**Lab report instructions**

This assessment gives you the opportunity to practice writing like a psychological researcher. You will test your own research questions and hypotheses using the data provided to you, and present your findings in a lab report.

This includes testing the factor structure of either Personality or Perfectionism (you choose), and then testing how at least three predictor variables of your choice are associated with one dependent variable of your choice. I have provided some example questions that can be assessed using the data set, but you are welcome to explore other appropriate questions as well for your multiple linear regression analysis (MLR)

I recommend printing out and completing the planning sheet below. Then go to page 3 for more detailed instructions on writing each section of your lab report.

It’s a good idea to use factors from your exploratory factor analysis (EFA) in the MLR – in that case, you will first need to conduct your EFA to see what factors you get, before thinking about what questions you would like to address in your MLR.

| **Factor analysis**  Choose ONE construct to run a factor analysis on: personality OR perfectionism  Research questions for factor analysis:  - What are the underlying dimensions (i.e. factor structure) of personality OR - What are the underlying dimensions (i.e. factor structure) of perfectionism  Some EXAMPLE research questions for regression analysis:  - What is the association between the underlying dimensions of personality and procrastination  - What is the association between the underlying dimensions of perfectionism and procrastination  - What is the association between the underlying dimensions of perfectionism and predicted academic achievement  **Multiple Linear Regression**  Choose at least three predictor variables and enter them into the boxes on the left. Choose one dependent variable and enter this into the box on the right.    Based on your reading of the literature, how do you expect each predictor to relate to the dependent variable? Draw a + on paths you expect a positive relationship, - for negative relationship, x for no relationship, and ? for paths where there is not enough research or existing research conflicts |
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**What to include in each section of your lab report**

**Cover sheet**

The first page of your lab report is the cover sheet. Download and complete the template on Canvas (within the Lab Report assignment inbox).

**Title page**

The next page of your lab report is your title page. This must follow APA style (i.e. include title, author, institution) **except** replace ‘author’ with your student ID number instead of your name for blind marking.

Your title should be short (up to 15 words) and should include your research aims and key variable names, so that it gives your reader a fair idea of the main point of your research.

**Abstract**

Your abstract goes on the third page of your document. Start with an APA-formatted heading, and in 150-200 words, summarize:

1. The purpose of your study,
2. Your method – What did you do? Include a *brief* description of who your participants were and how you recruited them,
3. Key findings – What did you find? Include the percentage of variance explained in the final solution of your EFA, what factors you identified, the R2 value for your MLR and the relative contribution and meaning of each predictor (was X a significant predictor? If so, what was the strength and direction of the relationship?),
4. Conclusions (what are the key implications of this research?).

Writing tip: Although the abstract appears at the start of your lab report, it helps to write it last!

**Key words**

Below your abstract (still on p. 3), include 3-5 terms that are especially relevant to your research. These could include your variable names, for example. Imagine what terms people would need to use in a search to find your research – these should be your key words.

**Writing an introduction section**

Start your introduction section on a new page (if you’ve followed the steps above, then this is page 4). The purpose of the introduction is to explain what work has already been done in this area, build up an argument for why you’re doing your study and what you expect to find.

**Before you start writing:** You need to do some reading. To get you started, there are some readings in the ‘Lab report’ section of your Reading List on Canvas. Use the library website or Google Scholar to search by keywords for additional references.

**First paragraph:** Open with a broad introductory paragraph introducing the topic – why is this area interesting or important to study? Use some evidence here to highlight why it is interesting or important.

**Next 2-5 paragraphs:** Provide an overview of relevant previous research and define key terms along the way (e.g. your variables). You should only review constructs that you actually use in this lab report, not everything in the survey. Your job here is to build up a case for why you are doing this study, so highlight any gaps in the current literature that your study addresses along the way.

Another aim of your introduction is to build up a case for how your predictors might relate to your dependent variable in your multiple linear regression. It is better to organise your paragraphs by theme, rather than by study, author, or year the research was published. This means that rather than summarising several studies that looks at the relationship between all three of your predictor variables in one paragraph, you should separate these findings out, and describe existing research on predictor 1 and your DV in one paragraph, and research on predictor 2 and your DV in a different paragraph, etcetera.

