Introduction to Research Resources Document

This document contains an introduction to resources that medical students can partake in. This document includes information about grant writing, research software utilization, research conferences that medical students can present at, IRB processes, statistical research analysis, the different types of research students can get involved with, and an introduction to SciWheel Citations. The authors of this document include members of the COSGP National Research Committee.

Grant writing:

1. **Definition**:

Grant writing refers to the process of drafting and submitting a proposal to secure funding for a research project. There are a variety of funding organizations that award grants, such as government agencies, foundations, corporations, or even your school.

2. **Steps in Process/Explanation:**

- **Who can write grants?**
    - **Medical Students** can write grants, and there are plenty of grant opportunities aimed directly at students, though generally, you'll need a principal investigator (PI), such as a faculty member, to sponsor your grant application and oversee the project.
    - **Principal Investigators (PIs)** may lead the grant writing project, depending on the nature of the research project (ex., clinical research or larger projects). Often, students co-author grant proposals with a PI or faculty member leading the grant writing efforts, but students can be heavily involved and write portions of the proposal.
    - Grants may be a collaborative effort and involve teams, including students, faculty, and possibly external partners.

- **Do I need a PI to write a grant?** As a medical student, you will likely need a PI to support your grant application. Many institutions and funding agencies require a PI to oversee the project, and having an experienced PI can enhance the credibility of your grant proposal.
    - **How to Find a PI:** Look for faculty members who share your research interests. Send them an email and approach them with a well-thought-out idea to express your enthusiasm to contribute.
- **Do I need a research project that has already started to write a grant?** Not necessarily; you don't have to have a project already started, but preliminary research to identify a gap, highlighting the potential impact of your research on the field of study, a research question, a hypothesis, and clearly defined objectives and methods are all ways to strengthen your grant proposal.
    - **Does it need to be approved by an IRB already?** It depends; research involving human subjects will require IRB approval, but sometimes you can apply for grants prior to submitting for IRB approval. Projects such as systematic reviews and meta-analyses do not typically require IRB approval, but it's best to check with your institution first. Be sure to complete any required training, such as CITI certification (Collaborative Institutional Training Initiative) or other training that may be required for certain types of research.
    - **Do I need preliminary research?** You don't have to, but having some initial data or background work can strengthen your proposal. It shows that you've invested time and effort into the project, making it more credible. Also, this is always great to have when entering a meeting with a potential PI, too!
    - **Do I need to have a publication history to apply for grants? No!** While having previous publications is a great strength to your application, it's not always required. Focus on the quality of your proposal and your ability to carry out the research.
        - **Leverage Your PI's Experience:** If you don't have a strong publication history, your PI's credentials and publication record can help balance this out.

3. What types of grants are available to medical students?

- Internal vs. External Grants:
    - **Internal Grants:** Often offered by your institution or department, these grants are typically smaller and easier to apply for.
    - **External Grants:** These are offered by outside organizations, such as government agencies, foundations, or professional societies. They may offer more significant funding but can be more competitive.

- **Travel Grants:** For attending conferences or workshops related to your research.
- **Seed Grants:** Small grants that help you get a project started, often covering preliminary research or pilot studies.

4. Resources for students:

- **Institutional Resources:** Your school's research office or website often lists available grants. Also, faculty, mentors, and peers may know of opportunities that aren't widely advertised.
- **Databases and Online Resources:** Websites like Grants.gov, NIH RePORTER, or foundation directories are valuable tools.
- https://grants.nih.gov/grants/how-to-apply-application-guide.html
- https://grants.nih.gov/funding/searchguide/index.html#/
    - https://www.nichd.nih.gov/grants-contracts/funding-opps-and-notices
    - https://www.nia.nih.gov/research/grants-funding
- https://www.grants.gov/learn-grants/grants-101/
- https://reporter.nih.gov/
- https://new.nsf.gov/funding/opportunities
- https://ipr.osu.edu/sites/ipr.osu.edu/files/grant_writing_resources.pdf

Research software utilization:

1. Open Access Databases

The *All of Us* Research Program is a historic effort to collect and study data from one million or more people living in the United States. The goal of the program is better health for all of us. The *All of Us* Research Program allows researchers across a wide range of settings and institutions and at all stages of their careers (e.g., students, early-stage investigators) to execute rapid, hypothesis-driven research with just a computer and an Internet connection.

