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Early-Career Publishing: Authorship Trends of Students and Residents in Anatomy

Erken Dönem Yayıncılık: Anatomi Alanında Öğrenci ve Asistan Yazarlık Eğilimleri

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ABSTRACT

Background: Participation of students and residents in academic publishing has gained attention across medical disciplines, yet little is known about their roles in anatomical research. This study aims to examine the frequency, authorship positions, and publication trends of student and resident authors (SRA) in anatomical journals.

Materials and Methods: Of the 36 anatomy journals reviewed, only Anatomical Sciences Education (ASE) provided identifiable author information. All articles published in ASE between January 2008 and December 2024 were retrospectively analyzed. Author roles were identified from author biographies, and authors were categorized as student author (SA), resident author (RA), both SRA, and non-SRA. Authorship positions, article types, number of citations, and annual trends were recorded.

Results: Among 4,920 authors across 1,223 articles, 8.5% were SAs and 3.2% were RAs. Over time, the number of SAs and RAs increased significantly; however, when expressed proportionally, only articles that included SRAs showed a significant increase. Articles with SA and/or RA had a higher number of authors and were most often research reports. SAs and RAs were primarily middle authors, with low rates of first- or last-author positions. Citation counts did not differ significantly across author groups; however, articles including SAs, RAs, or SRAs showed descriptively higher median citation values.

Conclusion: Early-career author numbers in ASE are increasing but remain limited in scope and role. Structured interventions such as mini-projects, mentorship programs, and writing workshops could enhance students' and residents' engagement and support their progression to lead authorship in anatomical scholarship.

Keywords: Student authorship, resident authorship, trainee authorship, early-career researcher, academic publishing trends

ÖZ

Amaç: Tıp alanında öğrenci ve asistan yazarların akademik yayınlardaki katılımı giderek daha fazla ilgi görmektedir; ancak bu grubun anatomik araştırmalardaki rolleri hakkında yeterli bilgi bulunmamaktadır. Bu çalışma, anatomi dergilerinde öğrenci ve asistan yazarların sıklığını, yazar sırasındaki konumlarını ve yıllara göre yayın eğilimlerini incelemeyi amaçlamaktadır.

Gereç ve Yöntemler: İncelenen 36 anatomi dergisinden yalnızca Anatomical Sciences Education (ASE) dergisi, yazar kimlik bilgilerini açıkça sunmaktaydı. Ocak 2008 ile Aralık 2024 arasında ASE'de yayımlanan tüm makaleler geriye dönük olarak analiz edildi. Yazar rolleri biyografi bilgilerinden belirlendi ve yazarlar şu şekilde sınıflandırıldı: öğrenci yazar (ÖY), asistan yazar (AY), hem öğrenci hem asistan yazar (ÖAY) ve öğrenci/asistan olmayan yazar. Yazar sıraları, makale türleri, atıf sayıları ve yıllara göre eğilimler kaydedildi.

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ÖZ

Bulgular: One thousand two hundred twenty-three makalede yer alan 4,920 yazarın %8,5'i öğrenci, %3,2'si asistan yazarlardan oluşmaktaydı. Zaman içinde ÖY ve AY sayıları artış göstermiş olsa da, makale sayısına göre oransal değerlendirme yapıldığında yalnızca ÖAY'li makalelerde belirgin bir artış gözlendi. ÖY ve/veya AY içeren makaleler daha fazla yazar sayısına sahipti ve en sık Araştırma Makalesi türündeydi. ÖY ve AY'ler çoğunlukla ortanca yazar konumunda yer almakta olup, ilk ya da son yazar olma oranları düşüktü. Atıf sayıları yazar grupları arasında istatistiksel olarak anlamlı bir farklılık göstermemiştir; ancak ÖY ve/veya AY içeren makalelerde ortanca atıf değerlerinin tanımlayıcı düzeyde daha yüksek olduğu gözlenmiştir.

Sonuç: ASE dergisinde erken dönem yazar sayısı artış göstermekte, ancak bu artış kapsam ve rol açısından sınırlı kalmaktadır. Mini projeler, mentorluk programları ve yazarlık atölyeleri gibi yapılandırılmış uygulamalar, öğrenci ve asistan katılımını artırarak bu grupların anatomik yayıncılıkta ilk yazar konumuna ilerlemesini destekleyebilir.

Anahtar Kelimeler: Öğrenci yazarlığı, asistan yazarlığı, eğitimci yazarlığı, genç araştırmacı, akademik yayıncılık eğilimleri

Introduction

The involvement of students and residents in scholarly publishing has expanded significantly over the past two decades, supported by formal research programs (1,2), mentorship initiatives (3,4), and academic development tracks (5,6). This shift reflects a growing emphasis on preparing early-career individuals for academic roles through meaningful engagement in research (1,3,5). Numerous studies have shown that such involvement contributes to long-term scholarly output, increased competitiveness for residency and fellowship positions, and a greater likelihood of pursuing careers in academic medicine (2,4).

