PSYC3010: PSYCHOLOGICAL RESEARCH METHODS III

FORMAT EXPECTATIONS

School of Psychology

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THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

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ABOUT THIS BOOKLET

This booklet provides a series of format guidelines aimed to help you in your assessments. Remember, however, that this resource is no substitute for the primary source itself. That is:

APA (7th Edition), *Publication Manual of the American Psychological Association*.

There are a number of copies in the Central library (call no. Z253.A38 2020).

General APA 7th formatting guidelines can also be found online at: https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_style_introduction.html

DISCLAIMER

This booklet provides advice as to the formatting requirements relevant to the PSYC3010 Assessments. As such, there are many topics to which this booklet does not speak (e.g., referencing in APA 7). Again, the reader is directed to the primary source for guidelines on the formatting of these other areas.

BASIC FORMAT STYLE GUIDELINES FOR ASSESSMENTS

- Double-space all text, including title page, headings, figure/table titles and notes, and references.
- Use correct APA format headings (see next page).
- While fonts have been made more flexible for APA 7 (vs. APA 6), it is preferred that students use 12-point Times New Roman or 11-point Arial font throughout the document.
- Use indentations of half an inch or one tab (5-7 spaces) to begin new paragraphs.
- Use margins of one inch (i.e., 2.54cm) at the top, bottom, left and right of the document.
- Align all in-body text to the left. Keep the right side of the text "jagged". That is, do not "justify" the text to stretch it evenly across the line.
- The title should be fully explanatory when standing alone. It should be a concise statement of the main topic, identify the variables or theoretical issues under investigation, and the relationship(s) between them.
- A running head is not technically required for student papers. However, we prefer students to adopt a professional style which includes a running head. This is an abbreviated version of the title and should be no more than 50 characters (including spaces and punctuation). It must be positioned flush left, and appear in all uppercase letters at the top of the title page and all subsequent pages.
- Page numbers must be presented in the header aligned flush right, and be in the same font as the rest of the text (e.g., 12-point Times New Roman or 11-point Arial).
- Do not put an additional line space between headings and/or subheadings and the subsequent text.
- Likewise, do not place a line space between paragraphs.
- Do not start new sections on a new page (unless it is the Introduction following the Abstract or the References section following the Discussion).
- Do not leave widows (where the majority of a paragraph appears on one page with the last line flowing onto the top of the following page) or orphans (where the first line of a paragraph appears on its own at the bottom of a page and the remaining portion appears on the following page).
- One space is to appear after a full stop at the end of a sentence.
- Table and figure formatting both require a title/caption at the top.
- Examples (e.g., example items from a scale) are to be presented in quotation marks rather than italics. However, anchors of scales or responses to scale-like questions are to be presented in italics rather than quotation marks.
- Define all known abbreviations/acronyms used within the text the first time they are presented e.g., ANOVA, SMR, HMR, MMR. <u>However, do not invent/create acronyms, as this interferes with the clarity of your writing</u>.

- Use inclusive and bias-free language. This includes the use of the pronoun "they" rather than "he" or "she", and employing labels that are sensitive to how social groups and people describe themselves.
- Use language with an appropriate level of specificity rather than relying on broad categories (e.g., people aged 50 to 65 years rather than over-50s).
- While APA 7 states that reporting of values is to be determined by the precision of measurement, it is generally advised that means and standard deviations for integer scales are rounded and presented to one decimal place.
- Correlations, proportions and inferential statistics (e.g., *t, F*) are to be rounded and presented to two decimal places.
- Exact *p*-values are to be reported. While APA 7 allows for this to be to 2 or 3 decimals, since any *p*-value less than .001 must be reported as $p < .001$, it is preferred that students report all *p*-values to 3 decimal places for consistency.
- A zero should be placed before a decimal if the number is less than one, but the value can potentially exceed ±1, e.g., $F(3, 56) = 0.67$, $SD = 0.3$. However, if the value cannot potentially exceed ±1, no zero should appear before the decimal point, e.g., $r(38) = .23$, $p = .062$.
- Effect sizes and confidence intervals are to be supplied wherever possible for point estimates/statistics.
- Numbers at the start of a sentence are to be spelled out in words. Likewise, common fractions should appear as words rather than numerals (e.g., one third).
- Numbers below 10 are to be spelled out in the text in words. Anything higher should appear as a numeral.
- When representing a point on a scale, an age, a place in a series or after a noun, numerals should be used (e.g., three 2-year-olds, Item 4, a 7-point Likert rating scale).
- English/Latin lettered statistical notation should appear in italics (e.g., *t*, *F*, *r*), while standard notation should be applied for Greek letters (e.g., η, ω, β). However, notation presented as subscripts or superscripts should appear as standard type.
- Spaces should appear between elements of statistical notation e.g., $F(3, 32) = 6.32$, $p = .002$, $\eta^2_P = .37$.

An applied example of this formatting is provided on the following page.

EXAMPLE OF BASIC APA 7 FORMAT

Title of Assessment is Centered, in Boldface Type, with Upper and Lowercase Letters for Each Word, Contains No Abbreviations and Can Take One or Two Lines

We then go straight into the text for the Introduction. Notice that there is no "Introduction" heading, just the actual title for the paper. The Introduction is the only exception regarding this, as all other sections have an appropriate explicit (sub)heading e.g., Method, Results, Discussion and References. One of the key changes between APA 6 and 7 is that only one space should appear after a full stop, where previously it had been two.

Note that the first line of each paragraph is indented. This should be a half-inch or one tab (5-7 space) indentation. It is important that you make use of paragraphs, as to write in one huge chunk is not acceptable. Also observe that all margins on the page (i.e., top, bottom, left and right) should be one inch (i.e., 2.54cm) and all text is double-spaced.

Level 1 Heading (e.g., Method) is Centered and in Bold

Level 2 Heading (e.g., Materials) is Aligned Flush to the Left and in Bold

Level 3 Heading (e.g., Depression Measure) is Left-Aligned, Bold and Italicised

The body of the text following a Level 1, Level 2 or Level 3 heading should begin on a new line and be indented. The text should be either 12-point Times New Roman or 11-point Arial font, though we prefer the former rather than the latter. Again, everything should be double-spaced, with "0pt" selected under "Paragraph" → "Indents and Spacing" → "Spacing" → "Before" and "After" to prevent additional and unwanted spacing being added between lines. The text should also be aligned flush to the left, with jagged edges to the right (that is, do not "justify" the text). Do not leave "widows" or "orphans", where a single line of text from a paragraph is left either at the top or bottom of a page, respectively.

Heading Level 1 (e.g., Results)

Note that when you begin a new section (e.g., going from the Method to Results), you do <u>not</u> start a new page. Instead, when you begin a new section, you just press 'Enter'

on the keyboard once on the previous line. Do not leave an extra line between sections or subsections. To help with this, select “Don’t add space between paragraphs of the same style” under “Page Layout” → “Paragraph” → “Indents and Spacing” → “Spacing”, to prevent Microsoft Word automatically spacing without your consent.

BASIC WRITING STYLE FOR ASSESSMENTS

DO…	DO NOT…
• Use first-person perspective (e.g., "I", "our"). • Employ the gender-neutral pronoun "they" to avoid use of gendered pronouns where necessary. • Apply labels that are sensitive to how individuals and groups within society view themselves (e.g., people living in poverty vs. poor people). • Organise your ideas into paragraphs, and write in complete sentences. • Ensure paragraphs are 3-5 sentences long (one idea = one paragraph). • Use transitions to relate one idea to the next, especially between paragraphs. • Use simple, concise, formal and academic language. • Make clear, direct statements using the active voice (e.g., "The human resources manager distributed the forms to the hospital employees.") • Spell out each word. When using *established* acronyms, write them out in full the first time you use them. This includes defining abbreviations such as ANOVA, SMR, HMR and MMR. • Include a title page that conforms to APA 7th edition formatting standards. • Use APA 7th edition headings to separate each (sub)section of the report/ essay. • Use page numbers and a running head. • Use APA 7th format for all tables and figures. While these can be presented either on their own page at the end of a paper following the References, or be positioned in the text of the document, <u>for this course we want you to place tables and figures as close as is practically possible to the paragraph that refers to it</u> (e.g., directly before or preferably just after). DO NOT place it in the middle of a paragraph. • Take time with the writing process: pre-writing, drafting, revising, editing, and proofreading.	• Use third person (e.g., passive specification of the subject of every sentence) or second person (e.g., "your") perspective unless the instructor requests this. • Use gendered pronouns (e.g., "she" and "his"). • Use biased language (e.g., disabled people vs. people with disability). • Use directives i.e., "do this", "do that." • Use fragments i.e., incomplete sentences. • Write run-on sentences (i.e., two or more sentences that are joined without correct punctuation or connecting words). • Use informal, conversational tone. This includes the use of slang and idioms. • Use vague expressions e.g., "people", "the company". • Use jargon. If there is a simpler way of saying something, use it! • Create/invent acronyms. Unless an acronym is already established and well-known (e.g., MRI, ANOVA, SMR), it will only serve to confuse your reader. • Use 'wordy' writing styles. This includes flowery phrasing with too many adjectives, excessive use of complex terms, redundancy, unnecessary phrases that fill up space but don't add meaning, and any other techniques that increase the word limit but fail to add important information. • Use a descriptive or personal style of writing (unless explicitly requested by the instructor or assessment). • Start a sentence with a numeral. These should always be written out in words. Likewise for values less than 10. • Plagiarise. ALWAYS reference your sources of information and cite these correctly!

FORMAT GUIDELINES FOR TABLES

- Tables must be referred to in the text of the report, at a time that is appropriate.
- The table itself should be presented as close as practicable to its reference in the text (i.e., immediately before or after the paragraph that mentions it – do not place it in the middle of the paragraph). It is not necessary for a table to start on a new page unless it will not fit in its entirety on the previous page (this includes the table title and any relevant notes).
- The table must be intelligible as a stand-alone piece of information, without reference to the text required to understand it. This includes having a clear title that encapsulates exactly what data the table holds, and notes that help interpret any information contained therein (including explanatory notes of any abbreviations and significance levels applied).
- A table should appear on a single page, not split over two pages (this includes the title and any notes below).
- The table itself should be aligned flush to the left of the page, not centred.
- The title goes above the table. Uppercase is used to start each major word.
- The label (i.e., "Table 1") is presented in boldface type, on its own line and is not followed by a full-stop.
- The actual title for the table should appear below this on the next line in italics, with uppercase letters to start each major word. Again, no full stop is at the end. Each table title should be clear and concise, summarising the key information contained within.
- The title and notes for a table should be double-spaced, aligned to the left, and appear in the same font as the rest of the document.
- The spacing for the table body itself can be single, 1.5 OR double spaced, to assist readability.
- Font size within the table body must be legible (8-12pt), and appear in Times New Roman or Arial font (i.e., the font consistent with the rest of the document text).
- The table has no vertical lines *at all* and borders should not be used around individual cells.
- The spacing and alignment of table columns needs to be clear to allow for easy reading and distinguishing between the table elements.
- The only horizontal lines are at the top and bottom of the table, as well as underneath the first row that specifies the column title (i.e., the name of the variable/ statistic in that column). More complex tables may require more horizontal lines to break up (sub)sections of the table or to help identify more variables/ variable levels within a table.
- A note should be included under the table to make clear any symbols which appear in the table (e.g., abbreviations and significance of *p*-values). For this, general notes appear first, followed by specific notes and then probability level notes. Specific notes appear in a new paragraph (i.e., start a new line), while further specific notes follow on in the same paragraph. Notes regarding given probability/ significance levels also require a new paragraph.
- If including a correlation matrix, only provide the values for the upper right or lower left triangle (i.e., do not repeat the correlations in a full matrix format).
- Leave cells blank if not applicable/ relevant.
- Any cells containing a dash require explanation in the notes below.
- Entries within the table should be centered, unless alignment to the left assists readability (this usually occurs in instances of longer entries or those in the far-left column).

- Numerals presented in a table need to be consistent regarding the number of decimal places displayed. This is determined by the precision of measurement and should never change in the same column. As a general rule:
    - Means and standard deviations should be rounded and presented to one decimal place,
    - Correlations, proportions and inferential statistics (e.g., *t*, *F*) are to be rounded and presented to two decimal places, and
    - Exact *p*-values are to be reported to three decimals.
- Values that cannot exceed ±1 should NOT be presented with a 0 in front of the decimal place (e.g., correlations). This is demonstrated in Table 1 below, where the correlations, and mean and standard deviation for Sex (dummy-coded as 0 = males, 1 = females) have no 0 in front of the decimal place, while the mean and standard deviation for Stress (the values of which have the potential to exceed 1) do.

Example:
NB: Although this table is based on the workbook exercises, some numbers have been changed for illustrative purposes.

Table 1

Descriptive Statistics and Intercorrelations between Eating Difficulty, Stress and Sex

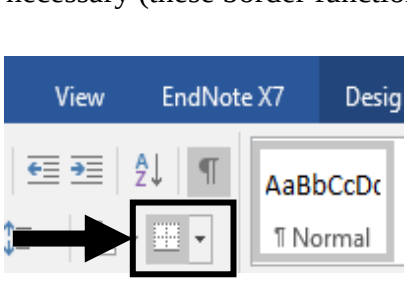
Variable	*M* (*SD*)	Stress	Sex
Eating Difficulty	12.9 (7.8)	.51**	.38*
Stress	0.9 (0.2)		.13
Sex	.5 (.5)		

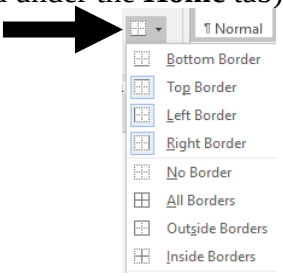
Note. Given no participants identified their sex as "other", sex was dichotomously coded as "males" = 0 and "females" = 1.

* $p < .05$. ** $p < .01$. *** $p < .001$.

NOTES ON CREATING TABLES IN MICROSOFT WORD

- Click **Insert** → **Table** and select the number of columns and rows required.
- Write in the text/ values for each cell. Be sure to give the columns titles.
- To change the borders, utilise these functions to add or delete border lines as necessary (these border functions are found under the **Home** tab).





FORMAT GUIDELINES FOR FIGURES

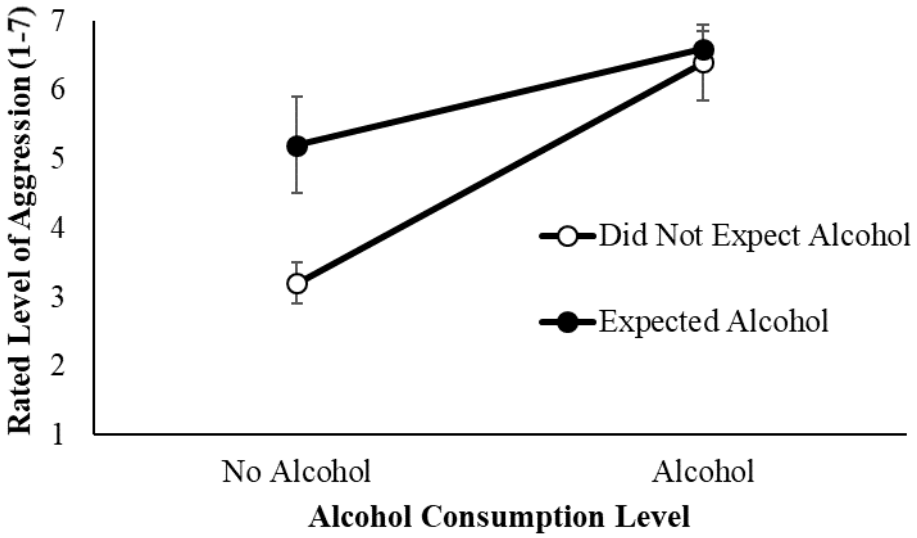
- Figures are formatted in parallel to tables. That is, consistent rules are applied to both.
- Figures must be referred to in the text, at a time that is appropriate.
- APA 7th edition format allows for figures to be presented either in the text of the document or on their own page at the end of a paper after the References list. For this course we want you to position them as close as practically possible to their mention in the text (i.e., immediately before or after the paragraph that referred to that figure – do not place it in the middle of the paragraph). It is not necessary for the figure to start on a new page unless it will not fit in its entirety on the previous page (this includes the figure title and any relevant notes).
- Graphs/ illustrations/ depictions should be referred to in the text as "Figure" NOT "Fig".
- Information in the figure should AUGMENT rather than duplicate the text. Be sure to state the key relationship(s) you want your reader to take away from the figure, but leave the details to them to work out.
- The figure should be easy to read and understand as a stand-alone piece of information.
- The figure itself should be aligned flush to the left of the page, not centred.
- The title (caption) goes above the figure and takes the same format as that for a table. Uppercase is used to start each major word.
- The label (i.e., "Figure 1") is presented in boldface type, on its own line and is not followed by a full-stop.
- The actual title for the figure should appear below this on the next line in italics, with uppercase letters to start each major word. Again, no full stop is at the end.
- The figure title should be brief but descriptive. It should include the IVs (or IV levels) and DV(s) portrayed in the graph.
    - TOO BRIEF: *Aggression Scores*
    - BRIEF BUT SUFFICIENTLY DESCRIPTIVE: *Aggression Scores as a Function of Alcohol Consumption and Alcohol Expectation*
- The title and notes for a figure are to be double-spaced, aligned to the left, and appear in the same font as the rest of the document.
- A note should be included under the figure to explain any special symbols and/ or abbreviations used. For this, general notes appear first, followed by specific notes and then probability level notes. Specific notes appear in a new paragraph (i.e., start a new line), while further specific notes follow on in the same paragraph. Notes regarding given probability/ significance levels also require a new paragraph.
- Axes and legends should be clearly labelled, with uppercase letters beginning each major word e.g., Alcohol Expectation.
- Axes labels should appear in boldface type.
- The magnitude/ scaling/ direction for the axes or grid elements needs to be made clear.
- Legends (keys to the symbols used in figures) should be placed within the borders of the figure plot area where possible.
- The entire figure must be large enough to be legible in both size and resolution. Font size should be no smaller than 8-point and no larger than 14-point. Further, the font should appear as Times New Roman or Arial (i.e., the same font used throughout the rest of the document).
- Use distinct, geometric forms for differentiating lines or bars in your figure.
    - Good, distinct forms:

        - Open circle versus solid circle line markers.
        - Light-shaded versus dark-shaded bars.
    - Examples that are NOT distinct enough:
        - Square versus circle line markers.
        - Black versus dark-shaded bars.
- The top and right axes of the graph plot area should be removed. Only the bottom and left axes should be seen (i.e., the *x* and *y* graph axes).
- There should be no outer border.
- The background needs to be white, not grey.
- The background should not have horizontal gridlines unless they are necessary for clarity.
- The figure should appear in black and white (greyscale). Shading, patterns and colour should only be used for clarity.
- Error bars should be included. These can represent either standard deviation or standard error values, but you must specify which and its scaling in the figure note e.g., Error bars indicate ±1 standard deviation from the mean.