The NCI's Genomic Data Commons (GDC) provides the cancer research community with a repository and computational platform for researchers who need to understand cancer, its clinical progression, and response to therapy. Tools are provided to guide data submissions by researchers.

Connectome Workbench is an open source, freely available visualization and discovery tool used to map neuroimaging data, especially data generated by the Human Connectome Project. This workbench allows you to explore data and activity on the surface, as well as in the volume of the brain allowing researchers to see aspects of how age, growth, disease, and other factors can affect the ever-changing connections in the human brain.

2. Statistical Analysis

R: An open-source programming language and software environment for statistical computing and graphics.

Stata: Used for data analysis, manipulation, and professional graphics.

MATLAB: Useful for complex mathematical computations, simulations, and algorithm development.

bioRxiv: allow researchers to share preliminary findings quickly with the scientific community.

Zenodo: An open-access repository where researchers can share research outputs including papers, datasets, and other materials.

Coursera & edX: Offer courses on various research methods, data analysis techniques, and programming languages. Many courses are free or have financial aid options.

Research Conference Document:

This document contains a list of conferences where medical students can submit their research abstracts to. **Each conference is hyperlinked to the conference/association's website.**

Anesthesiology:

- American Society of Anesthesiologists (ASA)

Cardiology:

- American College of Cardiology
- American Heart Association
- Heart Rhythm Society (HRS)
- Society for Cardiovascular Angiography and Interventions (SCAI)

Dermatology:

- American Academy of Dermatology
- Society for Investigative Dermatology (SID): Image of Society for Investigative Dermatology

Emergency Medicine:

- American College of Emergency Physicians (ACEP)
- Society for Academic Emergency Medicine (SAEM)
- Emergency Medicine Residents' Association (EMRA)

Family Medicine:

- American Academy of Family Physicians (AAFP)
- Family Medicine Education Consortium (FMEC)
- Society of Teachers of Family Medicine (STFM)

Internal Medicine:

- American College of Physicians (ACP)
- Society of General Internal Medicine

Neurology:

- American Academy of Neurology (AAN)
- American Neurological Association (ANA)
- American Society of Neuroradiology (ASNR) Annual Meeting
- Society for Neuroscience (SFN)
- Child Neurology Society (CNS)

Neurosurgery:

- American Association of Neurological Surgeons (AANS)
- Congress of Neurological Surgeons (CNS)
- Walter E. Dandy Neurosurgical Society (WEDNS)

Obstetrics & Gynecology:

- The American College of Obstetrics and Gynecologists (ACOG)
- Society of Maternal-Fetal Medicine (SMFM)

Oncology:

- American Society of Clinical Oncology (ASCO)
- American Association for Cancer Research
- European Society for Medical Oncology (ESMO)

Orthopedic Surgery:

- American Academy of Orthopaedic Surgery (AAOS)
- Orthopedic Research Society
- American Orthopaedic Association (AOA)

Otolaryngology:

- American Academy of Otolaryngology - Head and Neck Surgery (AAO-HNS)
- American Laryngological Association (ALA)
- American Rhinologic Society (ARS)

Pathology:

- College of American Pathologists (CAP)
- American Society for Clinical Pathology (ASCP)
- United States and Canadian Academy of Pathology (USCAP)

Pediatrics:

- American Academy of Pediatrics (AAP)
- Society for Pediatric Research (SPR)

Physical Medicine and Rehabilitation:

- American Academy of Physical Medicine and Rehabilitation (AAPM&R)
- Association of Academic Physiatrists (AAP)

Psychiatry and Behavioral Health:

- American Psychiatric Association (APA)
- American Association of Child and Adolescent Psychiatry (AACAP)

Public Health:

- American Public Health Association (APHA)

Radiology:

- American College of Radiology (ACR)
- American Society of Neuroradiology (ASNR) Annual Meeting
- Association of University Radiologists (AUR)
- Radiological Society of North America (RSNA) Annual Meeting
- Society of Radiologists in Training (SRT) Annual Educational Conference
- The European Society of Radiology (ESR) Congress

Surgery:

- American College of Surgeons (ACS)
- Association of Surgical Educators (ASE) Annual Meeting
- The Society for Academic Emergency Medicine (SAEM) Annual Meeting
- The Surgical Outcomes Club (SOC) Annual Meeting

Urology:

- American Urological Association (AUA)
- Endourological Society
- European Association of Urology (EAU) Congress
- European Urology Residents Education Programme (EUREP)
- Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction
- Society of Urologic Oncology (SUO) Annual Meeting
- The Section of Urology of the American Academy of Pediatrics (SAU AAP) Annual Meeting

Other:

- AcademyHealth
- American Federation for Medical Research
- American Medical Student Association (AMSA)
- American Medical Student Research Symposium (AMSRS)
- American Society of Tropical Medicine and Hygiene 72nd Annual Meeting
- Asian Pacific American Medical Student Association
- Association of American Medical Colleges (AAMC)
- European Medical Students' Association (EMSA) Conferences
- Institute for Healthcare Improvement
- International Congress of Medical Students (ICMS)
- International Conference for Healthcare and Medical Students (ICHAMS)
- North American Primary Care Research Group (NAPCRG)
- Research!America National Health Research Forum

- Student National Medical Association (SNMA) Annual Medical Education Conference
- The Student National Medical Association

Use this Google form to submit more research conferences to be added to this document.

IRB processes:

The Institutional Review Board (IRB) is a committee established to review and approve research involving human subjects. Its primary purpose is to ensure that the rights, welfare, and safety of participants are protected. The history and evolution of the IRB reflect broader developments in the ethical oversight of research. The IRB is a cornerstone of ethical research practices, developed in response to historical abuses and evolving ethical standards. It plays a crucial role in safeguarding participants and ensuring the integrity of research.

History

- **Early 20th Century**: The origins of ethical oversight in research can be traced to various abuses in medical and behavioral research, particularly those revealed in the early to mid-20th century. Notable among these were the **Nazi human experiments** during World War II and the **Tuskegee Syphilis Study** in the United States.
- **Nuremberg Code (1947)**: The Nuremberg Trials, held after World War II, led to the creation of the Nuremberg Code, which established principles for conducting ethical research, emphasizing informed consent and the necessity to avoid harm.
- **Declaration of Helsinki (1964)**: The World Medical Association adopted this declaration, further emphasizing ethical principles for medical research involving human subjects, including the need for research protocols to be reviewed by independent committees.
- **Belmont Report (1979)**: Following the Tuskegee Syphilis Study revelations, the U.S. government established the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. The Belmont Report outlined three fundamental ethical principles: respect for persons, beneficence, and justice. This report became the foundation for modern IRB regulations.
- **Federal Regulations (1981 & 1991)**: The U.S. government established formal regulations for the protection of human subjects, known as the **Common Rule**. These regulations mandate that research involving human subjects conducted or supported by federal agencies must be reviewed by an IRB. The regulations were updated and became widely known as the **1991 Common Rule**, with significant revisions occurring in 2018 to modernize and clarify requirements.

1. Purpose and Function of the IRB

The IRB is a committee established to review and approve research involving human subjects. The primary purpose is to protect the rights, safety, and well-being of participants. The IRB ensures that research is conducted in accordance with ethical principles, particularly the Belmont Report's principles of respect for persons, beneficence, and justice.

1. **Protect Human Subjects**: Ensure that the rights, safety, and well-being of research participants are upheld. This includes verifying that risks are minimized, benefits are maximized, and subjects give informed consent.
2. **Ethical Review**: Evaluate research proposals to ensure they comply with ethical standards and federal regulations. The IRB reviews the study's design, procedures, and the process for obtaining informed consent.
3. **Oversight and Monitoring**: Provide ongoing oversight of approved research, ensuring compliance with approved protocols, and monitoring for any adverse events or deviations from the approved procedures.
4. **Legal Compliance**: Ensure that research complies with local, national, and international laws governing human subjects research.

