

BETWEEN ACADEMIA AND INDEPENDENCE: A BIBLIOMETRIC PERSPECTIVE ON CAREER PATTERNS AND GENDER DYNAMICS OF INDEPENDENT RESEARCHERS

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In bibliometric sources, independent researchers are on the rise. We define independent researchers in economic terms, as researchers who conduct research (and publish their research results) for no payment, without institutional affiliation. An increasing number of publications are (co-)authored by people who identify as 'independent' on the publication itself. The rise in independent researchers highlights the casualisation of the academic labour force as a potential contributing factor to these uncommon career trajectories but also raises questions about aspects of research that are difficult to trace in bibliometric sources. Furthermore, independent researchers may face specific difficulties when applying for funding, accessing materials and paying conference fees (Babyak, 2020; Kara & Boynton, 2024). This contribution focuses on two aspects of independent researchers' careers: career trajectories and gender. Historically, there has been a gendered dimension to working as an independent scholar (Moyal, 2002; Pomata, 2013; Roth Breitzer, 2018), although a recent bibliometric study has indicated that this may no longer be the case (Lund et al., 2023). This research aims to investigate what role gender plays in the phenomenon of independent research. Furthermore, tracing independent researchers' publication histories reveals that independent researchers transition between institutional affiliation and unaffiliated research at different stages of their careers. We show what independent researchers' careers may look like in terms of length and affiliation status.

We have used OpenAlex as it is an open data source. Considerations of access and openness are especially important for independent researchers. Our search on OpenAlex has led to a dataset of 28,508 publications (co-)authored by independent researchers, excluding retracted publications and preprints. In the year 2023, 3,328 publications (co-)authored by independent researchers could be identified on

OpenAlex. This is comparable to the publication output of a mid-sized university. The domain of social sciences and humanities is the largest domain for independent researchers (slightly over half of the publications), while there are fewer independently authored articles from life sciences, physical sciences and health sciences. This may be partly due to our definition of independence in economic terms. Slightly over half of the publications involving independent researchers are sole-authored publications (55.6%).

The works found are associated with 22,772 independent researchers. A portion of independent researchers is only linked with one record in OpenAlex (6,778 or 29,8%). However, other authors have contributed to multiple research articles and works. We have retrieved the full publication histories of flagged independent researchers. This approach has relied on the author name disambiguation algorithm of OpenAlex, and is not without its flaws. We have added a cleaning step to take out obvious mismatches that would affect the results (such as unrealistically long careers and publication histories).

Next, we have investigated whether the authors who at one time published as independent/unaffiliated researcher have also published while affiliated to a research-performing organisation, which we would define as mixed careers. We looked at positive markers for institutional affiliation. The reason why we took this approach is because independent authors may omit their affiliation information. These cases are indistinguishable from cases of missing metadata and make it harder to trace independent researchers. We assume that researchers who indicate independence at one point in their careers, remain independent unless they provide an institutional affiliation. There are some cases where it was difficult to determine whether the authors were independent or affiliated because of quality issues in the affiliation information ('unclear' cases). The results are presented in table 1. Career length is based on the years between an author's first publication and last publication. We can see that authors with mixed careers have a higher average number of works per author, and also a longer career whereas authors who exclusively publish as independent scholars tend to have a lower publication count and shorter research career.

Table 1: Overview of career types.

Career	Number of authors (and percentage)	Average number of works per author	Average length of career (in years)
Authored only one work	6,778 (35.0%)	1	1
Always as independent	1,691 (8.7%)	3.6	5.7
Mixed career	9,562 (49.4%)	14.8	14.7
Unclear	1,323 (6.8%)	12	10.6
Total	19,354	8.8	8.8

Authors with a mixed career are more likely to first publish while affiliated and later publish as an independent author. This would be the case for PhD students who start their research career at a university, but do not pursue an exclusively academic career afterwards. Table 3 shows the percentage of authors with mixed careers starting with or without affiliation. The category 'both' indicates that the author published multiple works in the same year with different affiliation statuses. An important caveat here is that we are relying on works that are in OpenAlex, which is not necessarily the full publication history of these researchers (for the group that publishes first as an independent researcher, it is possible that earlier publications exist but are not in OpenAlex).

Table 2: First publication for authors with a mixed career (publishing both as independent and with affiliation)

Affiliation with first publication	Number of authors (and percentage)
Affiliation	6,754 (70.6%)
No affiliation/independent	1,745 (18.3%)
Both	741 (7.8%)
No affiliation	1,745 (18.3%)
Uncertain	322 (3.4%)

Using a model to infer the probability that a given name is gendered male or female allows us to explore the gendered dimension of unaffiliated research work. Gender assigning by name does not imply gender identity or expression. We use the results of gender classification only on an aggregated, in order to point towards structural inequality. The open source model 'nomquamgender' includes information on the number of sources per name (Buskirk et al., 2022). We find that while a majority of names could be gendered male, when compared to a test data set with the same disciplinary distribution, a larger percentage of female gendered names is found among independent researchers, suggesting that there could be a gendered dimension at play. However, there seems to be no gender effect between authors with mixed careers or always publishing as independent. The average career length for authors with male-gendered names is slightly longer (9.85 years) than for authors with female-gendered names (8.21 years).

There are a few important limitations to our work. Firstly, OpenAlex is evolving and changing rapidly. Our approach relies on affiliation information as well as on the author name disambiguation algorithm of OpenAlex. We have noted instances where affiliation information is unclear, and these need further investigation. It is also important to stress here that the performance of algorithms to classify names varies across regions, and is not ideal. Finally, we defined independence in terms of affiliation statements, but it is possible that authors indicate institutions without being paid employees. For example, students or voluntary employees may list an institutional affiliation without receiving any salary.

In conclusion, the number of works published by identifying as independent researchers has increased. People publishing as independent researchers frequently began their careers while affiliated with a university or research performing organisation. Our results indicate that long careers as independent researchers are uncommon, but mixed careers whereby researchers spend shorter periods of time as independent occur more frequently. Independent researchers are an important group to be aware of in terms of structural inequalities and barriers in the academic work environment. Recognizing independent researcher's work can highlight funding and access barriers.

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