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Evolution of the Involvement of Researchers From the University of Caen (France) in Author Identifiers and Social Networks: 2019–2023

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ABSTRACT

As author identifier services (AIDs) and academic social networks (ASNs) have become increasingly central to scholarly communication in the last decade, it is important to study how these tools are being used and how far researchers are involved in these services. This study aims to assess the evolution of the presence of researchers from 2019 to 2023, on three AIDs (ORCID, ResearcherID and IdHAL) and on two ASNs (ResearchGate and Academia) categorized by discipline and career advancement in a medium-sized multidisciplinary university in France (University of Caen Normandy). The total number of publications found on each of the five sites studied was assessed to evaluate the ability of these sites to provide an accurate view of the scientific output of individuals and their institution. In this case, for each of the researchers we need to determine whether they had a profile on any website studied, and to record the number of their publications. As main results, the number of profiles has increased across the five sites studied over the period 2019–2023. This increase is very important on two of the five sites studied: IdHAL and ORCID (330% and 159% increase, respectively), while it is more moderate on the other three sites (less than 30%). This illustrates the result of incentive policies implemented in France in recent years concerning IdHAL and ORCID. The analysis of the number of publications on each profile in 2019 and 2023 across the five sites studied showed large differences in terms of the total number of publications included in profiles, highlighting the inability of these sites to qualify a population of researchers by considering the number of publications available on these different sites. To complement this study, future research should consider analysing the content and methods of data entry on these sites, particularly ORCID, as well as the frequency with which this data is updated, especially in relation to the development of different providers in the context of open science.

1 | Introduction

Author identifier services (AIDs) and academic social networks (ASNs) have become increasingly central to scholarly communication in the last decade. AIDs like ORCID, Scopus AuthorID or ResearcherID have been developed aiming to solve the long-standing problem of author name ambiguity and help streamline the academic publishing workflow. These tools provide unique identifiers that help distinguish between authors with similar names and accurately attribute scholarly works to the correct individual. This is critical in large databases where common names can lead to confusion (Haak et al. 2012). ORCID, in particular, has been widely adopted by publishers and funding bodies to simplify manuscript submission, peer review and grant applications. This integration improves transparency and efficiency in research workflows (Arunachalam and Madhan 2016). Maintaining an updated identifier profile can enhance researchers' visibility and impact by linking all their outputs across platforms. However, it has been shown that many researchers have not currently fully adopted these systems (Boudry and Durand-Barthez 2020), except for ORCID whose adoption and awareness level is

Key Points

- Among the five platforms studied, the increase in profile percentages was statistically significant over the period studied.
- The important increase in the number of researchers with an ORCID or an IdHAL is the result of incentive policies implemented in France in recent years.
- The analysis of the total number of publications on each profile across the five platforms studied showed large differences.

now important (Boudry and Durand-Barthez 2020; Bordons et al. 2024; Arroyo-Machado et al. 2025). Indeed, with the exception of ORCID, most countries do not yet require or encourage researchers to register on other sites. The lack of interoperability between these sites may also discourage researchers from using several.

ASNs like Academia and ResearchGate have emerged as influential platforms for scholarly communication, research dissemination and professional networking. These tools allow users to share publications, receive feedback and stay updated on developments in their fields (Manca 2018). They support global academic interaction and collaboration and help researchers build their academic identities through online CVs, citation metrics and engagement in community discussions (Asmi and Margam 2018). As these tools are for profit, they raise concerns about data ownership, advertising and the commodification of academic content (Bhardwaj 2017). Concerns have been also raised about metrics fraud in ResearchGate (Kirilova and Zoepfl 2025).

For all stakeholders involved in research it is important to examine the usage of AIDs and ASNs to know who and where are the users of these tools (Fuhr and Monnin 2024). It can be useful to implement or to evaluate the results of incentive policies, or to improve training and services (Boudry and Durand-Barthez 2020; Quinn 2023; Bordons et al. 2024; Houghton and Foster 2024). As new tools that have appeared relatively recently, a number of articles have been published on ASNs (Manca 2018) and AIDs (Gasparyan et al. 2014; Haak et al. 2012; Mering 2017) to explain how they work and why they can be useful. The first studies to evaluate researchers' investment in these tools appeared in 2015, showing a rather moderate adoption of ORCID, ResearcherID or Academia by researchers, with the exception of ResearchGate (Haustein et al. 2015; Mikki et al. 2015). Comparable studies were then carried out on both ASNs and AIDs, mainly up to 2020, and showed similar results overall to these initial studies (Aman 2018; Morgan and Eichenlaub 2018; Sandberg and Jin 2016; Tran and Lyon 2017; Boudry and Durand-Barthez 2020). A more recent study (Fuhr and Monnin 2024) assessed the investment of Canadian researchers (university of Manitoba) in three AIDs (ORCID, Scopus AuthorID, ResearcherID) and one ASN (ResearchGate), showing a high level of adoption of Scopus AuthorID and ResearchGate. According to a survey by the Organisation for Economic Co-operation and Development (OECD) (Bello and Galindo-Rueda 2020), ORCID was the AID most used by researchers in 2018 and, in 2024, a French national survey studying the adoption and use of five AIDs (ArXivID, IdHAL, ORCID, ResearcherID and Scopus Author ID) showed that ORCID and IdHAL were the most used by French researchers (Boudry and Bouchard 2024).