2. Types of IRB Review

IRB reviews are generally categorized into three types, depending on the level of risk involved in the study:

- **Exempt Review**: Research involving minimal risk and fitting specific categories may be exempt from full IRB review. Examples include studies involving anonymous surveys or educational tests.
- **Expedited Review**: Research involving no more than minimal risk and fitting certain categories may undergo expedited review. This review is conducted by the IRB chair or a designated reviewer, not the full board.
- **Full Review**: Research involving more than minimal risk, vulnerable populations (e.g., children, prisoners), or sensitive topics requires a full board review. The entire IRB committee must review the research proposal.

3. IRB Application Process

The process typically involves the following steps:

1. **Preparation of Research Proposal**: Researchers must prepare a detailed research proposal outlining the study’s objectives, methodology, participant recruitment, consent process, and data handling procedures.
2. **Submission to the IRB**: The completed proposal is submitted to the IRB for review. This submission includes all relevant documents such as consent forms, recruitment materials, and questionnaires.
3. **IRB Review and Feedback**: The IRB reviews the submission, focusing on the ethical implications of the study. The IRB may request revisions, ask for additional information, or approve the research as submitted.
4. **Approval and Monitoring**: Once approved, the research can commence. The IRB may require periodic updates or monitoring to ensure ongoing compliance with ethical

standards. Any modifications to the research must be approved by the IRB before implementation.

4. Informed Consent

Informed consent is a cornerstone of ethical research. It involves providing potential participants with clear and comprehensive information about the study, including its purpose, procedures, risks, benefits, and their rights as participants. The consent process must ensure that participants understand this information and voluntarily agree to participate.

5. Continuing Review and Amendments

- **Continuing Review:** For studies that require it, the IRB conducts ongoing reviews at least annually to ensure continued compliance with ethical standards. The level of continuing review depends on the risk level of the research.
- **Amendments:** Any changes to the research protocol after IRB approval must be reviewed and approved by the IRB before implementation. This includes changes to the study design, procedures, or consent forms.

6. IRB Compliance and Reporting

Researchers are required to report to the IRB any adverse events, unanticipated problems, or deviations from the approved protocol. Failure to comply with IRB requirements can result in suspension or termination of the research and possible legal or professional consequences.

7. Challenges and Considerations

- **Ethical Dilemmas**: Balancing the need for research with the protection of participants can present ethical challenges, particularly in studies involving vulnerable populations or sensitive topics.
- **Regulatory Compliance**: Researchers must comply with both institutional policies and federal regulations, such as the Common Rule (45 CFR 46), which governs the protection of human subjects in the U.S.
- **Global Research**: Conducting research in international settings adds layers of complexity, as researchers must navigate varying ethical standards and cultural considerations.

8. Conclusion

The IRB process is fundamental to ethical research involving human subjects. It serves as a safeguard to protect participants, ensure ethical conduct, and maintain public trust in research. While navigating the IRB process can be complex, it is an essential aspect of conducting responsible and ethical research.

9. Step by Step Requirements

The process for obtaining IRB (Institutional Review Board) approval involves several steps and requires various resources to ensure that the proposed research is ethical and complies with federal regulations. Below is an overview of the typical steps and resources needed:

Determine if IRB Review is Required:

Consult Guidelines: Determine whether your research involves human subjects and if it requires IRB review. Research involving human subjects typically includes interactions with individuals or the use of identifiable private information.

Exemptions: Some research may be exempt from IRB review if it involves minimal risk or certain categories like educational settings or public behavior observations. Check with the IRB to confirm.

Complete Required Training:

Human Subjects Protection Training: Complete training on the protection of human subjects. Many institutions require researchers to complete the CITI (Collaborative Institutional Training Initiative) program or a similar course.

Certification: Obtain a certification of completion, which is often required as part of the IRB application.

Prepare Your Research Protocol:

Research Plan: Develop a detailed research plan that outlines your study's objectives, methodology, participant recruitment, data collection methods, and analysis.

