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ABCD BIOSTATS LONGITUDINAL PAPER

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A PREPRINT

Samuel W. Hawes

Psychology; Center for Children and Families  
Florida International University  
Miami, FL 33199  
[shawes@fiu.edu](mailto:shawes@fiu.edu)

Wesley K. Thompson <sup>\*</sup>

Population Neuroscience and Genetics Lab  
University of California, San Diego  
San Diego, CA 92093  
wkthompson@ucsd.edu

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# Abstract

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**Keywords** keyword1 · keyword2 · (optional and can be removed)

## 1 Sectioning

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\*Use footnote for providing further information about author (webpage, alternative address)—*not* for acknowledging funding agencies. Optional.

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## 2 (Pandoc) Markdown syntax

### 2.1 Basic formatting

Text can be **bold**, *italic*, or `verbatim` (e.g., for code).

This is a quotation:

*This is an infamous quote.*

— The Author

Explicit URLs and email addresses are automatically converted to clickable links, e.g., <https://abcdstudy.org> and [janosch@ucsd.edu](mailto:janosch@ucsd.edu). Links can also be shown with alternative text, e.g., The ABCD study's website and Janosch's email address.

One can also use L<sup>A</sup>T<sub>E</sub>X syntax directly if one has or wants to, like the `\medskip\noindent` above.

## 2.2 Footnotes

Footnotes can be added like this.<sup>2</sup>

## 2.3 Lists

This is an *unordered* list:

- first item
- second item
  - first subitem
  - second subitem
    - \* first subsubitem
    - \* second subsubitem
- third item

This is an *ordered* list:

1. first item
2. second item
3. third item
4. fourth item
5. fifth item
6. sixth item
7. seventh item
8. eighth item
9. ninth item
10. tenth item
  - i. first subitem
  - ii. second subitem
  - iii. third subitem
  - iv. fourth subitem
  - v. fifth subitem
  - vi. sixth subitem
  - vii. seventh subitem
  - viii. eighth subitem
  - ix. ninth subitem
  - x. tenth subitem
  - xi. eleventh subitem
    - a. first subsubitem
    - b. second subsubitem
    - c. third subsubitem
11. eleventh item

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<sup>2</sup>This is a footnote.

## 2.4 Citations

Citations can be added using the following syntax:

- `[@citation1] / [@citation2; @citation3]` for parenthetical citations.<sup>3</sup>
- `@citation4` for in-text citations.

This is what one paper says (see Hadash et al. 2018, for an overview). This is what two other say (Kour and Saabne 2014b, 2014a). Hadash et al. (2018) said more.

## 2.5 Mathematical notation

Math is based on L<sup>A</sup>T<sub>E</sub>X syntax.<sup>4</sup> To display math inline, one has to enclose mathematical expressions in `$...$`, e.g.,  $\sum_{n=1}^{10} n^2$ . To add an equation, one can utilize L<sup>A</sup>T<sub>E</sub>X equation environments:

$$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i \quad (1)$$

## 3 R Markdown syntax/elements

### 3.1 Code

One can embed arbitrary R code<sup>5</sup> anywhere in the document like “the square root of 36 is 6.” Furthermore, one can use “code chunks” to execute bigger chunks of R code and have the results displayed in the document (or not<sup>6</sup>).

```
# select variables
y <- iris$Species
x <- iris$Sepal.Length

# print regression model
glm(y~x, family = 'binomial')
```

Call: `glm(formula = y ~ x, family = "binomial")`

Coefficients:

```
(Intercept)
-27.829
          x
  5.176
```

Degrees of Freedom: 149 Total (i.e. Null); 148 Residual

Null Deviance: 191

Residual Deviance: 71.84 AIC: 75.84

### 3.2 Figures

Code chunks can also be used to embed plots generated with R (or other programming languages). The appearance of figures in the output document can be modified using chunk options.<sup>7</sup> For example, the following prints a figure that takes up 75% of the column width. It’s set in a floating environment, so might not appear at this exact location.

<sup>3</sup>Prefixes and suffixes can be added to parenthetical citation, e.g., `[cf., @citation1]`.

<sup>4</sup>See, e.g., <https://en.wikibooks.org/wiki/LaTeX/Mathematics> or [https://www.overleaf.com/learn/latex/mathematical\\_expressions](https://www.overleaf.com/learn/latex/mathematical_expressions).

