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Review Article

Statistical Analysis, Publication; A big ethical concern in Research

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Abstract

Background: As suggested by the scientific studies, any error or inaccuracy in the statistical analysis method of the research occurs, and this will eliminate any mistakes that may harm the publication's value. As a result, the current study concentrates on ethical issues and concerns in statistical analysis.

Methodology: Content analysis is appropriate for this study because there is much textual material on ethical problems and issues in statistical analysis. The current study looked into some of the most common and essential ethical difficulties and statistical issues.

Results: For the work to be acceptable in various regions, researchers should consider ethical principles based on the findings of this study when conducting an analysis, and the journal should be created with comprehensiveness in mind, ensuring that all relevant factors are taken into account to ensure the research's accuracy.

Conclusion: Considerations and moral components that authors should examine are ethical concerns. While conducting statistical analysis, including the amount of data, the process, and the tests utilized, the information should not be fabricated.

Keywords

statistical analysis, ethics, research integrity, statistical reform, ethical practice

Introduction

The quality of statistical reporting and data presentation in scientific papers is generally low. Clinical trials in molecular pharmacological therapies and breast cancer account for one-third of all clinical trials. For example, disclose findings randomly,¹ In 60-95 percent of biomedical research papers, statistical analyses that are not pre-specified or depart from stated study goals are published². Furthermore, one-third of all graphs published in the prestigious American Medical Association Journal are unclear.³ Moreover, stated findings differ from data analyses. For example, more than 40% of clinical trial papers contain incorrect interpretations of statistically insignificant data⁴. Many reporting criteria (for example, CONSORT; Consolidated Standards of Reporting Trials) exist.⁵ To boost the quality of research reporting, prominent publications have devised, approved, and imposed. Editorials have also been published in journals recommendations to promote higher reporting requirements.⁶⁻⁹ However, it is debatable if The quality of reporting has considerably increased.¹⁰⁻¹²

An editorial was published in the journal of Physiology (JP) to report the mediocre skills of statistical data analysis and representation, specifically in physiology and pharmacology. The goal was to provide researchers with concise, non-technical principles on the most critical aspects of data analysis and presentation. Drummond and Vowler's essential recommendations include: (1) reporting continuous outcome variability using standard deviations rather than typical errors of the mean, (2) reporting accurate p-values for primary analyses and post-hoc testing, and (3) plotting raw data used to calculate variability.¹³⁻¹⁵ These ideas were made in the hopes that they will be included in future study reports by the authors. However, it's questionable whether these journals' reporting techniques have altered due to the published editorial recommendations.

We looked at a cross-section of research papers published in the JP and the British Journal of Pharmacology (BJP) to investigate reporting processes. We evaluated statistical assessment,

analysis, presentation, and spin in a random sample of publications issued four years afterward when Drummond and Vowler's editorial advice was revealed.

Scientific research output should be published by societal, personal, and cultural norms. When generating the content, it should be done with the most honesty and precision. This will assist in preserving the dignity of the research's information content and the subject.¹⁶ The ethical attitude of researchers should always be oriented to social principles that consider society's common good. In 1940, occupational legislation was enacted to avoid human rights violations caused by inaccurate information.

Human rights are protected in the research process thanks to publication ethics. It has several principles that will help it reach its primary goals. The right to withdraw from the study process, informed consent, and human fortification from psychological and physical harm are examples of such legislation.¹⁷ During the publication process, several ethical problems arise that will be fully addressed in the work. It's worth mentioning that moral integrity is essential in publishing and writing. Several ethical issues have arisen due to violations of publication rules of ethics. Such ethical considerations have lowered the publication's dignity, resulting in decreased informational content. Before considering ethical obstacles of the manuscript submission, selection, and publication, it is necessary to underline some ethical considerations in the scholarly journal.¹⁷