Informed Consent Documents: Create informed consent forms that clearly explain the study's purpose, procedures, risks, benefits, and the rights of participants.

Data Management Plan: Include how you will handle, store, and protect data, especially if sensitive information is involved.

Submit the IRB Application:

Application Form: Complete the IRB application form, providing detailed information about your study, including the research protocol, informed consent documents, recruitment materials, and any other relevant documents.

Supporting Documents: Attach all required supporting documents, such as surveys, questionnaires, or recruitment flyers.

Review Type: Indicate the type of review requested (exempt, expedited, or full review), based on the risk level of the research.

IRB Review Process:

Pre-Review: The IRB office may conduct a pre-review to check for completeness and compliance with submission requirements.

IRB Committee Review: Depending on the study's risk level, the IRB will conduct an exempt, expedited, or full board review. During this review, the IRB assesses the ethical aspects of the study, including risks, benefits, and participant protections.

Revisions and Resubmission: The IRB may request modifications to the protocol or informed consent documents. You will need to make these changes and resubmit for approval.

Receive IRB Approval:

Approval Letter: If the IRB approves your study, you will receive an approval letter or certificate outlining any conditions or ongoing requirements, such as progress reports or continuing review.

Approval Number: This number must be included in all communications about the study, such as recruitment materials.

Conduct the Research:

Follow Approved Protocol: Conduct your study exactly as approved by the IRB. Any deviations or modifications must be reported to the IRB and approved before implementation.

Monitor and Report: Report any adverse events, unanticipated problems, or deviations to the IRB promptly.

Continuing Review and Final Report:

Ongoing Review: For studies lasting more than a year, the IRB may require an annual review or continuing review.

Final Report: Once the study is completed, submit a final report to the IRB, including a summary of the results and confirmation that all participant data has been handled as per the approved protocol.

Resources Needed

Institutional Resources:

IRB Office: Your institution's IRB office is the primary resource for guidance, forms, and submission portals.

Institutional Policies: Review your institution's specific policies and guidelines for human subjects research.

Training Programs:

CITI Program: Offers courses on human subjects research ethics and compliance.

NIH Training: The National Institutes of Health also provide human subjects research training resources.

Templates and Forms:

Informed Consent Templates: Use standardized templates provided by your IRB for creating consent documents.

IRB Submission Forms: Download and complete all required IRB submission forms from your institution’s IRB website.

Guidelines and Regulations:

Belmont Report: Familiarize yourself with the ethical principles outlined in the Belmont Report.

Common Rule: Understand the federal regulations under the Common Rule that govern IRB review.

Collaboration:

Faculty Advisors/Mentors: Especially for student researchers, faculty advisors can provide valuable guidance in navigating the IRB process.

Colleagues and Peers: Consult with colleagues who have experience with the IRB process for advice and review of your application materials.

These steps and resources provide a comprehensive roadmap for obtaining IRB approval, ensuring that your research is ethically sound and compliant with regulatory standards.

References

- U.S. Department of Health and Human Services. (2018). *45 CFR 46: The Common Rule*. Retrieved from HHS.gov.
- National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. (1979). *The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research*. Retrieved from HHS.gov.
- Office for Human Research Protections (OHRP). (2021). *Institutional Review Boards (IRBs) and Protection of Human Subjects*. Retrieved from HHS.gov.

Other Resources:
https://www.youtube.com/watch?v=57EQt8xtwsc
https://www.hhs.gov/ohrp/register-irbs-and-obtain-fwas/irb-registration/new-irb-registration/index.html
https://opa.hhs.gov/sites/default/files/2020-07/opa-tip-sheet-irb.pdf

Introduction to Statistical Research Analysis:

Definition:

Statistical analysis in research objectively evaluates data, helping to determine whether results are significant or due to chance. It enhances the reliability and generalizability of the findings. The resources below contain general information on understanding statistics, what tests to use, and how to perform them through the program R-Studio.

Process:

1. Define Your Research Question and Hypotheses

- **Identify the problem**: Clearly state the research question you aim to answer.
- **Formulate hypotheses**: Develop null and alternative hypotheses.

