, from which you would then repeat Steps 3 and 4 on page 41. While "Scan Data" usually assigns the correct level of measurement for the variable, errors in assignment sometimes occur. Thus, if you use the "Scan Data" function, it is a good idea to check the SPSS assignment in "Variable View."

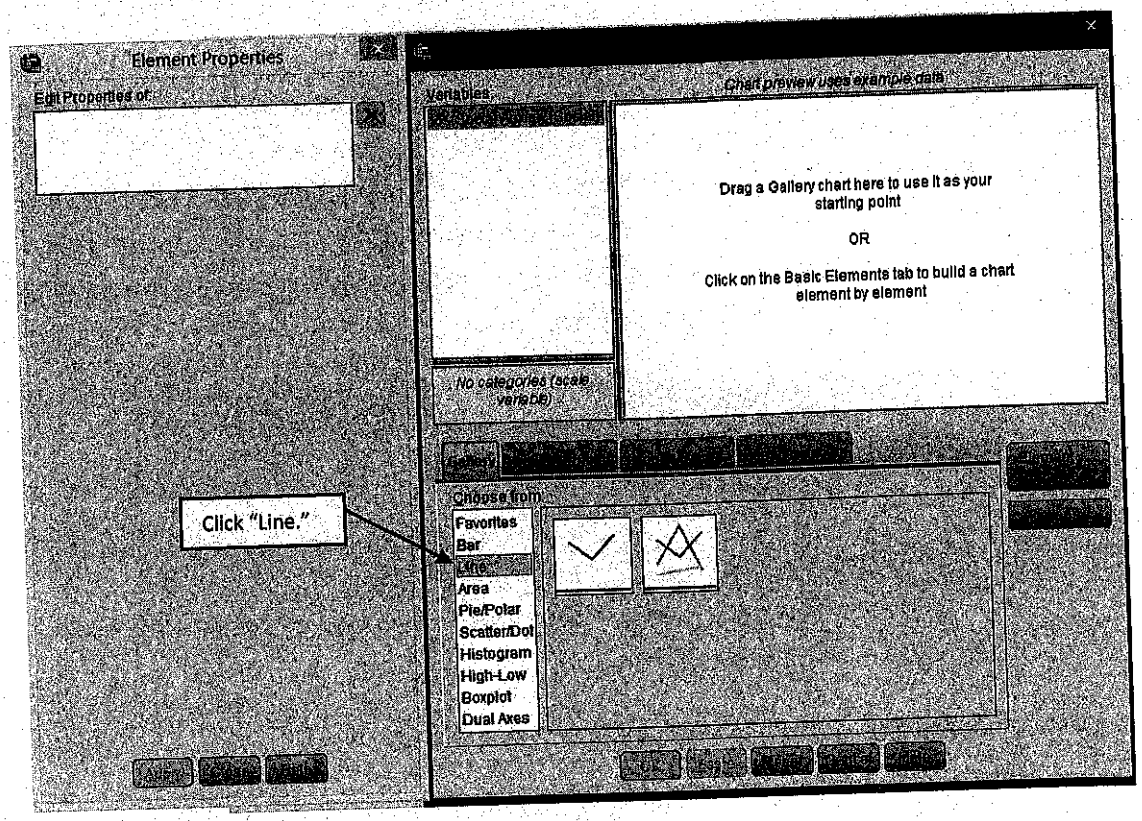

Figure 5.3. Step 10: Main "Chart Builder" window.

After clicking "Line," the main "Chart Builder" window will change to show icons for the two available types of Line charts, as shown in Figure 5.4 on the next page.

Step 11: Drag the icon for a simple "Line" chart from the "Gallery" and drop it into the chart preview area above the "Gallery."

See the arrows in Figure 5.4 on the next page. To drag and drop, use the mouse to hover over the icon of the simple "Line" chart, then press and hold down the left mouse button while moving the mouse into the preview area. Release the left mouse button to drop the icon anywhere in the preview area.

After dropping the icon into the preview area, the main "Chart Builder" window will change, and another window, titled "Element Properties," will open beside it, as shown in Figure 5.5 on page 46.

