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Position Stand

Ethical Issues Relating to Scientific Discovery in Exercise Science

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ABSTRACT

International Journal of Exercise Science 12(1): 1-8, 2019. This work aims to present concepts related to ethical issues in conducting and reporting scientific research in a clear and straightforward manner. Considerations around research design including authorship, sound research practices, non-discrimination in subject recruitment, objectivity, respect for intellectual property, and financial interests are detailed. Further, concepts relating to the conducting of research including the competency of the researcher, conflicts of interest, accurately representing data, and ethical practices in human and animal research are presented. Attention pertaining to the dissemination of research including plagiarism, duplicate submission, redundant publication, and figure manipulation is offered. Other considerations including responsible mentoring, respect for colleagues, and social responsibility are set forth. The *International Journal of Exercise Science* will now require a statement in all subsequent published manuscripts that the authors have complied with each of the ethics statements contained in this work.

KEY WORDS: Research design, conducting scientific methodology, dissemination of findings

INTRODUCTION

The *International Journal of Exercise Science* has published research in the movement science field for over a decade. During this time period we have seen subtle shifts in the landscape of how research is designed and conducted. Early on, we noted an issue with document originality, which lead to a position stand against plagiarism and where we proffered solutions (8). Since that time, we have incorporated an originality check as part of our pre-review process. As the maturity of the journal has progressed, we once again have noted a pressing need to address ethical issues, this time of a more global nature relating to the entire scientific process. As we are a student-focused journal, our aim is to present these topics as simply as possible and to promote these ideals so they become ingrained in future generations of exercise scientists. Toward this end, we will now require a statement in all published

manuscripts within the journal that authors have complied with each of the ethics statements below.

RESEARCH DESIGN

Authorship

Conducting research, publishing, and engaging in creative endeavors is critical for career advancement as well as professional development. By engaging in research, you advance the scope of your knowledge, expand your network for collaborations, and contribute to the body of work in your area of expertise. Authorship is the most visible and accepted method to recognize your own contributions to a project, as well as those from other collaborators who may have contributed to the project (1). Prior to beginning a project, it is good practice for there to be an open discussion between individuals involved in the investigation to determine who will be included as authors, the expectation for authorship, and the order individuals will be listed on the publication(s). Those who make substantial intellectual contributions to the work should be included as an author, and others should be acknowledged for their involvement. Honorary or guest authorship is not permitted or ethical. Neither acquisition of grant funding nor provision of materials or technical services are in themselves sufficient contributions to justify authorship, regardless of whether they may be essential to the project.

One qualifies as an Author provided the following stipulations are met:

1. Contribution to the concept, design, review, analysis, or data interpretation of the creative work or research study;
2. Participation in the drafting or editing of the manuscript or creative work;
3. Final approval of the manuscript or creative work prior to publication; and
4. Ability to present the findings of the project at a professional conference or other scholarly setting (9).

The practice of leaving an individual who earned recognition off the authors list is equally unjust. Students participating in the research process may work more in the apprentice realm, but if significant contributions were made, they should be included on the authors list.
Contributions to a project that do not qualify for authorship should be acknowledged separately according to journal guidelines or disciplinary standards. Contributions to a project that do not qualify for authorship may include, for example, assistance in obtaining external funding or providing technical support (9).

Lead authors and subsequently listed authors, regardless of the order, share certain responsibilities equally. Although the lead author is similar to a project manager, in that he/she is responsible for all of the heavy lifting and major logistical needs of a research project, subsequently listed authors all shoulder certain ethical responsibilities. All authors listed share the responsibility of maintaining academic integrity of the project. Additionally, all authors should be given equal input and are held equally responsible for the final presentation of the project (i.e. submitted manuscript, poster presentation, etc.). The lead

author is responsible for ensuring that all authors feel comfortable with the validity and ethics employed in creating the final project (9).

Sound Research Practices

As a researcher, it is important to know, understand, and employ sound practices. Examples of these basic processes are acquiring approval from your institutional review board, controlling for all anticipated variables that might affect your results, managing your data, and using the most appropriate statistical analysis to evaluate and interpret your data. Violating any of these, whether by omission or commission, can be considered unethical.

Approval from your institutional review board is an absolute necessity if the research includes use of human or animal subjects. This pre-approval must be explicitly stated in the Methods section of any paper submitted for possible publication. Failure to obtain or include this information will almost always result in immediate rejection.

Controlling for all possible variables is important to eliminate bias and reduce the effects of any confounding (unanticipated) variables on the research data. Failure to adequately control variables is poor research design. This oversight will lead to invalid data, and attempts to present or publish invalid data is unethical.