In the last years, such studies have tended to focus solely on ORCID, which has positioned itself as being the predominant standard for author identification in academic communication (Pampel et al. 2023). These studies have been performed in several countries and have shown highly variable ORCID adoption rates: 41.8% in France (in the Toulouse scientific area) (Heusse and Cabanac 2022), and 90.4% in Portugal (Faculty of Arts and Humanities of the University of Porto) (Fernandez-Marcial et al. 2023). Due to the fact that IdHAL is an identifier whose scope is limited to France, to the best of our knowledge, no international studies have assessed its adoption by researchers.

Some studies have also tempted to compare AIDs or ASNs with established bibliographic databases in terms of publication counts or different metrics. Our team (Boudry and Durand-Barthez 2020), studying the population of the researchers of the University of Caen Normandy (France), has compared the number of publications per researcher on ORCID, ResearcherID, ResearchGate and Academia with Scopus. It has been shown that these four sites lead to an underestimation of the number of publications per author. Conversely, for individuals, a strong correlation has been found for ResearcherID, and especially for ResearchGate, when assessing the number of citations per article. Singh et al. (2022) compared ResearchGate with Google Scholar in terms of number of publications per author and in terms of number of citations of 4238 authors having h-index value greater than 100. They found that Google Scholar surpasses ResearchGate. Another study have compared the number of publications of the researchers at the University of Manitoba (Canada) found in ORCID, Scopus, Google Scholar and ResearchGate. They had shown that Google Scholar and ResearchGate were the most efficient in terms of number of publications (Fuhr and Monnin 2024). They have also pointed out that 'using ORCID to list publications is not effective because there are few people using it, and those that do, do not use it for that purpose' (Fuhr and Monnin 2024). Lastly, Bordons et al. (2024) have studied the number of publications of Spanish ERC researchers found in ORCID profiles, the WoS, Scopus and Google Scholar. They found a positive correlation in all three cases, with an especially strong correlation with WoS and Scopus. They also found that Google Scholar surpasses ORCID in terms of number of publications, indicating that ORCID coverage can be increased. This article aims to assess the evolution of researchers' presence on three AIDs (ORCID, ResearcherID and IdHAL) and two ASNs (ResearchGate and Academia), categorized according to discipline and career advancement. It is based on studying researchers who were present in both 2019 and 2023 at the University of Caen Normandy, a medium-sized, interdisciplinary university in France. Although AIDs and ASNs are tools with different functions and objectives, it seems important to study them together. This makes it possible to determine which of these sites are preferred by researchers and to identify which ones align with expectations and usage. Furthermore, to our knowledge, few studies of this type have included so many tools, and those that have are relatively outdated (Boudry and Durand-Barthez 2020; Mikki et al. 2015; Morgan

and Eichenlaub 2018; Tran and Lyon 2017). Repeating the analysis after a four-year interval also makes it possible to identify trends regarding researchers' involvement in these platforms. Furthermore, it enables an assessment of the impact of incentive policies implemented in France and locally in Caen. This four-year period should make it possible to assess whether the incentives introduced in 2018 (e.g., first National Plan for Open Science [2018–2021] Ministère de l'Enseignement Supérieur et de la Recherche 2018, in which ORCID is one of the cornerstones of the open science ecosystem), and in 2019 (e.g., France's membership in the ORCID international consortium and awareness-raising and training campaigns regarding IdHAL; Kuntziger 2015) have had an impact on researchers' adoption of these websites.

An analysis of the number of publications on each profile in 2019 and 2023 across the five sites studied has also been performed to compare the capacity of the different sites studied to qualify the scientific production of a population of researchers. This study is intended to complement the study we carried out in 2019, which looked at the adoption of two AIDs and two ASNs at the University of Caen Normandy (Boudry and Durand-Barthez 2020).

2 | Methods

2.1 | Service Providers Included in This Study

Three AIDs were included in this study (ORCID, ResearcherID and IdHAL) and two ASNs (ResearchGate and Academia).

- ORCID: Launched in 2012, the ORCID platform is an international non-profit organization, the purpose of which is to create and maintain a database of distinct researcher identifiers. It offers an identifier to link one's identity, affiliations, research activities and contributions;
- ResearcherID: ResearcherID is offered by Clarivate Analytics' Web of Science (WOS) database and was introduced in 2008. This tool creates identities for research scholars and enables them to generate research profiles, including their titles, affiliations, research interests and publication lists. This identifier is linked to the Web of Science database via an algorithm-based abstracting and indexing service;
- IdHAL: IdHAL is the AID of the French national open archive HAL;
- ResearchGate: ResearchGate, which was launched in 2008, is an ASN that is mostly oriented towards the STM (Science, Technology and Medicine) fields (Thelwall and Kousha 2016; Manca 2018). ResearchGate offers complete services (free and immediate deposit of references and full text publications, use of an internal communication system allowing direct contact between researchers...) at no cost, unlike Academia;
- Academia: Launched in 2008, Academia is an ASN mostly oriented towards Social Sciences, Arts & Humanities (Thelwall and Kousha 2016; Manca 2018). Academia offers all the standard services provided by ASNs. One must note that some information is available only in its paid version (e.g., direct and complete access to citations).