2. Plan Your Research Design

- **Choose the study design**: Decide between experimental, observational, cross-sectional, etc.
- **Determine the sample size**: Use power analysis to ensure your sample size is adequate.
- **Select sampling method**: Random, stratified, cluster, etc.

3. Collect Data

- **Data collection methods**: Surveys, experiments, observational studies, etc.
- **Ensure data quality**: Use reliable and valid instruments.

4. Prepare Data for Analysis

- **Data cleaning**: Handle missing data, outliers, and errors.
- **Data coding**: Convert categorical data into numerical form if necessary.
- **Data transformation**: Normalize or standardize data if required.

5. Conduct Descriptive Statistics

- **Summarize data**: Calculate mean, median, mode, standard deviation, etc.
- **Visualize data**: Use histograms, bar charts, box plots, etc.

6. Perform Inferential Statistics

- **Choose appropriate tests**: T-tests, ANOVA, chi-square tests, regression analysis, etc.
- **Check assumptions**: Ensure data meets the assumptions of the statistical tests.
- **Run the analysis**: Use statistical software like SPSS, R, or Python.

7. Interpret Results

- **Evaluate significance**: Look at p-values, confidence intervals, and effect sizes.
- **Draw conclusions**: Relate findings back to your hypotheses and research question.

8. Report Findings

- **Write a report**: Include introduction, methods, results, and discussion sections.
- **Use APA style**: Follow guidelines for formatting and citing sources.

9. Validate and Reproduce

- **Peer review**: Have your analysis reviewed by others.
- **Reproducibility**: Ensure your methods and results can be replicated.
- https://www.skillsyouneed.com/num/simple-statistical-analysis.html

Types of Statistical Tests

Parametric Tests

1. **Assumptions:**
   - Data follows a specific distribution, usually normal.
   - Homogeneity of variance (equal variances among groups).
   - Interval or ratio level of measurement.
2. **Examples:**
   - **T-tests**: Compare means between two groups.
   - **ANOVA (Analysis of Variance)**: Compare means among three or more groups.
   - **Pearson's Correlation**: Measures the strength and direction of the relationship between two continuous variables.
3. **Advantages:**
   - Generally more powerful if assumptions are met.
   - Can provide more precise estimates.
4. **Disadvantages:**
   - Sensitive to outliers and deviations from assumptions.
   - Not suitable for small sample sizes or non-normal data.

Non-Parametric Statistical Tests

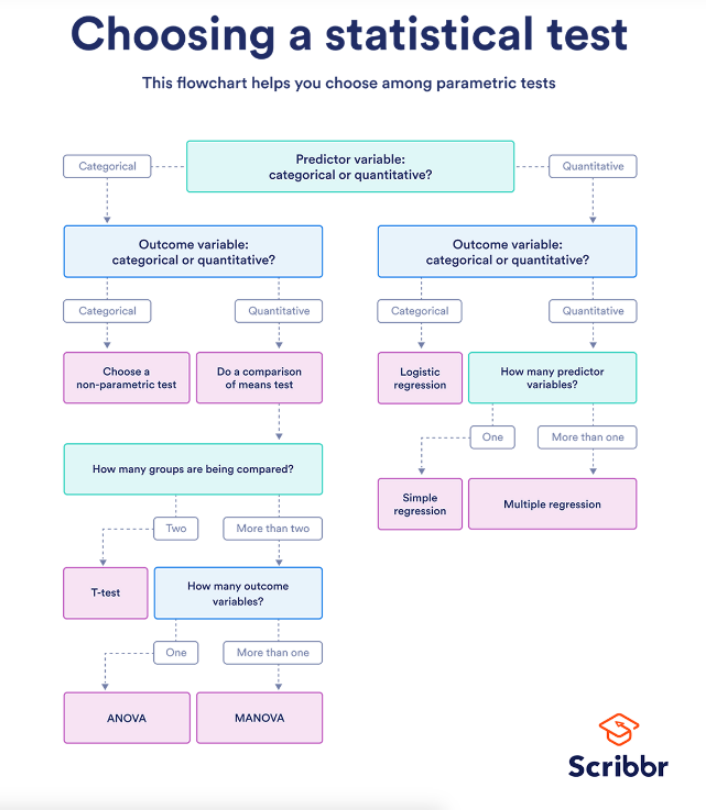
1. **Assumptions are NOT made about data**
   a. Can be used with data that is not normally distributed + data with no equal variances
   b. Used when assumptions of parametric statistical tests are NOT met
2. **Examples**
   a. **Wilcoxon Rank Sum test (Mann Whitney U test)** : compares differences between 2 groups of data
   b. **Chi-square of Indepence** : Determines whether 2 variables are independent
   c. **Cochran's Q test:** used to compare more than 2 groups of the data

