

# Cross Inequality in Science and Sociology

**Dongyang Xuanyuan\***

Jinan Foreign Language School International Center, Jinan 250000, Shandong Province, China

\*Corresponding author: Dongyang Xuanyuan, [dongyang\\_xuanyuan@163.com](mailto:dongyang_xuanyuan@163.com)

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**Abstract:** This research paper aims to analyze the impact of social inequality by discussing income inequality in social sciences and the challenges that women face in employment. Through questionnaire survey and data analysis, this paper comprehensively discusses the multi-dimensional impact of inequality in women's employment and proposes feasible measures to reduce employment inequality from multiple perspectives. The impact of the current situation of women's employment in society from two key dimensions of economy and sociology was analyzed. Insights and directions for the future government and society were provided to formulate relevant policies.

**Keywords:** Social inequality; Gender pay gaps; Government policy; Discrimination; Societal welfare

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## 1. Introduction

The American scientific workforce is not representative of the whole population. Workplace barriers are well studied in this research paper. However, few studies have examined the impact of these differences on scientific progress. Most studies tend to focus on race or gender and fail to account for the intersection of these variables. This paper draws on many scientific papers to study the relationship between scientists and the results of their research. A close relationship was found between the characteristics of scientists and their research topics, suggesting diverse changes that impact the career development of minors. Scientific policies should consider this relationship to increase equitable participation in the scientific workforce and thus enhance the robustness of scientific research <sup>[1,2]</sup>.

The American scientific workforce is predominantly comprised of white individuals. Studies have shown that systemic barriers prevent women and minors from entering the scientific field. However, few studies have adopted cross-cutting perspectives and studied the impact of these inequalities on scientific knowledge. In this paper, a large-scale biometric analysis of the relationships between cross-identities, themes, and scientific influence was conducted. Homogeneity was found between identity and the subject, suggesting a relationship between the diversity of the scientific workforce and the expansion of base knowledge. However, the topic selection comes at a trivial personal cost and shortcomings between topic references were observed. To improve the robustness of science, research organizations should provide adequate resources for various areas

of research that have historically been underfunded, while providing access to highly reputable networks and topics for women and minors <sup>[3-5]</sup>.

## 2. Study methods, materials, and conclusion

There are many ways to measure equality and inequality using various models and methods. For example, the coefficient of variation in the thematic proportions of each ethnic group, or images to show links between the two or more.