Examples:

Figure 1

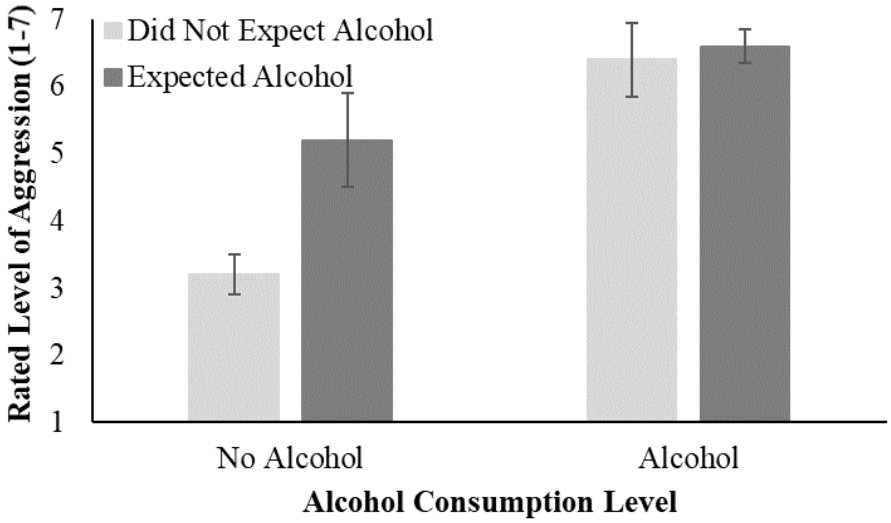
The Effect of Alcohol Consumption on Mean Rated Aggression Levels as Moderated by the Expectation of Alcohol



Note. Error bars represent ±1 standard deviation from the mean.

Figure 2

The Effect of Alcohol Consumption on Mean Rated Aggression Levels as Moderated by the Expectation of Alcohol



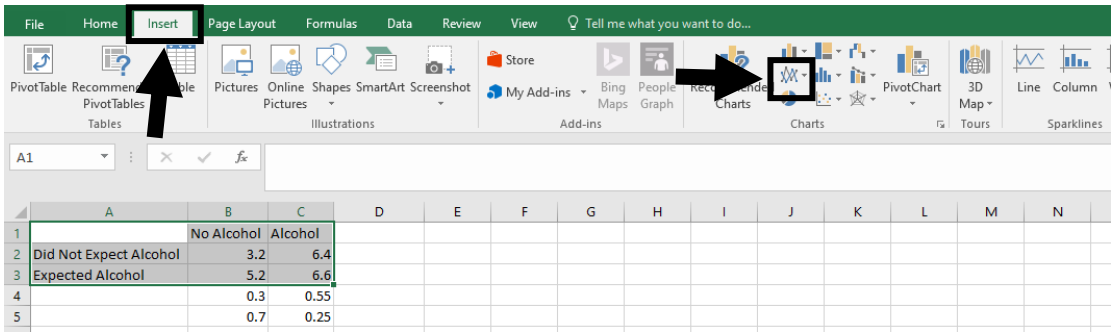
Note. Error bars represent ±1 standard deviation from the mean.

CREATING LINE GRAPHS IN EXCEL

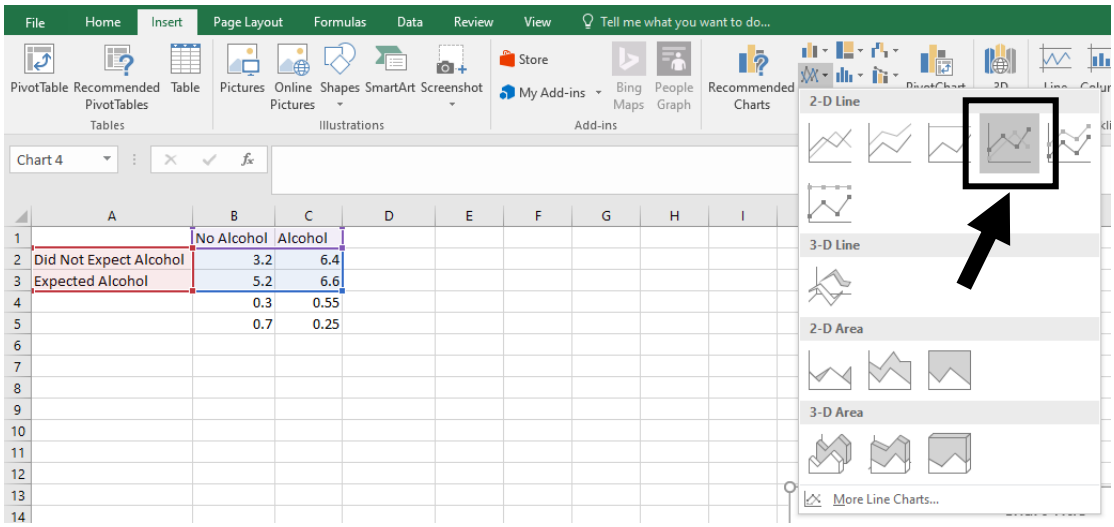
1. **Enter the data** of the variable means and standard errors (or standard deviations) into the Excel spreadsheet. Place the means at the top and then enter the error estimates in the same order pattern as the means, but beneath them. By convention, order your variable levels from lowest to highest magnitude if possible. For example:

	A	B	C
1		No Alcohol	Alcohol
2	Did Not Expect Alcohol	3.2	6.4
3	Expected Alcohol	5.2	6.6
4		0.3	0.55
5		0.7	0.25

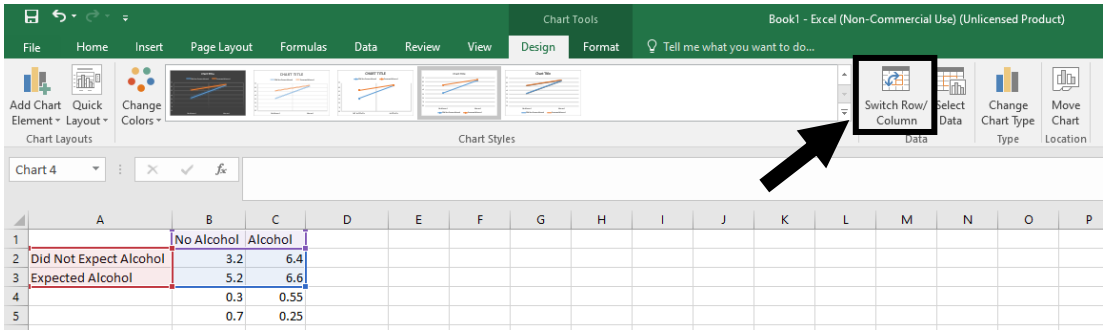
2. **Highlight your data for the means only**, and under the **Insert** tab select the **Insert Line or Area Chart** icon.



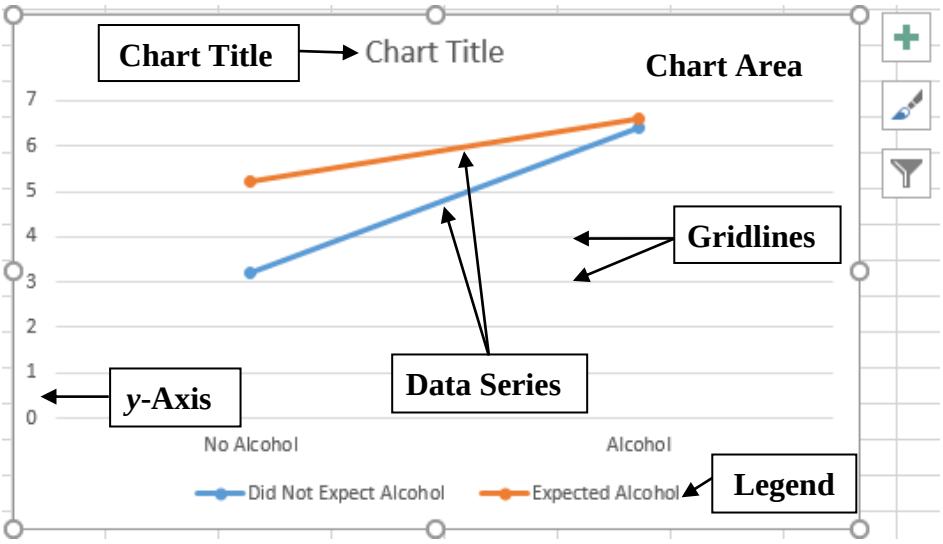
3. Under the **Insert Line or Area Chart** tab, select **Line with Markers**.



4. The graph will now appear, and the **Chart Tools - Design** tab will have automatically become active. Check that the graph looks appropriate (i.e., the correct variables are on the *x*-axis and/ or represented by the separate lines). If something is not quite right, you might have to select **Switch Row/ Column**.



5. Now you need to spend some time formatting the graph to adhere to APA 7th guideline standards. There are several parts of the graph you can edit. To change formatting, you just right-click on the area you want to edit and change the details. The following are the most important areas to change, as well as a couple of hints about APA 7th format (though you will need to check this more thoroughly for yourself). There are seven main aspects of the graph that require editing in Excel. These are: **Chart Title**, **Chart Area**, **Gridlines**, **Data Series**, **Error Bars** (these will be missing on the initial graph, and you will need to add them), ***y*-Axis** and **Legend**.



Note. This is the original line graph that appears in Excel. This is NOT yet edited to APA 7th standard. **<u>This is NOT an acceptable form in which to present your data!</u>**

CHART TITLE

6. Right-click on the **Chart Title**. From the drop-down menu that appears, select **Delete**.

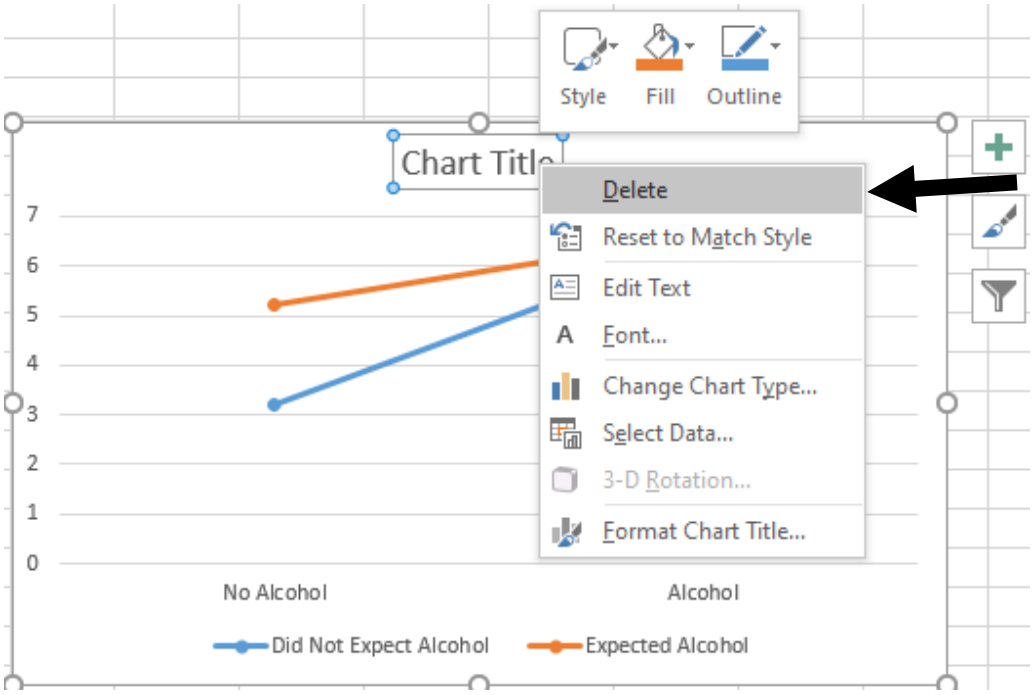
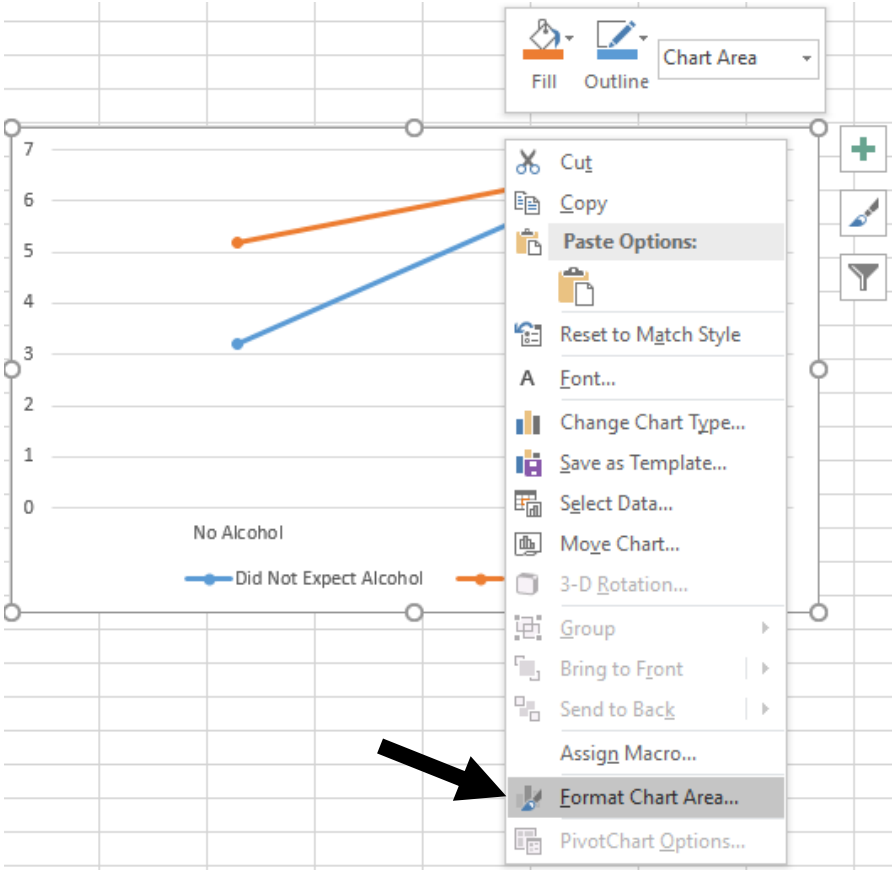
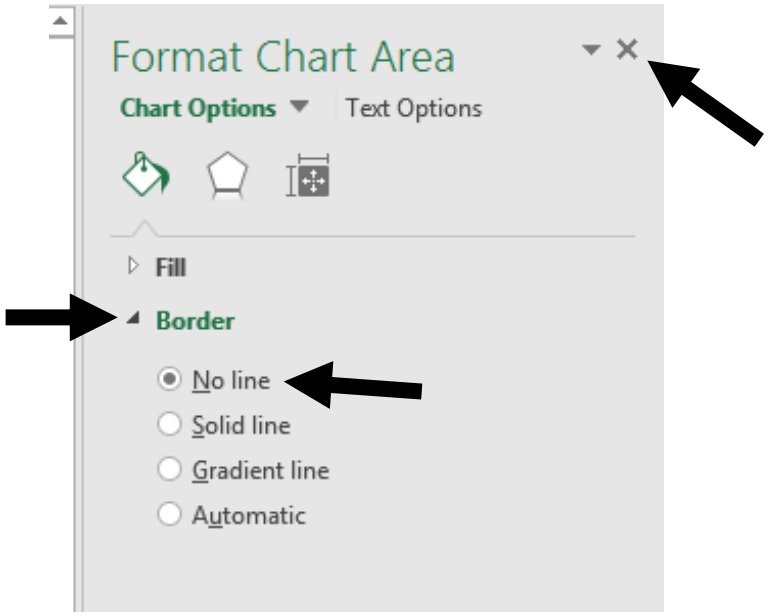


CHART AREA

7a. Right-click within the chart area (not plot area) and select **Format Chart Area**.

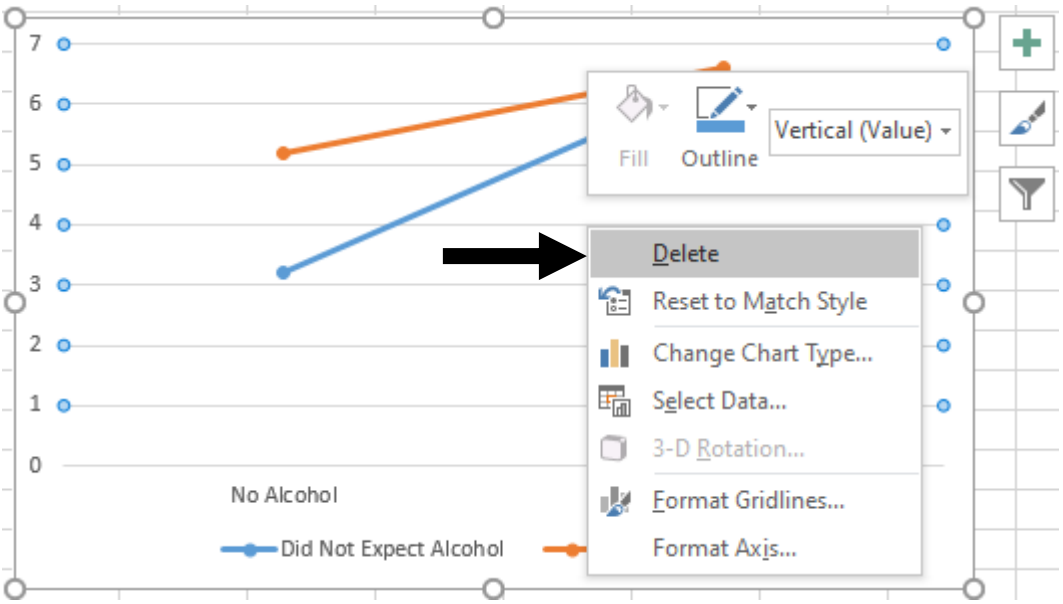


7b. A Format Chart Area menu will appear on the right of screen. Click on the **Border** heading, and select **No line**. Close this window by clicking on the "**X**" in the top right-hand corner.



