Effective Use of Scatter Charts

**Purpose**
This tool provides guidelines and tips on how to effectively use scatter charts to communicate research findings.

**Format**
This tool provides guidance on scatter charts and their purposes, shows examples of preferred practices and practical tips for scatter charts, and provides cautions and examples of misuse and poor use of scatter charts and how to make corrections.

**Audience**
This tool is designed primarily for researchers from the Model Systems that are funded by the National Institute on Disability and Rehabilitation Research (NIDILRR). The tool can be adapted by other NIDILRR-funded grantees and the general public.

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Overview and Organization

- Positive Relationship ......................................................... 4
- Negative Relationship .......................................................... 7
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XY Scatter Charts

- The primary use of XY Scatter Charts is to display two paired measurements obtained from the same individual (or entity) (such a person's height vs his-her weight) and to combine these dual (paired) measurements from a group of individuals (or entities) to determine if a relationship (correlation) exists between the data elements under investigation (e.g. do taller persons generally weigh more than shorter persons).

- One of the data elements from a given individual (such as the person's weight) is plotted along the horizontal axis (the “X” axis). The other data element obtained from the same individual (such as his or her height) is plotted on the vertical axis (the “Y” axis). Hence the term “XY”.

- When the height and weight of, say, 30 or more persons is plotted, the resultant data points tend to “scatter” in a reasonably predictable way. In this example, the scatter of the plotted data points would suggest that, on the whole, taller persons tend to weigh more than shorter persons.
Adult Males with high Body Mass Index also tend to have Higher Systolic Blood Pressure. Lower BMI = Lower SBP.

Source: Mock Data.
XY Scatter Charts

Added Trend Line – Red Dashed Line.

This is a positive relationship. Higher BMI is associated with higher SBP.

Each dot shows the BMI and SBP data for one adult male. This person had a BMI of 18.6 and an SBP of 111.

For XY charts, often OK to truncate the axes to better display the scatter of the data points. Also used gridlines for readability.

Generally include the axis titles for XY Scatter charts so the reader clearly understands which data is on which axis.

R-Squared is a measure of strength of the relationship. Range 0.00 to 1.00. Tighter pattern around trend line = higher $R^2$. 

$R^2 = 0.60$
Body Mass Index as Related to Systolic Blood Pressure
Males 18 and Older - Untreated - US - 2014

160 and Up
High Blood Pressure
Stage 2

140-159
High Blood Pressure
Stage 1

120 -139
Pre-Hyper-
Tension

Under 120
Normal

18.5 -24.9
Normal BMI

25.0 - 29.9
Overweight

30.0 and Higher
Obese

R² = 0.60

Body Mass Index BMI

Systolic Blood Pressure SBP
Unit of analysis is a grade level within a school. Negative Relationship. School-Grades with a high proportion of economically disadvantaged students tend to have lower standardized reading scores in that school-grade level.

Source: Mock Data.
XY Scatter Charts – No Relationship

Length of Life Line As Related to Longevity
Deceased Males - 18 and Older - US

No Relationship. The length of one’s Life Line [Palmistry] is not related to the length of one’s life.

Source: Mock Data.