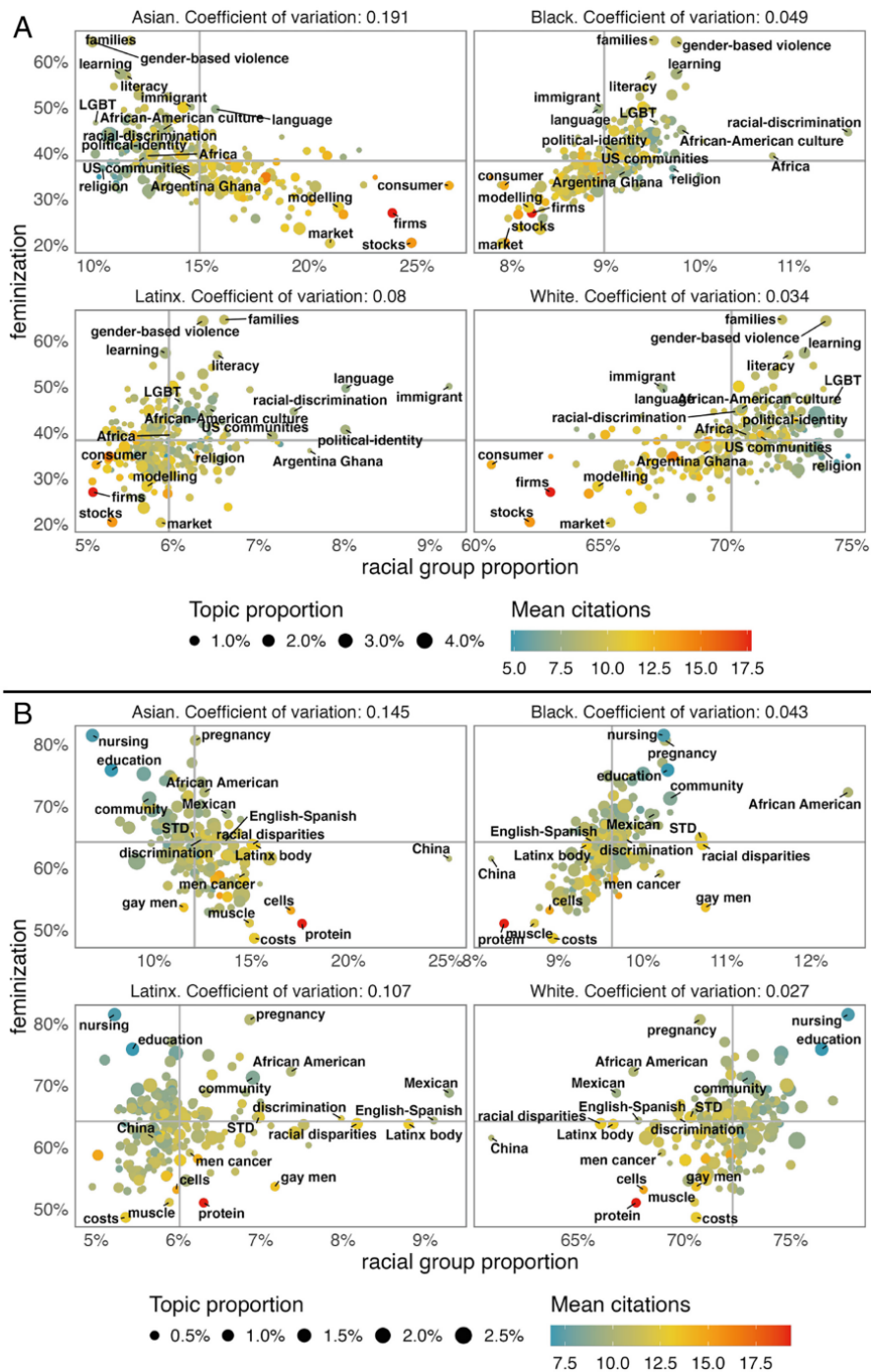
Firstly, we looked at employment inequality in scientific development from the perspective of ethnic groups. Ethnic categories are a social structure shaped by the policies of a given state, and not all countries have formalized systems to categorize ethnicity. Therefore, our analysis focuses on the specific cultural structure of races in the United States. To infer racial or ethnic origin, we used information from the 2010 U.S. Census on last names and racial groups. The racial groups considered in the U.S. census are non-Hispanic whites, non-Hispanic blacks or African Americans, non-Hispanic Asians, the native Hawaiians, non-Hispanic American Indians, Alaska Natives (AIAN), Hispanics or Latinos. Census data provided 162,253 of the most common surnames identified with each ethnic group. We calculated the probability that each person is associated with each ethnic group, rather than assigning them to the most likely group, and used these probabilities to calculate weighted totals, where each person contributes to the sum of each group, as a function of the distribution of ethnic groups associated with their last name <sup>[6,7]</sup>.

The group studied were authors of published books. Primarily, the publication pattern of affiliated first authors in the US between 2008 and 2019. Our data included 5,431,451 articles indexed in the Science Network (WOS) database and 1,609,107 US authors. We focused on first authors because they are usually the ones who contribute the most to an article and represent the most obvious names in bibliographic references. Metadata includes a given author's first and last name, which can be used to infer their race and gender. The gender disambiguation algorithm is based on the approach introduced by Lariière, which uses census data and a list of male and female names from a particular country to assign the gender. However, there are some limitations. Because gender is binary, the other genders can only be assigned through self-identification. By analyzing the surnames of American authors, we can infer their employment direction and opportunities, thus judging the inequality in scientific development in the US in terms of published bibliography.

A comparison of the racial and gender demographics of the first authors with the Demographics of the United States showed that white and Asian writers were overrepresented, while black and Latino writers were underrepresented. It was also found that different groups of scholars were unevenly distributed in their research topics. In the social background, people's thoughts will vary and will be influenced by their education level <sup>[8]</sup>.

It can be concluded that black, Latino, and white women were underrepresented in physics, math, and engineering, and overrepresented in health, psychology, and arts. Asian women were underrepresented in the arts, humanities, and social sciences, but highly represented in biomedicine, chemistry, and clinical medicine. African-American, Latino, and white men were underrepresented in psychology and health. Asian men were also underrepresented in humanities and social sciences but were more represented in physics, engineering, mathematics, and chemistry. Male first authors were generally cited more than women in both original and field-normalized citations, and Asian authors were cited more than black, Latino, and white authors. For white, black, and Latino women, the citation gap narrowed when normalized citations were considered, suggesting they were more widespread in areas with lower citations. However, even when field normalization citations are taken into account, gaps remain.