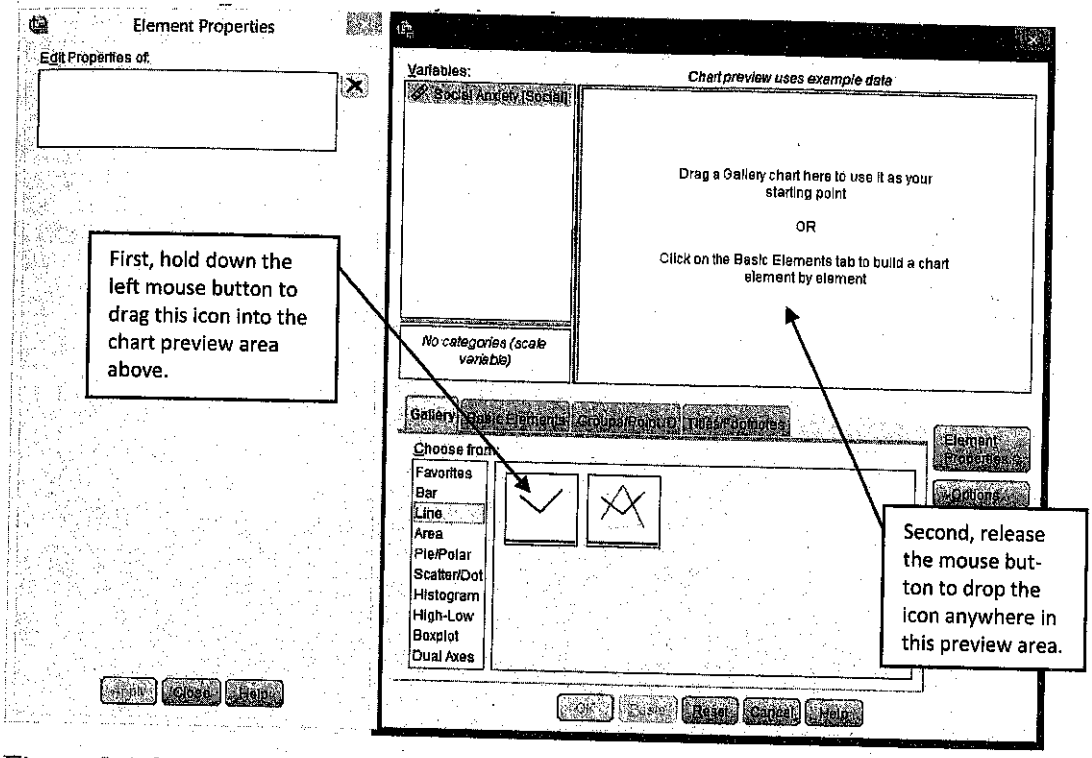

Figure 5.4. Step 11: Main "Chart Builder" window showing icons of available types of "Line" charts.

Step 12: From the "Variables" box of the "Chart Builder" window, drag the highlighted **Social Anxiety [Social]** variable and drop it into the dotted-line rectangle labeled "X-Axis?" within the chart preview window.

See the arrows in Figure 5.5 on the next page. Note that after performing Step 12, SPSS Statistics will immediately show an example line chart in the chart preview area, as shown in Figure 5.6 on the next page. This example chart is only a rough preview and does not reflect our actual data.