3. **Advantages**
    a. Can be used when variable in test population is not normally distributed
    b. Computations can sometimes be easier than parametric counterparts
4. **Disadvantages**
    a. Less sensitive than parametric counterparts , larger differences are needed before null hypothesis can be rejected
    b. Uses less information than parametric tests → less specific results regarding descriptions of the median/mean values
    c. Less efficient due to requirement of a larger sample size needed to compensate for lowered sensitivity

How to Choose the Right Test

- **Data Type:** Determine if your data is continuous, ordinal, or nominal.
- **Distribution**: Check if your data meets the assumptions of normality.
- **Sample Size**: Consider the size of your sample; non-parametric tests are often better for small samples.
- **Research Question**: Align the test with your specific research question and hypotheses.

Flowchart : Choosing a Statistical test



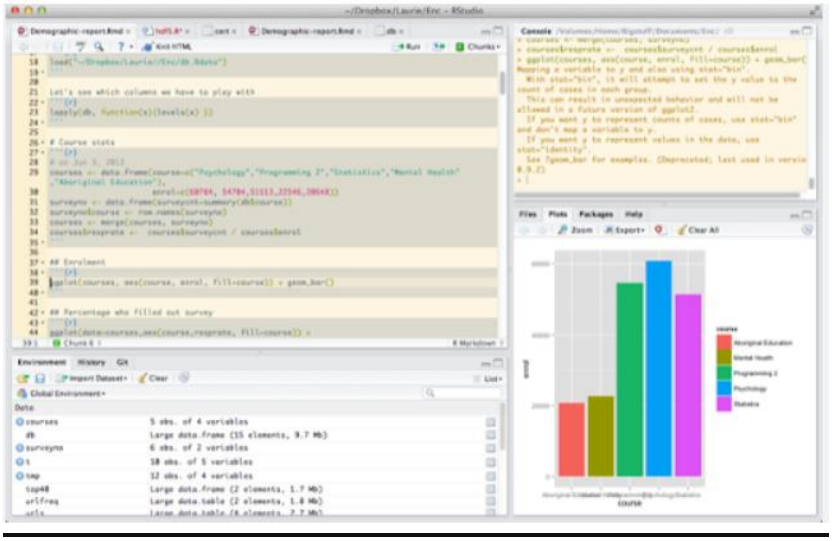
Using R-Studio to For Data Analysis

What is R-Studio?

Open source software that allows researchers to perform import, access, transform, plot and model data through visualization functions.

R Studio https://www.r-project.org/

R-Studio Interface



Advantages of R over Excel in Statistical Research

- Free and open source, whereas Excel is not
- R has a much larger user base and support community
- Contains a large library of built-in functions making it more capable of handling larger data sets and performing different statistical tests

Tutorial Videos for Setting up R and Basics of R for Statistical Computing

1. https://education.rstudio.com/learn/beginner/
2. https://www.youtube.com/watch?v=BvKETZ6kr9Q
3. https://www.youtube.com/watch?v=_V8eKsto3Ug

Resources for Students

Tutorial Videos for Setting up R and Basics of R for Statistical Computing

1. https://education.rstudio.com/learn/beginner/
2. https://www.youtube.com/watch?v=BvKETZ6kr9Q
3. https://www.youtube.com/watch?v=_V8eKsto3Ug

Different types of research students can partake in:

1. Basic Science Research

- **Laboratory-based studies:** Involves working in a lab setting, often with cell cultures, animal models, or biochemical assays.
- **Molecular biology:** Researching the molecular mechanisms underlying diseases.
- **Genetics and genomics:** Exploring genetic mutations and their effects on health.