Parallel to this trend is the evolving role of clinician-educators and physician-scientists, who serve as crucial links between patient care, teaching, and research. The demand for these dual-role professionals continues to rise, but concerns about their declining numbers and structural barriers to advancement remain well documented (7-9). Career development tracks and reform initiatives have been proposed to strengthen the physician-scientist pipeline and preserve academic medicine's research mission (10).

Clinician-educators, in particular, often play a central role in nurturing early-career researchers. Mentorship, whether through structured scholarly concentration programs or informal faculty guidance, has been repeatedly cited as a key determinant of publication success among trainees (11,12). Faculty commitment and institutional infrastructure, including academic medicine tracks and education fellowships, have also been shown to enhance student and resident engagement in research (13-15).

Despite the growing number of studies analyzing authorship by students and residents across fields such as general medical education (16), internal medicine (17,18), and surgery (19), similar investigations are absent in the anatomical sciences. This is a notable gap and a rich area for early-career contributions (20), especially considering the continuing shortage of anatomy educators (21). In this context, examining authorship trends in anatomy journals is particularly meaningful, as early-career engagement plays a critical role in sustaining the educational and academic capacity of the discipline. For this reason, the present study aimed to analyze the frequency, author positions, and annual trends among student and resident authors (SRA) in anatomical journals.

Materials and Methods

Within the scope of this study, 27 journals in the "Anatomy & Morphology" category of the Web of Science Master Journal List (22) and 21 journals listed in the Federative International Committee on Scientific Publications (FICSP) section of the International Federation of Associations of Anatomists website (23) were examined. Eleven of these journals appeared on both lists, and one was excluded from the study because it is no longer being published. To examine whether the remaining 36 journals regularly provided author information, a standardized and reproducible screening approach was applied across all journals. For each journal, the first issue published within the most recent 10-year period was examined to reflect current publication practices and to establish a comparable reference point across journals. The consistent inclusion of author biographies or contribution notes in the full-text articles of a given issue served as the criterion for determining whether a journal regularly provided author information. As a result, only one of these journals (Anatomical Sciences Education [ASE]) provided author information for full-text articles. Therefore, following this eligibility assessment, all articles published in ASE between January 2008 and December 2024 were included in the study. Full-text articles were collected from the website of ASE (24) between March and April 2025. Since this study was conducted using publicly available data, no ethics committee approval was obtained.

Article Evaluation

Published articles were classified according to ASE author guidelines (25) as: Research Report; Descriptive Article (renamed Discursive Articles from 2024); Viewpoint Commentary (renamed Viewpoint from 2024); Short Communication; Relevant Review (renamed Review from 2024); Letter to the Editor; and Editorial. Some ASE article categories underwent editorial renaming during the study period (from 2024 onward); however, these changes reflect terminology updates rather than structural differences. For consistency, the earlier category names were used throughout the analysis. Additionally, the number of citations was noted for each article on the Web of Science website between 7 and 9 April 2025.

Author Evaluation

The total number of authors and the author information were obtained from the Notes on Contributions (NoC) (renamed Author Biographies in 2024) section of full-text articles. Authors who were described as medical students, interns, bachelor's students, or undergraduate students (e.g., medical, dental, physiotherapy, psychology, and veterinary) were categorized as student authors (SA). Authors identified as clinical fellows, registrars, assistants, trainees or residents were categorized as resident authors (RA). Author roles such as healthcare staff (medical doctor, nurse, physical therapist, psychologist, midwife, etc.), academic (lecturer, assistant professor, associate professor, professor, emeritus prof, etc.), and non-medical roles (tutor, officer, librarian, statistician, etc.) were recorded as non-SRA (non-SRA). Additionally, authorships reported as research assistant, master's/MSc student, doctoral/PhD student, postdoctoral researcher/fellow, and teaching/research fellow were considered academic roles and included in the non-SRA group. This classification was based on the expectation that individuals in these positions are required to engage in scholarly publishing, either strategically or because it is compulsory, as part of their academic training or career development (26). Authorship positions of the SAs and RAs in the articles were recorded as first, middle, and last author positions. Middle authorship was only evaluated in articles with three or more authors.

