

Research Education Seminar Series

Lecture 5



Alex Stephens, PhD, Director of Research

Basic outline

1. *Research Overview*

- Overarching aims of the research office
- Why do we engage in research?
- Simplified research framework
- Research translation framework
- Evidence-based practice pyramid

2. *Robust study design*

- Epidemiological methods – study designs
- Key elements of study validity and critical appraisal
- Measures of association
- Determining sample size – power analysis

3. *Analysis*

- Basic biostatistical methods and analysis

4. *Writing for research*

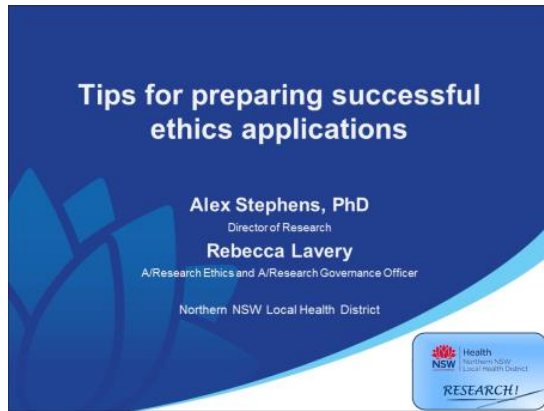
- Writing grants, papers and scientific presentations

5. *Ethics, governance and software*

- Research ethics and governance
- Research software

Research ethics and governance

- Tips for preparing successful ethics applications – *PowerPoint presentation*



Overview

- 1 Have a robust and high quality (human) research proposal drafted
- 2 Refer to the National Statement on Ethical Conduct in Human Research
- 3 Determine the “risk” of the research activity (negligible, low or higher than low)
- 4 Access the Human Research Ethics Application (HREA) by creating an account online, and carefully start the ethics application
- 5 Complete the site specific assessment (SSA) application and draft supporting documents (e.g. patient information sheet)
- 6 Submit application and supporting documents for review



- Our ethics and governance website:
<http://nswlhd.health.nsw.gov.au/about/northern-nsw-local-health-district/human-research-ethics-and-governance/>

Software for research

Surveys, data collection and database management



- Developed in 2004 by a multi-institution consortium led by Vanderbilt University as a secure data collection tool for clinical researchers
- REDCap is a very powerful tool for building and managing online surveys, data collection and databases.
- Is used as a secure, web-based application, with both online and offline development and data capture functionality

A screenshot of the REDCap website. At the top, there is a navigation bar with the REDCap logo and statistics: Institutions (2430), Countries (111), Projects (431k), Users (564k), and Articles (3678). Below the navigation bar, there is a section with a red pencil icon and text stating: 'The REDCap Consortium has 2,430 active partners in 111 countries. REDCap software has generated over 431,000 projects from over 564,000 users. 3,678 journal articles cite REDCap.' Below this text is a world map with red dots indicating the locations of REDCap users. A callout box points to Australia, stating 'Australia (95 institutions)'. To the right of the map, there is a section titled 'Services and Features' with a thumbs-up icon, listing: Surveys, Multi-site studies, Secure data collection, Scalable, Proven reliable since 2004, Online and offline, and Export to common statistics packages. Below this is a section titled 'How to Join?' with a globe icon, stating: 'REDCap is free to non-profit organizations who join the REDCap Consortium. More on joining the REDCap Consortium'. At the bottom of the map area, there are instructions: 'Double-click to zoom in.' and 'View full-screen map'.

- Very wide footprint – used all over the world with 95 institutions already registered in Australia alone
- Used by numerous Universities and also by other LHDs

Main features

- Secure and online
- Caters for multi-site access via computer or mobile device
- Fast and flexible
- Allows offline development and data capture (with subsequent transfer to project upon internet connection)
- Powerful survey design tool
- Basic reporting
- Exporting feature to multiple programs and packages including Excel, PDF and numerous statistical packages (R, SPSS, SAS, Stata)