2.2 | Study Setting and Data Collection

Situated in Normandy, approximately 250 km west of Paris, the University of Caen Normandy offers programs in all academic disciplines to approximately 32,000 students. There were 1047 researchers in 2019, and 1050 in 2023, which 807 were present in both 2019 and 2023 who were included in the study. Out of these 807 researchers, they were 503 (62.3%) in STM and 304 (37.7%) in HSS. For six individuals, the status was 'other researchers' and did not allow us to determine career advancement. Of the 801 researchers for whom career advancement was found, 299 (37.3%) were in the early stages of their career and 502 (62.7%) were experienced researchers. Name, surname, status, and laboratory of the researchers were provided by University of Caen Normandy in 2019 and 2023. Assistant professors, lecturers and assistant researchers were considered as early career researchers, whereas full professors and research directors were considered as experienced researchers. The discipline of each researcher was assigned according to the search field of their own laboratory.

In 2019, we manually searched for each of the 1047 researchers whether they had a profile on any site studied. All searches were done in March 2019. In 2023, searches were done manually for ORCID and Academia. For IdHAL, ResearcherID and ResearchGate, a Python script was used to search on each site using name and surname for the 1050 researchers. From these results, a manual verification was done to assess if researchers had a profile on each of these sites. All searches were done in October/November 2023.

As described previously (Boudry and Durand-Barthez 2020), in 2019 and 2023, ORCID searches were complicated when the name of the researcher was found in the ORCID registry but the profile was private, with no distinguishing information available. Because it was impossible to disambiguate or confirm researcher identity in these cases, we did not include ORCID records that were not public or when no information was available in the profile. On Academia, some researcher profiles are created automatically by the site rather than by the researchers themselves. Since the main objective of this study was to assess researchers' voluntary involvement in the five sites studied, only profiles created by researchers were included in the analysis.

The number of publications on each profile was manually collected on ResearcherID, IdHAL, ResearchGate and Academia in 2019 and 2023. The number of publications on each profile was manually collected on ORCID in 2019 and using ORCID public API through a developed Python script in 2023. To ensure consistency between these two different methods (manual in 2019 and using a Python script in 2023), we made sure that the results obtained with the Python script were identical to those obtained manually by using a set of test profiles.

The statistical analysis was conducted using R software Version 4.5.1 (R Foundation, Vienna, Austria). The Mac Nemar's test was used to evaluate significant differences in profile percentages

observed in 2019 and 2023. The statistical significance was set at a p value less than 0.05. In order to take into account the inflation of overall alpha risk caused by multiple comparisons, a correction of p values using the Holm's method was applied to each of the calculations of changes in the number of profiles on the five sites studied (overall, by discipline, and by career advancement). Adjusted p values according to Holm's method were therefore considered.

3 | Results

3.1 | Change in the Number of Profiles on the Five Sites Studied Between 2019 and 2023

As shown in Figure 1, the number of profiles has increased across the five sites studied over the period 2019–2023. The percentage increase in the number of profiles is very important on two of the five sites studied: IdHAL and ORCID (330% and 159% increase, respectively) ($p < 0.001$). The percentage increase on the other three sites is more moderate (less than 30%) ($p < 0.001$).

Table 1 focuses on changes in the number of public and private ORCID profiles and shows an overall increase in the total number of ORCID profiles. This is the result of a large increase in the number of public profiles and a small decrease in the number of private profiles. This result seems to show an evolution in researchers' understanding of the usefulness and interest of an ORCID profile being public rather than private. It should be remembered that one of the main benefits of an ORCID profile is that it allows researchers to publish their list of publications.

The analysis of the changes in the presence of researchers across the five sites studied from a disciplinary point of view (Figure 2a) shows that there are three very large increases in the number of HSS researcher profiles on the three AIDs (IdHAL, ORCID and ResearcherID). All differences in profile percentages were statistically significant.

As far as STMs are concerned, IdHAL and ORCID also show the highest percentage increase in the number of profiles. Finally, it should be noted that the changes in numbers of HSS researcher profiles were more marked in four out of the five sites studied (all except Academia). This seems to indicate that HSS researchers became involved at a later stage in these four sites, confirming the usual time lag between HSS researchers and STM researchers in terms of adoption of digital technologies (Arroyo-Machado et al. 2025). The results presented in