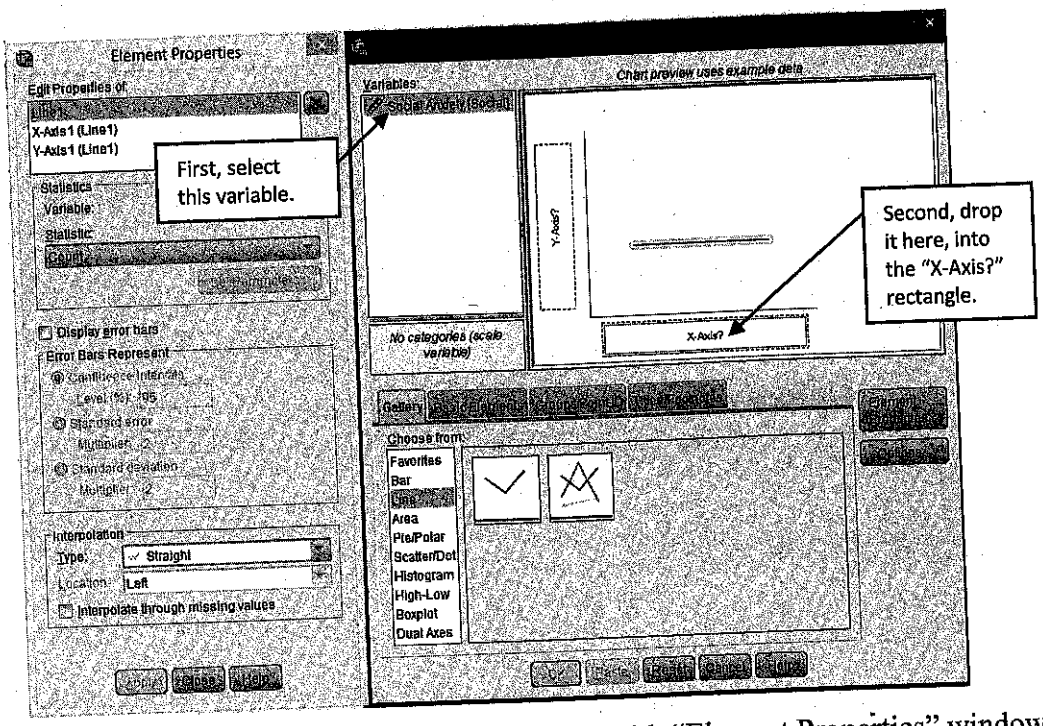

Figure 5.5. Step 12: "Chart Builder" window with "Element Properties" window.

Step 13: Click "OK" to create the chart.

See the arrow in Figure 5.6. After performing Step 13, an unformatted frequency polygon will appear on your screen. ***See the output in Figure 5.7 on the next page.***

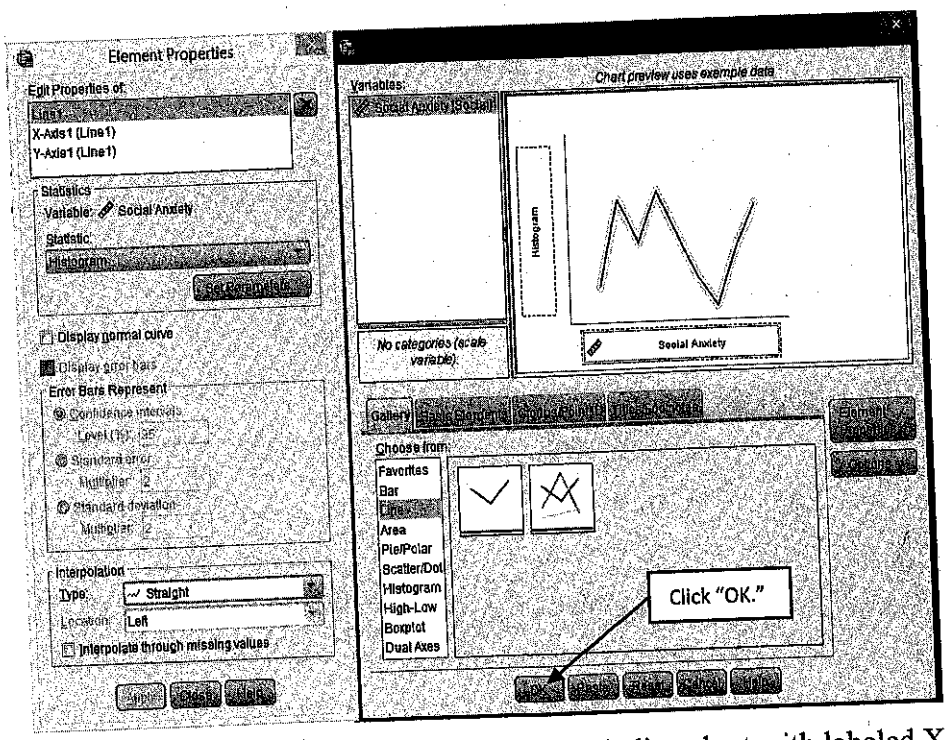

Figure 5.6. Step 13: Preview showing example line chart with labeled X-Axis.

