

Guidelines on Writing a Proposal or Grant

The purpose of these guidelines is to provide guidance for both student researchers and faculty mentors. Use these as general guidelines. There are several ways to organize the subheadings of your proposal or grant, and these should be specific to the granting agency or committee. Be sure to check for specific formatting guidance of the granting agency or committee.

Main Sections of a proposal or grant

1. Project Summary
2. Project Description
 - A. Introduction
 - B. Literature Review
 - C. Methods
 - D. Research preparation
 - E. Significance (Intellectual Merit & Broader Impacts)
3. References
4. Budget & Budget Justification (if applicable)

1. Project Summary

- In some ways, this is the MOST impactful section of the grant/proposal.
- This is usually written last.
- This should be succinct; similar to an abstract.
- This answers the “What”, “How”, and “Why” of your project.
- The **overall goal** of this section is to introduce and give an overview of your project.
- Include a summary of the main points of the proposal, research questions, specific aims, methods, significance (intellectual merit and broader impact).
- Do NOT include specific hypothesis predictions or a literature review here. (Those will be detailed in your project description).

2. Project Description - Introduction (1-3 paragraphs)

- Provide a statement of the problem(s) you are addressing: Briefly explain what we already know, what we don't know or have left to learn ("the hole" that your project will "fill"), and how your project will address this.
- Clearly and succinctly summarize the motivation or impetus for your study (why should we care?)
- Outline your **research goals and objectives**
 - Goals vs. Objectives:
 - Goals explain what you hope to achieve. They express a general intention, they are broader, and intangible.
 - Objectives define strategies of how you will attain your goals. They are narrower, more precise, and tangible.
- Outline your **research questions or hypotheses**
 - Questions vs. Hypotheses:
 - What are the specific questions that guide your research?
 - Hypotheses are testable causal explanations, and are usually framed as specific prediction generated by a guiding theory.
- This gives an overview of your **specific aims** & how these will be accomplished (which is a brief foreshadowing of your methods but not overly detailed methodology here. That belongs in the methods section).
- Suggests the **importance/ significance and timeliness** of your research
- This section "sells" your proposal.
- First sentence of last paragraph might begin with statements such as "The objective of this study is ...", "I propose to clarify...." , "This study aims to advance and determine the utility of...." etc.

3. Literature Review

- This is NOT a general review of research but rather a strategic review of relevant research with specific goals in mind.
 - What has been done before (cite, cite, cite), what's left to answer, how might your question augment this.
- This "frames" your questions
- It should underline the gaps in our previous knowledge & how your project might fill them.
- What do I need to know in order to understand why this is an important question?
- Builds support for your hypotheses and research methodology (why are you using particular methods?)

- Please consult the medical librarians. They can find articles you can't

4. Methods

- This is the “People, places, things!” of your study.
- This includes samples, methods of data collection, data analysis (including specific statistics).
- This includes any previous pilot data, if applicable.
- Many granting agencies will ask you to include your timeline of project completion, data storage/protection, and projected dissemination within this section. (How long will it take, how will you preserve the data, where/to what audience do you plan on presenting or publishing this?)
- This section should have sufficient detail to allow a colleague to reproduce your study

5. Research preparation (if applicable)

- This speaks to your “research competence”- are YOU qualified to conduct this study? It is an argument that you are the right person to do this project and can carry it to completion.
- Discuss relevant aspects of your research, training, etc.
 - What is your experience related to this study specifically or research in general? (What training did you complete or approvals/ permissions that you acquired to do this research or gain access? Are you experienced in using these methods? Do you need informed consent? IRB approval? Is there a conflict of interest?)

6a. Significance- intellectual merit (WHEN APPLICABLE)

- How does your project advance theoretical understanding of the problem you outline in the introduction?
- How does it contribute to generalized knowledge both within your discipline and beyond?
- How does it apply to other future studies?

6b. Significance - broader impacts (WHEN APPLICABLE)

- This section may or may not be applicable and usually only required for grants (in particular NSF) but not proposals.
- These are the practical implications of your study to society, the community, the medical field, a marginalized or underrepresented population, etc.
- How does it contribute to the training or education to any of those groups?