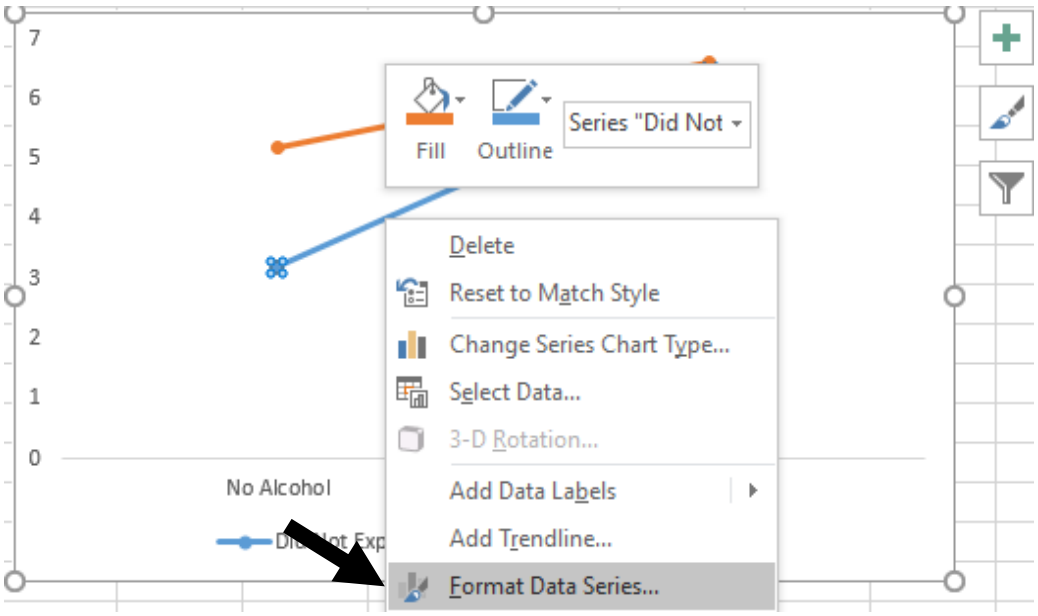
GRIDLINES

8. Right-click on one of the chart gridlines. Select **Delete** from the drop-down menu that appears.

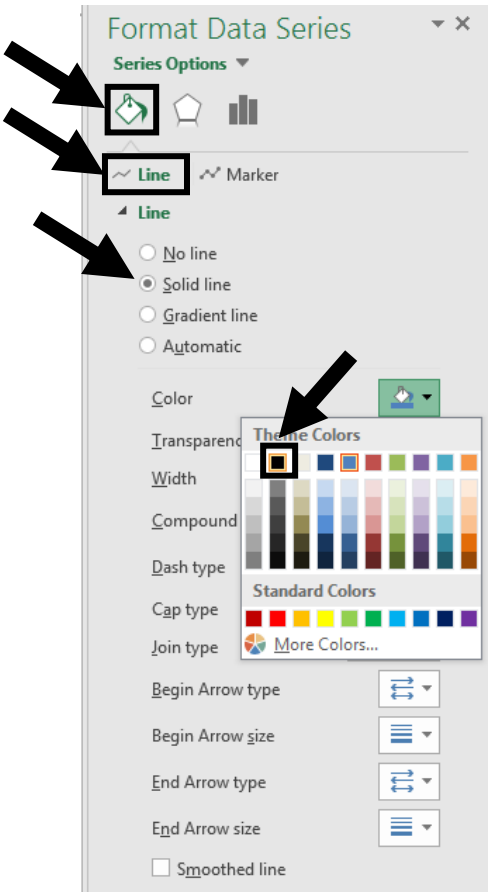


DATA SERIES

9a. Right-click on one line on your graph and select **Format Data Series** from the menu that appears.

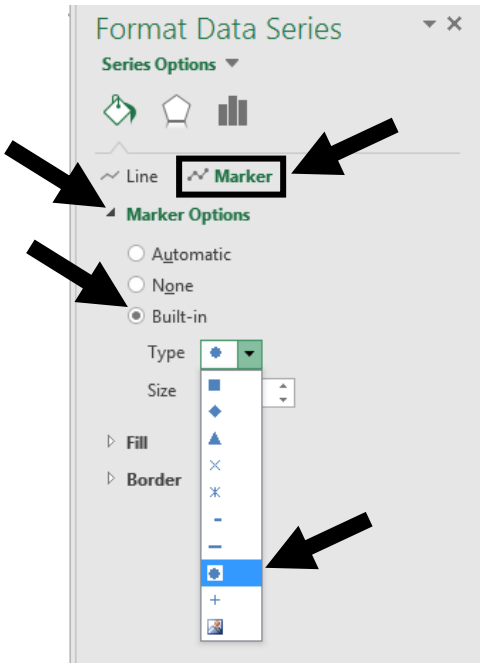


9b. A Format Data Series menu will appear on the right of screen. Click on the **Fill & Line** (1st) icon at the top left. Here you can change the shape, outline and colour of the data points and lines. Specifically, under the **Line** options, click **Solid line** and then select **black** as the Theme Colour from the drop-down menu.

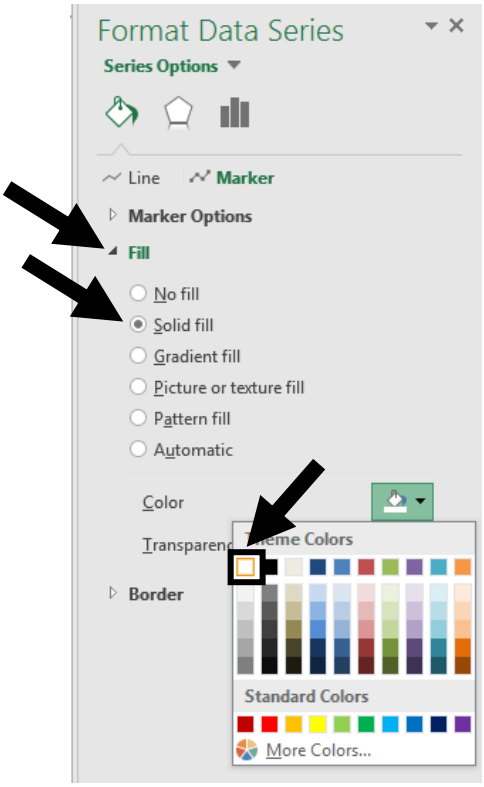


9c. The best way to distinguish lines is by using distinct markers. For example, APA 7th format suggests the use of open and closed circles. Alternatively, a circle and a triangle are considered more geometrically distinct – and are thus preferred over – a square and a diamond as line markers.

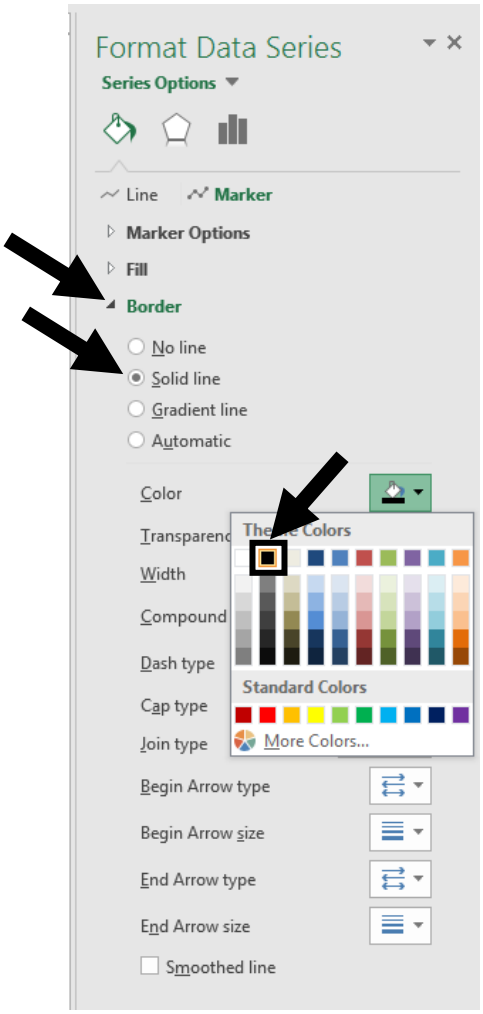
To provide open and closed circles, under the **Marker** options, from the drop-down menu for **Marker Options**, click **Built-in** and select the **circle shape** from the menu for **Type**. Also increase the **Size** from 5pt to **7pt**.



9d. Then under the **Fill** heading, click **Solid fill** and select **white** here as the Theme colour, so that it appears as an open circle (while for the other line you would choose a **black** fill at this step so that it appears as a closed circle).



9e. So that the line around the marker itself appears as a solid black line, under the **Border** heading, click **Solid line** and select **black** as the Theme Colour from the drop-down menu. APA 7th format prefers that the lines are all black and of the same style (i.e., same solid line weight). **Close** the Format Data Series window.



9f. Repeat this same process for the other line(s) in your graph.

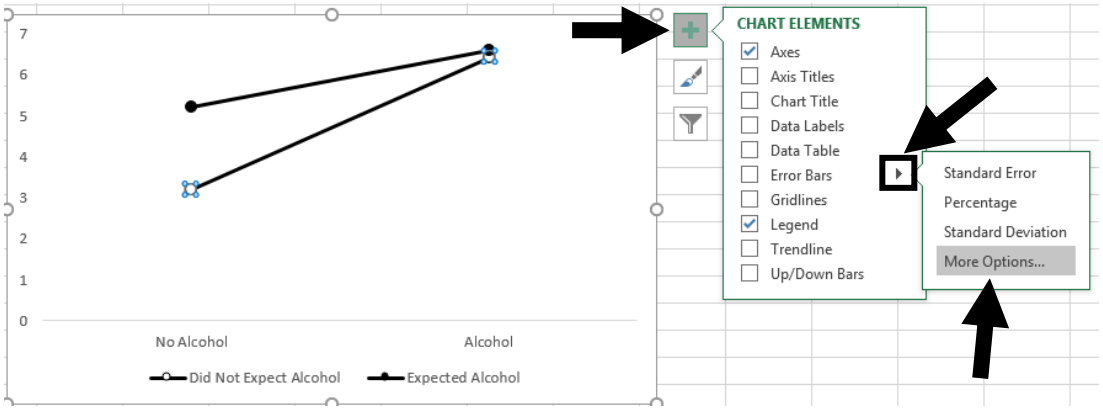
ERROR BARS

At this point you need to add error bars to your graph, which visually represent how confident you are about the accuracy of the means. In psychology we use either the standard error or the standard deviation for these error bars. Some journals or advisors prefer one over the other, in which case obey their commands. If you are free to choose, most people opt for the standard errors because they are smaller (which makes you look more accurate) and they are slightly more convenient to find in SPSS (e.g., if you have asked for tests of the simple effects). Each mean has its own error estimate. That is, if you have four means, you will have four error estimates.

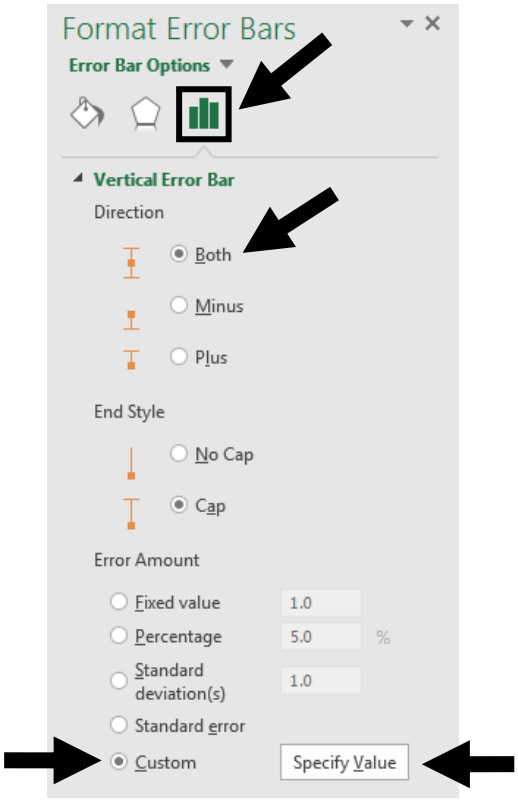
10a. Once you have found them – if you have not already – enter the error estimates into Excel in the same order pattern as the means, but underneath them. In the example below, 0.3 would be the standard deviation (*SD*) associated with the 3.2 mean (i.e., did not expect alcohol/ no alcohol consumed), 0.55 would be the *SD* for the did not expect alcohol/ alcohol consumed mean 6.4, and 0.7 and 0.25 would be the *SD*s associated with the means 5.2 and 6.6, respectively.

	A	B	C
1		No Alcohol	Alcohol
2	Did Not Expect Alcohol	3.2	6.4
3	Expected Alcohol	5.2	6.6
4		0.3	0.55
5		0.7	0.25

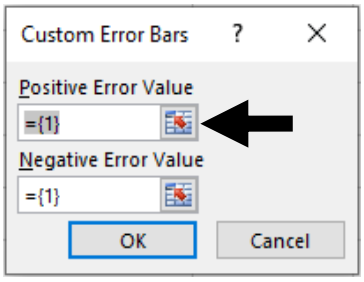
10b. Next, **click on the chart** and **click on one of the lines** (carefully noting which means it represents given by the values highlighted inside the box in the spreadsheet). Click on the "+" symbol next to the chart that represents **Chart Elements**, select the **arrow next to Error Bars** and choose **More Options...**



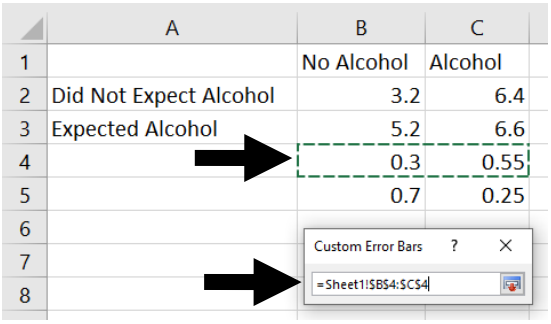
10c. A Format Error Bars window will open on the right-hand side of the screen. Click on the **Error Bar Options** (third) icon at the top. You should confirm that **Both** is selected as the form of **Vertical Error Bar** to be displayed. That is, we want error bars that appear both up and down from the mean data points on the graph. Next, select **Custom** and click on **Specify Value**.



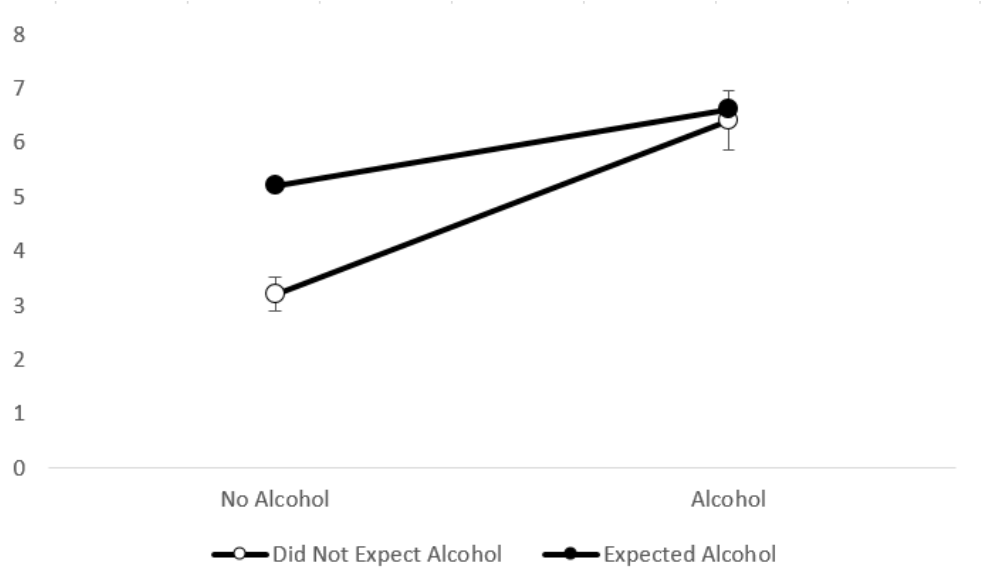
10d. The Custom Error Bars window will open. It will list the positive and negative error values as 1 by default. This means nothing and needs to be altered to match the actual error values for the line in question. To do this, click on the **red arrow square** next to the number for **Positive Error Value**.



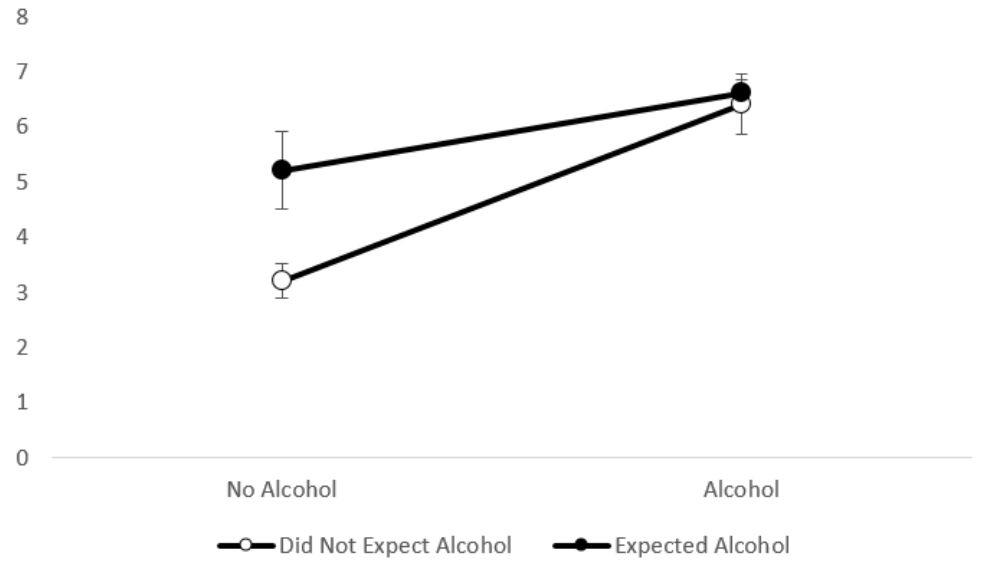
10e. Then use your cursor to **highlight both of the errors** (in our case, standard deviations – but this works the same for standard errors) associated with the line means in the spreadsheet. It will give you a crazy-looking formula. Hit **Enter**.