Statistical Analysis

The normality of the data distribution was assessed using the Kolmogorov–Smirnov test. For data not conforming to a normal distribution, non-parametric tests were used. The Mann–Whitney U test was performed for comparisons between two independent groups, and the Kruskal–Wallis H test was applied for comparisons among three or more groups. For post-hoc analyses following the Kruskal–Wallis H test, Dunn's test was performed. The relationships between categorical variables were examined using the chi-square test; when the assumptions of this test were not met, Fisher's exact test was used. For annual trend analyses, Spearman's rank correlation test (Spearman's rho, p) was applied, and results were reported as Spearman's rank correlation coefficients (p). To control for the increased risk of Type I error due to multiple comparisons, Bonferroni correction was applied in all post-hoc analyses. A p-value of <0.05 was considered statistically significant. Statistical analyses were conducted using SPSS version 22 (IBM Corp., Armonk, NY).

Results

ASE published 1,280 articles between 2008 and 2024. Because the number of these article types was low, three perspective articles and one curriculum report were excluded from the analysis. In addition, articles classified as editorial (n = 42) did not provide adequate author information, and 3 research reports, 3 descriptive articles, 3 letters to the editor, 1 relevant review, and 1 viewpoint commentary without a NoC/Author Biography section were also removed from the analysis. The remaining 1,223 articles were included for further analysis (Figure 1). Included article types were research reports, descriptive articles, short communications, letters to the editor, relevant reviews, and viewpoint commentaries.

A total of 4,920 authors were identified, including 416 (8.5%) SAs and 158 (3.2%) RAs. The median number of authors per article was 4 (range: 1–47). Articles involving student and/or RAs had a higher median number of authors ($p < 0.001$): medians were 8 for articles with both SA and RA (SRA), 5 for articles with either SA or RA, and 3 for non-SRA articles (Table 1). A statistically significant difference in the number of authors was observed among the groups ($p < 0.001$); the number of authors in non-SRA articles was significantly lower than in the other groups ($p < 0.001$).

SAs and RAs were most frequently listed as contributors to research reports and were next most frequently listed as contributors to descriptive articles. Their involvement was lowest for letters to the editor (Table 1). A significant association was found between article type and author group ($p < 0.001$). Subgroup analyses revealed that SA involvement was higher in research reports, whereas non-SRA involvement was higher in letters to the editor ($p < 0.001$).

