

Overcoming Data Fabrication in Scientific Research

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Abstract

The goal of this study is to identify the factors that contribute to the occurrence of data fabrication in scientific research and to propose prevention methods that can be implemented by research agencies or research institutions. The study is a full literature review; it analyzes previous studies related to the contributing factors of researchers fabricating data and its effects such as the impact on the world of scientific research in addition to damaging the researcher's credibility and causing a loss of public trust in the findings of scientific research. Furthermore, another effect of data fabrication is the retraction of the publication, which will result in the researchers' lifetime ban from conducting scientific research. It is proven that data fabrication is a significant contributor to the retraction of papers, with a percentage of 49.4%. The finding of this study is to come out with several suggestions for prevention strategies for data fabrication, such as empowering training in research integrity and enforcement of academic research policy. It also concludes with recommendations for improving research ethics with a well-designed plan for fostering research integrity in various platforms for a better future.

Keywords: Data fabrication, Contributing factors, Retraction, Prevention strategies, Well-designed plan.

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■ 1.0 INTRODUCTION

Ethics in research are taught quite seldom. However, at the beginning of a researcher's career, the pressure to publish may result in "ethical breaches" (Schroter et al., 2018), which can then lead to improper behavior in the study itself. In the context of research, "research misconduct" may refer to the fabrication of data as well as the reporting of research findings.

Data fabrication is inventing data and presenting it as an authentic representation of a never-before-conducted research project (Kang & Hwang, 2020). When a researcher manipulates the original data and then presents it to the audience as two separate data sets, this is an example of fabrication (Chau et al., 2018), such as fabricating data while a researcher provides the data that they have produced but that have never existed over the research period. The process includes establishing wholly new records, while the process of falsifying data involves modifying records that have already been created. The act of fabricating false information is the most extreme kind of dishonesty and misbehavior (Elsayed, 2020).

However, it is anticipated that researchers carry out their work in respect of the highest ethical standards, according to all relevant institutional, national, and international rules (Elsayed, 2020). It is essential that research is carried out ethically and that its findings be reported. In addition, doing one's study ethically not only satisfies a moral need but also produces superior findings. Researchers need to pay attention to the specifics of their work, including the methodologies used for quantitative and statistical analysis, as well as the predictability of their cooperation with other researchers (Elsayed, 2020). The dissemination of false information distracts the research into false findings and getting erroneous results. The deliberate manipulation of data is a significant violation of the ethical principles expected among researchers.

Since erroneous results might be derived from fabricated data, its veracity is crucial. It's a wasted amount of funds, time, and resources if the anticipated outcomes don't materialize. The capacity for improved decision-making and accurate results, as well as increased research efficiency. Data are never absolutely exact, but the

degree to which it corresponds to reality may determine the degree to which it is accurate. In the context of science, accuracy is measured by how closely data is aligned with reality; the closer it is, the better its accuracy.

There are occasions when the research findings do not correspond with the researcher's expectations. Therefore, it is possible that some researchers manipulated these study findings to get a better end and may have presented false results (Elsayed, 2020). An example of data fabrication is when researchers seek to change data to satisfy their early expectations.

Data fabrication occurs due to the motivators that drive the researcher to do it. Those factors make the researcher commit fraud in the research and further cause failure in their life. This study will explain more about the things that motivate researchers to fabricate data and the impact of those things.

■ 2.0 HOW DOES DATA FABRICATION HAPPEN?

A significant amount of data fabrication goes on within science-based research. The researchers have been motivated to accomplish that goal for many different reasons, which empowered them to do it. It can be concluded that individual circumstances (Davis et al., 2007), and social, cultural, and psychological (Fanelli et al., 2017) variables are predicted to raise the chance that researchers may inflict data fabrication.

2.1 Individual Circumstances

Someone with poor moral worth is more likely to engage in unethical behavior in the scientific community. Remembering that the goal of any study is to make the truth more widely known is something every researcher should always keep in mind. If a researcher were to lose their integrity, it's possible that they would make poor decisions when confronted with challenges. Researchers need to be truthful and competent in solving any difficulties, even when they are under intense time constraints. They should give all their attention and devotion and make their research their primary concern (Amin et al., 2012). Those researchers who are seeking personal prestige, popularity, and renown have a greater likelihood of engaging in unethical behavior, particularly if they have poor morality. In this age of globalization, scientists must preserve a high moral value in all decisions. Researchers must be careful not to allow their ambitions for tenure and promotions to influence their decisions of what constitutes ethical conduct since this might lead them to behave unethically.

