Measurement in Jamovi

A Student-Friendly Guide for Chapter 4: Measurement

# Welcome Back to Jamovi!

Great job completing Chapter 3! You've already learned how to open data files, run descriptive statistics, and create visualizations in Jamovi. Those foundational skills will serve you well in this chapter.

In Chapter 4, we're going to build on what you know and learn some new skills:

* **Computing new variables** — like adding up scale items to create total scores
* **Calculating reliability** — specifically Cronbach's alpha to see if scale items work together
* **Setting measurement levels** — telling Jamovi whether your variables are nominal, ordinal, or continuous
* **Creating histograms** — to visualize distributions of clinical measures

**🔄 Building on Chapter 3:** Remember how you opened data files and ran Descriptives in Chapter 3? You'll use those same skills here! The main difference is that now you'll also learn to create new variables by combining existing ones.

# Opening the Chapter 4 Data File

Just like in Chapter 3, we'll start by downloading and opening a data file. This time, we're working with clinical measurement scales.

## Step-by-Step: Getting Your Data

1. **Download the data file** from the OSF page (**https://osf.io/a8kev/**). Navigate to the "Ch. 4 – Measurement" folder.
2. **Download the .csv file** (RITC\_DATA\_CH04\_Measurement.csv).
3. **Open Jamovi** and click the ☰ menu → Open → navigate to your file.

Once opened, you'll see data from about 500 participants who completed four clinical measurement scales:

* **GAD-7** — Generalized Anxiety Disorder scale (7 items: Anx\_1 through Anx\_7)
* **PHQ-9** — Depression scale (9 items)
* **PC-PTSD-5** — Trauma scale (5 items)
* **ISI** — Insomnia Severity Index for sleep disturbances (7 items)

# Research Activity 4.1: Computing Total Scores in Jamovi

Here's where we learn something new! In Chapter 3, our variables were already ready to analyze. But often in research, you need to **compute** new variables by combining existing ones.

For example, the GAD-7 has seven individual items (Anx\_1 through Anx\_7), but to measure someone's overall anxiety, we need to add these items together to create a **total score**.

## Creating the Total Anxiety Score

In Jamovi, we create new computed variables using the **Data** tab. Here's how:

### Step-by-Step Instructions

1. **Click on the "Data" tab** at the top of Jamovi.
2. **Click "Compute."** This creates a new computed variable column and opens the compute variable dialog box.
3. **In the "Name" field, type:** TotalAnxiety. Then, in the description field, describe the variable.
4. **In the formula box, type:**

Anx\_1 + Anx\_2 + Anx\_3 + Anx\_4 + Anx\_5 + Anx\_6 + Anx\_7

The result should look like the image below:

A screenshot of a computer

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1. **Press Enter** or click elsewhere to apply the formula.

**💡 Pro Tip:** As you type variable names in the formula box, Jamovi will show suggestions — you can click on them to auto-complete! This helps avoid typos.

### Alternative Method: Using the SUM Function

Instead of typing out each variable with plus signs, you can use Jamovi's SUM function:

SUM(Anx\_1, Anx\_2, Anx\_3, Anx\_4, Anx\_5, Anx\_6, Anx\_7)

Both methods give you the same result!

### Verify Your Calculation

After creating the computed variable, it's good practice to "spot check" a few cases:

* Look at the first participant's individual anxiety scores (Anx\_1 through Anx\_7)
* Add them up manually
* Check that your TotalAnxiety variable matches.

## Creating Total Scores for Depression, Trauma, and Sleep

Now repeat the process to create total scores for the other three scales. Here are the formulas you'll need:

| **Variable Name** | **Formula** |
| --- | --- |
| TotalAnxiety | Anx\_1 + Anx\_2 + Anx\_3 + Anx\_4 + Anx\_5 + Anx\_6 + Anx\_7 |
| TotalDepression | Dep\_1 + Dep\_2 + ... + Dep\_9 (all 9 PHQ items) |
| TotalTrauma | Trauma\_1 + Trauma\_2 + ... + Trauma\_5 (all 5 items) |
| TotalSleep | Sleep\_1 + Sleep\_2 + ... + Sleep\_7 (all ISI items) |

**💡 NOTE:** Pay attention to the way the sleep variables are named. Thanks to how the scale is administered, the items are: Sleep1\_1, Sleep1\_2, Sleep1\_3, Sleep2, Sleep3, Sleep4, Sleep5.

# Here is an example.

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# Visualizing the Distribution: Creating Histograms

Remember creating bar charts in Chapter 3? Now we'll create **histograms** to visualize continuous variables like our total scores.