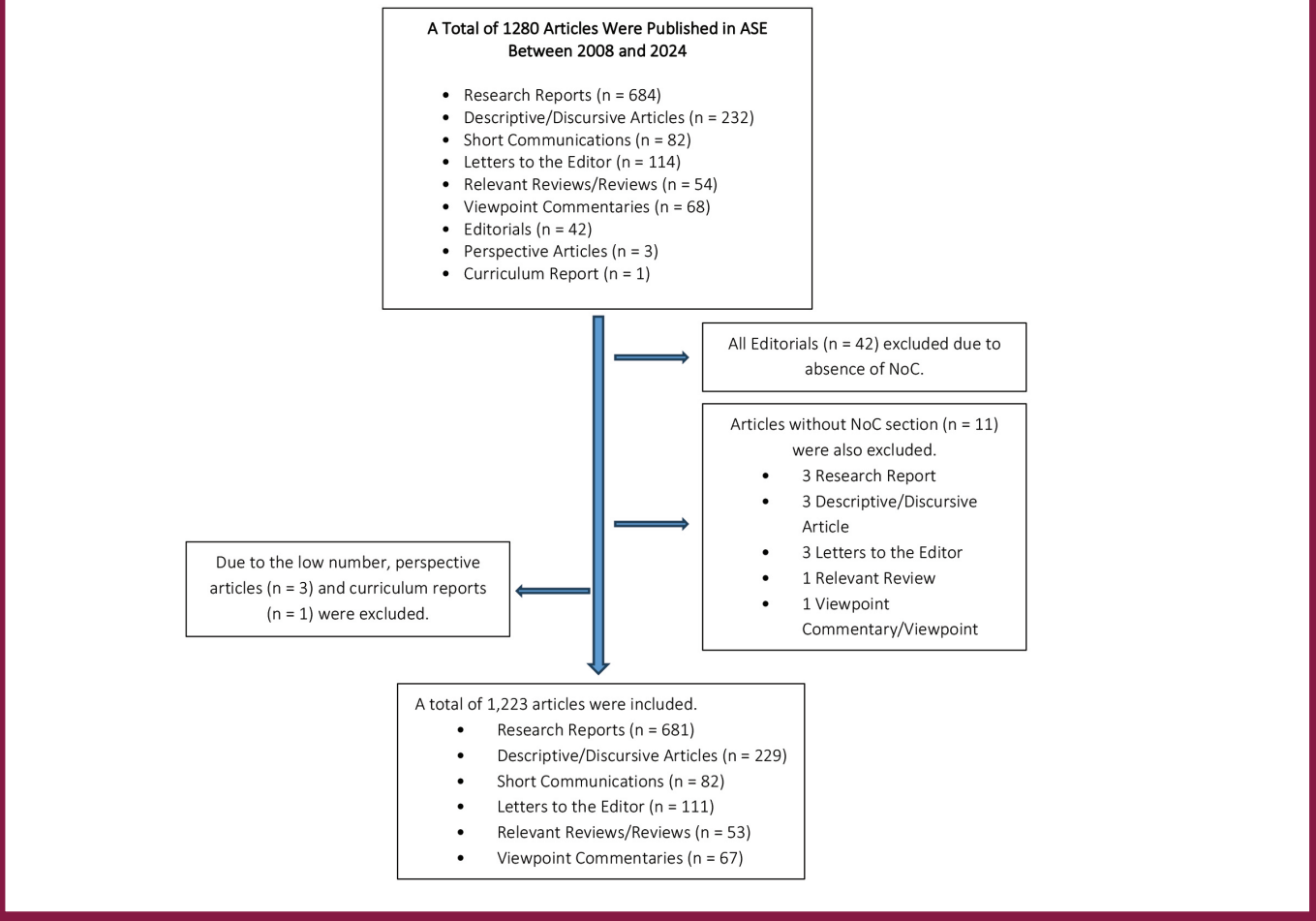

Figure 1. Identification of articles included and excluded in the analysis.
NoC, Notes on Contributions.

Of the published articles, 197 (16.1%) had one or more SA, 89 (7.3%) had one or more RA, 24 (2.0%) had one or more SRA, and 913 (74.7%) had non-SRA (Table 1). SA was the first author in 102 (8.3%), middle author in 164 (13.4%), and final author in 15 (1.2%) articles. Similarly, RA were first authors in 53 articles (4.3%), middle authors in 70 (5.7%), and last authors in 11 (0.9%). The positions of both SA and RA were significantly associated with article type (SA: $p < 0.001$; RA: $p = 0.015$). Specifically, SAs and RAs were more likely to be listed as first authors in research reports (SAs: $p < 0.001$; RAs: $p = 0.02$) and less likely to be listed as middle authors in letters to the editor (SAs: $p < 0.001$; RAs: $p < 0.001$).

The median number of citations per article was 14 (minimum: 0; maximum: 659). The median number of citations was lowest in non-SRA articles (13), compared with 15 in SA articles and 16 in RA and SRA articles (Table 1). However, no statistically significant differences in the number of citations were observed between author groups ($p = 0.629$) or between author positions (SA: $p = 0.700$; RA: $p = 0.774$).

Between 2008 and 2024, the numbers of both SAs ($p = 0.77$, $p < 0.001$) and RAs ($p = 0.56$, $p = 0.02$) increased significantly (Figure 2). Similarly, significant upward trends were observed in the numbers of articles classified as non-SRA ($p = 0.83$, $p < 0.001$), SA ($p = 0.68$, $p = 0.003$), and SRA ($p = 0.68$, $p = 0.003$). There was also an increase in the number of articles with RA, but this increase was not statistically significant ($p = 0.45$, $p = 0.072$). Regarding proportions, decreasing trends were observed in articles with non-SRA ($p = -0.34$, $p = 0.18$) and in those with RA ($p = -0.07$, $p = 0.79$), whereas an increasing trend was observed in articles with SA ($p = 0.33$, $p = 0.19$); however, none of these trends

Table 1. Distribution of authors by article types, citations, author numbers and positions.

		Author groups				
		non-SRA	SA	RA	SRA	p-value
Article types	Research Report	476 (38.9%)	130 (10.6%)	58 (4.7%)	17 (1.4%)	p < 0.001
	Discursive Article	179 (14.6%)	32 (2.6%)	15 (1.2%)	3 (0.2%)	
	Short Communication	60 (4.9%)	13 (1.1%)	8 (0.7%)	1 (0.1%)	
	Letter to the Editor	106 (8.7%)	4 (0.3%)	1 (0.1%)	0	
	Review	40 (3.3%)	10 (0.8%)	2 (0.2%)	1 (0.1%)	
	Viewpoint	52 (4.3%)	8 (0.7%)	5 (0.4%)	2 (0.2%)	
	Total articles: 1,223 (100%)	913 (74.7%)	197 (16.1%)	89 (7.3%)	24 (2%)	
Citation	Median (min–max)	13 (0–604)	15 (0–208)	16 (0–274)	16 (0–659)	p = 0.629
Author number	Median (min–max)	3 (1–47)	5 (1–27)	5 (1–12)	8 (3–14)	p < 0.001
Author positions	First author	NA	107 (2.2%)	53 (1.1%)	NA	NA
	Middle author		293 (6%)	94 (1.9%)		
	Last author		16 (0.3%)	11 (0.2%)		
	Total authors: 4,920 (100%)	4346 (88.3%)	416 (8.5%)	158 (3.2%)		

Data presented as number (%) or median (min–max).
min–max, minimum–maximum; NA, not applicable; non-SRA, non-student and resident author; RA, resident author; SA, student author; SRA, student and resident author.

reached statistical significance (Figure 3). However, the proportion of articles with SRA (p = 0.60, p = 0.011) showed a strong, statistically significant increasing trend over the years.

