

How has gender balance evolved over the past 10 years in STEM-related disciplines?



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Aims and Objectives

- Explore the evolution of gender balance over the past 10 years – 2007 to 2016 (inclusive) in STEM-related research with an Irish affiliation.
- Identify methodological issues.

Methodology

Downloaded STEM-related articles with Irish component from WoS using WoS Research Areas¹

Used Genderize.io² to genderize names of authors, returning either “male”, “female” or “null”

Manual identification of “null” values using pronouns, University sites, photographs at conferences etc.

Overview

- Number of publications have gradually increased from 10,109 in 2007 to 17,628 in 2016.
- Collaborations are becoming increasingly popular, from constituting 82.68% of publications in 2007 to 89.73% of publications in 2016.
- Number of collaborators per publication has also increased with the average number of collaborators per publication increasing from 3.26 in 2007 to 4.4 in 2016.
- Accuracy of genderizer was 0.96 (96% probability of identified gender being accurate).
- Null values represent 1.7% of the data – authors with unidentified genders (due to inability to find the gender of the author online).

Key Findings

- Female representation is improving, with the ratio of females to males being 1:2.56 in 2007 and 1:1.71 in 2016 (see Figure 1).

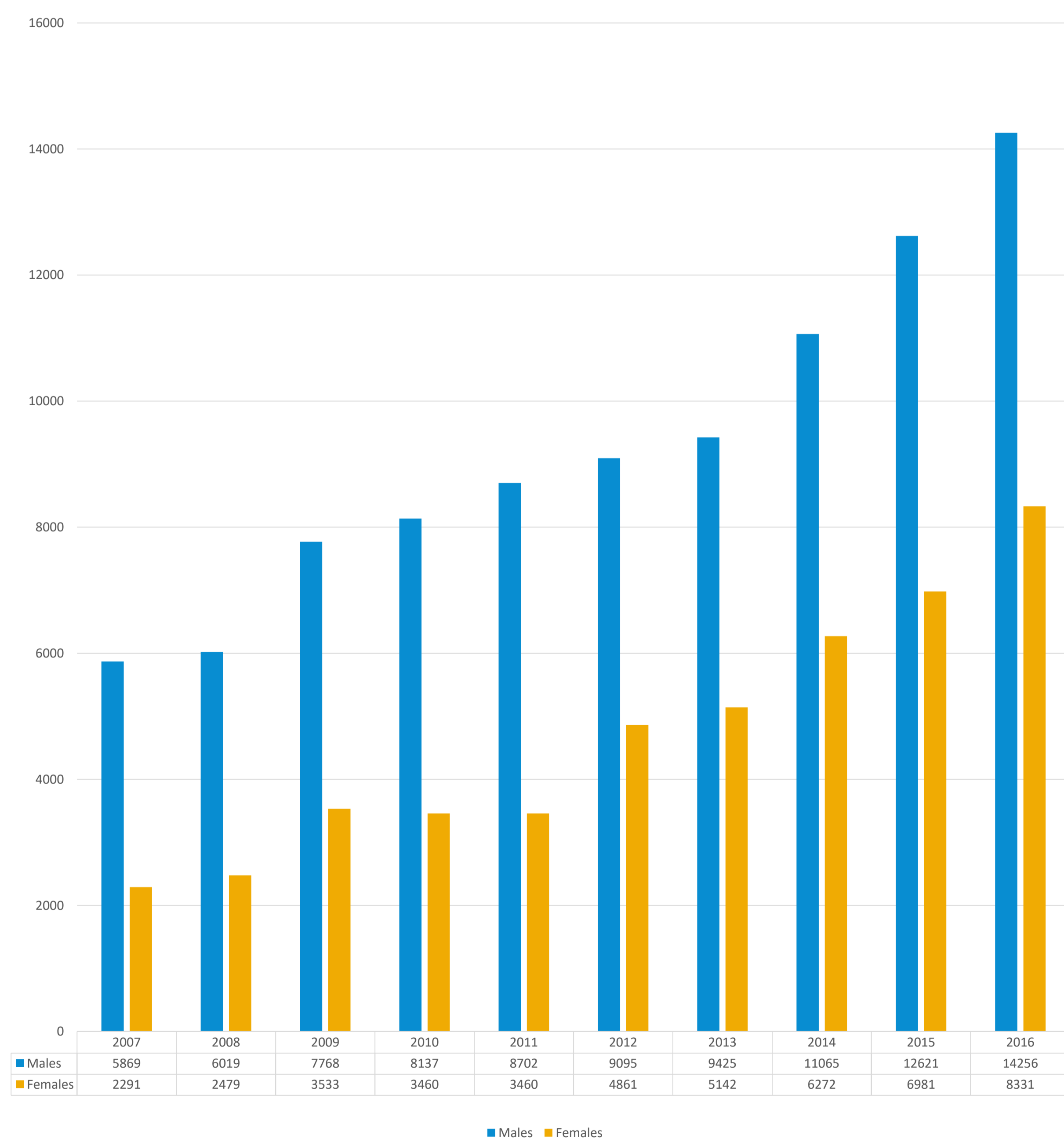


Figure 1. Evolution of gender balance over 10-year timeframe.

- Mixed-gender collaborations are increasing, with the ratio of all female collaborations to all male collaborations being 1:5.53 in 2007 and 1:3.32 in 2016.
- Significantly more of the manually identified null values were of male gender than of female gender – the average ratio of females to males manually identified was 1:3.9 (deviates from overall average of 1:1.95).

Methodological Issues

Web of Science (WoS)

- Author names with misspellings resulting in “null” values
- Fadas in Irish names (e.g. Ciarán)
- Lack of consistency in formatting of names – first name and last name reversed, mixture of initialised first names and full first names within same article

Genderize.io

- Frequent inability to identify gender of Asian origin names resulting in “null” values

Conclusion

- Greater gender balance in STEM-related research with an Irish affiliation is observed over the 10-year timeframe.
- Gender balance within collaborations have also improved over time.
- On average, the female to male ratio over the 10 years is 1:1.95. Within the manually identified cohort, the gender ratio is 1:3.9, females to males, suggesting that the 1.7% of the data that remain null values may be largely unidentified females (gender not found online).
- Difficulties in studying gender are identified, highlighting the barriers in conducting research aimed at improving gender balance when gender may often go concealed.

Future Research

- Future research should seek to explore the reasons behind the discrepancy between the average gender ratio observed over 10 years (1:1.95, females to males) and the gender ratio amongst the manually identified cohort (1:3.9, females to males) – perhaps male researchers have greater online presence than females. An exploration of this possibility and potential reasons would prove beneficial to future research.
- Another major contribution would be to expand the scope of this research to other disciplines – current initiatives often strive to improve gender balance in STEM-related disciplines, potentially neglecting other areas. An improvement in STEM due to these initiatives may thus demonstrate their contribution, and moreover, highlight their importance in motivating women in other potentially gender-imbalanced areas.
- Understand reason for variation in formatting of names, whether this be cultural differences, personal preferences, or journal requirements.

References

¹Clarivate Analytics (January 31 2018). Research Areas (Categories/Classification) *Web of Science Core Collection Help*. Retrieved September 13th, 2018, from http://images.webofknowledge.com.ucd.idm.oclc.org/WOKRS530JR6/help/WOS/hp_research_areas_easca.html

²(n.d.). Determine the gender of a first name. *Genderize.io*. Retrieved September 13th, 2018, from <https://genderize.io/>.