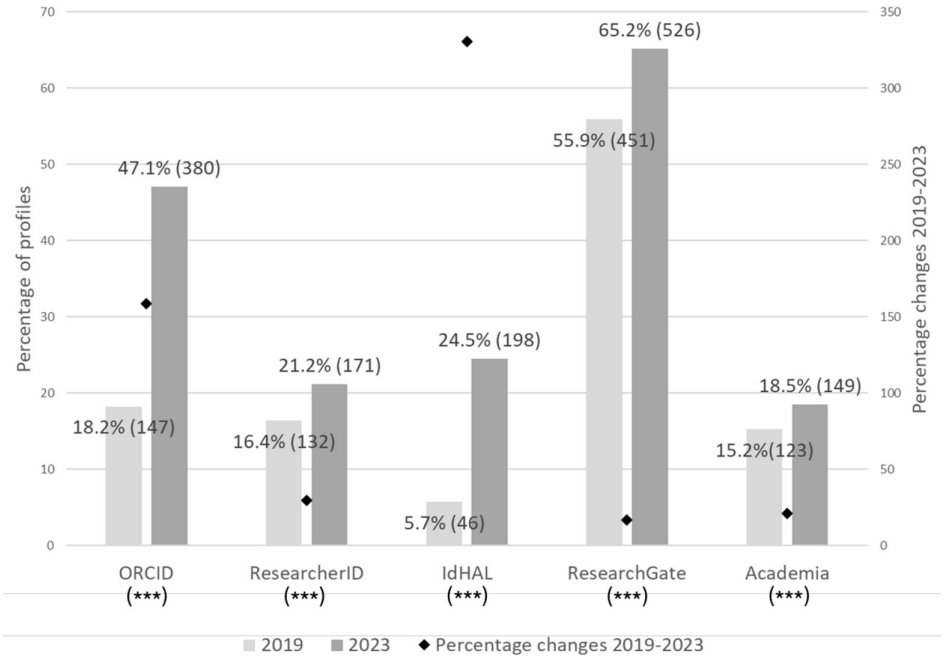

FIGURE 1 | Change in the profile's percentage 2019–2023 for the five sites studied and the population studied ($n = 807$). Numbers are shown in parentheses. Significant differences in profiles' percentages observed in 2019 and 2023: ***$p < 0.001$.

TABLE 1 | Growth in the number of ORCID profiles in 2019 and 2023 (total, public and private).

	Number of researchers	Total number of ORCID profiles (%)	Number of public ORCID profiles (%)	Number of private ORCID profiles (%)	Proportion of public ORCID profiles/total number of ORCID profiles	Proportion of private ORCID profiles/total number of ORCID profiles
2019	807	331 (41)	147 (18.2)	184 (22.8)	44.4%	55.6%
2023	807	560 (69.4)	380 (47.1)	180 (22.3)	67.9%	32.1%