10f. Repeat this procedure by clicking the **red arrow** next to the **Negative Error Value**, **highlighting the *same* cells** (i.e., the standard deviations for the means of that *same* line) and hitting **Enter**. Click **OK**. At this point, one of your lines should have error bars and not the other. Double-check the distance of these error bars is identical above and below the mean circles for this line i.e., check that you didn't accidentally highlight the wrong/ other row of cells for the Negative Error Value.

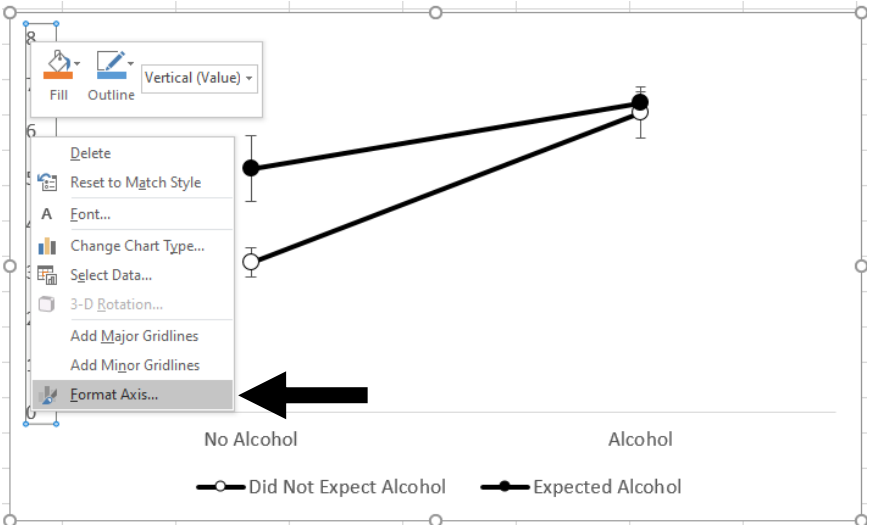


10g. Don't stop now. Add the error bars to the other line by **clicking on that other line**, selecting the "+" symbol next to the chart that represents **Chart Elements**, clicking the **arrow next to Error Bars** and choosing **More Options...** When the Format Error Bars window opens, click on the Error Bar Options (third) icon at the top. Confirm that **Both** is selected as the **Vertical Error Bar** display option. Click the button for **Custom** and then **Specify Value**. When the Custom Error Bars window opens, **click on the red arrow square** next to the number {1} for **Positive Error Value**. Then use your cursor to **highlight both of the errors** associated with this other line's means in the spreadsheet (NB: these will be different from the first set of standard deviations/ errors you highlighted). When it comes up with a crazy-looking formula, hit **Enter**. Repeat this procedure for the Negative Error Value. Click **OK**. At this point, you may begin to revel, because both of your lines have error bars.

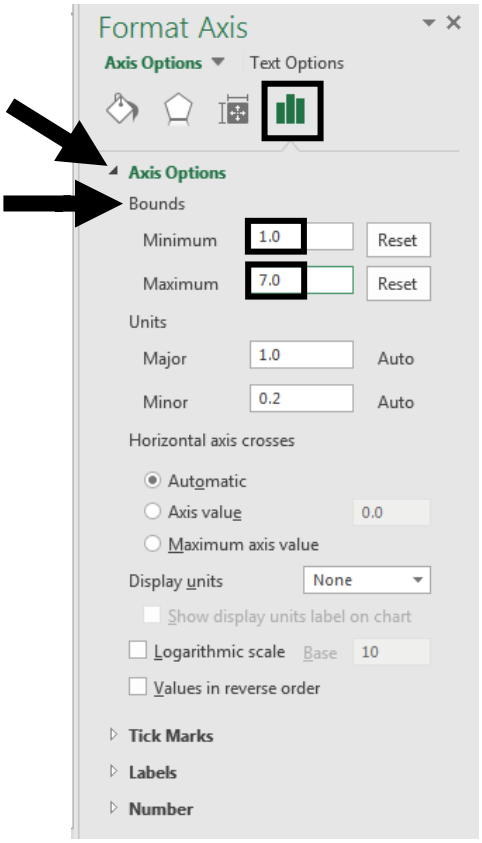


Y-AXIS

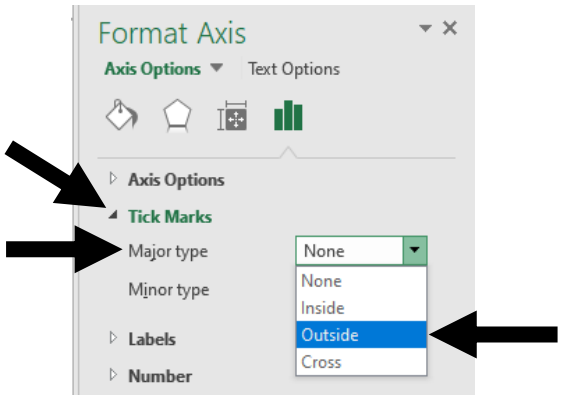
11a. Right-click on the *y*-axis of the graph and choose **Format Axis**.



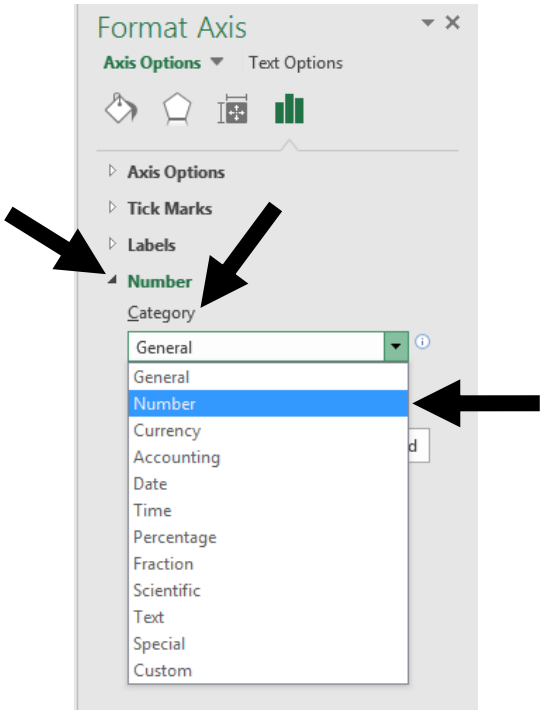
11b. A Format Axis window will open on the right-hand side of the screen. Since a 7-point rating scale (from 1 to 7) was used to measure Aggression levels (DV), the *y*-axis should reflect this same scaling. To change the *y*-axis scale, click on the **Axis Options** (4th) icon and under the **Axis Options → Bounds** heading, change the **Minimum** scale value to **1**. Also change the **Maximum** to **7**. NB: Although it is ideal to have the maximum scale value the same as the maximum *y*-axis value, sometimes this value needs to be increased in order to accommodate the error bars – be mindful of this.

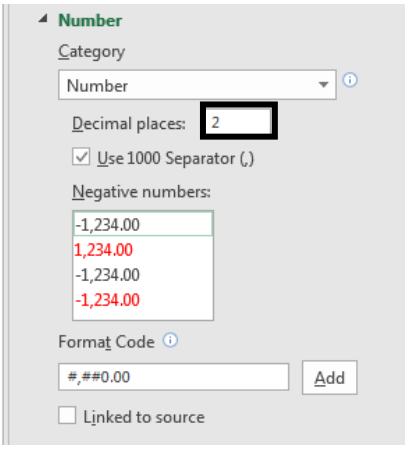


11c. Tick marks can be added for easier value reading for graphs. To do this, under the **Tick Marks** heading, select **Outside** from the drop-down menu for **Major type**.

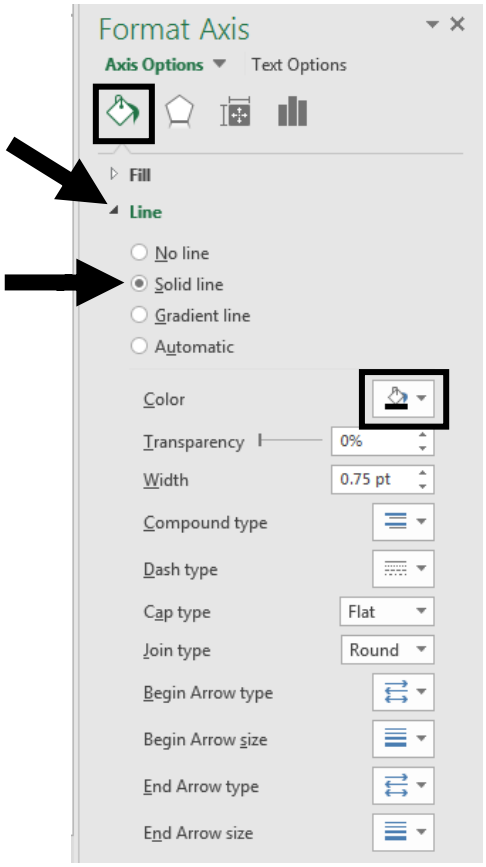


11d. If you wanted to change the number of decimal places displayed for the *y*-axis values, this is done under the **Number** heading by selecting **Number** from the **Category** drop-down menu. Then enter the desired number of decimal places. Recall that APA 7th format allows for either whole numbers, or 1 or 2 decimal places to be displayed, dependent upon the precision of measurement. Since we're fine with whole numbers (as this represents the original scale units), we will leave this.

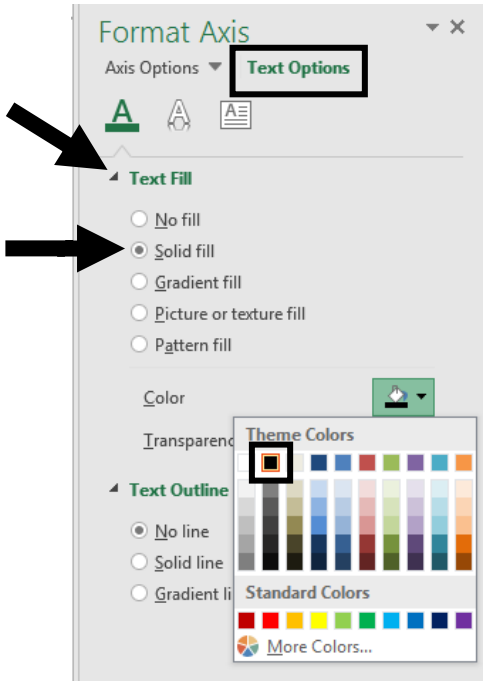




11e. To ensure that the *y*-axis itself has an axis line, click on the **Fill & Line** (1st) icon. Under the **Line** heading, make sure that **Solid line** is selected, along with **black** as the Colour. Then **Close** the Format Axis window by clicking the cross at the top right corner.

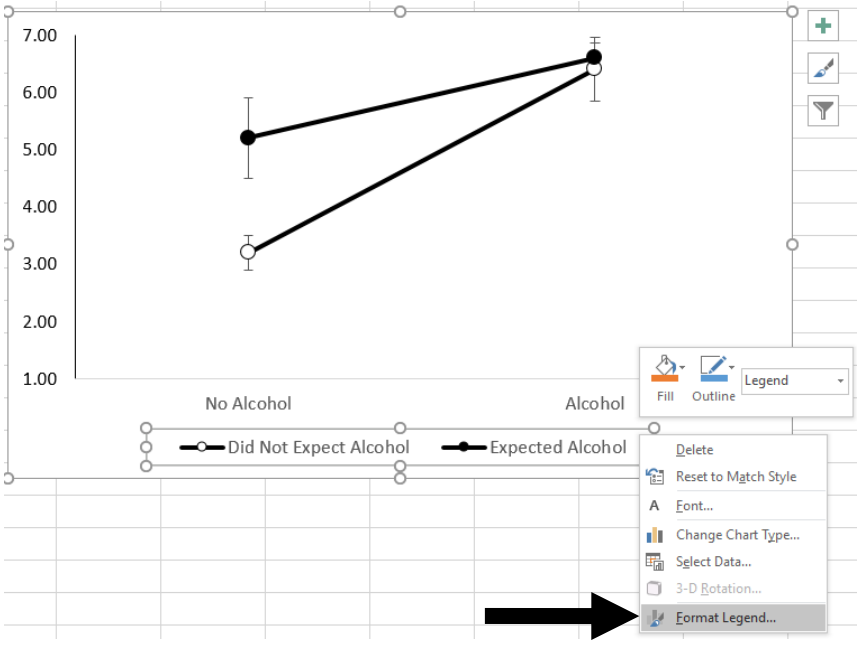


11f. You'll notice that the text colour for the numbers on the *y*-axis is grey rather than black. To amend this, click on **Text Options** and under the **Text Fill** heading click **Solid fill** and select **black** as the Theme Colour.

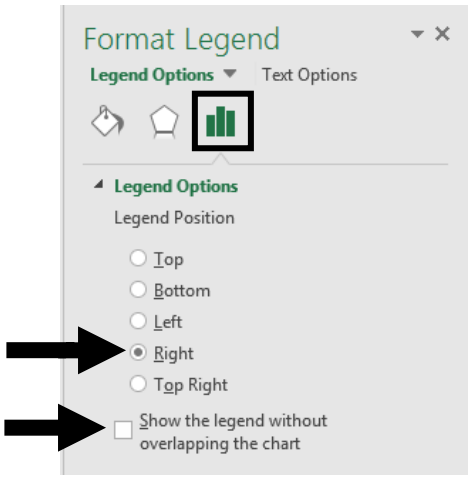


LEGEND

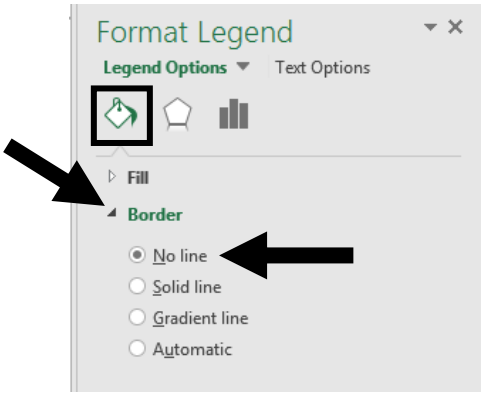
12a. Right-click on the legend and select **Format Legend**.



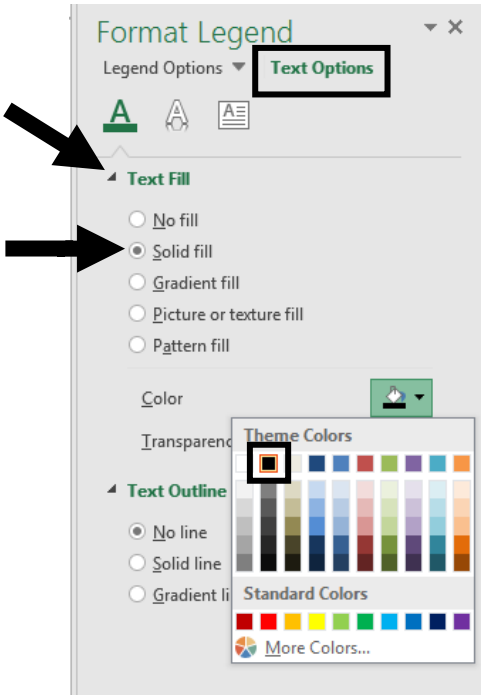
12b. A Format Legend window will open on the right-hand side of the screen. The Legend preferably should appear inside the confines of the graph area. This will depend on what your individual graph looks like, so it may take some trial-and-error with regard to the position of the Legend. However, this will be easier to determine if you first go to the **Legend Options** (3rd) icon and **uncheck** the box for **Show the legend without overlapping the chart**. In this particular case, the best **Legend Position** is **Right**.



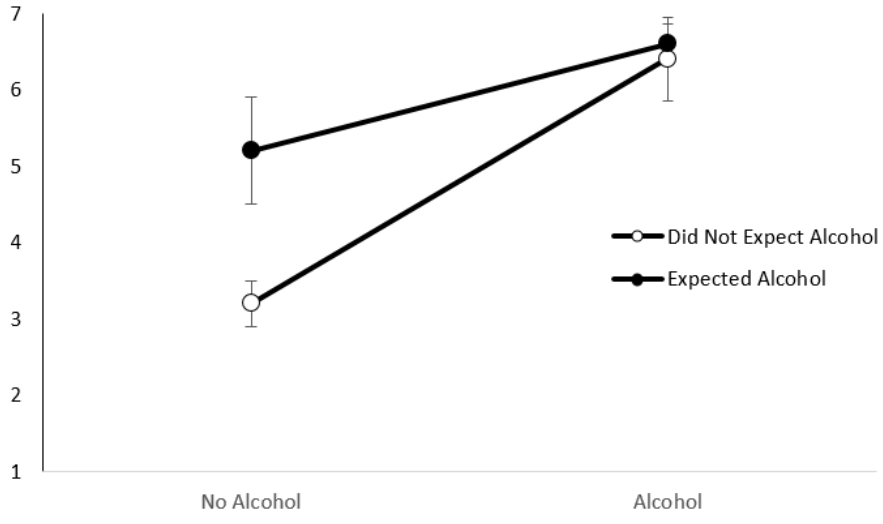
12c. APA 7th formatting requires no border surrounding the Legend. To ensure this is removed, click on the **Fill & Line** (1st) icon and under the **Border** heading, select **No line**.