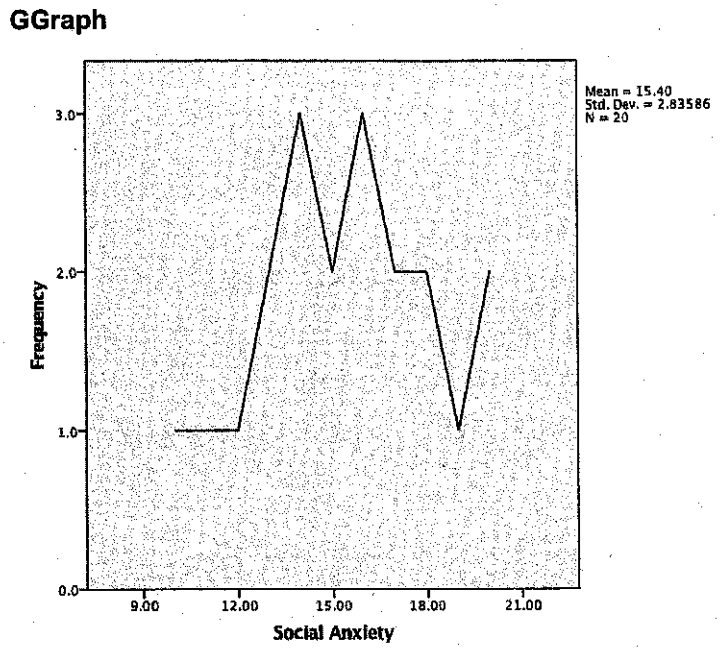

Figure 5.7. Frequency polygon (SPSS Statistics format).

Step 14: Save and close the output.

Interpreting the SPSS Statistics Output

Like a histogram (see Chapter 4), a frequency polygon provides an overview of the distribution of scores (e.g., social anxiety scores). In the frequency polygon in Figure 5.7, notice the middle of the distribution as well as the range of social anxiety scores from low to high.

Formatting an SPSS Statistics Frequency Polygon for a Research Report

Terminology: *Graphs* Versus *Figures* for Labeling a Polygon

Notice that SPSS Statistics refers to a polygon as a *graph*. While the term *graph* is commonly used in the media and in fields such as business and economics, in the social and behavioral sciences, statistical drawings are called *statistical figures* or simply *figures*. SPSS Statistics labels the output as "GGraph" (geometric graph).[3]

[3] SPSS Statistics also uses the terms *SGraph* (statistical graph) or *CGraph* (coordinate graph), which are sometimes mentioned in advanced discussions of graph building. SPSS Statistics publications also use the term *chart*, which is referred to as a *figure* in the social and behavioral sciences.

Giving a Frequency Polygon a Number and Caption (per APA)

All figures should be given a number and a descriptive title (i.e., a *caption*) such as the following:

Figure 5.7. Frequency polygon (SPSS Statistics format).

Pay special attention to the following three items if you are following the style suggested in the *Publication Manual of the American Psychological Association*.

1. The word *Figure*, the number, and the caption are placed *below* the figure.
2. The word *Figure* and the number are italicized and are followed by a period.
3. The caption (i.e., title of the figure) is *not* italicized and ends with a period.

Information Box 5.1

Distinguishing Between a Statistical Figure and a Statistical Table

A *statistical figure*, such as a frequency polygon, is a drawing that represents statistical output. In contrast, a *statistical table* is an ordered set of statistical values without drawings.

Formatting a statistical table is different from formatting a statistical figure. Table 5.1 on page 42 is an example of a statistical table formatted per APA style. Notice that the table number and caption (i.e., title) are placed *above* a table, while a figure's number and caption are placed *below* the figure.

Information Box 5.2

Creating a Polygon That Shows Percentages Instead of Frequencies

To create a polygon that shows percentages instead of frequencies, after completing Step 7 on page 42, (a) click the down-arrow button in the "Statistic" box of the "Element Properties" window, and (b) select "Percentage ()" from the pull-down list. Then (c) click "Apply," followed by (d) "OK." (***See Figures 5.8 and 5.9 on the next page***.)