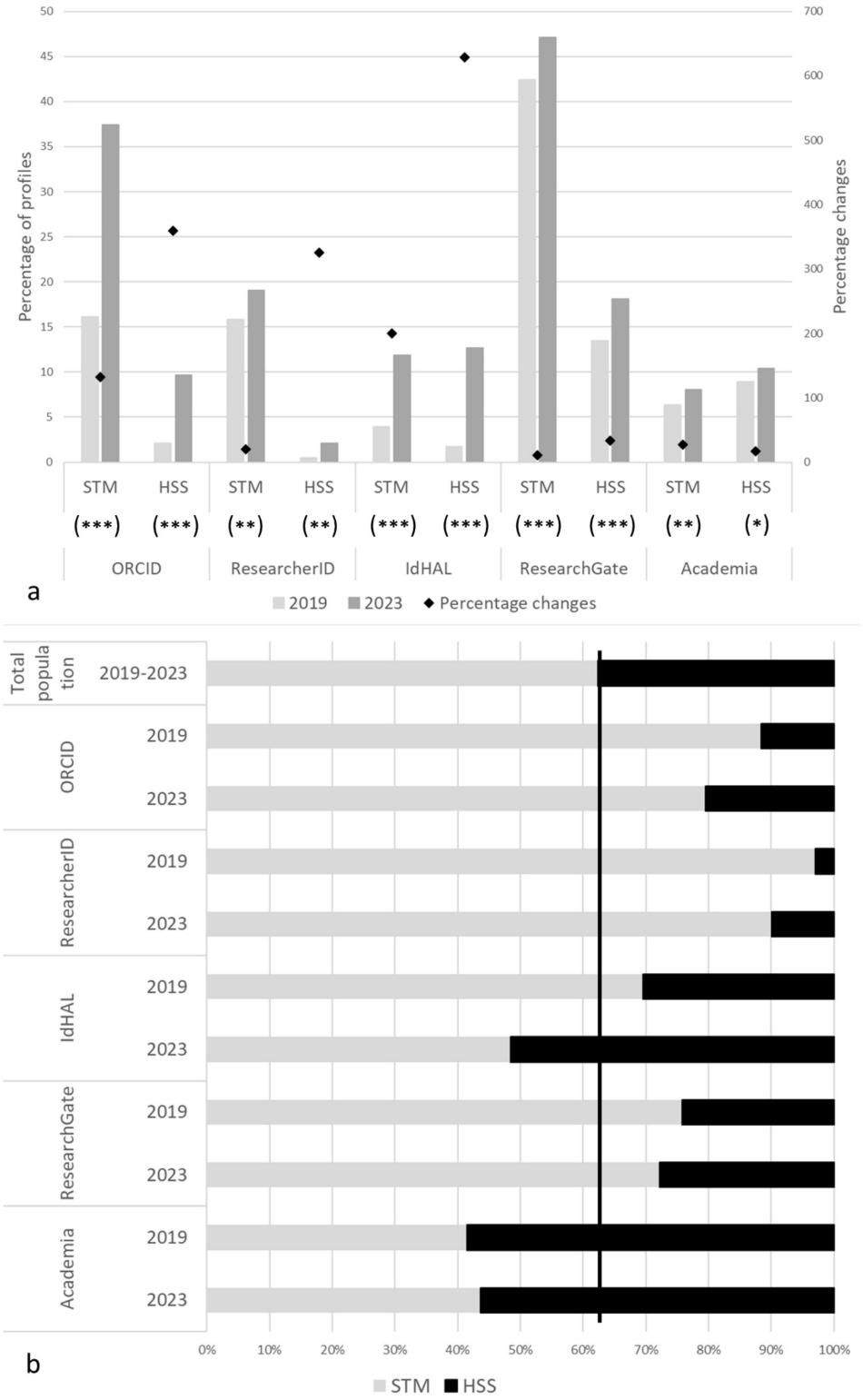

FIGURE 2 | (a) Change in the profile's percentage by discipline 2019–2023 for the five sites studied and the population studied ($n = 807$; 503 (62.3%) in STM and 304 (37.7%) in HSS). Significant differences in profiles' percentages observed in 2019 and 2023: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. (b) Distribution of profiles by discipline in 2019 and 2023 for the five sites studied. The vertical line corresponds to the reference value for the total population studied, indicating the over- or under-representation of respondents in relation to the total population, for example, STM researchers are over-represented on ORCID and under-represented on Academia.

Figure 2b confirm these trends. For ORCID, ResearcherID, ResearchGate and IdHAL, the over-representation of STM researchers has been limited over the last 5 years while for Academia, the over-representation of HSS researchers has been rather less limited. Only one site has seen a reversal in the over-representation of one of the disciplinary groups: IdHAL, where STM researchers were over-represented in 2019 and are no longer in 2023.

First, it should be remembered that for six of the 807 researchers studied, it was not possible to determine their career advancement. All differences in profile percentages were statistically significant, except for experienced research on Academia. For the five sites studied, there is a greater increase between 2019 and 2023 in the number of profiles of early-career researchers compared to experienced researchers for each of the sites studied (Figure 3a). This can certainly be explained by the fact that experienced researchers are more likely to interact with different sites (article submission platforms) and institutions or actors in global research (e.g., funding agencies when responding to calls for projects), which brings them into contact with the five sites studied earlier than early-career researchers, resulting in a smaller catch-up effect (Bouchard and Boudry 2024). For ORCID, ResearcherID, ResearchGate and Academia, the over-representation of experienced researchers has tended to decrease over the last 5 years, while their under-representation has very slightly increased for IdHAL (Figure 3b).

3.2 | Change in the Number of Publications in the Profiles on the Five Sites Studied Between 2019 and 2023

An analysis of the number of publications on each profile in 2019 and 2023 across the five sites studied is presented in Table 2. At the time of data collection, unlike the four other sites studied, it was impossible to create a profile on IdHAL without the requirement to include a publication. In order to include IdHAL in this comparative analysis, we therefore considered only profiles on the four other sites studied that included at least one publication. Without this precaution, it would have been impossible to compare the values for some of the parameters we calculated (e.g., medians). This analysis makes it possible to compare the ability of the different sites studied to reflect the scientific production of a population of researchers (Boudry and Durand-Barthez 2020). Furthermore, quantifying the proportion of profiles with no publication can help identify potential misuse of these sites or a lack of understanding of how they work, especially if the percentage is high. There are major disparities in the percentage of profiles with publications (from 82.3% for ORCID to 98.2% for ResearcherID). The high proportion of researchers who had an ORCID but did not mention any publication in both 2019 and 2023 (31.3% and 18.2%, respectively) can certainly be explained by the high percentage of researchers who stated in the national survey we conducted in 2023 (almost 60%) that they had been obliged to use their ORCID identifier (Bouchard and Boudry 2025). This means that some researchers create an account solely to enable them to access a service (e.g., submitting an article to a journal) (Bouchard and Boudry 2025). The ORCID is then regarded as a mandatory gateway to access services, without researchers taking possession of their profiles, genuinely using them and necessarily including publications. Conversely, ResearcherID and ResearchGate profiles lacking publications are rare, particularly in 2023. It is noteworthy that following the integration of Publons into the WoS in 2022, it has been mandatory to have at least one publication in this database to create a ResearcherID, thereby explaining the substantial decline in the percentage of ResearcherID profiles without publication between 2019 and 2023. Finally, it is important to note that the percentage increase in the number of publications between 2019 and 2023 is greater than the percentage increase in the number of profiles for the five sites studied, meaning that researchers mention more publications overall in 2023 than in 2019. There are also large disparities between the five sites studied in terms of the total number of publications included in profiles, and in terms of the median number of publications per researcher. This underscores the inability of these sites to provide an accurate view of the scientific output of individual researchers and their institutions, as we have already highlighted (Boudry and Durand-Barthez 2020).

4 | Discussion

The objective of this study was to assess the evolution of the presence of researchers from 2019 to 2023, on three AIDs (ORCID, ResearcherID and IdHAL) and on two ASNs (ResearchGate and Academia) in a medium-sized multidisciplinary university in France (University of Caen Normandy). To the best of our knowledge, such a type of study has never been performed. A notable strength of our study is the manual verification process employed to verify the presence of researchers on each of the five sites under scrutiny. This methodological approach serves to enhance the robustness of the results obtained. Nevertheless, this study has one major limitation: only one university was included, and although University of Caen-Normandy is a medium-sized multidisciplinary university, it may not be fully representative of universities in France or elsewhere. Consequently, the findings may not be widely applicable in general.