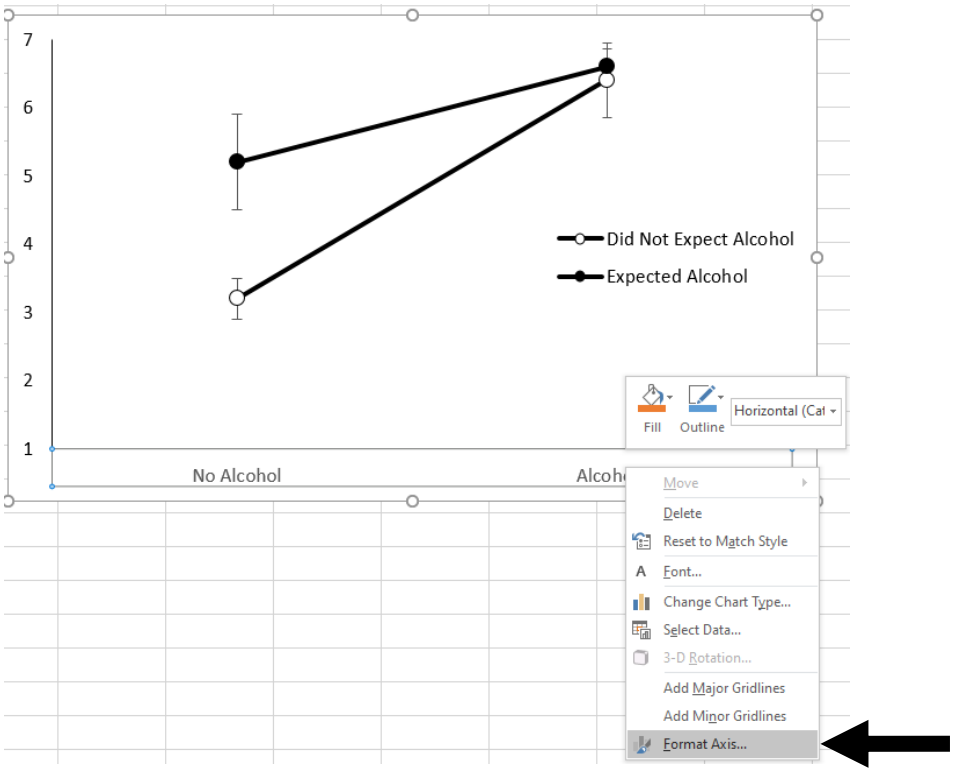
12d. Again, you'll notice that the text colour for the Legend is grey rather than black. To amend this, click on **Text Options** and under the **Text Fill** heading click **Solid fill** and select **black** as the Theme Colour.



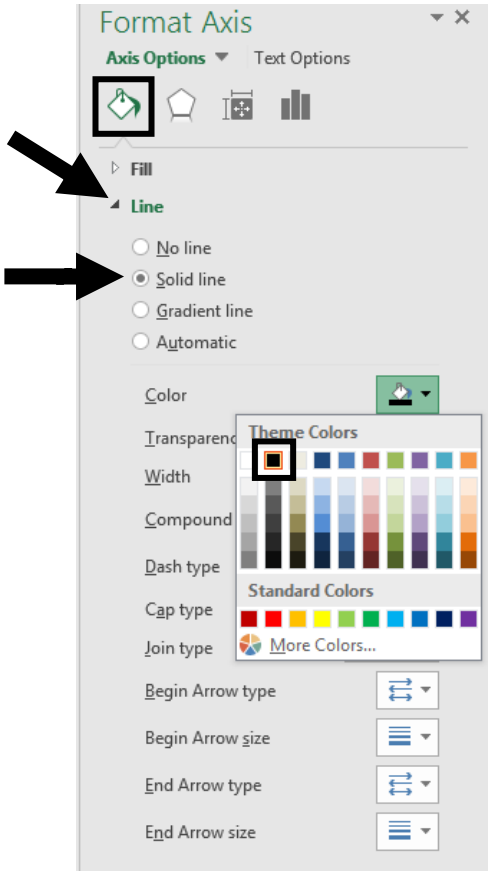
Close the Format Legend window. The plot area should now look like this:



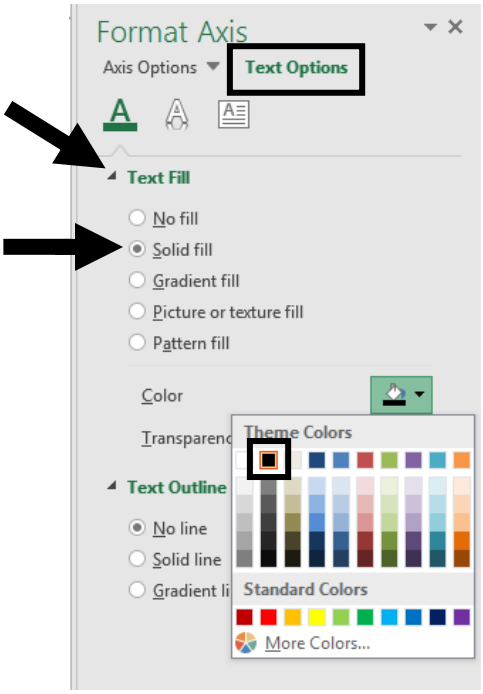
13a. The *x*-axis also needs to be addressed in terms of an appropriate (black) colour for the axis line itself, as well as the text. To do this, right-click on the *x*-axis and select **Format Axis**.



13b. A Format Axis window will open on the right-hand side of the screen. To ensure the *x*-axis has an axis line, click on the **Fill & Line** (1st) icon. Under the **Line** heading, make sure that **Solid line** is selected, along with **black** as the Theme Colour.



13c. Again, you'll notice that the text colour for the *x*-axis is grey rather than black. To fix this, click on **Text Options** and under the **Text Fill** heading click **Solid fill** and select **black** as the Theme Colour.



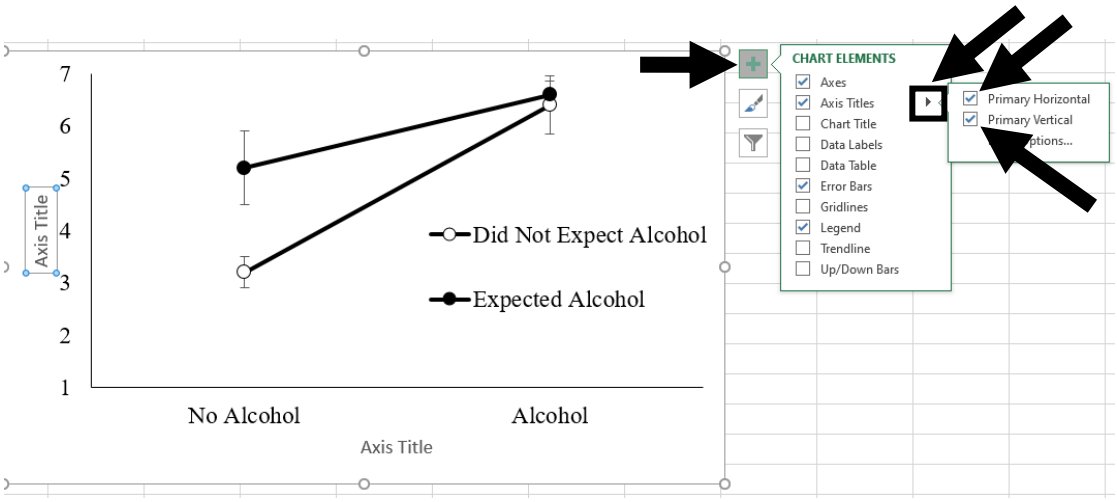
14a. Now, you will need to change the font of the axes and the legend to that required by APA 7th formatting standards. To **capitalise the axes and legend IV level labels**, simply **change these in the Excel spreadsheet** where you entered your data (if you did not already enter these variable names that way). Make sure the labels are informative. Also, it is convention (as well as more logical) to enter the levels of each IV from low to high (where this is possible). For example:

	A	B	C
1		No Alcohol	Alcohol
2	Did Not Expect Alcohol	3.2	6.4
3	Expected Alcohol	5.2	6.6

14b. To ensure that the text itself for each axis is in appropriate APA 7th format, **click on the axis** and – using the tools under the **Home** tab – change it to **Times New Roman 12pt** or **Arial 11pt font** (consistent with the remainder of your document). Repeat this process for the Legend.

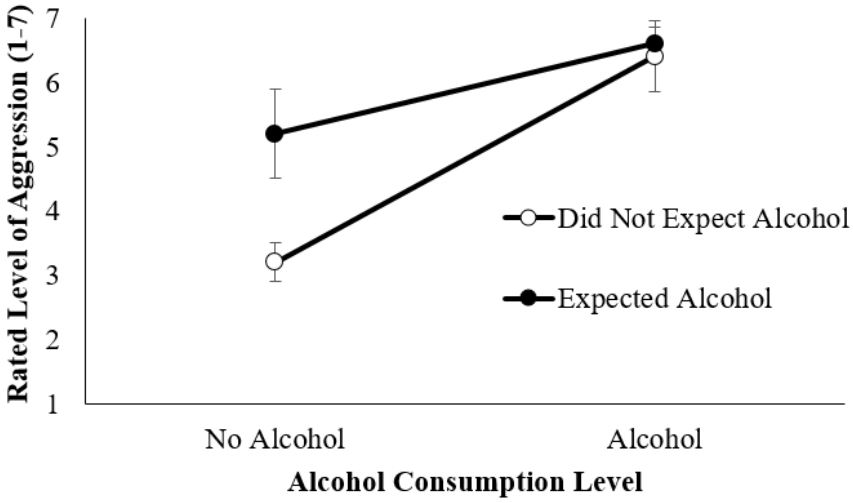
14c. Some of the graph elements may become distorted during the process above and require you to manually re-size and re-position them e.g., the Legend and its contents. Be sure that everything can be read/ seen clearly and in its entirety.

15a. To name your axes in Excel, click on the graph and then click on the "+" symbol next to the chart that represents **Chart Elements** and select the **arrow next to Axis Titles**. You will need to check the boxes for both **Primary Horizontal** and **Primary Vertical**.

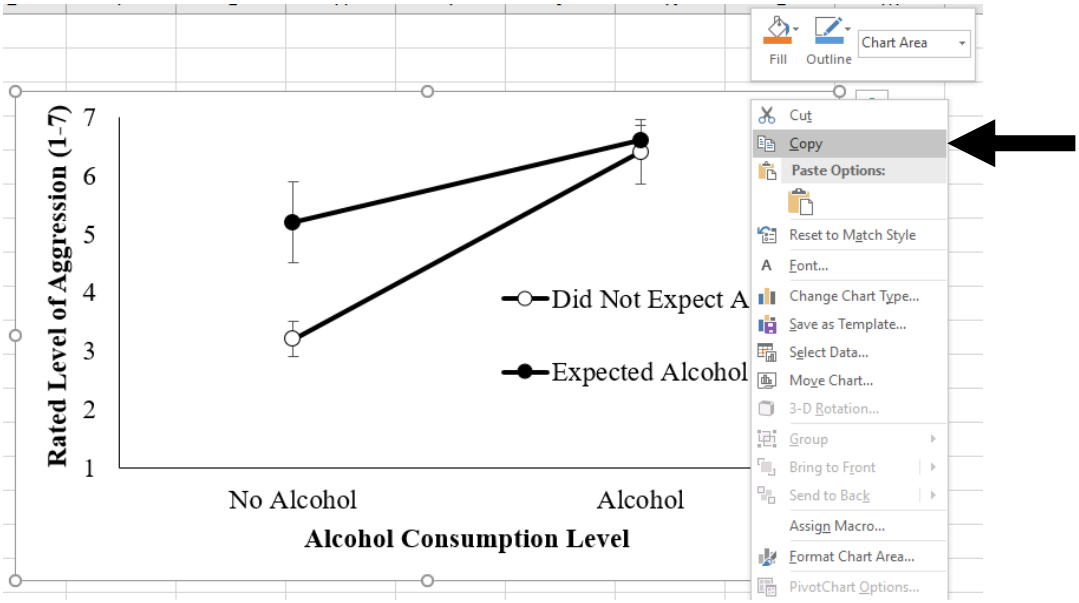


15b. Give appropriate titles to both your horizontal and vertical axes. Include all relevant magnitude/ scaling/ direction information for the axes titles, as well as checking this for the axes themselves and the Legend. In our case, we need to make clear the scaling used for the DV Rated Level of Aggression, which was 1-7. The direction and magnitude of both our axes have already been made clear i.e., the *y*-axis has values 1 to 7 listed up the side, while the *x*-axis has the level of alcohol consumption clearly identified (no alcohol and alcohol). Likewise, the levels involved for the other factor have been made clear in the Legend.
Make sure that the axes titles are in a font style and size consistent with APA 7th formatting standards. Recall that these labels should be presented in boldface type. All this is done by clicking on the axis title itself and then entering the new title and formatting it via tools under the **Home** tab. It may be necessary to manually centre your titles over their respective axes.

NB: We would NOT recommend giving the figure a title in Excel. It is much easier to type the title in Word above the graph (and relevant notes below it), after you have pasted it into the relevant document.



16a. Once you are happy that your graph complies with APA 7th formatting standards, move it into a Word document by simply **right-clicking within the chart area** and selecting **Copy**.

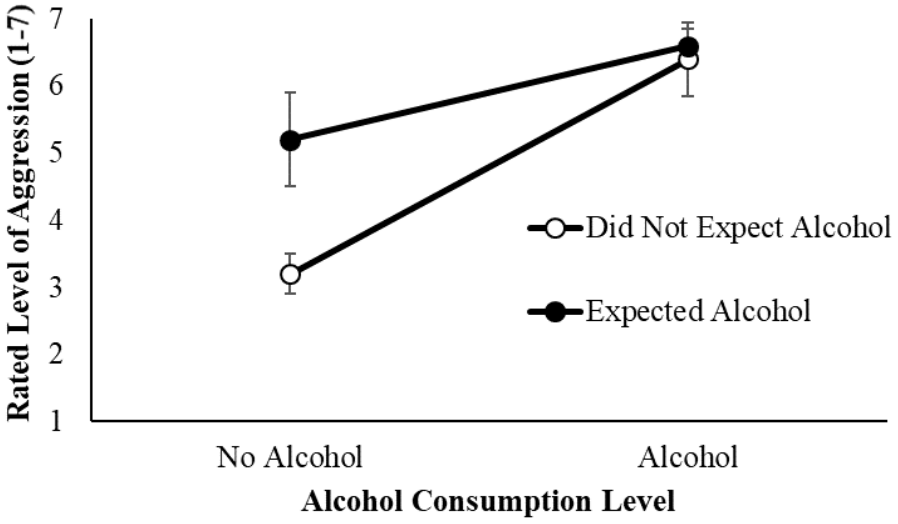


16b. Open the Word document in which you wish the graph to appear. Place your cursor on the spot where you want the graph to go, and right-click. Select **Paste** from the drop-down menu options that are presented. Your graph will appear in your Word document. This figure should be aligned flush to the left of the page (rather than centred).

17. For the final step, you need to give the figure a title consistent with APA 7th format requirements (now that it is in your Word document). The title – like that for a table – will appear above the figure, with any relevant notes placed beneath. Further, the "Figure 1" section of the title needs to be bolded, while the title itself is italicised. Usually, the figure title identifies the DV and the IVs (or IV levels). Notes should identify the type and magnitude of error bars employed. For example:

Figure 1

The Effect of Alcohol Consumption on Mean Rated Aggression Levels as Moderated by the Expectation of Alcohol



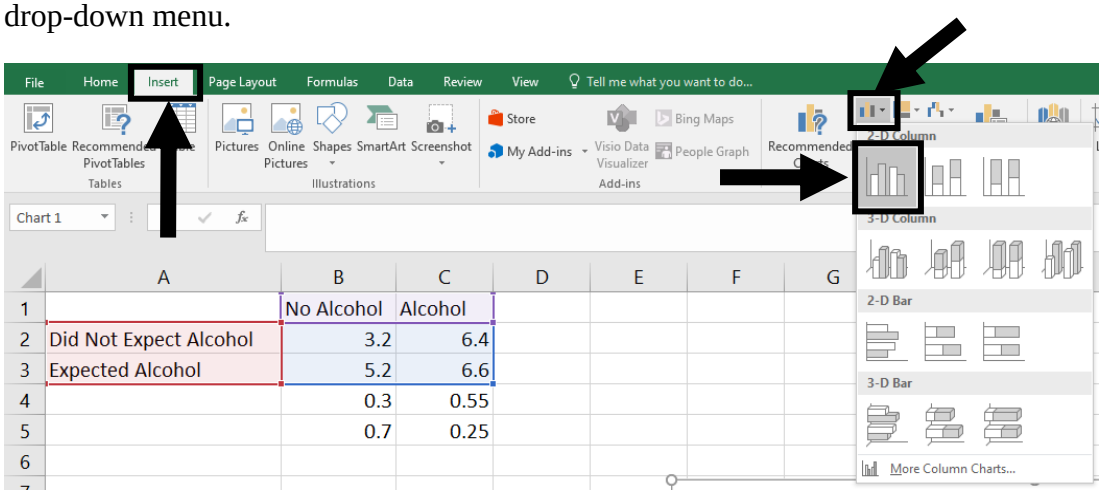
Note. Error bars represent ±1 standard deviation from the mean.