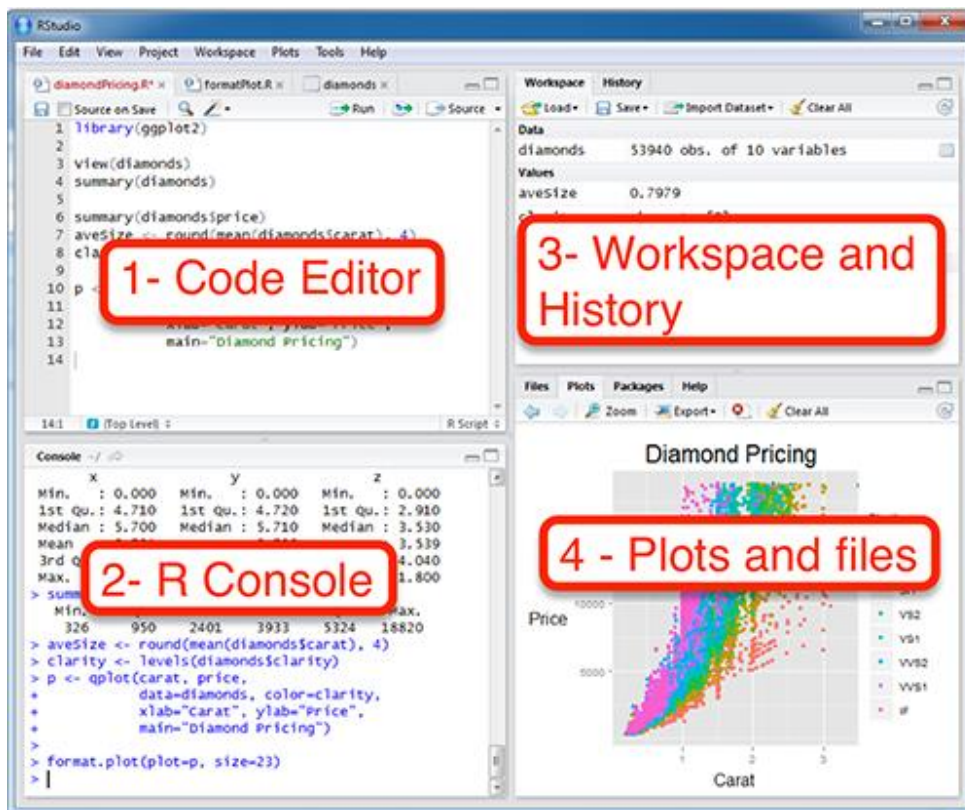
R statistical software



- The R project for statistical computing is an incredible, free, open source software for statistical analysis and graphics.
- R is underpinned by a multitude of packages that facilitate basic and advanced data and biostatistical analysis, and (very impressive) graphics.
- R is syntax-based – therefore, coding is required to run data manipulations and analysis.
- Although coding may appear to be time consuming, written code can be saved and run over again, or adapted to different projects → this will likely save time in the long run.



- A user friendly wrapper for R is R Studio, which provides graphical user interface (GUI)-type functionality, although coding is still required.
- Key elements include the code editor, R console, workspace and history, and plots and files consoles



- The program is incredibly flexible, catering for a vast suite of data manipulation and analysis techniques, and has excellent static and dynamic graphics and data presentation tools (including apps).

Main advantages

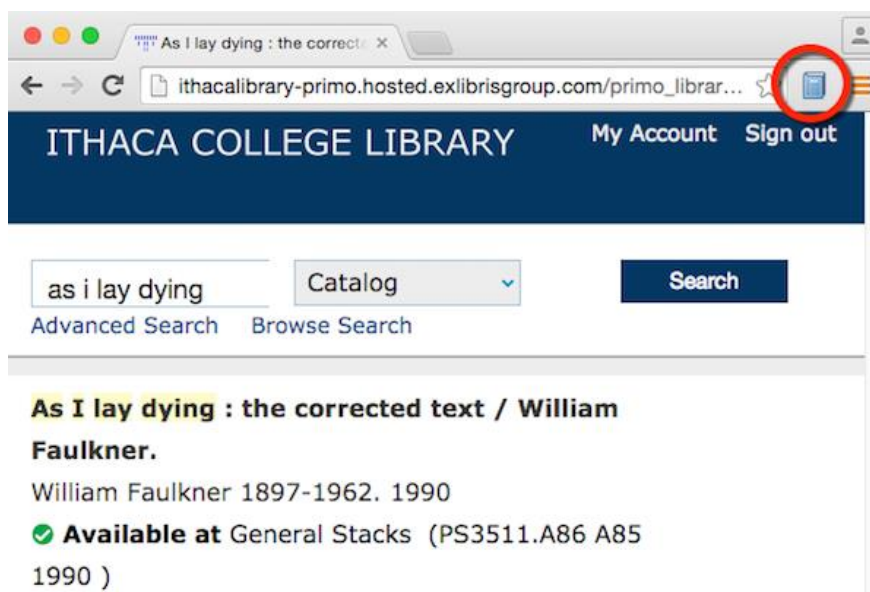
- Probably the most comprehensive statistical analysis software
- R (the programming language) is developed for statistical analysis by practicing statisticians
- Excellent graphical capabilities
- Free and Open Source
- Connects with many software and formats (e.g. CSV files, Microsoft Excel, SPSS, SAS, MySQL, Oracle)
- Extensive library of packages

Disadvantages

- Has a fairly steep learning curve to become familiar with programming language, although the language is intuitive and is of a similar level to other statistical program languages
- Documentation (for packages) can sometimes be difficult to follow

zotero

- <https://library.ithaca.edu/sp/subjects/zotero>
- Zotero [zoh-TAIR-oh] is a free, easy-to-use tool to help you collect, organize, cite, and share your research sources (<https://www.zotero.org>)
- Zotero allows you to capture and save bibliographic information about items found on the web
- Zotero software works on PC, Mac and Linux systems
- Bibliographic items are easily added to Zotero by clicking on an icon which appears in the browser toolbar once the program is installed



- Multiple item formats can be added to Zotero including library catalogues or databases, journal articles, or generic webpages (e.g. news site)
- If it's not possible to add an item from content, new items can be created and added manually in a variety of formats (e.g. book, book section, document, journal article).
- Bibliographies can be created from items saved in Zotero by simply selecting them, and clicking "Create Bibliography from Items...". Bibliographies can be created according to a number of styles.

- In-text citations can also be created (perhaps the most common and useful way to manage references) via the installation of plug-in in word processing software (e.g. Microsoft Word).