Among the five platforms studied, the increase in profile percentages was statistically significant over the period studied. The number of researchers who had a profile on ORCID and IdHAL increased over 159% and 330% increase, respectively. By contrast, the increase on the remaining three sites was much more moderate. The increase in the number of researchers with an ORCID or an IdHAL is undoubtedly the result of incentive policies implemented in France in recent years (Ministère de l'Enseignement Supérieur et de la Recherche 2018, 2021a, 2021b, 2021c). Regarding ORCID, it was mentioned in the first National Plan for Open Science (2018–2021) (Ministère de l'Enseignement Supérieur et de la Recherche 2018), which was set to become one of the cornerstones of the open science ecosystem. In 2019, France joined the ORCID consortium (Accueil ORCID France 2026), with the specific goals of establishing a community of practice and ORCID coordinators across the whole French higher education system and research institutions. The role of these coordinators is to help steer institutional policies regarding researcher identifiers and to promote the implementation of ORCID within these institutions. The ORCID researcher identifier was subsequently highlighted in the Policy on Data, Algorithms and Source Codes (Ministère de l'Enseignement Supérieur et de la Recherche 2021a) and the Second National Plan for Open Science (2021–2024) (Ministère de l'Enseignement Supérieur et de la Recherche 2021b), both from the researcher's individual perspective (digital identity, visibility of work, promotion of narrative CVs) and from technical perspectives (reliable key information to avoid data re-entering, particularly when applying for grants) and strategies (national governance of unique identifiers). As there is no obligation for researchers to have an ORCID profile, the national strategy is

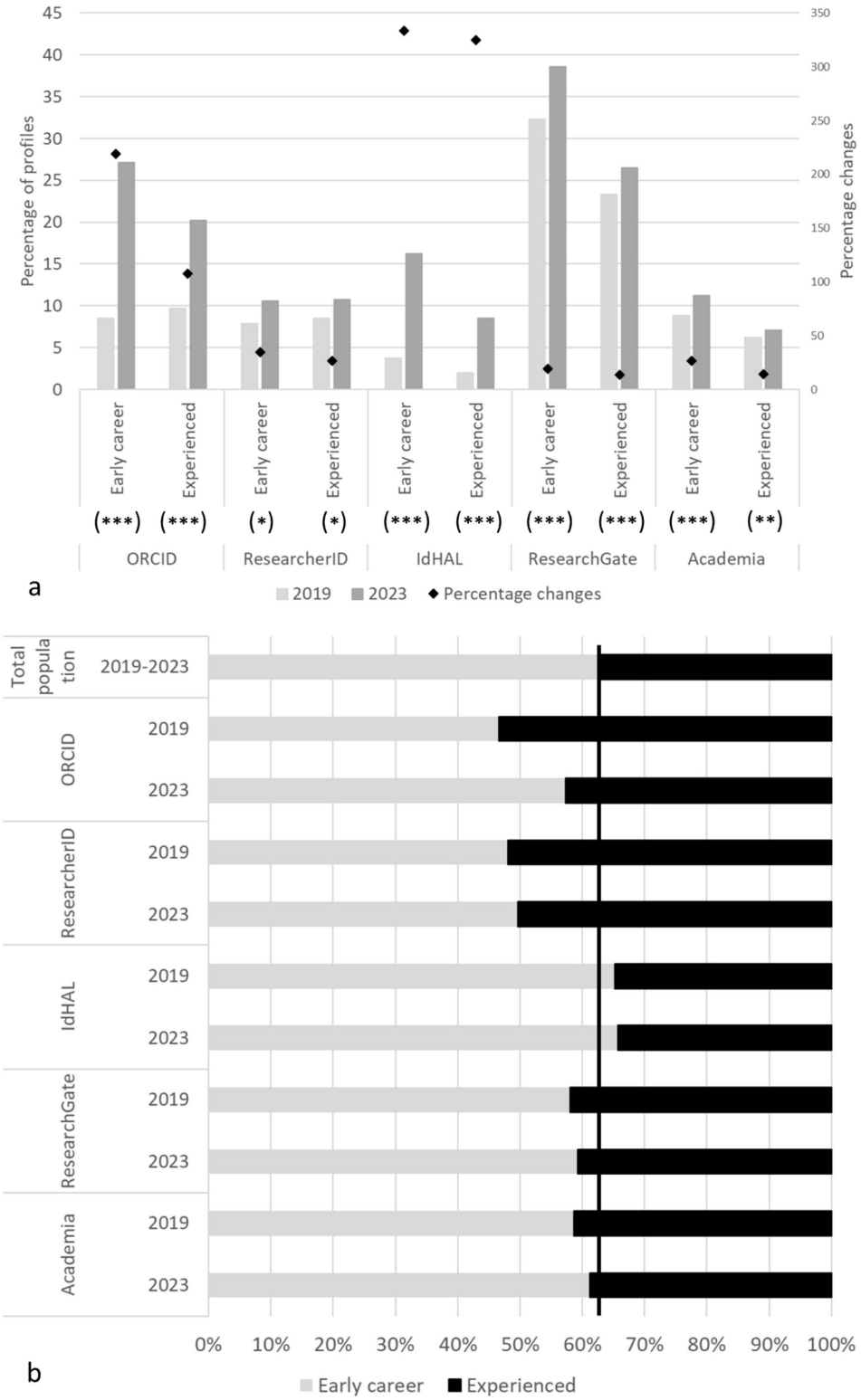

FIGURE 3 | (a) Change in the profile's percentage by carrier advancement 2019–2023 for the five sites studied and the population studied ($n = 801$; 299 (37.3%) early stages of career and 502 (62.7%) experienced researchers). Significant differences in profiles' percentages observed in 2019 and 2023: ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$. (b) Distribution of profiles by carrier advancement in 2019 and 2023 for the five sites studied. The vertical line corresponds to the reference value for the total population studied, indicating the over- or under-representation of respondents in relation to the total population.