**In the last paragraph of your introduction:** Explain the aims of your study. To set this up, tell us in a sentence or so what you do in your study (e.g. “In this study, I examine the factor structure of X, and then test how A, B, and C are related to D.”). Then have a sentence explaining that one of your aims is to summarise the items belonging to the construct you have chosen for your EFA – either personality OR perfectionism – into a smaller number of factors. Because you are doing an *exploratory* factor analysis, it is fine to have a research question rather than well-developed hypotheses for this. The other main aim of your research is to test your predictions about whether and how the variables you examine in your multiple linear regression are related. Based on the evidence you reviewed in the previous paragraphs on the relationship between each of your predictors and the DV, write a hypothesis for each of your predictor variables (e.g. “I hypothesise that X and Y will each positively predict the DV, while Z will negatively predict DV”).

**Method**

When writing your method section, keep in mind that you should write this in enough detail that someone could run your study (e.g. to try to replicate your findings). The method section has three subsections, and you need to make sure your headings for these are formatted correctly (use an APA guide).

**Participants**

The participants subsection should include details about who participated in your study (i.e. the descriptive information about them). Have a look at the data you have available to you in the class dataset and think about the best way to summarize this (e.g. means/standard deviations, or frequencies) after completing data screening/cleaning.

The reason we include details about our participants is so that our readers can consider whether we had sufficient power to detect statistical relationships (so the overall number of participants is important to report), and so they can consider how generalizable our findings are. Make a comment on how representative the sample is of the target population.

**Measures**

Write a brief paragraph about each of the measures that **you used** in your lab report. This information helps other researchers get a sense for how trustworthy your measures were. For each measure, you should include an example item, explain how participants responded (e.g. Likert scale, explain the anchors), how many items in total were included to measure the construct, whether con-trait items were included and if these were reverse-coded. To guide interpretation of your findings, tell us what it indicates if a participant scores high in the variable. For the measure you will run your EFA on, you do not need to include information about scale reliability in the measures section (as this instead goes in the results section). However, for any other multi-item measures you include, you do need to report and interpret a reliability statistic. There is no need to describe the measures in the survey that you did not use, or how the descriptive information about participants were measured.

**Procedure**

In the procedure section, include details about sampling (target population, sampling frame, sampling technique used). Explain how the surveys were administered by briefly summarizing the relevant information from the survey administration guidelines you were given (i.e. information that someone would need if they wanted to replicate this study). Relevant details include where and how data were collected, how long the survey typically took to complete, and information that is relevant to judging whether the study was ethical (was participation voluntary or involuntary? Confidential or anonymous?).

**Results**

**Data screening**

Follow the data screening protocol (download from Canvas when this is available) for support with this step, which requires knowledge of content covered in tutorials.

As you screen the data, summarize what you are doing so that you can include a short paragraph explanation of this in your lab report. You need to explain the changes you make to the dataset during this process. Like the method section, aim to give enough detail so that someone could replicate this process, keeping in mind that specific details like case numbers are meaningless to a reader, but explaining that you deleted cases where the values were out-of-range is meaningful and replicable.

**Psychometric instrument development**

Here’s a checklist of the things you should report from your psychometric instrument development analyses:

* Type of factor analysis used (Principal Components Analysis is recommended), and the type of rotation
* Notes on the assumptions – consider sample size (including cases:variables ratio), linearity (e.g. check scatterplot matrix for outliners or nonlinear relations), factorability of the correlation matrix
* Briefly summarise the steps taken to get to the final model
  + How many factors were indicated by the Scree plot/Initial Eigen Value table?
  + What models/factors structures were examined?
  + Which items were retained and/or dropped and why?
  + How much variance was explained in the initial and final model(s) – after rotation if used on the final model
* Label **and describe** each factor
* Table of factor loadings (sorted by size, small factor loadings hidden)
* Reliability analysis (Internal consistency/Cronbach's alpha) for each factor, and interpretation
* Calculation of composite scores to represent each factor (mean or total score?)
* Descriptive statistics for the composite scores (either in a table or in text)
* Correlations between composite scores (either in a table or in text), and interpret what this means (were factors related?)
  + NOTE: be smart about space here. If your factors will also go into your MLR, you could include just one correlation matrix that includes all correlations, rather than repeating this information in your MLR section.