A researcher must always manage her/his data in an organized manner. Depending on the nature of the study and the equipment being utilized, research data are often collected and stored on the hard drive of a research modality. If this is the case, there should be a secure login to protect the data and prevent non-researchers from accessing the data. To safeguard against losing data due to computer error, all data should also be collected or replicated on hard copy sheets. These physical data sheets are to be categorized based on study and stored securely to protect confidentiality. All research data must be kept for a minimum of 3 years, and if a research journal, grant agency, or other official organization charged with research integrity requests a copy of the data for a study, it must be provided.

Choosing the most appropriate statistical analysis to present research data at a conference or in a paper is important. The authors must ensure that the data is expressed and interpreted effectively and that there is no manipulation of the data. A researcher should not alter or misrepresent data in an attempt to demonstrate findings that are not really present in the data.

Non-discrimination

When conducting research using human subjects, the sample required for a given study methodology may be recruited from a virtually infinite number of different populations based on the variables and characteristics in which the researcher is interested. However, it is important when recruiting the study sample that the researcher does not discriminate based on any characteristic protected by law, including race, color, religious creed, ancestry, national origin, physical or mental disability, medical condition, marital status, sex, age, gender identity, sexual orientation, veteran status, or citizenship status (14). The only exceptions to this would be if a study sample in its entirety is limited to a population with specific defining

characteristics for the sake of scientific inquiry, if the population cannot safely complete the methods required, or if the data gathered from a particular population would be considered invalid (i.e. physical activity recall in a population with a mental disability).

Objectivity

Objectivity in research entails eliminating bias and conflicts of interest from a study (conflict of interest is described in more detail below). Neither the motivation for conducting the study, the methodology used, the results of the study, nor how the results are interpreted should be subject to an individual's personal interests, values, or personal biases. Research findings should be a result of the research itself and the topic or variable of interest, e.g. the independent variable. If a researcher's motivation is not objective when designing the study, collecting the data, or analyzing the results, then they have introduced bias into the study, which will likely produce invalid results.

Respect for intellectual property

Intellectual property (IP) is anything published, produced, manufactured, or discovered as a result of a person or persons' intellectual activity. Examples may include scientific works and/or discoveries, inventions, industrial designs, literary and artistic works, etc. IP may be involved in research in a few different ways. Researchers may use IP of another entity as a tool in their research methodology, they may conduct research specifically on the IP of another entity, or they may produce their own IP from their research. Regardless of how IP may be involved in research, there are ethical considerations that must be acknowledged (3).

If researchers are using IP as a tool in their methodology or if they are researching a specific IP item, all IP must be referenced appropriately. This includes, for example, manufacturers' names, their locations, and the specific edition or version of the product(s) being used, as well as how the product(s) were used in the study. If IP will be produced from their research, the specific roles and contributions of each researcher should be determined beforehand for the purposes of authorship, professional presentation, commercialization, etc. In some cases, such as faculty member supervising a student, a written agreement is developed and signed by all parties indicating roles and contributions (3).

Financial interests

It is common for researchers to seek financial support for their respective research and, indeed, some research is dependent upon adequate external financial resources for it to be initiated or sustained. All authors should disclose all sources of support, e.g. grants, contracts, gifts, received and/or utilized for completion of the research to their university, co-authors, members of their research team, any students contributing to the research project, and to all research participants on consent documents. All authors should also fully disclose relevant financial interests and external activities in presentations and publications. In some cases, the researcher(s) with financial interest may have their role in the project limited in an effort to mitigate potential conflict of interest.

CONDUCTING RESEARCH

Competency of the Researcher

Protecting subjects, gathering valid data, and appropriately analyzing and interpreting data rely on the qualifications and experience of the researcher. Competency in research is described by the National Health and Medical Research Council (11) as the experience, qualifications, and expertise necessary to conduct the research (10). If a student is leading the investigation, it is the mentor's' responsibility to guide and educate the student on the techniques and methods used to collect and analyze the data in order to assure valid and reliable results. These competencies include quantitative and qualitative designs, equipment utilized for data collection, and the analysis of the evidence.

Conflict of Interest

Unfortunately, external factors can impact even perfectly planned and executed studies. Institutions and researchers may knowingly, or unknowingly, bias the study or data through conflicts of interest. You are expected to disclose potential mechanisms of bias, or conflicts of interest, in your cover letter to the Editors. Example disclosures may include financial resources allocated to the project, benefits the institution or researcher may have obtained consequent to the study or results, or personal involvement of a research member as a participant.

Honesty, Falsification, and Fabrication

The act of research is to further understanding and knowledge in a particular field. However, researchers may be tempted to misrepresent or exclude data if the results may work against a particular agenda. Because of this, those submitting to the *International Journal of Exercise Science* must be committed to research integrity by conducting honest investigations, presenting the data (mostly in their original form) for scrutiny, and providing founded evidence based judgments and conclusions. Removing data (other than by standardized methods for outlier evaluation), altering data, or misrepresenting the evidence in the Results or Discussion deviates from research integrity to research misconduct and exposes your submission to immediate desk rejection. Research misconduct also includes straying from the approved research methods or failing to disclose conflicts of interest (11).