CREATING BAR GRAPHS IN EXCEL

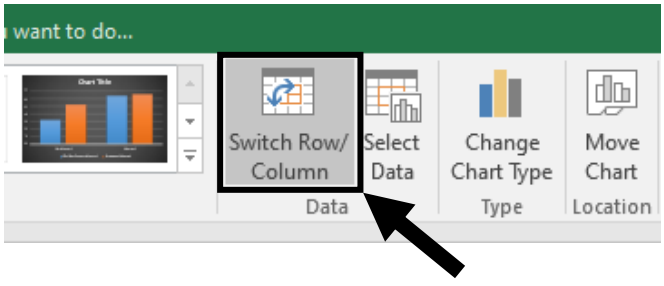
1. **Enter the data** of the variable means and standard errors (or standard deviations) into the Excel spreadsheet. Place the means at the top and then enter the error estimates in the same order pattern as the means, but beneath them. By convention, order your variable levels from lowest to highest magnitude if possible. For example:

	A	B	C
1		No Alcohol	Alcohol
2	Did Not Expect Alcohol	3.2	6.4
3	Expected Alcohol	5.2	6.6
4		0.3	0.55
5		0.7	0.25

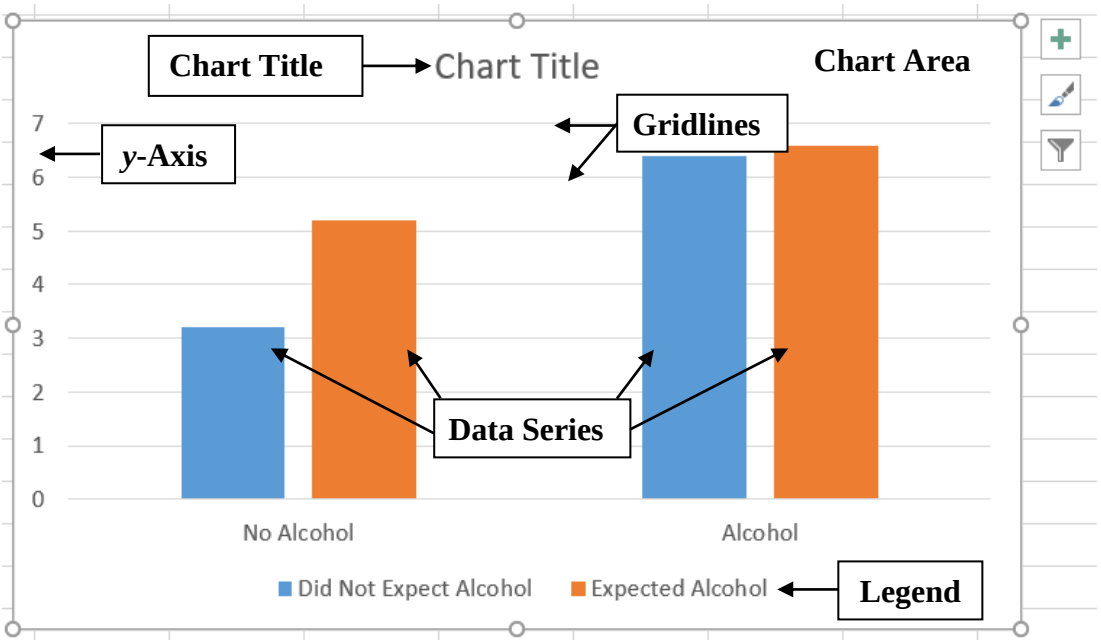
2. **Highlight your data for the means only**. Then under the **Insert** tab, click on **Insert Column or Bar Chart** and select **2-D Column: Clustered Column** from the drop-down menu.



3. The graph will now appear, and the **Design** tab (under Chart Tools) will have automatically become active. Check that the graph looks appropriate (i.e., the correct variables are on the *x*-axis and/ or represented by the separate bars). If something is not quite right, you might have to select **Switch Row/ Column**.



4. Now you need to spend some time formatting the graph to adhere to APA 7th standards. There are several parts of the graph you can edit. To change formatting, you just right-click on the area you want to edit and change the details. Follow the steps outlined above (in the ***Creating Line Graphs in Excel*** section) to ensure the **Chart Title**, **Chart Area**, **Gridlines**, **Data Series**, **Error Bars** (these will be missing on the initial graph, and you will need to add them), ***y*-Axis**, and **Legend** are all in appropriate APA 7th format.



Note. This is the original bar graph that appears in Excel. This is NOT yet edited to APA 7th standard. **This is NOT an acceptable form in which to present your data**!

5a. You will need to change the font of the axes and the legend to that required by APA 7th formatting standards. To **capitalise the axes and legend IV level labels**, simply **change these in the Excel spreadsheet** where you entered your data (if you did not already enter these variable names that way). Make sure the labels are informative. Also, it is convention (as well as more logical) to enter the levels of each IV from low to high (where this is possible). For example:

	A	B	C
1		No Alcohol	Alcohol
2	Did Not Expect Alcohol	3.2	6.4
3	Expected Alcohol	5.2	6.6

5b. To ensure that the text itself for each axis is in appropriate APA 7th format, **click on the axis** and – using the tools under the **Home** tab – change it to **Times New Roman 12pt** or **Arial 11pt font** (consistent with the remainder of your document). Repeat this process for the Legend.

5c. Some of the graph elements may become distorted during the process above and require you to manually re-size and re-position them e.g., the Legend and its contents. Be sure that everything can be read/ seen clearly and in its entirety.

6a. To name your axes in Excel, click on the graph and then click on the "+" symbol next to the chart that represents **Chart Elements** and select the **arrow next to Axis Titles**. You will need to check the boxes for both **Primary Horizontal** and **Primary Vertical**. Follow the instructions listed in the previous ***Creating Line Graphs in Excel*** section.

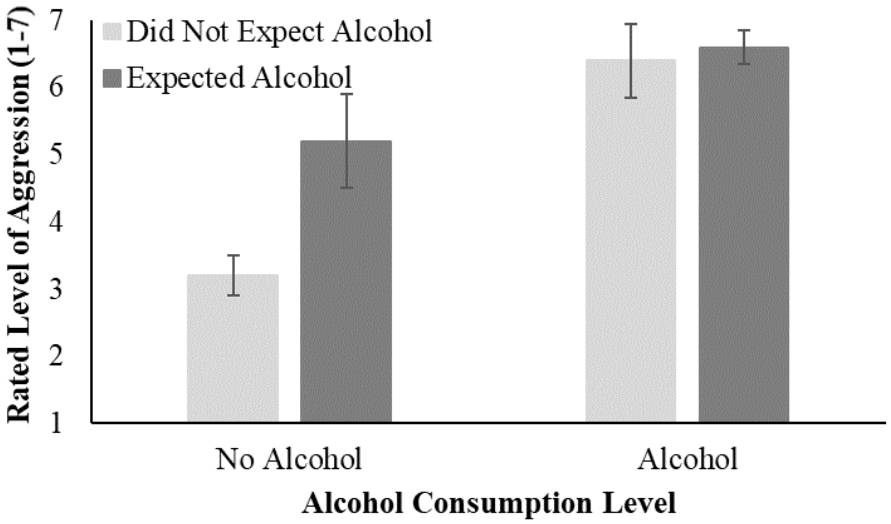
6b. Give appropriate titles to both your horizontal and vertical axes. Include all relevant magnitude/ scaling/ direction information for the axes titles, as well as checking this for the axes themselves and the Legend. In our case, we need to make clear the scaling used for the DV Rated Level of Aggression, which was 1-7. The

direction and magnitude of both our axes have already been made clear i.e., the *y*-axis has values 1 to 7 listed up the side, while the *x*-axis has the level of alcohol consumption clearly identified (no alcohol and alcohol). Likewise, the levels involved for the other factor have been made clear in the Legend.
Make sure that the axes titles are in a font style and size consistent with APA 7th formatting standards, including being presented in boldface type. It may be necessary to manually centre your titles over their respective axes.

NB: Again, we would NOT recommend giving the figure a title in Excel. Instead, type the figure title (caption) in Word above the graph (and relevant notes below it), after you have pasted it into the relevant document. It should look like the following:

Figure 1

The Effect of Alcohol Consumption on Mean Rated Aggression Levels as Moderated by the Expectation of Alcohol



Note. Error bars represent ±1 standard deviation from the mean.

A Couple of Extra Notes on Creating Bar Graphs in Excel:

- The shading of the bars can be altered in the same way the data points (i.e., Data Series) of line graphs are changed. Choose bars which are maximally distinctive. Patterned bars should not be used unless there are more than 2 levels of the IV. Black bars should be avoided, as the error bars will not be visible against this colour. Ideally, opt for light grey (or even white) and dark grey (as above). While colours and patterns *can* be used, they should *only* be employed for clarity. In doing so, keep in mind to use high-contrast colours/ patterns that individuals with visual difficulty (including colour-blindness) will be able to distinguish easily.

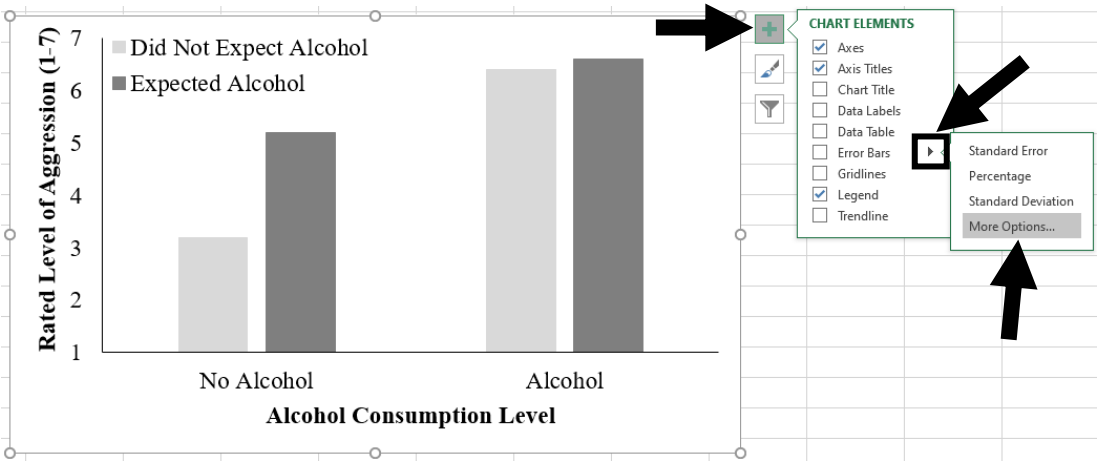
- The error bars for bar graphs should be created in the same manner outlined in the previous section on ***Creating Line Graphs in Excel***. Again, this means that you will need to track down the standard error or standard deviation values associated with each mean in order to do this. You will then need to enter these values into Excel in the same configuration pattern as the means with which they are associated. Then follow the steps listed in the previous section to complete this procedure.

ALTERNATIVE METHOD TO CREATING STANDARD ERROR BARS

(with thanks to Yolanda Gribble, School of Psychology)

There may be times when you do not have a standard error value for each individual mean in your dataset, but rather standard error values for each simple slope or simple effect that was conducted. **These standard error values would be associated with more than one mean each (i.e., they would be associated with one line on your line graph or one colour of bar on your bar graph each)**. If this is the case, the below outlines an alternative way to construct your standard error bars for your graph.

1. To insert these standard error bars, **click on the chart** and **click on one of the lines/ bars**. Click on the "+" symbol next to the chart that represents **Chart Elements**, select the **arrow next to Error Bars** and choose **More Options...**



2. A Format Error Bars window will open on the right side of the screen. Click on the **Error Bar Options** (3rd) icon at the top. Confirm that **Both** is selected as the form of **Vertical Error Bar**. That is, we want error bars that appear both up and down from the mean data points on the graph. Next, select **Fixed Value** and enter the standard error value (from your data) SEPARATELY for each data series (i.e., variable level). That is, one value will be entered as the standard error for one line on your line graph or one bar colour on your bar graph, while a different value will be entered later for the other(s). Enter as many decimal places as you have, to maximise accuracy. **Close** the window.

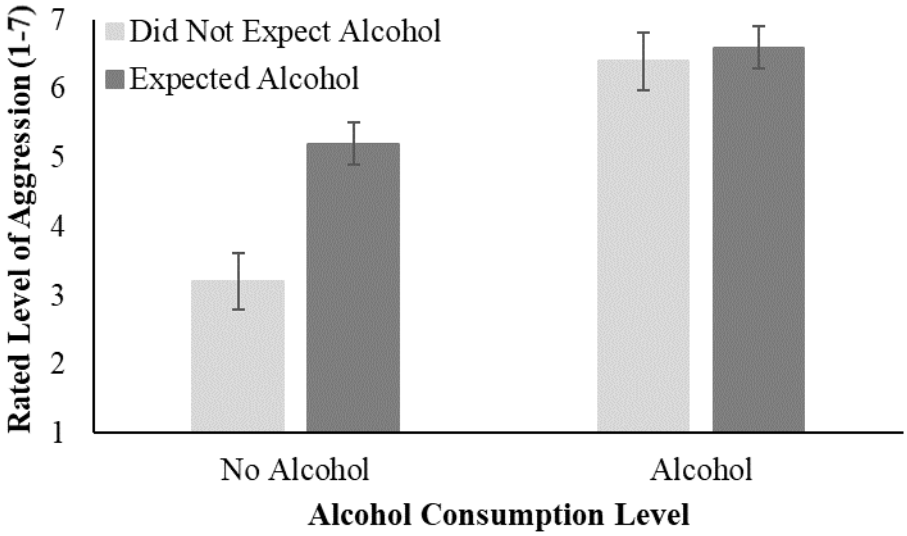
Note: If the error bars are too large, you may need to increase the *y*-axis scale maximum value to accommodate this. The error bars should be seen in their entirety on the graph. This is why we state the scaling used in the *y*-axis label to let the reader know the original scale employed i.e., Rated Level of Aggression (1-7).

3. Using the instructions outlined in ***Creating a Line Graph in Excel***, move your graph into a Word document.

4. For the final step, you need to give the figure a title (i.e., caption) consistent with APA 7th format requirements (now that it is in your Word document). The title – like that for a table – will appear above the figure (with any relevant notes below it). The "Figure 1" section of the title needs to be bolded, while the title itself is italicised. **It is very important when using error bars to make a note below the figure that identifies what these bars represent regarding the type and magnitude** (see below). For example:

Figure 1

The Effect of Alcohol Consumption on Mean Rated Aggression Levels as Moderated by the Expectation of Alcohol



Note. Error bars represent ±1 standard error from the mean.

FORMAT TIPS FOR BETWEEN GROUPS (INDEPENDENT GROUPS) FACTORIAL ANOVA

STRUCTURE OF THE OVERALL WRITE UP

1. State what kind of analysis was performed, identifying the IVs and the DV. This includes specifying the levels of the IV(s). Don't forget that we tend to make use of conventional notation for this, which communicates a lot of information in few words (see tutorial slides). If this is the first time you have used the term ANOVA in the text, this acronym/ abbreviation must be written out properly and introduced i.e., analysis of variance (ANOVA).
2. Report results of the first main effect, stating the significance and direction. Also include main effect follow-up tests (i.e., main effect comparisons) if this main effect was significant and the IV had more than two levels. If main effect comparisons were required, hold off on reporting the direction of effect until you present these.
3. Report results of the second main effect, stating the significance and direction. Include main effect follow-up tests (i.e., main effect comparisons) if the main effect was significant and the IV had more than two levels. Again, if main effect comparisons were used, wait to report the direction of effect until reporting these.
4. Report the significance of the interaction. If it was significant, include a graph showing the interaction and refer the reader to this figure in the text.
5. Report any necessary follow-up tests for the interaction (i.e., simple effects).
   (a) If these simple effects only contain two levels, then describe their significance and direction.
   (b) If the simple effects contain more than two levels, further follow-up tests (i.e., simple comparisons) need to be performed. So first, report the significance of each simple effect. Then for the significant ones, go on to report the significance and direction of their follow-up simple comparisons.

The example write-ups below use the SPSS output (and hand calculations) generated from the Drug Dosage x Sex experiment in Activity 2 and Activity 3 of the PSYC3010 Tutorial Workbook.

An Important Note Regarding APA 7 vs. SPSS Output

While APA 7th format edition asks that effect sizes, appropriate statistics and confidence intervals (CIs) be reported for all statistics/ point estimates, there is a mismatch between what APA 7 requires and the statistics/ output offered through the SPSS program.

For example, SPSS only offers partial eta-squared (η_p^2) as an effect size for the *F*-tests for ANOVA, despite the fact that this provides an inflated estimate of the variance explained by a factor. Recall that it is preferable to report either eta-squared (η^2) or omega-squared (ω^2) instead. These need to be calculated by hand, based on values provided by SPSS in the ANOVA Test of Between-Subjects Effects table.

There is also no effect size available through SPSS for follow-up main or simple comparison *t*-tests. However, output values regarding the relevant group means and standard deviations from SPSS can be input into free online calculators to compute Cohen's *d* for *t*-tests. An example of such an online calculator can be found at: https://www.socscistatistics.com/effectsize/default3.aspx

Similarly, the actual *t*-values for follow-up main and simple comparisons are omitted from SPSS. Instead, output tables supply only a mean difference score for comparisons. Yet these values are not intelligible in isolation, as they are not expressed relative (or as a ratio) to the standard error present within the data. That is, a mean difference of any size or magnitude between two groups (i.e., treatment effect) does not mean much unless we also consider how much we expect scores to differ just by chance (i.e., error variability). Fortunately, however, the *t*-values can be calculated relatively easily from the information provided in the Multiple Comparisons and Pairwise Comparisons tables, respectively. Specifically, the *t*-value for the given comparison is generated by dividing the relevant comparison's mean difference score by its associated standard error. These values are located in the first two columns of the table. The degrees of freedom (*df*) reported with the *t*-test is that for error (found in the Tests of Between-Subjects Effects table).

A further issue is that within SPSS no confidence intervals are given for *F*-test results. If these are available to you however, they should always be reported. When reporting confidence intervals within the text, APA 7th format only requires that the % span of the confidence intervals be stipulated the first time they are used within a paragraph or within an analysis e.g., 95% CI [Lower, Upper]. After this, the percentage should not be repeated i.e., CI [Lower, Upper].

Comparable to the issue with *t*-values, SPSS also does not provide the required confidence intervals for pairwise comparisons. Instead of supplying the 95% CIs for a *t*-value, it presents those for the mean difference score for comparisons. Again, these are not particularly useful as they do not account for the amount of error present within the data. Yet again, the necessary calculations to derive the 95% CIs for *t* are relatively easy and can be performed based upon the information supplied in the Multiple Comparisons table (for main effect comparisons) and Pairwise Comparisons table (for simple effect comparisons). Specifically, the lower bound 95% CI value for *t* for a given comparison is generated by dividing the existing relevant comparison's lower bound 95% CI value for the mean difference score (located in the second last column) by its associated standard error (located in the second column). A similar procedure is employed to determine the upper bound 95% CI value for *t*, where the existing relevant comparison's upper bound 95% CI value for the mean difference score (located in the last column) is divided by its associated standard error (located in the second column). Always check that these 95% CI values flank the *t*-value correctly. That is, the *t*-value of interest should always be positioned perfectly in the middle of the two reported CI values (minus rounding considerations), with equal distances between the *t*-value and each of the lower and upper bound values.

WRITING UP RESULTS OF A MAIN EFFECT THAT HAS ONLY TWO LEVELS

1. Using full sentences, state in words whether or not the main effect (in this case, of sex) was significant. Back up this statement with statistics in APA format.

Example of APA 7th Format for Reporting Statistics for a Main Effect:

$F(3, 32) = 18.29$, $p < .001$, $\omega^2 = .13$

- Notice that the symbols for the statistics *F* and *p* are italicised. All statistics in English/ Latin letters should be. Note though that ω^2 and all other statistics that use Greek symbols should not be italicised. Instead, all Greek-lettered notation should appear in standard text.

