

GOOD SCIENTIFIC PRACTICE AND ETHICAL PRINCIPLES IN SCIENTIFIC RESEARCH AND HIGHER EDUCATION

Joanna Kruk

Faculty of Physical Culture and Health Promotion, University of Szczecin, Poland

Address for correspondence:

Joanna Kruk
Al. Piastow 40b/6, 71-065 Szczecin, Poland
Fax: +48 91 444 2734
E-mail: joanna.kruk@univ.szczecin.pl

Abstract. High ethical standards constitute the foundation of high-quality scientific research. Scientific research as a public trust must be conducted according to specific codes, rules, governmental laws, and regulations relating to research ethics. The aim of this paper is to highlight the fundamental ethical principles in scientific research, and those common to sport science and medicine.

Key words: scientific research, research ethics, publication research

Introduction

Interest in ethics, both in science and technology, is increasing, as its importance has long been recognized after the World War II. There are two main reasons: the well-known examples of unethical research, so-called “ethic scandals”, for example medical experiments in Nazi Germany in World War II (for a review, see Hunter 2010; Carpi and Egger 2009 and references therein), and increased numbers of scientists, resulting from the increased founding of research by governments and private businesses. Unfortunately, honesty and integrity of data, conflict of interest or misconduct behaviors, such as plagiarism, fabrication, and falsification of data, became part of the scientific research. Although the role of ethics and guidelines for conducting research have been commonly accepted by scientists, and a series of research ethics scandals were known, there was a need to document ethical standards for high-quality scientific research. Therefore, two very important initiatives were designed and started the promotion of responsible research with humans – the Nuremberg Code containing ten basic ethical principles (Center for Bioethics, University of Minnesota 2003) and the Helsinki Declaration (World Medical Association 1964). The latter document is continuously updated and contains basic ethical principles for conducting biomedical research, which are contained in the Nuremberg Code and, additionally, guidelines designed to maintain the unique principles responsibility for the health and welfare of human subjects participating in clinical research. Also, guidelines for the responsible conduction of research with animals, detailing sale, transport, and other care instructions were regulated

(Institute for Laboratory Animal Research, National Research Council 1996). The importance of ethics in all fields of science and technology is summarized by Jean-Michel Baer, in his foreword to the 2010 European Textbook on Ethics in Research (Hunter 2010). He claims that “Ethics is of great importance to science and technology. There are many developments in science and technology that regularly give rise to ethical questions in European societies – stem cell research, genetically modified food, human enhancement, to name just a few. The intense social debate such developments trigger, highlights the importance of high ethics standards for science and technology. These standards reflect our adherence to the ethical values and fundamental rights, such as human dignity, freedom, democracy, pluralism, solidarity, integrity and non-discrimination, on which the EU is founded”. “High ethics standards also add to the quality of research, and increase its likely social impact”.

Given the importance of ethics in the scientific research and academic learning, the purpose of this paper is to highlight the fundamental ethical principles in scientific research and to provide guidance on ethical core principles, common to sport science and medicine.

Research ethics principles

The term “research ethics” is defined in the free encyclopedia Wikipedia, as follows: “Research ethics involves the application of fundamental ethical principles to a variety of topics involving scientific research. These include the design and implementation of research involving human experimentation, animal experimentation, various aspects of academic scandal, including scientific misconduct (such as fraud, fabrication of data and plagiarism), whistle blowing; regulation of research, etc.” In the opinion of the Centre for Bioethics, the University of Minnesota (2003) “research ethics provides guidelines for the responsible conduct of biomedical research. In addition, research ethics educates and monitors scientists conducting research to ensure a high ethical standard”. Many universities, government agencies (e.g. The National Centre for Research and Development in Poland), and professional associations, have adopted ethical standards based on the Nuremberg Code and the Declaration of Helsinki, in agreement with national and international laws. They are summarized by professor David Resnik of the University of Wyoming and Bioethicist and the National Institute of Environmental Health Science IRB Chair (2011). Among them we can find:

- *Principle of honesty* – reported data, methods, and procedures, results and publication status must be truthful and accurate, i.e. without fabrication, falsification or plagiarism of data. Also, collaborators, colleagues, students, granting agency, the public, cannot be deceived.
- *Principle of objectivity* – researchers are obligated to avoid or to minimize errors in all scientific actions: experimental design, results interpretation, grant writing, action as expert or referee, etc. The personal or career benefit, as well as financial interest, cannot affect research. Interpretation of results and expert decisions must be based on facts, without the influence of external sources.
- *Principle of integrity* – “keep your promises and agreements; act with sincerity; strive for consistency of thought and action” (Resnik 2011).
- *Principle of carefulness* – decisions dealing with the researcher’s work and that of others have to be assessed completely, carefully, and fairly; results should be validated through replication.
- *Principle of openness* – methods, data, results and their interpretations should be presented and published, thus submitted to criticism.