Ethical Practices in Human/Animal Research

Efforts to define ethical practice have engrossed moral philosophers for centuries. The notion of establishing research ethics did not gain traction until the atrocities committed by the Nazi regime and investigators at the Tuskegee Institute. Resultant from these nefarious research practices arose standardized guidelines for experimentation with living creatures. The formation of the Declaration of Helsinki and Belmont Report assimilated standards for treatment of those participating in research. By publishing with IJES, you are confirming the following practices were implemented:

1. Benefits of the investigation outweighed the risks posed to the participant. Overall, the research did no harm. Those assorted to a vulnerable group (minors, imprisoned, mentally impaired, economically disadvantaged, etc.) were given increased protection.

2. Participants were treated fairly, as individuals, and with respect. There were fair appropriations of benefits of participation to all individuals.
3. The anonymity and privacy of the individual was protected, participants' well-being maintained, and their decisions honored without ramifications.

To guarantee the investigation met the aforementioned standards, original research works must include explicit statements of permission granted by an Institutional Review Board (or comparable ethical board) and that participants signed an approved informed consent. These permissions must be granted *prior* to collection of data. Failure to include such statements is cause for immediate desk rejection. Please refer to your institution's human subjects committee or Institutional Animal Care and Use Committee guidelines for information on submitting applications and obtaining approval.

DISSEMINATING RESEARCH

Plagiarism

The concept of plagiarism includes, but is not limited to using another's' words, ideas, statistical data or any creative work as if it were original to you (7). The act of plagiarism includes omitting quotation marks when direct quotes are utilized, paraphrasing another's work without crediting the original author, using material from the internet as if it were one's own, and allowing another to write the majority of a manuscript and claiming it as one's own work (7).

Duplicate Submission

If a manuscript has been peer-reviewed and published in a journal, book, or full proceedings; any publication of the same data occurring afterwards is considered a duplication (13). Accepted exceptions to this rule are if the data have been presented and published as a meeting program abstract, or if the database is analyzed in an original way to test a different hypothesis (13). Additionally, it is not acceptable to submit the same manuscript to more than one journal at the same time.

Redundant Publication

This redundancy concept involves the reproduction of previously published data in the form of a new manuscript with nothing novel contributed to the literature (5). It is not ethical to utilize the same data, change the title slightly or the authorship order, and submit to another journal. While the *International Journal of Exercise Science* does not currently have a threshold for overlapping data that would constitute redundant publication, another peer-reviewed publication has set this limit at no more than 10% (4).

Figure Manipulation

The prevalence of figure manipulation claims has increased in recent years. Image misconduct is defined as gross misrepresentation or interpretation, purposefully manipulating the contrast or brightness to distort or disguise, superimposing or repeating images to represent data not actually collected, and/or presenting the figure as something other than what it is (12). Simple

modifications to make the figure easier to read or more appealing are not considered misconduct so long as the image is representative of the collected data (more detailed information on acceptable image manipulation can be found on the *Journal of Cell Science*'s policies webpage) (6).

OTHER CONSIDERATIONS

Responsible mentoring

A mentor is an individual who has achieved specific career milestones and guides another towards similar success. Mentorship can consist of counseling on several career components including philosophies surrounding pedagogy, creative works, and professional service. A mentor can have a powerful effect on early career individuals, and evidence suggests that mentoring has a more significant relationship with questionable behaviors than formal training on research integrity (2). Thus, it is incumbent that senior researchers set an example of high ethical standards.

Respect for colleagues and social responsibility

A colleague is an individual with whom one works professionally. Colleagues should be respected for their professional work regardless of their age, race, religious or political views, sex, or sexual orientation. Social responsibility suggests that an individual and/or organization is obligated to act in the best interests of the society in which it operates. In this context, all works that are submitted to the *International Journal of Exercise Science* must have high ethical standards and advance knowledge in the areas of exercise science and kinesiology.

DISCUSSION

Our aim was to reinforce best practices with respect to ethical considerations in the overall research process, particularly for students emerging as scientists in the area of exercise science. It is our hope that greater attention will be paid at the outset of the research process when study design is considered. Additionally, ethical practices while conducting experimentation as described in this work is expected. Once data collection has concluded, dissemination of findings in an ethical manner is also required. When these habits have been ingrained, it is hoped that young and seasoned scientists alike will practice responsible mentoring, respect for colleagues, and social responsibility so that their contributions to science will benefit all.

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