2.2 Pressure to publish

It is a frequently held belief that scientists may participate in unethical behavior in the scientific community due to high expectations about their productivity or effect. According to Yu et al. (2020), it is one of the top factors influencing data fabrication, and because of this worry, several rules and efforts have previously been developed to deter scientists from publishing excessive work and chasing high impact at any cost. For example, there may be tremendous pressure to publish in institutions that assess the quality of the publication, or the number of publications a researcher has or the number of high-profile research awards they have gained determines their career progression. Furthermore, the pressures to produce a hypothesis that the early expressed perceptions in research can justify also contribute to the pressure in publishing. Nonetheless, the hypothesis cannot forecast the occurrence of retractions and corrections or the tendency to report overestimated results.

2.3 Lack of Social Control

When people's coworkers, mentors, or society scrutinize their job, they are less motivated to engage in unethical behavior. Lack of social control triggers the researchers to conduct research unethically to quickly achieve the targets without any work inspection (Fanelli et al., 2017). The importance of social control in research is to prevent the occurrence of data fabrication and cause researchers to hesitate to commit fraud because it will cause their reputation to be bad among colleagues or team members. Group research is better than individual research because it increases the level of social control among group members and guarantees a more comprehensive report of research results.

2.4 Cultural Environment

Students learn very early in their academic careers that cheating is a viable strategy for achieving their objectives. A significant number of students are caught cheating on their exams, and this trend may remain as they research since it is often believed that it is permissible to accomplish objectives by avoiding the advised techniques (Buljan et al., 2018). This process is further amplified by the larger cultural environment, which emphasizes the examples of those in power who achieved success by "not going by the book." This setting suggests that "going against the book" is

the most significant way to ascend the hierarchy.

2.5 Competitive Colleagues

English literacy ability is indisputably crucial and creates competitiveness among the researcher's colleagues, particularly in an organization. Therefore, this language is extensively utilized and must be acquired, mainly by university students who implement their knowledge in the industry and seek employment. There is no denying that students' inability to effectively evaluate data and produce high-quality scientific writing is exacerbated by their lack of linguistic skill with this language (Shak et al., 2016). As a result, they frequently rewrite or redo the work of other researchers. On occasion, people come up with original concepts, but they are limited in how they may express those concepts due to the English language.

2.6 Pressure for Promotion

Publishing is a means to improve one's financial situation and social standing, even though there is no established system of incentives and penalties. Publishing publications is a must for any academic or research career that seeks promotion (Buljan et al., 2018). When seen in this light, the act of publishing papers transforms into a self-serving activity designed to further one's academic career. This could be the motive why someone would participate in unethical acts.

■ 3.0 EFFECTS OF DATA FABRICATION

Data fabrication is not only illegal and can cause harm to the scientific environment and human life. Incorrect or unethical behavior in research is not just against the law but also dangerous to people. Inappropriate research behavior can damage or destroy confidence between researchers, funding organizations, and the general public. Therefore, any attempt to fabricate data represents a violation of the standards of scientific integrity (Sengupta & Honavar, 2017).

When broken down into its parts, data fabrication leads to the loss of effort on the part of researchers' publishers as well as other stakeholders who put their faith in the manufactured work (Stacey, 2016). Editing, peer review, and individual researchers' time spent on the process can all be considered as costs. Furthermore, according to (Kingori & Gerrets, 2016), a person who is charged or convicted of data fabrication may face lifelong imprisonment or the prohibition from participating in any other kind of research endeavor. As a result, their professional reputations are harmed, and they are permanently unable to find work.

Data fabrication is significantly harmful to scientific research, and the fallout from this problem spreads into other areas of society. According to OECD (2007), the following broad categories of potential adverse effects were recognized as having the potential to occur:

- Damage to both persons and society if dishonest research leads to the production or distribution of a harmful product or method (e.g., a drug or therapy). If incorrect findings become publicly recognized and trusted, society may suffer the consequences.
- Direct harm to the scientific sector by planting false trails for other researchers to follow and coercing third parties into wasting their time, effort, and resources to recreate fraudulent findings. Since repeatability, verifiability, and consistency are characteristics of the scientific process, we are fortunate that the research record is intrinsically capable of self-correcting. Nevertheless, false results may continue to be shown and may continue to mislead for long periods.
- Do damage to science by reducing the public's trust in science and the national government's capability and ability to provide support in promoting scientific research competently and ethically. This will harm the scientific community wholly. Thus, it results in damage to the scientific community. In addition, the reliability of scientific study and guidance on topics that have significant repercussions for society, particularly in fields like health, environment, energy, and national security, might suffer as a result of this, which would be one of the potential consequences.