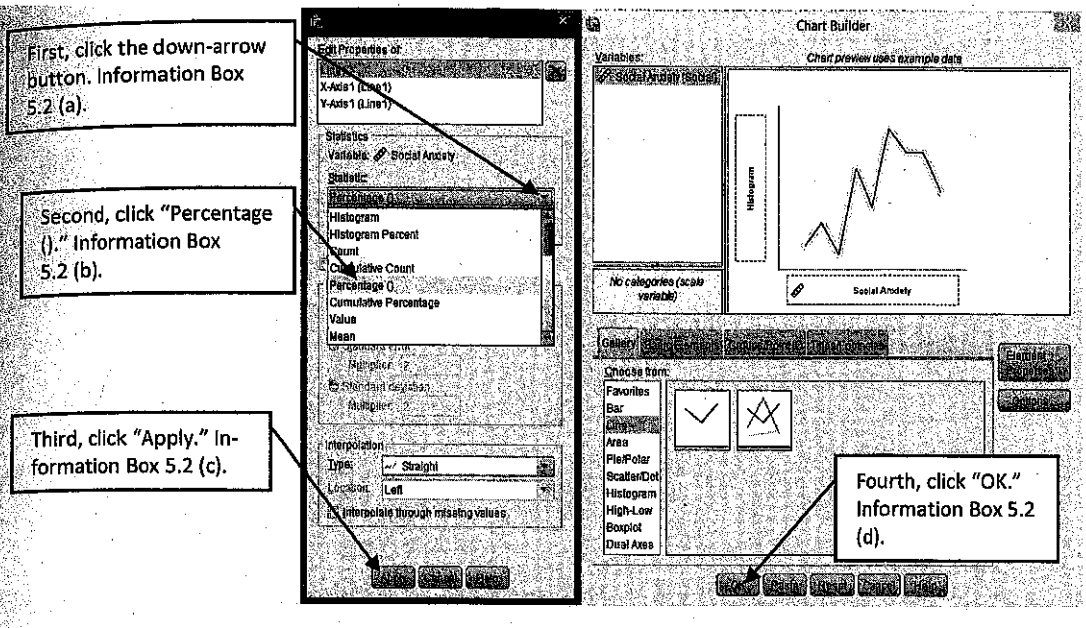

Figure 5.8. See Information Box 5.2 on the previous page.

GGraph

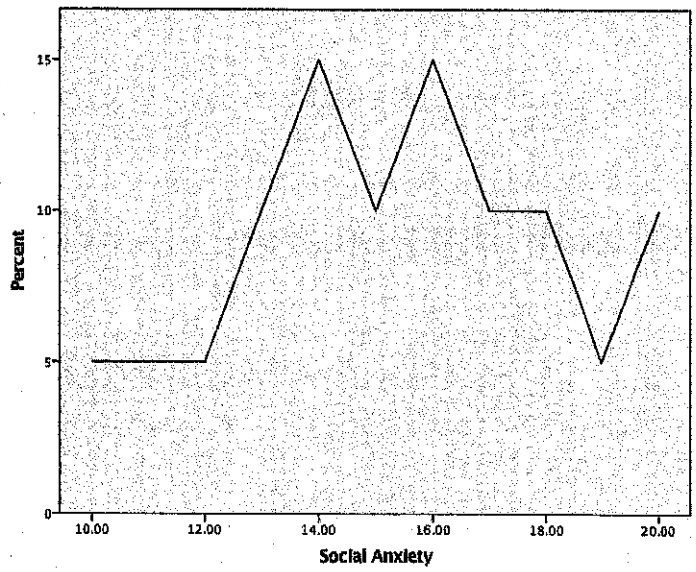

Figure 5.9. Polygon showing percentages for **Social Anxiety** scores. (See Information Box 5.2 on the previous page.)

Exercise for Chapter 5

1. Prepare a frequency polygon for the Current Events Knowledge Test scores shown in Table 5.2. When you create the data file, name the variable **Current** and label it **Current Events Knowledge**. See Chapter 2 for directions on creating a new data file.

Table 5.2
Current Events Knowledge Test Scores on a Scale From 0 to 12 for 20 Students

0	7	1	2	3	5	7	5	10	6
8	9	5	6	4	5	7	6	11	12

2. Prepare a polygon showing *percentages* for the scores on the ABC Depression Inventory shown in Table 5.3. When you create the data file, name the variable **Depression** and label it **Depression Scores**. See Chapter 2 for directions on creating a new data file.

Table 5.3
ABC Depression Inventory Scores on a Scale From 10 to 20 for 20 Clients

17	18	19	20	13	13	14	14	15	16
15	10	11	12	16	17	18	15	16	14