- When reporting the effect size, η^2 is acceptable, although some prefer ω^2. Despite the fact that η_p^2 (partial η^2) is used in journal articles, it is not recommended as it provides an inflated effect size value.
- Notice that the statistics (*F*, $\eta^2$and ω^2) only go to two decimal places.
- In contrast, the *p*-value goes to three decimal places.
- For values that cannot potentially exceed ±1 (e.g., ω^2 and *p*), there is NO zero placed BEFORE the decimal place.
- Notice the spacing between elements of the statistical notation. I.e., it is not all run together, but rather is separated out for reader clarity.
- The *p*-value reported here is converted to "< .001", and is <u>not</u> reported as "= .000" even though SPSS gave the significance as the latter. You should <u>never</u> report a *p*-value as equal to either .000 or 1.000. Instead, you should report these as $p < .001$ and $p > .999$, respectively.
- Lastly, it is important to note that if you had used a statistics program where you had access to the confidence intervals for the *F*-test, you would always report these statistics (following the effect size).

2. Next, report the direction of the effect in words (e.g., male rats performed significantly better on the maze running task than females). Provide evidence for this statement with statistics. Namely, report the marginal means and standard deviations for each level of the sex factor:

Example of APA 7th Format for Reporting Means and Standard Deviations in Text:

When describing each level in the text, you could report each group's *M* and *SD* after you mention that group within the sentence, like this:
(*M* = 10.9, *SD* = 1.7)

Alternatively, you could describe the direction fully and at the end of the sentence report both *M*s and *SD*s, like this:
(*M* = 10.9, *SD* = 1.7, and *M* = 9.3, *SD* = 2.4, respectively)

- Notice again, that the symbols for the statistics (*M* and *SD*) are italicised.
- Also, the statistics (*M* and *SD*) only go to one decimal place (due to the precision of measurement used).

WRITING UP RESULTS OF A MAIN EFFECT THAT HAS MORE THAN TWO LEVELS

Remember that if a main effect is significant and the factor has more than two levels, you have to perform follow-up main effect comparisons using either pairwise *t*-tests (through SPSS) or linear contrasts (via hand calculations or complicated SPSS syntax).

1. Firstly though, report the significance of the main effect (as in point 1 for a main effect for a factor with only two levels).

2. Then state what kind of test was done to follow-up the significant main effect (i.e., main comparisons were performed using pairwise *t*-tests or linear contrasts). If a correction was used, specify *which* correction and why. Regardless of whether or not a correction was used, state the number of comparisons performed and their α-level.

3. For each follow-up test, report the results in words, stating the significance. Back this up with appropriate statistics.
   Note that APA 7 asks for an effect size and confidence intervals to be included in this statistical notation. While not given directly, the 95% confidence intervals can be determined from the SPSS output. However, an effect size is not provided. Yet these can be computed if needed using an online statistics calculator for Cohen's *d*. An example of such an online calculator is found at:
   https://www.socscistatistics.com/effectsize/default3.aspx
   For this, you need to input the relevant mean (*M*), standard deviation (*s*) *not standard error*, and sample size (*n*) values for the two groups involved in the *t*-test. As an example, for the main comparison *t*-test for zero versus small drug dosage:
   Zero: $M = 8.0000$, $s = 1.56347$, $n = 10$
   Small: $M = 12.3000$, $s = 0.94868$, $n = 10$
   This gives a Cohen's *d* value of 3.33.

Examples of APA 7th Format for Reporting Follow-Up Statistics of a Main Effect:

Pairwise *t*-test from SPSS output:
$t(32) = -8.13$, $p < .001$, $d = 3.33$, 95% CI [-10.16, -6.09]

- This is the correct reporting for a pairwise *t*-test main effect comparison conducted through SPSS, with the effect size computed online via a Cohen's *d* calculator.
- Note that the *p*-value reported here is exact (i.e., was stated by SPSS as ".000"), because it was available in the SPSS output.
- Also note that *t*-values, Cohen's *d* and confidence intervals are reported to two decimal places, while *p*-values are given to three decimals.
- While not provided in the example above, since *t*-values, Cohen's *d* and confidence intervals can all potentially exceed a value of ±1, if any had been below this, a zero would appear before the decimal place (e.g., $d = 0.86$).
- Again, take note of the spacing applied between the statistical notation elements.

Linear contrast performed by hand calculation:
$t(32) = -8.13$, $p < .05$

- Notice that the *p*-value reported here is simply given as "$p < .05$" because this statistic was based on hand calculations, so it's the best we can do. Exact *p*-values should always be reported if they are available.
- If you had made use of a Bonferroni correction for this, don't forget to report the ' (i.e., prime sign) next to the *t*! This would look like: $t'(32) = -8.13$, $p < .001$, $d = 3.33$, 95% CI [-10.16, -6.09] and $t'(32) = -8.13$, $p < .05$ for a *t*-test comparison performed via SPSS and hand-calculated linear contrast, respectively.

4. Be sure to describe the direction, backing up your verbal statement with marginal means and standard deviations reported in APA format (as outlined previously). Note that when reporting multiple comparisons that use the same group more than once, DO NOT repeat any *M*s and *SD*s that have already been given in the text.

Example 1: Overall, male rats (M = 10.9, SD = 1.7) performed significantly better than female rats (M = 9.3, SD = 2.4) on the maze running task.

Example 2: The significant main effect of drug dosage was followed up by a series of main comparisons, using four pairwise t-tests at $\alpha = .05$ each. Results revealed that rats with zero dosage (M = 8.0, SD = 1.6) performed significantly worse than those given either a small (M = 12.3, SD = 0.9), moderate (M = 10.0, SD = 1.3), or large (M = 9.9, SD = 2.2) amount of the steroid drug, $t(32) = -8.13$, $p < .001$, $d = 3.33$, 95% CI [-10.16, -6.09]; $t(32) = -3.78$, $p = .001$, $d = 1.38$, CI [-5.82, -1.74]; and $t(32) = -3.59$, $p = .001$, $d = 0.99$, CI [-5.63, -1.55], respectively. However, rats with a small steroid dose performed significantly better than those with a large dosage, $t(32) = 4.54$, $p < .001$, $d = 1.40$, CI [2.50, 6.57].

Take note that the positive or negative valence of the reported t-value indicates the direction of effect. That is, a positive t-value indicates that the first reported group involved in the comparison had a *higher* mean than the second group [i.e., (first group mean – second group mean) / standard error]. In contrast, a negative t-value indicates that the first reported group involved in the comparison had a *lower* mean than the second group. Always check that your t-value sign matches the direction reported in the text. Further, make sure that your confidence intervals span the given t-value properly. That is, a significant negative t-value will likewise have two negative CI values, a significant positive t-value will have two positive CI values, and a non-significant t-value (whether positive or negative) will have a negative lower bound CI value and a positive upper bound CI. In all cases, the t-value itself should sit directly in the centre of the reported CI values.

WRITING UP RESULTS OF A SIGNIFICANT INTERACTION

1. State whether or not the interaction was significant, and back up your statement using the appropriate statistics (reported in APA 7th format).

Example of APA 7th Format for Reporting Statistics of an Interaction:

$F(3, 32) = 4.91$, $p = .006$, $\omega^2 = .09$

- Notice that the p-value reported here is precisely .006. Again, exact p-values are to be given if they are available (which they are in SPSS output).
- When reporting the effect size, η^2 is acceptable, although ω^2 is preferred. Again, although η_p^2 is often used in the industry, it is not a desirable measure of effect size.
- Note that inferential statistics (such as F) and effect sizes should be reported to two decimal places, while the p-value is presented to three decimals.
- For values that cannot potentially exceed ±1 (e.g., ω^2 and p), there is NO zero placed BEFORE the decimal place.
- Again, notice the spacing provided between the statistical notation elements to aid reader clarity.
- Also, again, note that if you had used a statistics program where you had access to the confidence intervals for the F-test, you would always report these statistics (following the effect size).

2. If the interaction is significant, state which set of simple effects you performed to follow-up this effect. Also include a figure of the interaction, and refer the reader to this in the text.

3. Then report the simple effects, stating their significance. If the simple effect is for a variable with only two levels, also report its direction and back this up with cell means and standard deviations. Note that simple effects are reported with an effect size. Similar to the interaction, if confidence intervals were available for your simple effects *F*-tests, these would be reported after the effect size notation.

Example of APA 7th Format for Reporting Statistics for a Simple Effect:

$F(3, 32) = 6.32$, $p = .002$, $\omega^2 = .12$

4. If there is a significant simple effect for a variable with more than two levels, you will need to perform follow-up tests to find out exactly where the difference(s) lie (i.e., simple comparisons using either pairwise *t*-tests or linear contrasts). State which type of test you performed. If a correction was used, specify *which* correction and why. Regardless of whether or not a correction was used, state the number of comparisons performed and their α-level.

5. Report the significance and direction of the simple comparisons, backing up your statements with the relevant statistics in APA style.
   Note again that APA 7 asks for an effect size and confidence intervals to be included in this statistical notation. Recall that the 95% confidence intervals can be determined from the SPSS output (with a little work). However, the effect size – in the form of Cohen's *d* – will need to be computed. This can be done via a free online statistics calculator such as:
   https://www.socscistatistics.com/effectsize/default3.aspx
   Similar to main comparisons, you will need to input the relevant mean (*M*), standard deviation (*s*) *not standard error*, and sample size (*n*) values for the two groups involved in the *t*-test.
   As an example, for the simple comparison *t*-test for male rats comparing small and large drug dosages:
   Males
   Small: $M = 12.0000$, $s = 1.22474$, $n = 5$
   Large: $M = 11.6000$, $s = 1.14018$, $n = 5$
   This gives a Cohen's *d* value of 0.34.

Example of APA 7th Format for Reporting a Simple Comparison:

Pairwise *t*-test from SPSS output:
$t(32) = 0.53$, $p = .597$, $d = 0.34$, 95% CI [-1.50, 2.57]

- This is the correct reporting for a pairwise *t*-test simple effect comparison conducted through SPSS, with the effect size computed online via a Cohen's *d* calculator.
- Note that the *p*-value reported here is exact, because it was available in the SPSS output.
- Once again, take notice that *t*-values, Cohen's *d* and confidence intervals are presented to two decimal places, while *p*-values are reported to three decimals.
- Also note that since *t*-values and Cohen's *d* can potentially exceed a value of 1, there is a zero given before the decimal place for these.
- Be sure to apply the appropriate notation spacing when presenting these statistics in the text.

Linear contrast performed by hand calculation:
$t(32) = 0.53$, $p > .05$

- Notice that the *p*-value reported here is simply given as "$p > .05$" because this statistic was based on hand calculations, so it's the best we can do. Exact *p*-values should always be reported if they are available.
- If you are making a Bonferroni correction to the α-level used, don't forget to include the ' (i.e., prime sign) next to the *t*. E.g., $t'(32) = 0.53$, $p = .597$, $d = 0.34$, 95% CI [-1.50, 2.57] and $t'(32) = 0.53$, $p > .05$ for a *t*-test comparison performed via SPSS and hand-calculated linear contrast, respectively.

...and reporting the direction will require <u>cell</u> means and standard deviations:

…The average maze running performance for male rats in the zero drug group ($M = 9.0$, $SD = 1.4$) was significantly lower than that for male rats in the small, moderate or large dosage conditions ($M = 12.0$, $SD = 1.2$; $M = 10.8$, $SD = 1.3$; and $M = 11.6$, $SD = 1.1$, respectively), $t(32) = -4.01$, $p < .001$, $d = 2.27$, 95% CI [-6.05, -1.97], $t(32) = -2.41$, $p = .0.22$, $d = 1.32$, CI [-4.44, -0.37], and $t(32) = -3.48$, $p = .001$, $d = 2.02$, CI [-5.51, -1.44], respectively.

FORMAT TIPS FOR STANDARD MULTIPLE REGRESSION

*Note: The eating difficulty exercise from tutorials has been used in this section. However, some numbers have been changed for illustrative purposes.

An Important Note Regarding APA 7 vs. SPSS Output

While APA 7th format edition asks that effect sizes and confidence intervals be reported for all statistics/ point estimates, there is a mismatch between what APA 7 requires and the statistics/ output offered through the SPSS program.

For example, while SPSS offers an effect size for correlations and overall regression models (in the form of r or r^2 and R^2, respectively), confidence intervals are not provided for these statistics. Further, while confidence intervals are given by SPSS for the individual coefficients within a regression model, these are only available for *b* weights rather than β weights. Recall that we prefer to use β over *b* values for all the reasons outlined in lectures and tutorials (i.e., they are *standardised* coefficient weightings and therefore, can be compared among the variables within a regression model to determine which are the strongest/ weakest predictors). However, the 95% CI values for *b* can be converted into confidence intervals for β, based on the information SPSS supplies. As such, you should perform these extra calculations and report these 95% confidence interval values for β when providing the statistics for the individual predictor contributions.

To generate these 95% CI values for β from those given for *b* in SPSS, we need to first work out the coefficient ratio between *b* and β for the predictor of interest. This is achieved by dividing *b* by β for the relevant predictor (these values are located in the first and third columns, respectively, of the Coefficients table). The lower bound 95% CI value for β for a given individual model predictor is then calculated by dividing the existing relevant predictor's lower bound 95% CI value for *b* (located in the sixth column) by the associated coefficient ratio you just worked out (i.e., *b* / β). A similar procedure is employed to determine the upper bound 95% CI value for β, where the existing relevant predictor's upper bound 95% CI value for *b* (located in the seventh column) is divided by the associated coefficient ratio. Ensure your 95% confidence intervals span the given β value properly. That is, a significant negative β value will likewise have two negative CI values, a significant positive β value will have two positive CI values, and a non-significant β value (whether positive or negative) will have a negative lower bound CI value and a positive upper bound CI. In all cases, the β weight itself should be positioned perfectly in the middle of the two reported CI values (minus rounding considerations), with equal distances between β and each of the lower and upper bound values.

NB: Remember that when reporting confidence intervals within the text, APA 7th format only requires that the % span of these be stipulated the first time they are used within a paragraph or within an analysis e.g., 95% CI [Lower, Upper]. After this, the percentage should not be repeated i.e., CI [Lower, Upper].

WRITING UP RESULTS OF A STANDARD MULTIPLE REGRESSION

1. Describe the multiple regression analysis that was conducted, identifying the criterion and the predictors involved. If this is the first time you have used the acronym/ abbreviation for your regression type in the text, it must be written out properly and introduced i.e., standard multiple regression (SMR).

2. Conduct preliminary checks: Report the zero-order correlations between each predictor and the criterion (these are known as validities), as well as the intercorrelations between the predictors themselves (these are known as collinearities). Be sure to report the two-tailed tests of significance (i.e., *p*-values) for these! The reporting of preliminary checks is usually done in the text, with reference to a table that contains the means, standard deviations and zero-order correlations. Also be sure to mention explicitly which predictors were valid/ not valid within the regression model, and comment whether collinearity was at a problematic level overall. Generally speaking, if no correlations among the predictors exceed a threshold of $r = \pm.70$, collinearity is not problematic (as this indicates no predictors overlap more than 50% – as given by r^2 – with one another and therefore, none are redundant within the model).

   NB: If you have a dichotomous variable (such as the predictor sex as we have here), you will need to *describe* the zero-order difference in the criterion, because a 'positive' or 'negative' correlation will not make sense (i.e., it could mean different things depending on how the coding was performed). For example: "Females displayed significantly higher eating difficulty levels than males."

Example of Correlation Matrix, in APA 7th Format Style:

Table 1

Descriptive Statistics and Intercorrelations between Eating Difficulty, Stress and Sex

Variable	*M* (*SD*)	Stress	Sex
Eating Difficulty	12.9 (7.8)	.51**	.38*
Stress	14.4 (7.1)		.13
Sex	.5 (.5)		

Note. Given no participants identified their sex as "other", sex was dichotomously coded as "males" = 0 and "females" = 1.

* $p < .05$. ** $p < .01$. *** $p < .001$.

- Notice that the title goes above the table. The section "Table 1" is bolded. However, the title itself (i.e., "Descriptive Statistics and Intercorrelations…") starts on a new line and is italicised. The first letter of each major word of the title should appear as an uppercase (capital) letter.
- The title and any notes are to be double spaced. The table body itself can be single, 1.5 or double spaced.
- Observe that the values for means (*M*) and standard deviations (*SD*) are reported to only one decimal place (due to the precision of measurement used).
- In contrast, correlations (*r*) are reported to two decimals. Values within a column should never differ in terms of the number of decimal places displayed.
- Correlations do not require a 0 in front of the decimal place, as these cannot range above an absolute magnitude of 1. It is important that the means and

standard deviations are reported with a 0 in front of the decimal place, as these can range above an absolute magnitude of 1, except in the case of sex (which was dichotomously coded as 0 = "males" and 1 = "females").

- Note that the significance for correlations is denoted with asterisks (the code for which is given below the table). The convention is * $p < .05$, ** $p < .01$ and *** $p < .001$. These are presented with full stops in between. Sometimes † $p < .10$ is used to denote marginal significance (e.g., $p = .060$). <u>All three asterisk notations must be provided below the table – you cannot chop and change as the symbols for these specific significance levels are conventions of the psychology discipline and industry reporting standards!</u>
- The table has no vertical lines *at all*. The only horizontal lines are at the top and bottom of the table, as well as underneath the first row that specifies the column title (i.e., the name of the variable/ statistic contained therein).
- If including a correlation matrix, only provide the values <u>for the upper right or lower left triangle (i.e., do not repeat the correlations in a full matrix format)</u>.
- Cells with irrelevant or redundant information should be left blank. Do not add dashes to these. Dashes should only be used when missing information in a cell requires explanation (which would be supplied in the notes below).

3. Describe the analysis of regression. That is, describe the proportion of variance in the criterion that is explained by the predictors taken together (i.e., R^2 expressed as a percentage in the text), and state the significance/ non-significance. Provide the statistical notation for the test of significance and significance level at the end of the sentence i.e., $F(df)$ and p.

Example of APA 7th Format for Reporting Statistics of the Overall Model in a Standard Multiple Regression:

Together, stress and sex significantly explained 36% of the variance in eating difficulty scores, $F(2, 37) = 10.46$, $p < .001$.

