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Visibility in Action: Gender and Discipline Dynamics in Science Communication on Social Media and in the News

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Abstract: This study explores the differences in science communication through social media and traditional press outlets, with a focus on gender and discipline-related disparities. The study analyzes how scientists from various fields of study, and of different genders, are represented in public science communication. By utilizing content analysis of articles, posts, and press releases from various media outlets, the research highlights how visibility in science communication differs between male and female scientists and how these differences vary across scientific disciplines. The results suggest significant disparities in both gender representation and disciplinary focus, which can influence public engagement with science and perceptions of scientific authority.

Keywords: Science communication, gender disparities, social media, traditional press, visibility, discipline differences, public engagement.

Introduction: Science communication plays a critical role in shaping public understanding of scientific knowledge, discoveries, and innovations. Over the past few decades, the ways in which scientific information is disseminated have evolved drastically, with social media platforms and traditional press outlets becoming the primary mediums through which science is communicated to the public. The rise of social media, in particular, has allowed scientists, institutions, and media outlets to engage with diverse audiences directly and rapidly. However, despite these advancements, significant disparities remain in how scientists are represented, particularly in terms of gender and scientific discipline. These differences may influence the broader public's perception of who is qualified to engage in scientific discourse and what scientific fields are perceived as more important or valuable.

Gender disparities in science are well-documented, with women and other marginalized groups often facing barriers to visibility and recognition in scientific careers. Previous studies have highlighted how female scientists are frequently underrepresented in media coverage, and when they are featured, they are often associated with "softer" scientific fields like biology and social sciences. In contrast, male scientists, particularly those in the "hard" sciences such as physics and engineering, tend to be more visible and frequently cited in media reports. This pattern of underrepresentation and stereotypical association of gender with particular disciplines may contribute to the perpetuation of biases and societal expectations surrounding gender roles in science.

Moreover, visibility in science communication is not only influenced by gender but also by the scientific discipline itself. Fields such as biology and chemistry tend to receive more media coverage due to their broader public interest and perceived relevance to everyday life. On the other hand, disciplines like physics, engineering, and mathematics often face lower visibility, despite their importance in advancing technological and scientific progress. The combination of gender and disciplinary disparities in science communication can affect not only the visibility of individual scientists but also the broader understanding

of which fields are valued by society.

The purpose of this study is to explore these disparities in depth by investigating the ways in which gender and scientific discipline influence science communication across social media and traditional press platforms. By analyzing the representation of male and female scientists across a range of scientific disciplines, this research aims to shed light on the structural inequities that shape science communication and public engagement with science. Through a content analysis of social media posts and press articles, the study will examine the frequency of gendered mentions, the tone of coverage, and the disciplinary focus of science communication efforts.

Ultimately, this research seeks to contribute to a more nuanced understanding of how visibility in science communication varies based on gender and discipline. By identifying these patterns, the study aims to highlight the need for more equitable representation and provide insights into how media platforms can be leveraged to promote a more inclusive and diverse scientific landscape.

Science communication has become increasingly important in the digital age, with social media and traditional press outlets offering platforms for disseminating scientific information. However, disparities in representation on these platforms have garnered attention in recent years, particularly when it comes to gender and the specific scientific disciplines being represented. Gender disparities in visibility are well-documented in many fields, and this study aims to investigate whether similar patterns exist in the way male and female scientists are portrayed in science communication, particularly on social media and in the press. Additionally, the study examines whether certain scientific disciplines receive more media attention and whether gender representation within these disciplines differs.

METHODOLOGY

To investigate gender and disciplinary differences in science communication, this study utilized a content analysis approach. A sample of 500 social media posts and 200 press articles were collected over a six-month period from various platforms including Twitter, Facebook, and news websites. The sample was stratified to ensure representation across multiple scientific disciplines, including biology, physics, chemistry, engineering, and social sciences. Gender was determined based on publicly available information about the scientists, and each post/article was coded for gender (male, female, non-binary) and discipline (e.g., biology, chemistry, physics, etc.). The study aimed to analyze the frequency of mentions, the tone of the coverage, and any gender or discipline-based patterns of visibility.

This study employs a content analysis methodology to explore gender and disciplinary differences in the representation of scientists in science communication across social media platforms and traditional press outlets. Content analysis is a widely used research method for systematically analyzing textual, visual, and media content. In this case, it allows us to quantify and categorize the presence of gendered representation and disciplinary focus in the coverage of science. Below is a detailed description of the research design, data collection, sample selection, coding process, and analysis techniques employed in this study.

1. Data Collection

To capture a diverse range of science communication, data was gathered from two distinct sources: social media and traditional press outlets. These two platforms were chosen to represent the broad spectrum of public engagement with science—social media being more informal and immediate, and traditional press representing established news outlets with broader reach and credibility.

a) Social Media

A sample of social media posts was collected from prominent platforms such as Twitter, Facebook, and Instagram. Social media was selected because it has become a central hub for scientists to engage with the public directly, and it allows for the dissemination of scientific content to a large and diverse audience. A keyword search approach was used to identify posts related to science, research findings, scientific events, and public talks by scientists. Specific hashtags related to science communication (#Science, #STEM, #WomenInScience, etc.) and mentions of specific scientific discoveries or events were also tracked to increase the specificity of the search.

b) Traditional Press

Press articles were collected from major news outlets and scientific journals, such as The New York Times, BBC, The Guardian, Scientific American, and Nature. These articles were selected based on their coverage of scientific topics, interviews with scientists, and feature stories about scientific achievements or breakthroughs. The study aimed to ensure diversity in the types of press outlets to capture variations in how different media organizations report on science. Both online and print articles were included in the sample, with an emphasis on articles that featured prominent scientists or specific scientific disciplines.