In social sciences, the majority of Asian authors' work covers economics and logistics, while white and African American authors have less coverage in this field. African American authors are well-represented in the fields of racism, African American culture, and African studies. Latino authors are highly represented on topics related to immigration, political identity, and racial discrimination. In general, the research of different authors tends to be highly focused on specific subject areas, while some authors tend to publish around disciplines and research topics that reflect their gender and social identity. This indicates that some areas that are important to marginalized groups are less studied.



**Figure 1.** Relationship between racial group and feminization Thematic distribution by ethnic group and gender participation. (A) Social sciences, humanities, and professional fields. (B) health. For social sciences, humanities, and professional fields (n = 283,589 articles)

**Figure 1** shows the coefficient of variation (CV) for the proportions of each ethnic group on the subject. A high resume, compared to the average percentage, means that the group has a high level of engagement on some topics and a low level of engagement on others. Asian writers had the highest resumes, while white writers had the lowest. This suggests that Asian writers are highly specialized, focusing on certain subjects, while white authors cover a wider range of subjects. Black and Latino writers show greater specialization and focus on fewer topics and white authors are more evenly distributed among topics. However, this is to be expected, as they make up the majority of the author community. The most feminine topics include research on gender-based violence, family, and learning. In health, the topics most represented by Asian authors are China, protein, cells, and health economics (i.e., cost). Black writers wrote about racial differences and sexually transmitted diseases with special emphasis on African-American women and gay men. The latter theme is also relevant to Latino men. Latino authors posted more about the Latino population, racial differences (a theme shared with black writers), and English-Spanish topics similar to those previously found in Social Sciences.

### 3. Research on gender pay gaps

According to the World Economic Forum's 2021 Global Gender Gap Report, the global gender pay gap is approximately 16%. Specifically, for every dollar earned by men in the same job, women earn only 84 cents. The aforementioned pay gap for women of color is even more stark. For example, black and Latina women earn just 63% and 55% of what non-Hispanic white men earn, respectively. For women, limited career opportunities can be seen as a form of employment discrimination and inequality as male workers often have more promotion opportunities and increased commissions. Women are often excluded from opportunities that are critical to their careers, while their performance evaluations are biased<sup>[9-11]</sup>.

Another type of discrimination against women in the workplace is age discrimination. Older women are often affected, mainly due to stereotypes. Age discrimination can make it difficult for women workers to stay in the labor force for a long period, which in turn has an economic impact on women, such as significantly lower pay, shorter retirement periods, and reduced social benefits<sup>[12,13]</sup>. This often stems from stereotypes and biased perceptions by society. Although the inequality of social and cultural concepts has gradually changed in recent times, the cognition that "men are more intelligent, capable, and strong" is still deeply etched in people's hearts.

Secondly, loopholes in the distribution system of power in the workplace also result in the unfair treatment of women. In the current workplace, most important positions are held by men, which makes it difficult for female workers to access high-level information, which also implicitly affects the promotion opportunities of female workers. Women also face numerous hidden discriminations. When interviewing women employees, questions involving their families, such as "Our company will regularly issue Children's Day benefits to employees, how many benefits do you need?" are asked. This indirect interview method has set a foundation for women's employment<sup>[14,15]</sup>. Women are often asked about their childbearing status during interviews. It is believed that women were more likely to adjust their relationships concerning the job changes of male workers, which was the opposite for male workers<sup>[16]</sup>.

According to the 2022 Survey Report on the status of Chinese Women in the workplace, 61.2% of women were asked about their marriage and childbearing status during interviews, which was an increase from last year of 55.8%; 38.3% of women said marriage and childbearing affected career prospects; 11.9% of women were not promoted or received a pay raise because of their gender.

## 4. Discussion

Inequalities in science have been studied for a century, and some analyses suggested that these inequalities were the result of non-commercial scientific systems. Our results suggested that secondary authors tend to publish about scientific disciplines and research topics to reflect their gender. Specifically, we showed that the subject specialization of Asian, black, and Latino first authors in the US (via higher resumes) contrasts with the ubiquity of white authors. The even-numbered participation of white authors on each topic suggests that the relationship between race and the research topic is more associated with secondary authors. In other words, scientific knowledge production is optional, in which research on particular topics is influenced by the race and gender of the scientist. As explained by Bourdieu, the amount of scientific capital researchers has defined the strategies they can follow. The prevalence of white males in the scientific field and across topics indicates that this demographic group possesses a wider range of possible strategies to follow and has an advantage in their approach to investing in science capital, which exacerbates inequality in academic outcomes.