2. Clinical Research

- **Patient-oriented research:** Involves studies that require direct interaction with patients, such as clinical trials, observational studies, and case studies.
- **Epidemiological research:** Focuses on studying the distribution and determinants of health-related states or events in specific populations.
- **Outcomes research:** Examines the results of healthcare practices and interventions to determine their effectiveness.

3. Translational Research

- **Bench-to-bedside studies:** Translating laboratory findings into clinical applications.
- **Clinical trials:** Involvement in the testing of new treatments, drugs, or medical devices.
- **Implementation science:** Researching the best ways to implement evidence-based practices in healthcare settings.

4. Public Health Research

- **Community-based research:** Working on projects that focus on public health issues, preventive medicine, or health education.
- **Global health research:** Addressing health disparities and challenges in different populations worldwide.

5. Medical Education Research

- **Curriculum development:** Researching effective teaching methods and educational tools in medical education.
- **Assessment studies:** Evaluating the effectiveness of different assessment methods used in medical training.

6. Health Policy Research

- **Policy analysis:** Researching the impact of healthcare policies on patient outcomes, access to care, and public health.
- **Healthcare systems:** Investigating the functioning and efficiency of healthcare systems and services.

7. Ethics Research

- **Bioethics:** Exploring ethical issues in medicine, such as consent, confidentiality, and end-of-life care.
- **Medical ethics:** Researching the moral implications of medical practices and innovations.

8. Interdisciplinary Research

- **Collaborative projects:** Working with other disciplines, such as engineering, psychology, or social sciences, to address complex health issues.
- **Artificial intelligence in medicine:** Researching the application of AI and machine learning in diagnostics, treatment planning, and healthcare delivery.

9. Case Studies and Literature Reviews

- **Case reports:** Documenting and analyzing unusual or rare clinical cases.
- **Systematic reviews and meta-analyses:** Summarizing existing research on a specific topic to provide comprehensive insights.

10. Quality Improvement (QI) Projects

- **Process improvement:** Working on projects that aim to improve the quality and safety of patient care within healthcare institutions.
- **Patient safety:** Researching strategies to reduce medical errors and enhance patient safety.

SciWheel citations:

Definition:

Schiwheel is a reference management tool often used by researchers and students for managing references, creating bibliographies, and organizing research notes.

Process:

1. Sign Up and Install

- **Sign Up:** Create an account on the Sciwheel website.
- **Install the Browser Extension:** Sciwheel offers a browser extension that allows you to capture references directly from web pages.
- **Install the Word Plugin:** For easy citation management within your documents, install the Sciwheel plugin for Microsoft Word.

2. Adding References

- **From Web Pages:** Use the browser extension to capture references while browsing. Just click the Sciwheel icon when on a page with a reference you'd like to save.
- **Manual Entry:** You can also add references manually by selecting "Add Reference" and entering the details yourself.
- **Importing from Databases:** Import references from databases like PubMed, Google Scholar, or by uploading a BibTeX file.

3. Organizing References

- **Projects and Folders:** Organize your references into projects and folders for easy access.
- **Tags:** Use tags to label and categorize references.
- **Notes:** Add notes or annotations to references to keep track of important details.

4. Using References in Writing

- **Inserting Citations:** When writing a document in Word, use the Sciwheel plugin to insert citations. Select the references from your Sciwheel library, and the plugin will format the citation according to the style you choose.
- **Bibliography:** Sciwheel can automatically generate a bibliography in your document based on the citations you've inserted.

5. Collaborating with Others

- **Sharing Projects:** You can share your reference collections with collaborators by inviting them to your projects within Sciwheel.
- **Teamwork:** Work together on projects by managing and organizing references as a team.

6. Exploring Additional Features

- **Literature Search:** Use Sciwheel's built-in search tools to find new papers and references.
- **Smart Reading:** Use the tool to keep track of what you've read and what you plan to read, organizing papers by priority and relevance.