No significant change was observed in the proportion of SAs listed as first authors over time (p = 0.038, p = 0.188). However, the proportion of SAs as middle authors significantly increased (p = 0.079, p = 0.006), whereas their representation as last authors significantly decreased (p = −0.090, p = 0.002). No significant temporal trends were found in RA authorship positions (first: p = 0.007, p = 0.810; middle: p = 0.013, p = 0.648; last: p = −0.002, p = 0.934) for the entire study period.

Discussion

This study presents a comprehensive analysis of authorship by students and residents in the anatomical sciences, using a dataset of articles published in ASE (the only anatomy journal that includes complete author biographies) from January 2008 to December 2024. We assessed the frequency, placement, and academic impact of student and resident contributions by systematically examining author biographies, article types, authorship positions, and citation metrics. Our findings align with general trends reported in the literature for some topics, while revealing unique differences for others.

Student and Resident Authorship Rates and Trends

Author-Level Analysis

Among all authors analyzed in this study, 8.5% were students and 3.2% were residents. Although these groups represented a minority, the numbers of student and RAs showed a significant upward trend, reflecting the growing involvement of early-career individuals in anatomical science publications.

Similar patterns have been observed in other fields. Kan et al. (18) examined articles in JAMA Internal Medicine and found that 14.9% of authors were students, with student authorship increasing from 12.5% in 2010 to 19.3% in 2018. Likewise, Munzer et al. (16) reported cumulative student and resident authorship rates of 2.8% and 4.9%, respectively, in Academic Medicine, with residents contributing more

frequently than students in nearly all years. In contrast, our findings show that SAs consistently outnumber RAs in ASE publications. Overall, authorship patterns in the anatomical sciences are consistent with broader trends across medical disciplines, reflecting increasing early-career engagement.

Article-Level Analysis

Of the articles published in ASE, 25.4% included at least one early-career author, and increases in SA and SRA were observed across years. Notably, only SRA showed a statistically significant upward trend.

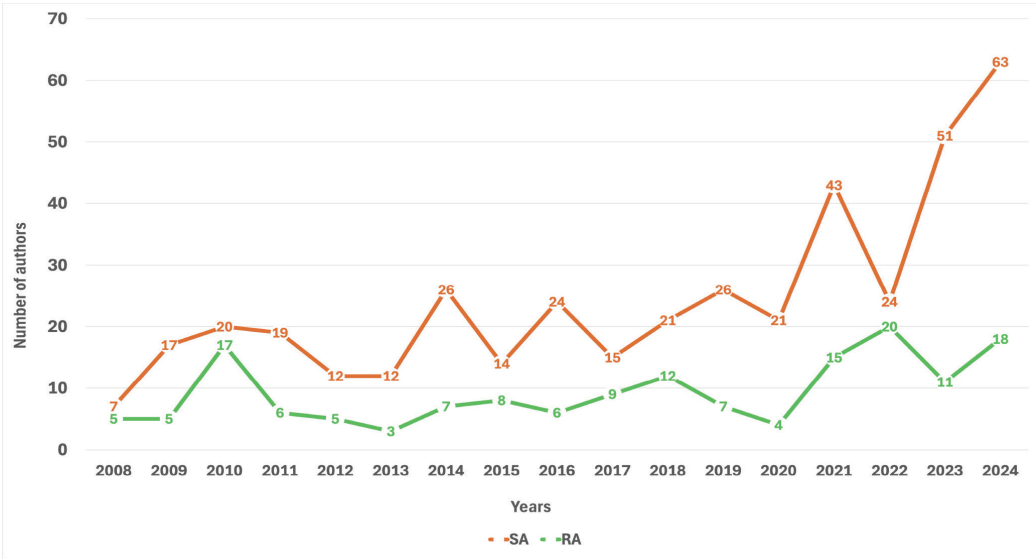

Figure 2. Annual trend in the number of student and RAs in ASE articles.
ASE, Anatomical Sciences Education; RA, resident author; SA, student author.