5 Common Mistakes to Sink your Proposal

1. Your central scientific question is not sufficiently interesting
2. The preliminary data you present are weak and call into question the feasibility of the proposal and the validity of your central hypothesis
3. The overall success of the proposal is dependent on the outcome of a key experiment which has yet to be performed
4. The scope of the project is too ambitious, with multiple hypotheses or rationales that pull the proposal in disparate directions
5. The PI and/or research team lack the experience to carry out the proposed work

Some general info on Scientific writing :

- Topic sentences as the first sentence of each paragraph. (e.g. “Numerous studies suggests that X “.
- Tie-in sentences as the last sentence at the end of each paragraph & ties it back to your project. (e.g. “While much research has been done on X, it is still unclear if”).
- Start with what we already know, what we know less about (“the hole”), and then how your project will address this.
- Clear, concise, readable, persuasive, use active voice (rather than passive).
- Avoid jargon, avoid needless words (e.g. actually, quite, indeed, surely, etc.), limit use of acronyms (redefine them once in each new section).

Examples of a scholarly project description:

“Femoral neck-shaft angle (NSA) is a measure of the medial inclination of the proximal femur [Martin No. 29 (Bräuer, 1988)]. It varies widely during growth, across geographic space, and across temporal periods. In general, there is a trend of increasing femoral inclination throughout the Holocene with the transition from hunting and gathering to urban, or industrial, societies (Anderson & Trinkaus, 1998, Backman, 1957; Larsen,

1995, 1997; Pearson & Buikstra, 2006; Ruff, Larsen, & Hayes, 1984). While a large body of research has been directed toward documenting this variation (Frankel, 1960; Garden, 1961; Henriksson, 1980; Hoaglund & Low, 1980; Inman, 1947; Isaac, Vettivel, Prasad, Jeyaseelan, & Chandi, 1997; Pick, Stack, & Anson, 1941; Reikeras & Hoiseth, 1982; Reikeras, Hoiseth, Reigstad, & Fönstelién, 1982, 1983; Sears, 1898), debates as to the functional and mechanical significance of this variation are ongoing. Specifically, it is unclear if population differences in adult NSA are stimulated by differences in activity levels between groups (Anderson & Trinkaus, 1998; Houston & Zaleski, 1967; Humphry, 1889; Trinkaus, 1993; Walmsley, 1915); or, if they are a secondary consequence of climate-induced body proportions (Gilligan, 2010; Gilligan, Chandraphak, & Mahakkanukrauh, 2013; Weaver, 2003). This study examines the proposed relationship between NSA and relative body mass over the course of development in a sample of geographically diverse immature remains which differ in body form.”

“Several studies have examined factors that may influence the likelihood of the pursuit of a medical degree, and suggest that these influential factors differ between males and females and that these career decisions are often made early in their academic life (Knight and Mattick, 2006; McHugh et al., 2011; Millan et al., 2005; Sianou-Kygiou and Tsiplakides, 2001; Teppo et al., 2015; Wierenga et al., 2003). Current data suggest that although the number and percentage of females pursuing a medical education is rising, a disproportionately lower number of females decide to matriculate compared to males, particularly in osteopathic medical schools (AACOMAS Reports). Within our own (ICOM) 2018 inaugural class, the numbers are even further skewed toward males compared to females (64.6% vs. 35.4%). This study attempts to gain a better understanding of the potential motivations and reservations or barriers in students’ decisions to pursue a medical education, and how we might utilize this understanding to better guide the design of outreach programs targeting underserved populations within our community.”

“The aim of this initial study is to lay the groundwork for further research about how philosophical assumptions affect physicians’ clinical reasoning, patient interactions, and patient outcomes by: 1) further establishing existing survey instruments that are designed to assess a person’s philosophical assumptions, and 2) describing a baseline distribution of philosophical assumptions among medical school faculty....Our hypothesis is that faculty in traditionally holistic fields (like osteopathic medicine or family medicine) will likely have more holistic philosophical assumptions, and faculty in traditionally reductionistic fields (like allopathic medicine or medical sub-specialties) will likely have more reductionistic philosophical assumptions.”

“Deaf users of American Sign Language (ASL) are regularly denied appointments when requesting the services of a sign language interpreter. This is especially problematic when Deaf individuals seek healthcare information and basic care (1). However, little research exists that clearly identifies the level of health disparities Deaf ASL users face, and just how educated healthcare professionals are about how to give their patients equal access to care. Understanding when, how, and how often Deaf users of ASL are denied appointments and/or the services of a sign language interpreter services...would be a meaningful advance in the reduction of the significant health disparities that Deaf ASL users currently face.”

“Reconstruction of activity patterns from the morphology of the human skeleton relies on the developmental plasticity of skeletal traits. In the lower limb, cross-sectional geometry and functional angles are two sources of data commonly used to infer activity patterns of past populations. Although independent research on CSG and femoral angles have highlighted their adaptive response to mechanical loading, the direct relationship between these two indicators of activity has not yet been explored. The purpose of this study is to”