**Multiple linear regression**

Remember that the MLR needs to have at least three predictors (these can be any variables in the data set, providing they meet the assumptions for MLR) and one dependent variable. It is a good idea for the MLR to include at least some of the factors from your EFA, so that your lab report flows nicely.

Here’s a checklist of the things you should report from your analyses:

* Present the zero-order correlations between your variables (either in a table or in text), and interpretation of these (see note above if the variables in your MLR include factors from your EFA).
* Statement explaining why you are running the MLR (remind us which hypotheses you are testing)
* Type of MLR (e.g., standard, hierarchical, or stepwise)
* Explain the extent to which assumptions were met (sample size, multicollinearity, multivariate outliers, normality of residuals, and what you did about any violations of these assumptions)
* Report the amount of variance explained: R2 and Adjusted R2, and the R2 change at each step if a hierarchical MLR is being conducted, along with inferential tests
* Include (either in a table or in text):
  + B for intercept & IVs
  + Beta (β) for IVs, with statistical significance (e.g., *t, p*)
* Report **in words** what the relationship between each IV and the DV means (interpret significance, size, direction of the association). Make sure to explain what the direction of each relationship means in plain English.

**Discussion**

**Summary of findings:** Your discussion should begin with a concise overview of your main findings, how these relate to your hypotheses and the research cited in the introduction. For the EFA, this means commenting on how the factors you found match up with factors described in the literature. For the MLR, you will comment on each predictor: If findings are consistent with hypotheses/research cited, you should make a statement about what this means (e.g. perhaps we can be more confident about the pattern of results?). If your findings are not consistent with hypotheses/research cited, discuss why this might be the case.

**Implications:** Consider the *theoretical* implications of your research - do they challenge or support existing theory?

**Applications:** Think beyond what your findings contribute to psychological research, and into the real world. Describe a possible way that your findings could be used. Imagine that you are trying to convince a funding body (who doesn’t care about theory so much) to give you money to do research in this area – how is what you have done here valuable in the real world?

**Strengths and limitations:** Think critically about the strengths and weaknesses of your study, and what you could do next time to improve this study if you were to run it again. You may want to consider things like the validity and reliability of the measures, statistical power, how appropriate the sampling technique was, or how generalisable your findings are. Remember that the discussion section is about showing depth of thought about your findings, not breadth of thought: resist the temptation to list multiple limitations without much detail, and instead give one or two possible limitations and develop these fully. Your points will be much stronger if you back them up with literature.

**Future research:** Given what you know from your study, what would you want to test next to continue expanding psychological knowledge on your topic? This is a separate point from suggesting ways to fix limitations. How could you build on your study to learn something new?

**Note:** While the main points in the discussion are generally presented in the order above, it can also be okay to interweave some points where this improves the flow of your discussion. Some examples of when you may want to do this include:

* When discussing a hypothesis that was not supported, it could make sense to highlight a potential limitation of your research if this potentially explains the unexpected results
* You may wish to discuss each finding in relation to the literature, implications and applications separately (i.e., short paragraph discussing each finding, rather than short paragraph covering each discussion point)

**References**

Present a complete and APA-formatted reference list. Check that you have included in your reference list every source that is cited in text, and none that are not cited in text. To get a good mark in the referencing and formatting component of the lab report, you need to follow APA guidelines for the in-text citations, reference list, and formatting of your document. Helpful resources include the APA manual (e.g. borrow one from the library) and online resources, e.g. <https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/general_format.html>

Throughout your report, make sure that *all* factual claims are supported with a citation. As a rough guide, I would expect to see at least 10-15 references for a lab report of this size.

**Appendices**

You do not need to include appendices, but if you do decide to, please understand that appendices **cannot** be used to circumvent the word limit. Instead, you can include details which are relevant to understanding the main text in the lab report, but would break the flow (e.g. correlation matrices). If you are using appendices, you must refer to each appendix at least once in the main text. If you do not do this, consider whether you need to include the information in the appendix at all. Note that you will lose formatting marks if this section does not follow APA – I do not want to see screenshots of jamovi output here. Moreover, tables cannot be inserted as figures to circumvent the word limit.

**Mark deductions**

If core sections of the lab report (i.e. assessable parts of the rubric) are placed in the appendix rather than in text, this will result in mark deductions for these sections

If screenshots of tables are used, an estimate will be made regarding the number of words these screenshots would take, which will be considered in the word limit.