Various branches of medicine sectors, such as anesthesiology, have been pushed to define the cause for the retraction of a publication due to the growing awareness of scientific misconduct. Data fabrication is one of the scientific misconduct that leads to publication retraction. According to Nair et al. (2020), data fabrication was the most prevalent cause of article retraction, accounting for almost half (49.4%) of all retractions. It was followed by a lack of adequate ethical approval, which accounted for 28% of all retractions, as shown in Table 1. Thus, the retraction causes further disciplinary actions from research committees towards the researchers that affect their

credibility, causing getting banned from conducting any research for a lifetime, fined, and finally jailed.

Table 1. Counts and proportions of reasons for retraction

Reasons for retraction	Count	Percentage
Data manipulation/fabrication/fraud	173	49.4%
Scientific misconduct	173	49.4%
Ethical issues	100	28.0%
No ethical approval	100	28.0%
Other data/methodology issues	15	4.2%
Flawed methods or statistics	9	2.5%
Invalid data or data error	5	1.4%
Findings were underpowered to support the conclusions	1	0.3%
Plagiarism	20	5.7%
Plagiarism	20	4.9%
Publication issues	23	6.5%
Previously published in another journal	14	4.0%
Overlap of research findings	3	0.9%
Authors' request	3	0.9%
Authorship dispute	3	0.9%
Other/uncategorizable	19	5.4%
Cannot access original article	11	3.1%
No explanation is given in retracted article notice	6	1.7%
Theft of intellectual property	1	0.3%
Alternative explanation for research finding	1	0.3%

Source: Nair et al. (2020)

■ 4.0 PREVENTION STRATEGIES

The following is the way to prevent data fabrication:

4.1 Research Integrity as Core Subject In Curricular

Integrity and ethics in scientific research conduct need to be ingrained in students from the earliest stages of their formal higher education. The educational system should place equal emphasis on acquiring academic and practical expertise. Additionally, mentors typically set the boundaries where supervising student research would be vital to the students while learning about research and often push the limits of what they are capable of doing (Buljan et al., 2018).

4.2 Implementation of an Absolute Transparency Mechanism

Making as much of the research's data as feasible accessible to other parties is one more excellent strategy that might be used to enhance the integrity of scientists (Rasmussen, 2019). For instance, recent federal regulations in the United States direct agencies that use citizen scientists to make the data publicly available while also offering post-publication peer review by ethicists. These regulations were implemented in response to the growing popularity of scientific research. In addition, institutions and organizations can encourage research transparency via the use of their internal rules, which should always be made accessible to the person in charge of maintaining the integrity of the research ethics board.

4.3 Academic Research Policy Enforcement

When it comes to enforcing the regulations governing academic research, one of the essential things that must be done is to ensure that everyone associated with the research environment is aware of their role in maintaining the integrity of the research. Some potential solutions to the problem of unethical behavior in research include putting up reminder advertisements and giving presentations on the issues at all levels of the scientific community. Leaders are responsible for ensuring no retribution for raising concerns about misbehavior and taking their views seriously. They also must play their roles to prevent these matters from happening in the future (Al-Has et al., 2021).

4.4 Setting Capable Research Leader

The expectations that each member of the team should have about transparency should be made clear by the leader. Those in authoritative positions should look at the success of mentoring programs for recently employed researchers and laboratory assistants to strengthen the ties of both mentors and mentees (Al-Has et al., 2021). All things considered, the objective is to foster an environment where researchers feel comfortable working together, sharing ideas, and building trust with one another.

4.5 Empowering Training and Responsibility of Researchers

It is anticipated that scientific researchers will uphold the most outstanding standards of quality, excellence, and honesty in their work. They are obligated to abide by the principles outlined in the Code Of Responsible Conduct In Research (CRCR), which guarantees the honesty and quality of their studies (NSC, 2020). Researchers should not only possess the intellectual and technical skills in their research as well as a passion for it. They should also have training in research methodology and research management, which includes the storage and preservation of data, resource management, personnel management, ethics, and relevant laws related to their research, and comply with CRCR accordingly (NSC, 2020). As a result, it lessens the likelihood that researchers would engage in unethical study practices.

■ 5.0 CONCLUSION

In summary, data fabrication in conducted research occurs due to many factors that include personal and social factors. Data fabrication can be prevented by implementing well-planned strategies to avoid unethical research conduct in all research agencies or institutions such as the implementation of an absolute transparency mechanism and academic research policy enforcement. The implementation of this action plan can directly increase researchers' awareness of the importance of data integrity to empower the country's research sector. Preventive measures need to be drawn up and implemented religiously to ensure that data fabrication no longer occurs and to maintain the principle of research integrity.

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