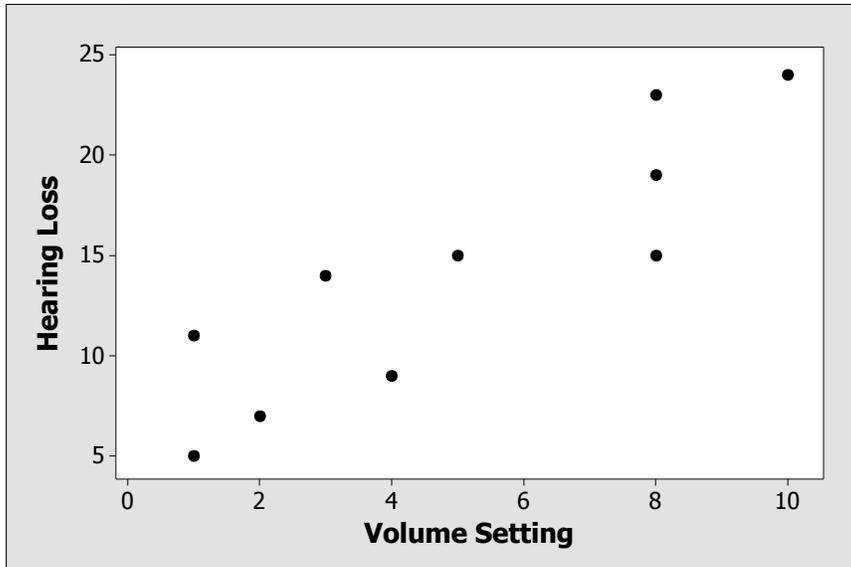


## Rubric – Hearing Loss vs. Volume Setting

### Solution

- a. A scatterplot is shown below.



- b. There is a strong, positive linear relationship between volume setting and hearing loss. As volume setting increases, hearing loss tends to increase.
- c. No, we cannot make cause and effect conclusion here because the researchers did not randomly assign students to volume settings. This is an observational study. It is possible that hearing loss is caused by some other factors and that those with hearing loss need to play the music at a higher volume in order to hear it.

### Scoring

Part (a) is scored Essentially Correct (E), Partially Correct (P), or Incorrect.

Essentially correct if the response includes a scatterplot with appropriate data points, scales included on both axes, and at least one variable label.

Note: A scatterplot with minor errors (such as one or two missing points, or plotting the average value at repeated x values) or with the axes reversed can be regarded as essentially correct. If the points in the scatter plot are connected by lines, this should be ignored.

Partially correct if the response includes a scatterplot that is essentially correct but without labels and/or incorrect or no scales OR the response includes some other two variable plot (for example, one that uses bars rather than dots to represent the data values) that shows the relationship and includes correct scales and labels.

Incorrect if histograms, dotplots, or other single variable plots are used or the value plotted at repeated x values was the total of all the corresponding y values.

Part (b) is scored Essentially Correct (E), Partially Correct (P), or Incorrect.

Essentially correct if the response indicates that there is a strong (or moderate), positive linear relationship between volume setting and hearing loss. The ideal response will contain four elements: strength, form of the relationship, direction, and context.

Partially correct if the response correctly addresses two or three of the elements (strength, direction, form of the relationship, context).

Incorrect otherwise.

Part (c) is scored Essentially Correct (E), Partially Correct (P), or Incorrect.

Essentially correct (E) if the response correctly claims that a cause-and-effect conclusion cannot be justified AND

- Provides an explanation based on the study design (for example, noting that this study was not an experiment, or was just an observational study, or that treatments weren't randomly assigned, or that no variables were controlled)

OR

- Provides a complete explanation of confounding in the context of this question.

Partially correct (P) if the response correctly claims that a cause-and-effect conclusion cannot be justified AND provides a weak or incomplete explanation (for example, only citing that association is not causation, or only noting that there could be confounding/lurking variables, or only stating that other variables such as age might impact hearing loss).

Incorrect (I) if the response claims that a cause-and-effect conclusion can be drawn OR answers that no cause-and-effect conclusion can be drawn but provides an incorrect explanation (such small sample size) or does not provide an explanation.

**The overall score is based on the performance for each of the three parts.**

**4 Complete Response**

All three parts essentially correct

**3 Substantial Response**

Two parts essentially correct and one part partially correct

**2 Developing Response**

Two parts essentially correct and one part incorrect

OR

One part essentially correct and one or two parts partially correct

OR

Three parts partially correct

**1 Minimal Response**

One part essentially correct and two parts incorrect

OR

Two parts partially correct and one part incorrect

Note: If the response scores PPE and parts (a) and (b) contain only minor errors, then the response may be scored a 3.