## Step-by-Step: Creating a Histogram for Anxiety Scores

1. **Click "Analyses" → "Exploration" → "Descriptives"**
2. **Drag your "TotalAnxiety" variable** to the Variables box.
3. **Expand the "Plots" section** at the bottom of the options.
4. **Check the box for "Histogram."**

Your histogram should appear in the Results panel, showing the distribution of anxiety scores!

### What You Should See

The histogram should show a **positive skew** (sometimes called "right-skewed"):

* Most people cluster at the low end (low anxiety)
* Fewer people have high scores
* The "tail" extends to the right

This is typical for clinical variables; most people in the general population don't have high levels of anxiety, depression, etc., but a smaller group does experience significant symptoms.

A graph of a graph

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**💡 Expected Results:** For the GAD-7, you should see a mean around 5.76, with scores ranging from 0 to 21. The distribution will be clearly skewed right.

# Calculating Reliability: Cronbach's Alpha

Chapter 4 introduces the concept of **reliability** — how consistently a scale measures what it's supposed to measure. The most common way to assess this is with **Cronbach's alpha**.

Think of it this way: if all seven items on the GAD-7 are measuring anxiety, people who score high on one item should also tend to score high on the others. Cronbach's alpha tells us how well the items "hang together."

## Interpreting Cronbach's Alpha

| **Alpha Value** | **Interpretation** | **What it Means** |
| --- | --- | --- |
| Above .90 | Excellent | Items work very well together |
| .80 to .90 | Good | Scale is reliable for research |
| .70 to .80 | Acceptable | Okay for exploratory research |
| Below .70 | Questionable | Scale may need revision |

## Step-by-Step: Calculating Cronbach's Alpha in Jamovi

1. **Click "Analyses"** in the top menu.
2. **Select "Factor"** from the dropdown menu.
3. **Click "Reliability Analysis."**
4. **Select all seven anxiety items** (Anx\_1 through Anx\_7) and move them to the "Items" box.

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1. **Look at the Results panel** — you'll see Cronbach's alpha (α) displayed!

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**💡 Expected Result:** For the GAD-7, you should see a Cronbach's alpha around .90 or higher — excellent internal consistency! This means the scale is reliable.

# Research Activity 4.4: Setting Measurement Levels in Jamovi

The textbook discusses four types of measurement scales (NOIR): **Nominal, Ordinal, Interval, and Ratio**. In Jamovi, you can tell the software what type each variable is, which affects how it can be analyzed.

## Jamovi's Measurement Types

Jamovi uses three categories (which map onto the NOIR system):

| **Jamovi Type** | **NOIR Equivalent** | **Use For** | **Example** |
| --- | --- | --- | --- |
| Nominal | Nominal | Categories, no order | Gender, Major |
| Ordinal | Ordinal | Categories with order | Education, Likert items |
| Continuous | Interval / Ratio | Numbers with meaning | Age, Total scores |

## Step-by-Step: Checking and Changing Measurement Levels

* **Click on the Data tab**
* **Click "Setup"** (or double-click any column header)
* **Look at the "Measure type" dropdown** — this shows the current setting
* **Click the dropdown to change it** if needed

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### Practice: Classify the Demographic Variables

Look at the demographic variables in your dataset and identify the appropriate measurement level:

* **Gender** → ? (categories with no order)
* **Education Level** → ? (categories with a meaningful order)
* **Age** → ? (can calculate meaningful averages)

**🔄 Why does this matter?** Setting the correct measurement level helps Jamovi offer appropriate analysis options. For example, you can't calculate a mean for nominal variables (what's the "average" gender?), but you can for continuous variables.

# Tips for Success

## Common Mistakes to Avoid

* **Typos in variable names:** If your computed variable shows all blanks, double-check that you spelled the variable names correctly in your formula. Variable names are case sensitive in Jamovi.
* **Forgetting to include all items:** Make sure you include ALL items when computing total scores. Missing one will throw off everyone's scores!
* **Wrong measurement level:** If Jamovi won't let you run an analysis, check that your variable is set to the right measurement type.

## Saving Your Work

Remember: When you create computed variables in Jamovi, they're saved as part of your .omv file. So save your work frequently (☰ → Save) to keep your new variables!

# Summary

In this chapter, you've added some important new skills to your Jamovi toolkit:

* **Computing new variables** — using the Data tab to create total scores from individual items
* **Creating histograms** — to visualize how variables are distributed
* **Calculating Cronbach's alpha** — to assess whether scale items reliably measure the same construct
* **Setting measurement levels** — to help Jamovi understand what kind of data you're working with

These skills build directly on what you learned in Chapter 3 (opening files, running descriptives) and will carry forward into future chapters. As the textbook notes, good measurement is the foundation of good research — and now you have the tools to work with measurement scales in Jamovi!

**📚 Looking Ahead:** In Chapter 5, you'll learn about correlations — examining relationships between variables. The computed variables and histograms you created here will come in handy!