- *Principle of responsibility* – researchers are obligated to make efforts to ensure that their research does not duplicate research carried out by other researchers, thus to give evidence of their professional responsibility (Foundation for Polish Science 2012). All authors bear full responsibility for the research process and the result publication; a special social responsibility (promotion of social good and other moral duties to society) and proper respect in conducting research on human subjects and animals are rested with the researchers.

Also, the standards of good scientific practices must be obligatory for teaching and academic training (response mentoring). It is worthwhile mentioning that the research ethics is a key part of advanced academic learning in all academic disciplines, as it prevents different forms of misconduct and fraud (Stern and Elliott 1997; Centre for Research Ethics & Bioethics, Uppsala Universitet). Owing to the fact that students and young scientists participating in research have not passed through formal special training in ethics education, it is important to discuss ethical standards during the presentation of students' projects or during preparation of dissertation. It allows them to make ethical decision, linked to responsibility, honesty, and fairness. It is also very important for students to learn competence in using the research results of other person in accordance with national/international law. Additionally, it is important to protect one's own research and to acquire the ability of their utilization in commercial purposes. It should be noted that universities offer courses in research ethics for students in different academic fields and disciplines. The postgraduate courses offered by the Centre for Research Ethics & Bioethics (Uppsala Universitet) or the University of Minnesota's Center for Bioethics (www.bioethics.umn.edu) are illustrative.

We should also remember that there is a huge list of unethical activities, regarded by the majority of researchers as deviations from acceptable research practice, which do not fall into the category of misconduct classification (Resnik 2011). For example, activities that constitute deviation according to the list of unethical activities include "promising a student a better grade by sexual favors" or "publishing the same results in two different journals without telling the editors" (Resnik 2011).

Publication ethics

Information on ethical issues useful to editors are divided into Research Ethics and Publication Ethics. This means that they are obligatory either for editors review boards, sponsors or authors. They have been summarized by the World Association of Medical Ethics and are available online (www.wame.org/ethics-resources/web-on-publication-and-research-et). These topics include a guide for the process of publication research with humans, and contain information useful for epidemiological studies, case-control studies, clinical trials, and genetic research. The rights and responsibilities of editors and publishers, per reviews, referees, authorship, conflict of interest, and ethical principles in human and animal research, are detailed basing on the Declaration of Helsinki, the Institute for Laboratory Animal Research of the National Research Council's Guide for the Care and Use of Laboratory Animals and the World Medical Association (www.wma.net/e/policy/17-c_e.html). According to the above reported ethical standards and laws, these are the most common to Sport and Medicine:

- *Protection of participants' right*. The rights and welfare of research participants must be respected. In the case of research with human subjects, we must remember that human life and well-being is most valuable. Human privacy, confidentiality, dignity and autonomy must be respected.
- *Ethical approval*. Each research using human participants or animals must be reviewed and approved before starting by an appropriate Ethics Commission in accordance with national and international laws.

- *The research protocol for a study.* Authors reporting experiments involving human individuals or animal subjects must certify that their study has been approved by appropriate research ethics committee, and that all investigations complied with the ethical and humane standards of research. The study design and selection of the observational or experimental participants must be clearly described. This should include eligibility, exclusion criteria and characteristics of the source population (cases group and control group). Research projects that use humans or animals must assess the risks and benefits of using these subjects in research. The projects must be carried out by qualified and responsible researchers. In case of a harmful study, research protocol with human subjects should contain details of any hazard risk or compensation. When reporting experiments involving animals, the researcher must show proper respect and care. The researchers are obligated, among other actions, to acquire animals legally, to apply appropriate experimental methods, and procedures, to ensure that animals have safe and hygienic conditions of living and nourishment, to maintain a protocol of animal care and examination, and to avoid unnecessary suffering (Harriss and Atkinson 2009; Institute, Indian Council of Medical Research; Institute for Laboratory Animal Research, National Research Council 1996). For a comprehensive description of ethics standards in exercise science research see Shephard (2002). Methods, apparatus and procedures should be detailed, allowing other researchers to reproduce reported results. The statistical methods should be applied to quantify findings and to present measurement errors (e.g. confidence intervals, standard deviations, correlation coefficients). Results should be presented in a logical sequence, e.g. in the form of tables, figures. The discussion section should include summary of the important finding, their interpretation and comparison with findings of other workers (if such data are available), and specification of strengths and limitations of the study. Also, future research directions should be indicated (Saudi Journal of Sports Medicine).
- *Informed consent.* Informed consent for subjects participation and publication must be obtained to ensure that the research allows for voluntary participation in the project as a study subject. If a study involves children or other subjects that cannot sign the consent, the consent should be obtained using other possibilities prior to procedure approval. Informed consent must include: purposes of the research; research methods and procedures; potential risks and participants' benefits; potential discomfort; rights to ask questions and to refuse to participate in the study or to withdraw consent at any time; sources of funding, conflict of interest (possible financial or personal conflicts) and institutional affiliations. According to the definition given by the University of Minnesota Center for Bioethics (2003) "Conflicts of interest arise when a person's (or organization's) obligations to a particular research project conflict with their personal interests or obligations". The item 'conflicts of interest' has been recently discussed by Khan et al. (2008).