Issues of publication ethics

It is essential to elaborate on the moral issues after a more in-depth and in-depth review of the ethical considerations that may occur due to the violation of ethical standards on publication. Ethical issues refer to ethical and moral components that authors should consider when writing their writings. According to Resnik (2019), authors who adhere to numerous ethical issues in the publication process are more likely to successfully disseminate their papers to the appropriate audiences.¹⁸

Statistics and ethics

An excellent place to start is with the notion of providing analysis as authentically as possible. Even so, it ignores the variability of science writing: audiences evaluate the statistics they reviewed in the light of their ideology and preconceptions of the author, who, throughout the turn, has a variety of explication and consensus-building objectives of this occur in a challenging publishing atmosphere, where authors of scientific papers strive for attention. As a result, researchers are not expressing their findings to each other, much less to readers, in ways that are appropriate for expanding awareness—they are not doing research correctly—and this is the most persistent challenge to the excellence of our environment for science communication. As a result, "scientific communication science" must be interested in the standard of the rules and procedures that regulate how scientists interact with one another and carry out their duties. The discipline of statistics is an excellent place to start because it's at the center of many debates about science and policy, and statistics ethics have gotten a lot of attention recently.¹⁹

Five suggestions for statistical communication and practice

"An integrity problem arises when you evaluate an activity that (a) helps you or a cause you support, (b) harms or diminishes the benefits to others, and (c) violates some rule," states the author²⁰. Although every ethical transgression can be depicted as unclear, this does not, and should not, diminish the importance of ethics. "Statisticians must be able to appreciate the importance of making decisions in the face of ambiguity and uncertainty." This is a sentence that covers everything. The second issue is, "What are all the ethical implications directly associated to statistics, data, and evidence-based communication?"

Five recommendations are discussed in this paper: (1) Public access and accessible procedures; (2) being transparent about the data used in statistical operations; (3) cultivating a data-respecting

culture; (4) publishing criticisms; and (5) respecting statistics' boundaries.

Public access and accessible procedures

Statistical findings are based on data, and the data analysis methods utilized are famously dependent on them.²¹ This is an extreme illustration of the repercussions of deficit spending, which is used to justify budget-cutting approaches. The authors committed a common mistake by misaligning columns in an Excel spreadsheet, causing their results to differ from their data. Years after the paper was published, this huge inaccuracy was found. Researchers later went through the bother of recreating the study.²², illustrating the value of sharing data and data analysis scripts with others, hence increasing the number of "eyes on the street" There have been ongoing discussions.²³

Being transparent about the data used in statistical operations

Bayesian inference mixes facts with previous knowledge. Some Bayesians claim that using such methods is an ethical obligation because the information would otherwise be "left on the table" when making judgments. Lots of other people argue that "there are circumstances and it becomes very evident that, what a researcher or statistician may do confidentially in analyzing data, they should not be using foreknowledge when they reveal their data to the public, or governmental agency" because "preceding beliefs on some of these thorny aspects of current policy are sometimes highly divisive."²⁴. As researcher²⁵ points out, these extreme viewpoints have flaws. When preliminary information is challenged, the recommendation to always use it becomes problematic; It is appropriate to provide accurate results in such situations. However, using data without a model that integrates a large amount of primary data is problematic in many high-stakes circumstances. Consider the reconstruction of past climate from tree rings, which can only be done in the context of statistical models, which are inherently controversial. The climate-tree-ring models are statistical models informed by physical concerns rather than physical models for tree development or curve fitting.