Discrimination challenges the notions of objective, apolitical, and elitist ideals in scientific discourse. This idea helps to reinforce and mask racial and gender biases in science. Structural racism remains a constant source of mental and physical stress for minority groups in the US, whose calls for justice in socioeconomic (e.g., health care, housing, education, finance, and criminal justice) and professional arenas are intermittently elevated, and then ignored). Academia is no exception in this aspect. Underrepresentation in science is similar to that in other sectors and can be attributed to the widespread legacy of systematic racial exclusion campaigns sanctioned by federal and state governments in the US to reduce the representation and participation of ethnic minority racial groups <sup>[17,18]</sup>.

## 5. Proposed implementation solutions for women and enterprises

This analysis showed that systematic inequities are reproduced in scientific assessment and resource allocation in terms of the value assigned to specific topics. Several policy recommendations have emerged from this analysis <sup>[19]</sup>.

Scientific institutions need to recognize the existence of knowledge gaps related to racial and gender segregation of authors and promote topics that are more underwritten by gender and race. Funding agencies can allocate more funds to areas that have historically been underrepresented. This will influence the entire academic award system as funding is closely related to productivity and impact, both of which are related to institutional progress. This has implications for individual scientists but also helps to increase their visibility and participation in understudied areas. Furthermore, institutions need to promote the diverse participation of scientists in high-impact topics, taking into account the need for resources and initiatives to provide marginalized individuals with access to high-impact networks.

One should enhance their sense of rights and seek legal help to solve problems. Learning to protect one's rights and take care of their own is the foundation of one's foothold in society. This enables one to get matching remuneration and receive the appropriate salary for life support. We should adjust our way of thinking and reflect on our values rationally, concerning our goals, gains, and purpose of existence <sup>[20]</sup>.

If individuals are experiencing unequal treatment, it is crucial to confront the unfair behaviors and pursue fairness. The government and society should strive to eliminate the gap between the rich and the poor effectively. People can also help out colleagues who seem to be in an unfair situation. These activities will help to reduce differences in the impact of different topics where race and gender intersect, thereby enhancing scientific equity and broadening the scope of knowledge.

Moreover, in some developing countries, the establishment of birth support systems is very important if the

culture of gender equality in the workforce is to be strengthened. For example, the revised law on the protection of women's rights and interests requires implementation by all government personnel. The occurrence of gender discrimination in employment can be modified, legal responsibilities can be clarified, and gender discrimination in employment in the scope of labor security supervision can be included. The supervision of women's work transfer such as recruitment, dismissal, and promotion should also be strengthened to improve the joint mechanism of gender discrimination in employment. This aims to provide a good working environment for women's fair employment, increase their contribution to society, and protect their physical and mental health. At the same time, it is feasible to improve the maternity leave and the work cost-sharing mechanism through the law. According to the survey, various enterprises hope that the local government will introduce relevant policies promptly to reduce the losses caused by women in the childbearing stage. Enterprises hope to ease this pressure through relevant government subsidies.

Third, society can actively implement men's child-rearing responsibilities. Men ought to actively bear the child-rearing pressure, which positively impacts women's willingness to bear children. This also balances the difference in child-bearing labor costs and can improve women's work equality.

Finally, the creation of family-friendly policies can provide women in the workplace with space and opportunities to contribute to society. Specifically, family-friendly policies refer to the policies and measures adopted by the government and society to promote family development and the well-being of family members. With the development of society, the concern about the fairness of women's employment is also increasing. Such policies can reduce women's pressure to balance work and family. Second, family-friendly policies can psychologically improve the status of women in the workplace and increase their employment rate. At the individual level, focusing on the mental health of women in the workplace can help promote gender equality and social progress. Under the influence of society, the leadership and cooperation spirit of women in the workplace have a crucial impact on the profits of enterprises. On the contrary, if women in the workplace are exposed to psychological stress for a long time, it is difficult for them to find a balance between work and family, which affects the well-being of children, the stability of their family, and the stability of the business.

## Disclosure statement

The author declares no conflict of interest.

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