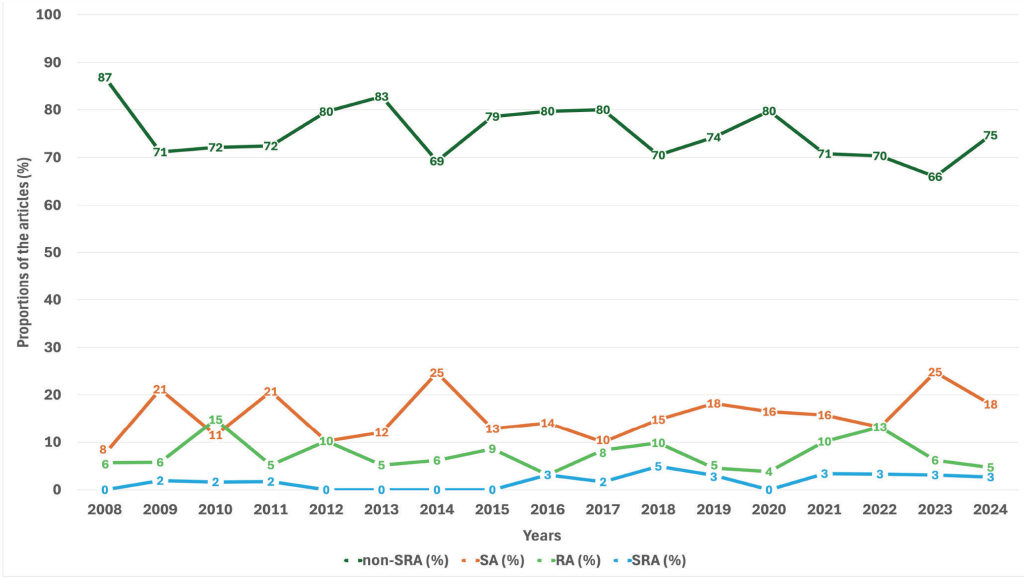

Figure 3. Annual trend of the proportion of articles by author groups.
non-SRA, non-student and resident author; RA, resident author; SA, student author; SRA, student and resident author.

Comparable findings have been reported elsewhere. Munzer et al. (16) recorded this rate as 14% (SA: 7.9%, RA: 7.7%) between 2002 and 2016. Kan et al. (18) reported that the percentage of articles with SA rose from 46.3% in 2010 to 58.0% in 2018, with a strong linear trend. Casciato et al. (19) noted that approximately 22% of articles published in the field of foot and ankle surgery were authored by residents. Wickramasinghe et al. (4) analyzed publications between 1980 and 2010 and reported an exponential increase in the number of articles including medical SA. Among these, the most represented fields were psychiatry (7.4%), general medicine (6.9%), and medical education (6%). Although anatomy shows lower early-career authorship rates than other disciplines, the upward trend in ASE indicates growing editorial and institutional support for these authors' involvement.

Number of Authors and Group-Based Variation

Our results indicate a clear relationship between the number of authors and early-career involvement. Non-SRA articles had the fewest authors (median = 3), followed by SA and RA articles (median = 5), and SRA articles (median = 8). This finding is consistent with studies showing that larger, collaborative teams often facilitate student participation (2,18,27).

Several mechanisms may explain this correlation. First, the inclusion of early-career authors often requires active mentorship within more complex research groups (28). Projects involving trainees commonly include multiple contributors to provide oversight and coordination. Second, student-involved research frequently takes place within structured educational frameworks such as scholarly concentration programs or departmental mentoring initiatives. Projects involving trainees commonly incorporate multiple contributors to support oversight and coordination (2,18). Second, student-involved research frequently takes place within structured educational frameworks such as scholarly concentration programs or departmental mentoring initiatives (5,6). Overall, these findings reflect a broader trend in which student- and resident-authored articles typically emerge from larger, structured research teams.

Authorship Positions of Student and RAs

SAs and RAs were most frequently listed as middle authors. Students were middle authors in 13.4% of articles, first authors in 8.3%, and last authors in 1.2%; residents showed a similar pattern (middle: 5.7%, first: 4.3%, last: 0.9%). Middle authorship by students increased significantly over time, whereas their last authorship declined; no significant temporal changes were observed for residents. These findings mirror broader trends in the literature. Munzer et al. (16) reported that SAs are the most frequent first and middle authors, while RAs are the most frequent last authors, and that the rate of first and middle authorship increased over the years. Kan et al. (18) similarly noted an increase in first authorship among students. Across studies, last authorship remains rare for early-career contributors.

This distribution reflects typical authorship hierarchies in academic publishing. First authors commonly lead core research activities, middle authors often provide collaborative or supporting contributions, and last authorship usually denotes senior oversight or mentorship (14). Because students and residents rarely occupy supervisory roles, their limited last-author representation is expected. However, the predominance of middle authorship may reflect more limited opportunities for leadership roles among students and residents in academic publishing. In this context, mentorship programs may be a mechanism to support early-career contributors in progressing toward first authorship and, eventually, last authorship with faculty guidance.

Article Types

Students and residents contributed most frequently to research reports (66.1%), followed by descriptive articles, short communications, viewpoint commentaries, and relevant reviews. This pattern is consistent with previous studies reporting that full-length empirical manuscripts are the most accessible pathway to authorship for early-career researchers (2,18). Amgad et al. (2) similarly found that student research commonly results in cross-sectional studies, case reports, and reviews, as these formats are feasible within training timelines. Scholarly Concentration programs also support this model by offering structured mentorship and opportunities for data-driven projects (13).

