Quantitative Data 101: A Refresher

Quantitative methods use numerical data to quantify and understand specific elements of the environment including student attitudes, understanding, and behavior. This data may be used to produce descriptive or inferential statistics. This session will first focus on the former, then shift to briefly describe three basic, but helpful statistics.

Session attendees will learn how to:

- name and identify different types of variables.
- understand the difference and calculate between mean, median, and mode.
- produce simple and accurate graphs of descriptive data.
- identify uses for chi-squared, correlation, and t-test analyses.
Coding the Environment

☞ Codes: Numbers/symbols used to represent items of interest—often called ‘variables’—within the environment.

☞ Variables: Any item of interest that may vary from one person, condition, or situation to the next.
Describing Variables

Levels of Measurement

- **Nominal Variables**
  - Identifies/describes mutually exclusive categories of interest within the environment. (e.g., on-off-campus, member/non-member, hair color)

- **Ordinal Variables**
  - Rank ordered categories on some ‘greater than’ or ‘less than’ dimension, but the conceptual distance between each is unknown. (e.g., undergraduate classification)

- **Interval Variables**
  - Builds on ordinal variables with ‘known’ distances between ordered categories.

- **Ratio Variables**
  - With all the characteristics of the above, these variables also have an absolute zero (no negative values). Common in physical sciences, but not social sciences.
Describing Variables

Independent v. Dependent

- **Independent Variables:** Also called attribute or descriptor variables, these variables identify characteristics that do not vary within group.

- **Dependent Variable:** Also called the criterion or outcome variables, these variables are expected to be altered depending on the independent variables controlled in the study.
Measures of Central Tendency

- These measures describe ‘normal’, ‘the most common’, the average, or the center point of a distribution of quantitative data.

- **Mode**: The most frequently occurring value in a distribution.

- **Median**: Is the score at which exactly half of the distribution is either greater or less. In other words, there is an equal of cases with greater values as there are values that are less than.

- **Mean**: the arithmetic average.
Let’s Review

- Independent vs. Dependent variables
- Levels of Measurement
  - Nominal
  - Ordinal
  - Interval
  - Ratio
- Now adding, “String”
Statistics

➢ “There are three kinds of lies: lies, damned lies, and statistics” - Benjamin Disraeli

➢ “Facts are stubborn, but statistics are pliable.” - Mark Twain

➢ Descriptive vs. Inferential Statistics
Chi-Squared Test

Assesses the likelihood that differences between what was observed and what was expected are by chance alone or by some other factor.

<table>
<thead>
<tr>
<th>Average Floor Program Attendance</th>
<th>Attended</th>
<th>Not Attended</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Hall</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td>Other Halls</td>
<td>42</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>40</td>
</tr>
</tbody>
</table>
Chi-Squared Test

Assesses the likelihood that differences between what was observed and what was expected are by chance alone or by some other factor.

<table>
<thead>
<tr>
<th>Average Floor Program Attendance</th>
<th>Attended</th>
<th>Not Attended</th>
</tr>
</thead>
<tbody>
<tr>
<td>My Hall</td>
<td>18 15</td>
<td>7 10</td>
</tr>
<tr>
<td>Other Halls</td>
<td>42 45</td>
<td>33 30</td>
</tr>
</tbody>
</table>

https://www.youtube.com/watch?v=VskmMgXmkMQ
Correlation

- Helps to understand the relationships between quantitative variables. Warning: correlation does not indicate causation (e.g., height correlates with intelligence).

https://www.youtube.com/watch?v=Ypgo4qUBt5o
The *t*-test

- Used to compare two samples and determine if observed differences (on a dependent variable) occurred by chance alone or perhaps due to an independent variable.
The TQA
A Three Question Assessment

- What ideas did this presentation generate for you?
- Did you learn something today that might help you perform your job better? Please describe.
- What could be changed about this presentation to make it more helpful or effective?
References