Cultivating a data-respecting culture

Aspects of scholarly research culture aid and encourage opacity in data collection, analysis, and reporting: Whenever it refers to gathering data, review boards of institutions can make it tough to disclose someone's data or gain an approach to others', and publications emphasize brevity over completeness when presenting results. Leading journals typically aim for three-page articles in the Science/Nature format, even in this digital age. Details can be found in online appendices. However, they usually focus on supplemental analyses to back up the primary paper's assertions rather than on the specifics of a study. Published studies usually emphasize creating a solid example and conveying a level of confidence rather than making all of the available data so others can verify and duplicate the study. However, integrity and clarity are insufficient²⁶. No amount of preregistration will save your study if the data is too far distant from the questions of interest. A sample-to-population mismatch can cause remoteness, biased and unpredictable measurements, a lack of comparability between treatment and control groups, a lack of realism in experimental conditions, or, expressed, a lack of comparability between treatment and control groups. A study must be informative, requiring careful measurement, design, and data gathering to be ethical. Without precise and meaningful measures, protocols like preregistration, random sampling, and random treatment assignment are meaningless. Top journals can publish articles containing intriguing or important data as an institutional solution without new data analysis or conclusions. In addition to facilitating data access, this step could reduce the pressure on researchers to add unnecessary elaborations to their investigations or excite their findings as a method of achieving publication.

Publishing Criticisms

You do not have to be a scholar to understand that refusing to confess anything is unethical when you've made a mistake or avoid facing proof that you've made a mistake. Technical statistical flaws might be difficult to detect (sometimes concealed within traditional practices, such as treating a

significant statistical comparison as strong evidence supporting a preferred scientific theory). Individuals and educational setups can be reluctant to accept mistakes, and scientific publishing is frequently used to conceal criticism. Journals are known for refusing to remove articles or post-correction letters. For instance, A few years back, I was referred to an article in the American Sociological Review that had a notable case of bias. According to the report, pupils who paid for their college educations outperformed those whose education was paid for by their parents²⁷. However, the statistical study used to make this conclusion did not account for the fact that self-funded students who were having difficulty were more likely to drop out. Unfortunately, the inaccuracy could not be fixed in the journal published since the editors thought the modification was insufficient to be published. Authors are enticed to push spectacular claims by a system of marginalizing critique. When published in reputable publications, it has a positive impact and a minor negative impact if flaws are detected later. In this case, I'm confident that the author and editors merely ended a factual error in failing to notice the collection favoritism. However, there are no clear motivations for the individuals interested to be more cautious as a collective. Pub Peer and other post-publication review sites, as well as blogs, maybe change the game.²⁸

Respecting statistics' boundaries

Several domains of scholarly investigation are becoming prevalent for assertions that serve no purpose.²³. Several substantial social psychology experimental publications, such as the well-known claim in "embodied cognition" that young adults walk slower after being slightly sensitized by being subjected to adults terms, have failed to be replicated²⁹. Many people (including the current author) consider the preceding statements ridiculous, but they are far from impossible, at least qualitatively. The literature on public opinion, for example, renders it exceedingly improbable that women's support for Barack Obama for president fluctuated by 20% during their monthly cycles³⁰. However, considering the precision with which the

relevant factors were measured, there's likely a small effect that went unnoticed³¹.

Conclusion

Researchers should consider ethical considerations before publishing their work to be accepted in different parts of the world. When publishers knowingly breach ethical standards, friction and challenges might arise. The authors should ensure that any information or facts from earlier studies do not create a conflict of interest. Ethics comes from the Greek word *ethos*, which refers to a systematic effort to understand distinct moral notions to defend moral theories and principles. In statistical analysis, ethics is concerned with making dynamic judgments about which decisions are correct or incorrect during the publication process. Ethical integrity is essential in statistical analysis, publication, and writing. Falsification, plagiarism, and fabrication are the three most common types of fraudulent publications. Plagiarism is defined as stealing intellectual property or information without crediting the creators. When authors decide to publish some pieces of information that had previously been published in other publications or journals, this is known as duplicate publication. To prevent the same publication, editorial review time should be expanded sufficiently to permit appropriate inspection before publication. Ethical issues refer to considerations and moral components that authors should consider when analyzing data. They include benevolence, defined as "doing no harm," secrecy, and anonymity, described as "respecting the rights and dignity of people recognised via personal responsibility." According to the ethical issue of informed consent, people should not be coerced into contributing their contributions to a certain subject matter brought up by the authors during their study process.

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Conflict of Interest

None to declare.

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