Early-career contributors were less frequently involved in shorter or more conceptual formats, such as letters or brief commentaries—a trend also reported in prior studies (2,13,16). Increasing exposure to a wider range of scholarly genres, including opinion pieces or education briefs, may help diversify the types of contributions trainees are prepared to make.

Citation Analysis and Academic Impact of Student and Resident Authorship

In our ASE dataset, the median number of citations per article was 14, and no statistically significant differences were found between author groups. Articles with SA had a median of 15 citations, those with RA and SRA had a median of 16, and those with non-SRA had a median of 13, indicating that the inclusion of early-career authors does not reduce citation performance.

Findings in the literature are mixed. Wickramasinghe et al. (4) reported that 59.1% of student-authored articles received no citations, raising concerns about reach and visibility. In contrast, van Eyk et al. (29) ound that medical student publications had higher citation averages than articles in their respective fields. Beyond the number of citations, H-index comparisons have been examined: Kan et al. (18) reported no significant differences between SAs and other authors. Overall, these results indicate that student or resident authorship does not diminish the academic impact of publications and may, in some contexts, be associated with comparable or even higher citation performance.

Barriers to Early-Career Authorship and Strategies for Improvement

Student and resident involvement in academic publishing is widely recognized as valuable, yet participation remains limited due to several persistent challenges. Our findings provide empirical context for these barriers, particularly with respect to authorship positions, article types, and patterns of early-career participation. Both our findings and the broader literature consistently highlight similar barriers and potential strategies to address them.

First, limited training in research methodology and scientific writing is one of the most consistently reported barriers to early-career authorship (2,7,18). Students and residents often receive minimal formal instruction in study design, data analysis, manuscript preparation and submission, and the peer review process (2,7), which can discourage active participation. In our study, the predominance of middle authorship among early-career contributors may partly reflect limited methodological and writing autonomy during training. Proposed solutions include embedding compulsory or elective research components into medical curricula, since such participation is associated with greater academic output and satisfaction (2). Scholarly Concentration programs provide structured, mentored research experiences that support confidence, productivity, and long-term engagement (13,17). Additional approaches include skill-building workshops (11,30), field-specific training programs (31,32), and journal-led initiatives such as manuscript-writing resources or dedicated sections for trainee contributions (33).

Second, time constraints represent another major barrier, especially for residents balancing clinical duties and students managing academic workloads (8,9). This constraint may help explain why early-career contributors in our dataset were most frequently involved in full-length research reports rather than shorter or conceptual formats that require different writing competencies. Small-scale, well-scoped mini-project modules have been recommended to facilitate participation in research.

Third, limited access to committed mentorship further restricts early-career authorship. Many trainees struggle to find mentors with adequate time, expertise, or institutional support (7,10,12). Our observation that articles involving early-career authors were typically produced by larger, structured research teams is consistent with the central role of mentorship in enabling trainee participation. Strengthening mentorship networks and intentional mentor–mentee matching—approaches already emphasized in Scholarly Concentration programs—may support progression from passive involvement to meaningful intellectual contribution (11,15,19,23).

Fourth, students and residents do not have equal experience in authorship positions. Students and residents often report restricted contributions, being under-credited, or being assigned primarily technical tasks (3,34). Our findings mirror this pattern, with middle authorship far more common than first or last authorship among early-career contributors. This may explain students' perceptions of being used as "free labor" (3). Concerns about student authorship being used as a symbolic or superficial gesture rather than genuine inclusion have also been raised (35). Addressing these issues requires early authorship planning, transparent task delegation, and rotational opportunities that allow trainees to experience a range of authorship roles (2).

Fifth, limited exposure to short-form scholarly formats—such as letters, viewpoints, or brief commentaries—may reduce early-career participation. Consistent with this finding, our dataset showed that Letters to the Editor had the lowest participation by student and RAs. Targeted workshops and short-form writing assignments within research teams may help increase familiarity with these genres.

In summary, these challenges represent interconnected barriers to early-career authorship. With coordinated efforts from institutions (15), mentors (10,28,34), and journals and editors (33) (focused on training, mentorship, structure, and inclusion), early-career scholars can be better prepared to take on leadership roles in publishing and contribute to the long-term vitality of academia. In the context of the anatomical sciences, early-career authorship may play a particularly important role in sustaining the academic workforce, given the well-documented shortage of anatomy educators and the long training pathway required for academic careers in this field. From this perspective, authorship patterns observed in anatomical journals may also serve as indirect indicators of the state of anatomy

education and the strength of the academic pipeline. Monitoring these trends may therefore provide insight into future workforce needs and the capacity of the discipline to support and retain early-career academics.