Conclusion

In research, education and professional practice it is necessary to apply the highest possible standards included in different national and international laws and Codes of Ethics. For any researcher, independently of a discipline, the knowledge of the code of ethics and basic principles of the proper conduction in scientific research and education should be obligatory. Researchers should have an awareness that reliability of our research record, scientific knowledge, and social responsibility, depend on adhering to the ethical codes and guidelines.

References

- Carpi A., Egger A.E. Scientific ethics, Vision learning 2009; Vol. POS-2 (5). Available at: www.visionlearning.com/library/module_viewer.php?mid=161. Accessed 4.06.2013.
- Center for Bioethics. The University of Minnesota. A Guide to Research Ethics, 2003. Available at www.bioethics.umn.edu. Accessed 12.06.2013.
- Centre for Research Ethics & Bioethics (CRB), Uppsala Universitet. Education: Postgraduate courses. Available at: www.crb.uu.se/education/postgraduate.html. Accessed 13.06.2013.
- Declaration of Helsinki. World Medical Association. Available at: www.wma.net/e/ethicsunit/helsinki.htm. Accessed 12.06.2013.
- Education Ethics Committee, Ministry of Education and Science, 2004.
- Foundation for Polish Science. The European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers 2012. Available at: www.fnp.org.pl/.../EN_Europejska_Karta-Naukowca. Accessed 27.06.2013.
- Harriss D.J., Atkinson G. International Journal of Sports Medicine – Ethical Standards in Sport and Exercise Science Research. *Int. J. Sports Med.* 2009; 30: 701–702.
- Hunter D. Locating ethics in research. In: Hughes J (ed.). *European Textbook on Ethics in Research. Studies and Reports European Commission.* Luxembourg: Publication Office of the European Union. 2010: 15–19.
- Indian Council of Medical Research. Available at www.icmr.nic.in/ethicol.pdf. Accessed 27.06.2013.
- Institute for Laboratory Animal Research. National Research Council. *Guide for the Care and Use of Laboratory Animals.* Washington, D.C.: National Academy Press. 1996; 140.
- Khan K.M., Stovitz S.D., Pluim B., Cook J.L., Bahr R., Arendt E.A., Noakes T.D. Addressing conflicts of interest and clouding of objectivity: BJSM's "Peer review: fair review" section. *Br. J. Sports Med.* February 2008; 42 (2).
- Resnik D.B. What is Ethics in Research & Why is it Important. May 1, 2011. Available at: www.niehs.nih.gov/research/resources/bioethics/whatis. Accessed 27.06.2013.
- Saudi Journal of Sports Medicine: Instructions for authors. Available at: www.sjosm.org/contributors.asp. Accessed 10.07.2013.
- Shephard R.J. Ethics in exercise science research. *Sports Med.* 2002; 32: 169–183.
- Stern J.E., Elliott D. *The Ethics of Scientific Research. A Guidebook for Course Development.* Published by University Press of New England, Hanover, NH 03755, 2009. Available at: www.dartmouth.edu/~ethics/archives/Stern_Elliott.pdf. Accessed 15.06.2013.
- Wikipedia, the free encyclopedia. Research ethics. Available at: http://en.wikipedia.org/wiki/Research_ethics. Accessed 27.06.2013.
- Zespół Etyki w Nauce przy Ministrze Nauki i Informatyki. *Dobra praktyka badań naukowych. Rekomendacje,* Warszawa 2004. Available at: www.zakladdydaktyki.wum.edu.pl/teksty/Dobra_praktyka_w_nauce.pdf. Accessed 10.07.2013.

Cite this article as: Kruk J. Good scientific practice and ethical principles in scientific research and higher education. *Centr Eur J Sport Sci Med.* 2013; 1: 25–29.