<sup>5</sup>A number of other programming languages are also supported, see <https://bookdown.org/yihui/rmarkdown/language-engines.html>.

<sup>6</sup>For an overview of different chunk options which determine how code chunks are displayed in the resulting document, see <https://yihui.org/knitr/options/>.

<sup>7</sup>See, e.g., <http://zevross.com/blog/2017/06/19/tips-and-tricks-for-working-with-images-and-figures-in-r-markdown-d>

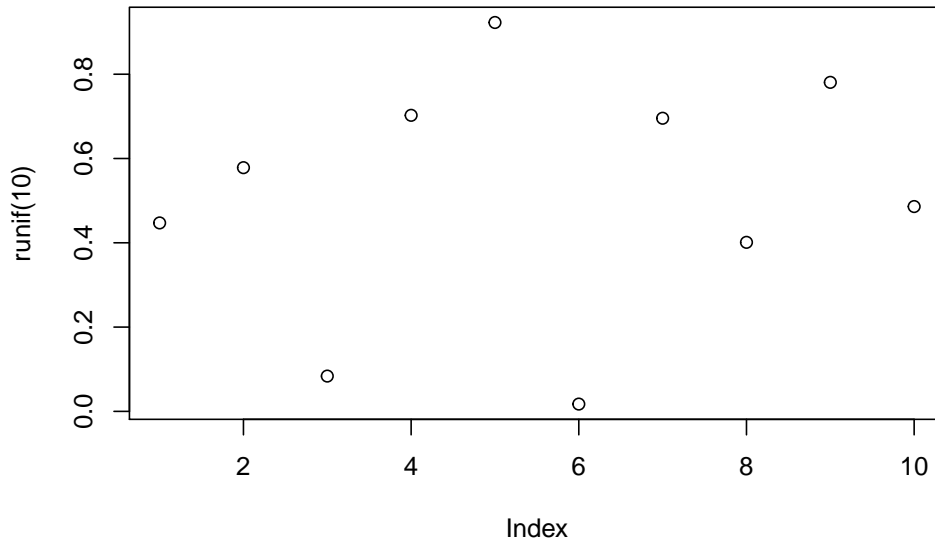


Figure 1: A figure.

While it possible to use standard Markdown syntax to include locally stored images, it's suggested to also use code chunks for these images. This makes it easy to format an image's appearance, add figure captions, and reference figures throughout the document (see below). The following figure is using a local image.

### 3.3 Cross-references

Using the Bookdown extension of R Markdown, it is possible to embed cross-references to different elements of the document.<sup>8</sup>

- `\@ref(section-id)` to reference sections, e.g., see Section 2.
- `\@ref(fig:plot-name)` to reference figures, e.g., see Figure 1.
- `\@ref(eq:equation-name)` to reference equations, e.g., see Equation (1).

## 4 Random tips and tricks

- To make on-the-fly changes to the layout
  - use `header_includes` in the YAML header to add code to the  $\text{\LaTeX}$  preamble or
  - put a modified class file in the same directory as the `.Rmd` file.
- To eliminate “overfull lines/boxes”
  - modify  $\text{\LaTeX}$ 's `\emergencystretch` parameter by including, e.g., `\setlength{\emergencystretch}{8em}` in the `.Rmd` file before the first overful box.
- To have URLs in figure captions be displayed with colored links
  - use `\url{}` around the URL.

## 5 Summary

This document gave a brief introduction on how to use R Markdown to generate reports in PDF format. For more thorough information on how to use R Markdown, see the following web resources:

- R Markdown guide
- R Markdown cookbook

<sup>8</sup>See <https://bookdown.org/yihui/bookdown/cross-references.html>.

- R Markdown for scientists
- Bookdown book

## References

- Hadash, Guy, Einat Kermany, Boaz Carmeli, Ofer Lavi, George Kour, and Alon Jacovi. 2018. “Estimate and Replace: A Novel Approach to Integrating Deep Neural Networks with Existing Applications.” *arXiv Preprint arXiv:1804.09028*.
- Kour, George, and Raid Saabne. 2014a. “Fast Classification of Handwritten on-Line Arabic Characters.” In *Soft Computing and Pattern Recognition (SoCPaR), 2014 6th International Conference of*, 312–18. IEEE.
- . 2014b. “Real-Time Segmentation of on-Line Handwritten Arabic Script.” In *Frontiers in Handwriting Recognition (ICFHR), 2014 14th International Conference on*, 417–22. IEEE.