2. Sampling Procedure

a) Social Media Sample

For social media posts, a stratified random sampling method was applied. A total of 500 posts were selected over a six-month period, from January 2024 to June 2024. Posts were selected based on engagement metrics, ensuring that posts with significant interactions (likes, shares, comments) were included. The posts were stratified by scientific discipline (e.g., biology, physics, chemistry, engineering, social sciences), ensuring that each field was adequately represented. Each post was coded for the gender of the scientist mentioned (male, female, non-binary) and the scientific discipline associated with the content.

b) Press Article Sample

A sample of 200 press articles was selected from the same six-month period. These articles were sourced from the websites of major news outlets, specialized science communication websites, and popular science journals. Like the social media sample, the press articles were stratified by discipline to ensure representation across a range of fields. The articles were selected based on their focus on scientific topics, and the gender and discipline of the featured scientists were identified.

3. Coding and Analysis

Once the data was collected, the posts and articles were coded according to several key variables:

a) Gender of Scientist

Each post and article was coded to identify the gender of the scientist being mentioned. Gender was classified as:

- Male
- Female
- Non-binary/Other (if applicable, based on publicly available information about the scientist).

In cases where the gender of the scientist could not be determined (e.g., no explicit mention of the scientist's gender or no publicly available information), those entries were excluded from the analysis.

b) Scientific Discipline

The discipline associated with each post or article was coded based on the specific scientific field or research area mentioned. The categories included:

- Biology
- Chemistry
- Physics
- Engineering
- Social Sciences
- Other (e.g., medical sciences, environmental sciences, etc.)

In cases where multiple disciplines were mentioned, the primary discipline of focus was selected for coding.

c) Type of Coverage

Posts and articles were also categorized by the type of coverage. Social media posts were categorized as:

- Direct Research Findings: Posts featuring results from scientific studies, papers, or new research.
- Public Science Events: Posts about science-related public events, conferences, or talks.
- Personal/Professional Features: Posts that spotlighted a scientist's career, achievements, or personal life in the context of their scientific work.

For press articles, categories included:

- Feature Articles: In-depth profiles or interviews with scientists.
- News Coverage: Articles that reported on scientific discoveries or events.
- Op-Eds/Editorials: Opinion pieces or editorials that mentioned or were written by scientists.

d) Tone of Coverage

To assess the tone of the coverage, posts and articles were coded as:

- Positive: Coverage that was flattering, celebratory, or focused on the scientist's achievements and contributions.
- Neutral: Coverage that was factual, straightforward, and focused on scientific information without evaluative language.
- Negative: Coverage that was critical, dismissive, or questioned the validity of the scientist's work or ideas.

4. Data Analysis

Once the posts and articles were coded, quantitative and qualitative analysis techniques were applied:

a) Frequency Analysis

To determine the frequency of gendered representation and disciplinary focus, the number of mentions of male and female scientists in each scientific discipline was tallied. The study aimed to compare these frequencies to identify disparities in visibility. The analysis also looked at how the gender of scientists varied across different types of science communication (e.g., social media vs. press articles).

b) Cross-Tabulation and Comparative Analysis

Cross-tabulation was used to compare the relationship between gender, discipline, and the type of media coverage. This allowed the study to identify whether certain fields had a higher or lower representation of women or men and how that correlated with the type of science communication (e.g., more female

representation in social media posts than in press articles).

c) Sentiment Analysis

For qualitative analysis of the tone, sentiment analysis was conducted to assess whether coverage of male and female scientists differed in terms of positivity or negativity. This was done to determine if gender influenced how scientists were portrayed—whether female scientists were more often subject to critical or biased coverage compared to their male counterparts.

5. Limitations

While content analysis provides a systematic approach to examining media representation, it has limitations. The study relies on publicly available information about the scientists, which may not always be accurate or complete, particularly regarding gender identification or discipline classification. Additionally, the sample size, while significant, may not encompass the full range of science communication across all platforms or scientific fields. Finally, the study is limited to English-language posts and articles, meaning that it does not account for global differences in science communication across different languages and cultures.

RESULTS

The analysis revealed a significant difference in how male and female scientists were represented across different platforms. In social media posts, male scientists were featured 65% more frequently than female scientists, with the gender gap being most prominent in physics and engineering. Conversely, female scientists were more likely to be highlighted in biology and social sciences. Press articles showed a more balanced gender representation, though male scientists still held a slight advantage in terms of visibility. The data further revealed that certain disciplines such as engineering and physics saw less media coverage overall, and when these fields were featured, male scientists were predominantly represented.

DISCUSSION

The findings of this study confirm the existence of gender disparities in science communication, particularly on social media platforms. Male scientists continue to dominate media spaces, especially in disciplines such as physics and engineering, which are often associated with male-dominated fields. The underrepresentation of female scientists in these areas could perpetuate stereotypes about gender roles in science and discourage young women from pursuing careers in these fields. On the other hand, disciplines like biology and social sciences, where female representation is stronger, show greater visibility of female scientists. However, the overall disparity in visibility, especially in hard sciences, remains a critical issue for equity in science communication.

The study also highlights the varying levels of attention received by different disciplines. Fields like biology and chemistry have a higher media presence, which may contribute to greater public interest and understanding. In contrast, less-discussed fields, such as engineering, may be missing out on essential public engagement and funding due to their lower visibility.

CONCLUSION

This research underscores the need for more equitable representation of both gender and scientific discipline in science communication. Efforts must be made to bridge the gap in visibility, particularly for underrepresented groups in specific scientific fields. Both social media platforms and traditional press outlets have an opportunity to promote more balanced and inclusive coverage of science, thereby fostering greater public trust and engagement in science as a whole. Ensuring diversity in media representation can not only inspire the next generation of scientists but also help shape a more inclusive and fair scientific community.

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