mainly based on incentives in the academic workflow. Thus, for example, special attention was given to researchers applying for grants, with a strong encouragement to log onto the appel sprojetsrecherche.fr website using an ORCID account. This portal gathers the main sources of funding for French research, and logging in via an ORCID account enables users to take full

TABLE 2 | Analysis of the number of publications on the five sites studied in 2019 and 2023 for researchers present in both 2019 and 2023. ORCID profiles considered are public profiles only.

	ORCID			ResearcherID			IdHAL			ResearchGate			Academia		
	2019	**2023**	**%[a]**	**2019**	**2023**	**%[a]**	**2019**	**2023**	**%[a]**	**2019**	**2023**	**%[a]**	**2019**	**2023**	**%[a]**
Number of publications	4588	14,410	214.1	6207	14,810	138.6	2286	12,901	464.3	31,583	44,586	41.2	2670	5507	106.3
Minimum	1	1		1	1		1	1		1	1		1	1	
Maximum	333	726		333	794		206	444		708	873		256	313	
Median	25	21		39	55		33	43.5		46	59		19	32	
First quartile (Q1)	5	4		20	33		16.3	26		22.5	26		8	11	
Third quartile (Q3)	61	58.5		73	109		63	78		90	110		42	64.3	
Number of profiles	147	380	158.5	132	171	29.5	46	198	330.4	451	526	16.6	123	149	21.1
Number of profiles with at least one publication	101 (68.7%)	311 (81.8%)		107 (81.1%)	168 (98.2%)		46 (100%)	198 (100%)		439 (97.3%)	505 (96%)		92 (74.8%)	124 (83.2%)	
Number of profiles without publication	46 (31.3%)	69 (18.2%)		25 (18.9%)	3 (1.8%)		0 (0%)	0 (0%)		12 (2.7%)	21 (4%)		31 (25.2%)	25 (16.8%)	

[a]Percentage increase.

advantage of all the features of the portal. It is also the case with the implementation of a single sign-on widget for ORCID on the national open archive HAL and the adjunction of HAL as a provider in the ORCID 'works' category. The national incentive policy has also been implemented locally in higher education and research institutions through awareness-raising and training initiatives on the ORCID identifier, and technical implementations, such as Current Research Information System (CRIS). Regarding IdHAL, it was first implemented in 2014. The promotion of this identifier also took place via the two national plans for Open Science, which highlights the central role of the HAL open archive in making scientific publications openly accessible (Berthaud et al. 2021). IdHAL has been the subject of awareness and training campaigns on a national level and locally in the French higher education system and research institutions (Kuntziger 2015), including the University of Caen Normandie from 2018. It should be noted that all researchers, regardless of their discipline or stage in their careers, have been the target of these incentives. To our knowledge, no mandatory policy requiring French researchers to adopt ORCID or IdHAL has been implemented, either at the University of Caen, or in other French higher education and research institutions, and so far, no deadline has been announced for implementing such a measure.

It should be noted that the period under study (2019–2023) included the COVID-19 crisis (late 2019–2022). This crisis most certainly influenced data collection in 2023; the successive lockdown periods undoubtedly disrupted the awareness-raising policies previously implemented, limiting researchers' involvement in the various sites studied. Conversely, it could also be assumed that lockdown periods provided researchers with an opportunity to devote more time to self-directed learning or to exploring these sites, thereby encouraging their adoption. Unfortunately, it is impossible to assess the overall impact of this period and whether it had a positive or negative effect on researchers' involvement in these sites.

The increase in the number of researchers with an ORCID or an IdHAL is consistent with the observation that adoption rates are much higher in countries where major agencies or institutions encourage or require the adoption of the ORCID identifier (Wang et al. 2024; Porter et al. 2025). The increase in the number of researchers with an ORCID profile seems to be also closely associated with the fact that an increasing number of global research players are making access to their services conditional on having an ORCID profile (Gasparyan et al. 2014; Citrome 2016; Xu and Hu 2024; Arroyo-Machado et al. 2025). It should be noted that although there has been a significant increase (159% increase) in ORCID adoption over the past 5 years, the rate remains below 50% (47.1%). As pointed out by Porter et al. (2025), 'a large portion of researchers without an ORCID do not see the benefits, either broadly or because they are in a field where they do not see its value or are at a career stage where they do not believe it is necessary'. These researchers would benefit from hearing about the benefits of AIDs, and librarians can play an important role in guiding graduate students through these tools (Monnin and Fuhr 2024).