- Note that R^2 is reported as a percentage in the text (i.e., 36%). If the percentage is < 1%, it should be rounded and reported as either 1% (if it rounds up) or "less than 1% of the variance" (if it rounds down). You should not report 0% R^2.
- If confidence intervals are available for your R^2 value, these would be presented at the end of the statistical notation following the p-value.

4. Next, report the findings for the individual predictors. Specifically, describe the unique contributions of the individual predictors, reporting their significance/ non-significance, direction of effect, βs, t-values, degrees of freedom, p-values and the 95% confidence intervals associated with these. Also describe how much of the total variance in the criterion was explained <u>uniquely</u> by each of the predictors (i.e., their sr^2 value expressed as a percentage in the text).

   Further, also comment on the respective importance of each predictor, particularly if it is tied to your research questions/ hypotheses. To determine the significance of this predictor strength order, use and report Fisher-Z test results. While these are not provided in SPSS, they can be ascertained via free online calculators such as: https://www.psychometrica.de/correlation.html

IF YOUR MODEL HAS ONLY TWO PREDICTORS:
For this, choose "Comparison of correlations from **dependent** samples" (as we are comparing the strength of predictors within the same dataset, generated by the same participants). Then input information regarding the relevant:
(1) sample size (*n*),
(2) zero-order/ Pearson correlation between the criterion and first predictor of interest (r_{12}),
(3) zero-order/ Pearson correlation between the criterion and second predictor of interest (r_{13}), and
(4) zero-order/ Pearson correlation between the first and second predictors of interest (r_{23}). This information can be found in the Correlations table.
As an example, for the standard multiple regression that examined eating difficulty (criterion) using *ONLY THE TWO* predictors of stress and sex:
$n = 40$, $r_{12} = .510$, $r_{13} = .382$, $r_{23} = .131$
This gives a Fisher-*Z* test result of: $Z = 0.70$, $p = .242$.

IF YOUR MODEL HAS MORE THAN TWO PREDICTORS:
If your regression model has MORE THAN TWO predictors, the values entered into the online calculator differ slightly and require extra SPSS analyses to gather relevant information!

Specifically, if we have more than two model predictors, we replace r_{12} and r_{13} with the partial correlation (*pr*) values for the two predictors we are comparing (found in the second last column of the Coefficients table at the relevant model step).

However, we also need to calculate a separate partial correlation (*pr*) between the two predictors (which will replace r_{23}), controlling for any other variables at that model step (including the criterion). This is achieved under the **Analyze → Correlate → Partial** analysis function in SPSS. E.g., for step 2 of the hierarchical multiple regression, move both **Stress** and **Neuroticism** (i.e., predictor 3 and predictor 4) into the **Variables** box, and **Eating Difficulty** (i.e., the criterion) as well as **Age** and **Sex** (i.e., predictor 1 and predictor 2, which were control variables entered at step 1 of the model) into the **Controlling for** box. Click **Paste** and **run** the syntax.

Important note: Be sure that all *pr* values you enter into the online calculator are converted into POSITIVE numbers (otherwise you'll get the wrong answer)!

Example of APA 7th Format for Reporting Statistics of the Individual Predictors in a Standard Multiple Regression:

Stress was a significant positive predictor, such that higher levels of stress were associated with greater eating difficulty, $\beta = .47$, $t(37) = 3.53$, $p = .001$, 95% CI [.20, .74]. Stress uniquely accounted for 22% of the variance in eating difficulty scores. However, a Fisher-*Z* test revealed stress did not differ significantly in strength from sex as a predictor of eating difficulty, $Z = 0.70$, $p = .242$.

OR

Stress significantly explained 22% of the unique variance in eating difficulty scores, whereby higher rated stress was associated with higher reported levels of eating difficulty, $\beta = .47$, $t(37) = 3.53$, $p = .001$, 95% CI [.20, .74]. In terms of

strength, although stress produced a higher unique contribution weight, a Fisher-*Z* test showed it was statistically equivalent to sex as a predictor of eating difficulty, $Z = 0.70$, $p = .242$.

- Note that sr^2 is reported in the text as a percentage i.e., 22%.
- Beta values (β) should be reported rather than *b*. Beta is preferred as it is a standardised statistic and thus, enables you to compare different predictors in the same study in terms of their strength. Though note that the *significance* of these strength differences needs to be assessed using Fisher-*Z* tests.
- The degrees of freedom (*df*) for the *t*-test are that for Residual, found in the ANOVA output table in SPSS. In contrast, the *t*-values are located in the Coefficients table.
- Confidence intervals for the beta weights can be determined from the SPSS output for the *b* 95% confidence intervals. These calculations involve three extra steps (outlined earlier on page 42).
- Given the confidence intervals are for β (rather than *b*), note that no 0 is placed in front of the decimal point. This is because these values cannot potentially exceed ±1.
- When specifying confidence interval notation, the % only needs to be stated the first time they are employed within a paragraph or analysis set e.g., 95% CI [Lower, Upper]. After this, the percentage does not need to be repeated i.e., CI [Lower, Upper]. Also note that no italics are used for this notation.
- Inclusion of Fisher-*Z* test results is required when speaking to whether or not an individual predictor is *significantly* stronger than another. This is needed to establish the order of predictor importance, based on the significant and relative magnitude order of their strength. Note the capital *Z* used for this notation, as well as the accompanying *p*-value.

5. Lastly, state the amount of shared variability in the model (i.e., $R^2 - \Sigma sr^2$) as a percentage in the text. There is no significance test associated with this. NB: shared variance cannot be a negative value. Therefore, if your calculations lead you to a small negative number, this is an artefact of the display and rounding of numbers in SPSS. Instead, report this value as less than 1%.

   As an example, for the SMR in Activity 5 Exercise 2 of the Tutorial Workbook, the overall regression model R^2 was .361 (which rounds to 36%), while the sr^2 values for stress and sex were .215296 (22%) and .101124 (10%), respectively. The latter sr^2 values are calculated by squaring the semi-partial or 'part' correlation for each predictor in the Coefficients table. When performing these calculations, use as many decimals as you have available to you to ensure maximal accuracy. As such, shared variance = .361 – .215296 – .101124 = .044580. Therefore, once rounded (i.e., .04), this shows that an additional 4% of variance in eating difficulty scores was explained by shared variability between stress and sex.

FORMAT TIPS FOR HIERARCHICAL AND MODERATED MULTIPLE REGRESSION

*Note: A combination of the eating difficulty exercises from the hierarchical and moderated multiple regression tutorials have been used in this section. However, some values may have changed for illustrative purposes.

1. If you have already provided the means, standard deviations, and zero-order correlations (with two-tailed tests of significance), then you would not repeat them at the start of a hierarchical or moderated multiple regression. *However*, if this has not been done, report these as part of your preliminary statistics in the next step (see step 2 from the section ***Format Tips for Standard Multiple Regression*** for how to report these).

2. Describe the multiple regression analysis that was conducted, identifying the criterion and predictors. If this is the first time you have used the acronym/ abbreviation for your regression type in the text, it must be written out properly and introduced e.g., moderated multiple regression (MMR). Include the order of predictor entry into the model, and the rationale behind this order.

   Remember that in moderated multiple regression we list the interaction as a predictor too. In moderated multiple regression, the rationale behind the order of predictor entry is to determine whether the interaction between the two predictors explains additional variance in the criterion OVER AND ABOVE that of the direct effects of the two predictors (where the criterion and predictors are named explicitly here). Also in moderated multiple regression, make sure that you note which variables were mean-centred and explain WHY this was done. Don't forget to describe how the interaction term was calculated. In moderated multiple regression, the information covered in the previous two sentences would appear prior to listing the order of predictor entry into the model.

3. Describe the proportion of variance in the criterion that was explained at step 1 (i.e., R^2_{ch} as a percentage in the text) as well as whether or not this was significant. Report the associated *F change* and significance level statistical notation at the end of the sentence i.e., F_{ch}, *df* and *p*.

   NB: It is important to report these change statistics for analysis techniques such as hierarchical multiple regression and moderated multiple regression. These analyses address the significance of the CHANGE in variance accounted for when blocks of predictors are entered into the model.

Example of APA 7th Format for Reporting Statistics of the Model at Step 1 for Hierarchical Multiple Regression:

At step 1, sex and age explained a significant 16% of the variance in eating difficulty scores, $F_{ch}(2, 37) = 3.39$, $p = .045$.

- Note that you should report R^2 *change* as a percentage in the text (i.e., 16%). Generally, percentages reported in the text are presented as whole values. If the percentage is < 1%, it should be rounded and reported as either 1% (if it rounds up) or "less than 1% of the variance" (if it rounds down). You should not report 0% R^2 *change*.

- Notice that the symbols for the statistics *F* and *p* are italicised. All statistics in English/ Latin letters should be. However, the subscript notation appears as standard text (i.e., not italicised). Likewise for any superscripts.
- Also notice that the inferential statistics (*F*) only go to two decimal places.
- In contrast, the *p*-value is reported to three decimals.
- The degrees of freedom in a change model represent that for Regression and Residual of the change that has occurred at the *relevant model step* (found under the Change Statistics section of the Model Summary output table in SPSS i.e., df1 and df2, respectively).
- Notice the spacing applied between elements of the statistical notation. I.e., it is not all run together, but rather is separated out for reader clarity.
- Lastly, if confidence intervals are available for your R^2 *change* value, these would be given at the end of the statistical notation following the *p*-value.

4. Describe the unique contribution of each individual predictor at step 1, reporting their significance/ non-significance, direction of effect, βs, *t*-values, degrees of freedom, *p*-values and their associated 95% confidence intervals. These are reported just as you would in a standard multiple regression (as discussed in the previous section). Also provide the proportion of total variance in the criterion that was uniquely explained by each predictor (i.e., sr^2 as a percentage in the text). If there was more than one predictor added to the model at this step, you would also give the amount of shared variance as a percentage in the text (i.e., step 1 R^2_{ch} – Σsr^2 for all predictors entered at step 1). Recall that shared variance cannot be a negative value. Therefore, if your calculations lead you to a small negative number, this is merely an artefact of the display and rounding of numbers in SPSS. Instead, report this value as less than 1%.

   As an example, for the HMR in Activity 5 Exercise 3 of the Tutorial Workbook, the step 1 model R^2_{ch} was .155 (which rounds to 16%), while the sr^2 values for sex and age were .145161 (15%) and .012321 (1%), respectively. The individual predictor sr^2 values are calculated by squaring their associated semi-partial or 'part' correlation in the Coefficients table *at step 1*. When conducting these calculations, be sure to use as many decimals as you have available to allow for maximal accuracy. In this case, the shared variance at step 1 = .155 – .145161 – .012321 = -.002482. This is, therefore, one of those rare cases where we obtain a small negative value due to SPSS issues of number displays and rounding. As such, this would be reported as showing that less than 1% of the variance in eating difficulty scores was explained by shared variability between sex and age at step 1 of the model.

5. Describe the increase in R^2 that resulted from the inclusion of the additional predictor(s) at step 2. State whether or not this was a significant increment in the explanation of the criterion variance, reporting the *F change*, degrees of freedom and significance level statistics outlined previously.

   For moderated multiple regression: The interaction term is entered at step 2. Report the change statistics as you would for a hierarchical multiple regression. However, you also report whether or not this indicated there was a significant interaction, giving appropriate individual predictor statistical notation (i.e., β, *t*, *df*, *p* and 95% confidence intervals).

Example of APA 7th Format for Reporting Statistics of the Model at Step 2 for Hierarchical Multiple Regression and Moderated Multiple Regression:

Hierarchical Multiple Regression:
At step 2, stress and neuroticism significantly accounted for 35% of the eating difficulty score variance over and above that explained by sex and age at step 1, $F_{ch}(2, 35) = 12.46$, $p < .001$.

Moderated Multiple Regression:
At step 2, the addition of the Stress x Self-Esteem interaction to the model significantly explained 8% of the variance in eating difficulty scores over and above the direct effects of stress and self-esteem, which indicated the presence of a significant interaction, $F_{ch}(1, 36) = 4.61$, $\beta = -.30$, $t(36) = -2.15$, $p = .039$, CI [-.58, -.02].

- Again, the degrees of freedom (*df*) for the change model represent that for Regression and Residual of the change that has occurred at the *relevant model step* (found under the Change Statistics section of the Model Summary output table in SPSS i.e., df1 and df2, respectively).
- In contrast, the degrees of freedom for the *t*-test are that for just Residual, and are located in the ANOVA output table *for the relevant model step*.
- Note that the HMR *p*-value reported was converted to "< .001", and was <u>not</u> reported as "= .000" even though SPSS gave the significance as the latter. You should <u>never</u> report a *p*-value as equal to either .000 or 1.000. Instead, you should report these as $p < .001$ and $p > .999$, respectively.
- Calculation of the 95% confidence interval (CI) values for β involves the same three extra steps outlined in the SMR section on page 42. These calculations require information from the SPSS Coefficients output table.
- When denoting the CI notation, the "95%" part of this is only stipulated the first time these are used within a paragraph or analysis set e.g., 95% CI [Lower, Upper]. Following this initial % specification, the percentage should not be repeated i.e., CI [Lower, Upper]. Further, note that no italics are employed for the 95% CI statistical notation.
- Also be careful in the use (or non-use) of 0 before a decimal place. If a value can potentially exceed a threshold of ±1 (e.g., F_{ch} and *t*), a 0 should be placed before the decimal point. However, if a value cannot potentially exceed ±1 (e.g., β, 95% CI for β, and *p*), no 0 should appear before the decimal.
- Once again, if you were working in a statistics program where confidence intervals were available for your R^2 *change* value, these would be given at the end of the statistical notation following the *p*-value (for the top HMR example).

6. Describe the individual contribution of each predictor entered at step 2. State the significance/ non-significance and direction of effect, providing the relevant statistical notation to accompany this (i.e., β, *t*, *df*, *p* and 95% CIs). Also give the proportion of variance in the criterion that was uniquely explained by each (i.e., sr^2 as a percentage in the text). If there was more than one <u>new</u> predictor added to the model in this step/ block, you also need to provide the shared variance as a percentage in the text (i.e., step 2 $R^2_{ch} - \Sigma sr^2$ for all new predictors entered at step 2. This follows the same procedure outlined in point 4 above).

For moderated multiple regression: It makes no intuitive sense to describe the direction for the interactive effect (e.g., 'positive' or 'negative'). Instead, as outlined before, simply state whether or not this indicated there was a significant interaction over and above the direct effects of the model, providing the associated β, *t*, *df*, *p* and 95% CI statistics at the end of the sentence. You should not provide the sr^2 value for the interaction, as this will be the same as the R^2 *change* value at step 2 and is therefore, redundant (see above example).

7. Repeat steps 5 and 6 above for each additional step/ block that is involved in your HMR.

8. Lastly, describe the overall model at the final step. Specifically, report the total proportion of variance in the criterion that was explained by all the predictors together (i.e., R^2 at step 2 as a percentage in the text). Report whether or not this model was significant, with the appropriate corresponding $F(df)$ and *p*-value statistics given at the end of the sentence.

Example of APA 7th Format for Reporting Statistics for the Final Model of a Hierarchical Multiple Regression:

At step 2, the overall model containing stress, neuroticism, age and sex explained a significant 51% of the variance in eating difficulty scores, $F(4, 35) = 8.97$, $p < .001$.

- Note that you report R^2 at the last model step as a percentage in the text (i.e., 51%). Generally, percentages reported in the text are presented as whole values. If the percentage is < 1%, it should be rounded and reported as either 1% (if it rounds up) or "less than 1% of the variance" (if it rounds down). You should not report 0% R^2.
- The degrees of freedom (*df*) this time represent that for Regression and Residual of the *whole model* (located in the ANOVA output table in SPSS *at the last step*).
- Again, if confidence intervals are available for your R^2 value, these would be given at the end of the statistical notation following the *p*-value.
- Observe that inferential statistics such as *F* are reported to two decimal places, while *p*-values are taken to three decimals.
- Also notice the spacing applied to the statistical notation.

ADD THESE EXTRA TWO STEPS FOR MODERATED MULTIPLE REGRESSION (MMR):

9. In MMR, you also need to report follow-up tests for a significant interaction. Display this interaction in an APA 7th format figure, and explain that the significant interaction was followed up by performing simple slopes analyses. In the figure, be sure to present separate lines for high and low levels of the moderator, and have the focal predictor variable on the *x*-axis. When referring your reader to the figure, make clear the key message(s) you want them to take away from the figure e.g., As seen in Figure 1, a significant interaction was present, whereby the positive effect of stress on reported eating difficulty level was eliminated at high self-esteem.

10. Explain that values one standard deviation above and below the mean were used for high and low levels, respectively, for each variable.
    - Then describe the effect of the key predictor (e.g., stress) on the criterion (e.g., eating difficulty) when the moderator was at a low level. Include the β, *t* and *df* for the slope, its significance level (*p*), and sr^2 value as statistical notation. Describe the direction of effect and state whether or not this was significant.
    - Lastly, describe the effect of the key predictor (e.g., stress) on the criterion (e.g., eating difficulty) when the moderator was at a high level. Again, include the β, *t* and *df* for the slope, its significance level (*p*), and sr^2 value as statistical notation. Also, again, describe the direction of effect and be sure to state whether or not this effect was significant.

Example of APA 7th Format for Reporting Statistics of the Simple Slopes:

For those with low self-esteem, stress had a significant positive influence, whereby higher stress levels were associated with greater reported eating difficulty, $\beta = .65$, $t(36) = 4.31$, $p < .001$, 95% CI [.34, .95], $sr^2 = .30$.

- Recognise that this time around, the sr^2 value is included as statistical notation at the end, rather than reported as a percentage in the text. Do not do both, as this is redundant reporting (and therefore, goes against APA 7 format).
- The degrees of freedom (*df*) for the *t*-test are that for Residual for the relevant model step. As such, this is found in the ANOVA output table in SPSS for step (model) 2.
- Once again, the confidence intervals for your beta weights need to be calculated based on the information SPSS supplies for the 95% CIs for *b* (found in the Coefficients table from the simple slopes output). This procedure requires the same three extra steps outlined in the SMR section on page 42.
- Note that when presenting the confidence interval statistical notation, the % is only required the first time they are stated within a paragraph or analysis set e.g., 95% CI [Lower, Upper]. After this, the percentage should not be stipulated again i.e., CI [Lower, Upper]. Also note that no italics are applied to this notation.