As shown previously (Thelwall and Kousha 2014; Ortega 2015; Bouchard and Boudry 2024; Porter et al. 2025), significant disciplinary differences persist in regard to the investment of researchers in the five sites studied. Researchers in HSS demonstrate a lower level of engagement compared to their colleagues in STM, with the exception of Academia which is mostly oriented towards Social Sciences, Arts & Humanities (Thelwall and Kousha 2016; Manca 2018). One possible explanation is that researchers in HSS used AIDs less in their research practices (Tran and Lyon 2017). Concerning ORCID, this difference may also be due to the less implementation of this AID in HSS journals, especially small ones, related to their limited capacity to incorporate this AID in their submission procedures (Bordons et al. 2024). Thus, as suggested by Porter et al. (2025), special efforts must be made to involve researchers in the arts and humanities more significantly in these services providers. Small publishers in HSS should also require an ORCID profile for all authors, or at least for the corresponding author (Fuhr and Monnin 2024).

This study revealed the existence of a time lag between HSS researchers and STM researchers when it comes to investing in these tools. A time lag that is disadvantageous to early-career researchers was also identified. As suggested by Arroyo-Machado et al. (2025) and Bouchard and Boudry (2025), this discrepancy can probably be attributed to the fact that STM researchers and experienced researchers have more interactions with the various sites (e.g., article submission platforms) and institutions or actors in global research (e.g., funding agencies when responding to calls for projects) that facilitate their early engagement with the sites under investigation, in contrast to HSS researchers and early-career researchers. These findings suggest that researchers' exposure to these five sites, whether through the different sites they are required to use, is a crucial factor in their uptake. These results may prove useful in prioritizing training initiatives for researchers using these different tools.

The analysis of the change in the percentage of public and private ORCID profiles between 2019 and 2023 shows a sharp increase in the percentage of public profiles, while the percentage of private profiles has not changed. In addition, the proportion of public ORCID profiles in relation to the total number of profiles (public and private) has increased sharply. These results are encouraging, as they seem to indicate that researchers have a better understanding of the visibility of their ORCID profiles, and therefore of the broader objectives of ORCID. These results also limit the scope of criticism from some authors who have pointed out the potential problems associated with the existence of these private profiles (Boudry and Durand-Barthez 2020; Craft 2020; Teixeira da Silva 2020; Porter et al. 2025).

The analysis of the number of publications on each profile in 2019 and 2023 across the five sites studied showed large differences in terms of the total number of publications included in profiles, highlighting the inability of these sites to qualify a population of researchers by considering the publications available on these different sites. For this to happen, researchers will certainly need to be made more aware of and trained on these different tools and, all stakeholders involved need to continue the efforts that have been made formerly in this area. However, as long as the updating of profiles is not more automated, especially concerning ORCID, the number of publications on profiles will depend on the personal motivation of researchers to reference their publications on these sites. It should be noted

that, in addition to publications, most information on ORCID profiles can be automatically updated through trusted organizations (e.g., researchers' institutions for affiliations, Datacite for datasets and Web of Science for peer reviews). The 'publication' field is usually the one with the most entries on ORCID profiles, meaning that the others (e.g., biography, funding or peer review) are rather less likely to be completed in full despite these possibilities (Fernandez-Marcial et al. 2023; Bordons et al. 2024; Arroyo-Machado et al. 2025; Penadés et al. 2026). The integration of ORCID in institutional information systems could be a solution for more complete and frequently updates profiles (Arroyo-Machado et al. 2025). Improving interoperability within the research ecosystem could also reduce as much as possible the tedious and repetitive data entry required of researchers to update their profiles, and significantly improve the accuracy and completeness of records (Bordons et al. 2024; Wang et al. 2024; Arroyo-Machado et al. 2025). Providers of ResearcherID, IdHAL and especially ORCID service provider have made great efforts in this direction. On the contrary, ResearchGate and Academia have made no progress in terms of interoperability with other sites. Logically, commercial sites such as ResearchGate or Academia will not voluntarily choose to do this at the risk of their users investing in other sites and leaving their own.

In conclusion, to realize the benefits of AIDs and especially ORCID, social and cultural change would be required in addition to technical changes. As pointed by Porter (2022), 'social and cultural change in the form of sustained community investment and collaboration around the development of ORCID and related infrastructures' is required for ORCID or any other persistent identifier to fully achieve its goals'. As shown by the results of our study, adoption rates are much higher in countries where the adoption of the AIDs and especially ORCID is encouraged or required (Porter et al. 2025). Consequently, agencies or institutions must intensify their efforts in this direction. Librarians can play an important role in increasing adoption rates for these services. As suggested by Monnin and Fuhr (2024), by 'demonstrating the unique functionality of each system, they can help early-career researchers understand how to share their research contributions as widely as possible, and prepare them to use multiple service providers'. If researchers are better supported in understanding how these services interoperate with each other, they will be better able to use them to their full capacity (Monnin and Fuhr 2024). To complement this study, future research should consider analysing the content and methods of data entry on these sites, particularly ORCID, as well as the frequency with which this data is updated, especially in relation to the development of different providers in the context of open science.

Author Contributions

Sarah Marcq: data curation, formal analysis, investigation, methodology, writing – review and editing, visualization, software. **Aline Bouchard:** conceptualization, funding acquisition, investigation, project administration, resources, validation, writing – review and editing, supervision. **Isabelle Mauger Perez:** writing – review and editing, methodology, investigation, data curation. **Benjamin Bober:** writing – review and editing, software, methodology, investigation, data curation. **Christophe Boudry:** conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, software, visualization, validation, writing – review and editing, writing – original draft, supervision.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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