Study Limitations

This study has several methodological limitations, which also point toward future research directions. The analysis was restricted to ASE because of limited data availability. This restriction reflects heterogeneity in journal publication policies regarding the reporting of author biographical information rather than a limitation of the study design itself. Accordingly, journal selection was limited to journals indexed in Web of Science and those identified through the IFAA/FICSP list; journals published by local anatomy associations outside these frameworks could not be systematically identified and were therefore not included. This may limit the generalizability of the findings to all anatomy journals and restrict insights into student or resident authorship in cadaver-based, radiologic, or clinical anatomy research. Future studies could expand these findings by including additional anatomy journals once author-level data become available.

Another limitation is the reliance on self-reported author roles, which introduces subjectivity. To overcome this and improve data reliability, journals could adopt standardized author contribution categories during manuscript submission. The inclusion of detailed contributor notes and the establishment of standardized author categories would provide more reliable metadata for future bibliometric studies. This would enable educators to establish longitudinal tracking of authorship trends, perform robust curricular performance analyses, and assess whether SAs remain academically active post-graduation.

Citation analysis was limited to the Web of Science database, which may have excluded citations from other indexing platforms. Additionally, the number of citations for recent articles is inherently lower due to limited time for accumulation; however, this limitation applies equally across all author groups and is not expected to bias comparisons. Lastly, excluding articles with incompletely declared author roles may have affected the reported contribution rates for student and RAs.

Conclusion

This study provides a comprehensive overview of student and resident contributions to research published in ASE between 2008 and 2024. The findings indicate a growing trend in student and resident authorship, reflecting broader shifts in academic medicine. Over this 17-year period, SA consistently outnumbered RAs.

Students and residents were more frequently listed as middle authors than as first or last authors, highlighting their active roles in conducting research while underscoring the mentorship-dependent nature of senior authorship. The increased number of co-authors on papers involving students or residents often indicates a collaborative, team-based research culture. Furthermore, although differences in citation counts were not statistically significant, articles with student and/or RAs demonstrated a higher median number of citations.

While these findings affirm the value of engaging early-career researchers in scholarly publishing, structural and educational strategies, such as mini-project modules, authorship rotation systems, targeted workshops, and certificate programs in anatomical research, could further promote equitable authorship opportunities and diversify the types of contributions available to trainees.

Increasing the involvement of students and residents in anatomical research not only supports their academic development but also contributes to the vitality, inclusivity, and sustainability of scholarship in the anatomical sciences. Strengthening mentorship, training, and infrastructure will be essential to ensure continued progress in the years ahead.

Ethics

Ethics Committee Approval: Since this study was conducted using publicly available data, no ethical committee approval was obtained.

Informed Consent: Not required.

Footnotes

Authorship Contributions

Concept: B.N.Ç.G., F.T.K., İ.A.G., Design: B.N.Ç.G., F.T.K., İ.A.G., Data Collection or Processing: B.N.Ç.G., F.T.K., Analysis or Interpretation: B.N.Ç.G., İ.A.G., Literature Search: B.N.Ç.G., F.T.K., Writing: B.N.Ç.G., İ.A.G.

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REFERENCES

1. Dyrbye LN, Davidson LW, Cook DA. Publications and presentations resulting from required research by students at Mayo Medical School, 1976-2003. Acad Med. 2008;83:604-610. [Crossref]

2. Amgad M, Man Kin Tsui M, Liptrott SJ, Shash E. Medical student research: an integrated mixed-methods systematic review and meta-analysis. PLoS One. 2015;10:e0127470. [Crossref]
3. Murdoch-Eaton D, Drewery S, Elton S, Emmerson C, Marshall M, Smith JA, et al. What do medical students understand by research and research skills? Identifying research opportunities within undergraduate projects. Med Teach. 2010;32:e152-e160. [Crossref]
4. Wickramasinghe DP, Perera CS, Senarathna S, Samarasekera DN. Patterns and trends of medical student research. BMC Med Educ. 2013;13:175. [Crossref]
5. Havnaer AG, Chen AJ, Greenberg PB. Scholarly concentration programs and medical student research productivity: a systematic review. Perspect Med Educ. 2017;6:216-226. [Crossref]
6. Ahn J, Martin SK, Farnan JM, Fromme HB. The graduate medical education scholars track: developing residents as clinician-educators during clinical training via a longitudinal, multimodal, and multidisciplinary track. Acad Med. 2018;93:214-219. [Crossref]
7. Siemens DR, Punnen S, Wong J, Kanji N. A survey on the attitudes towards research in medical school. BMC Med Educ. 2010;10:4. [Crossref]
8. Smith CC, McCormick I, Huang GC. The clinician-educator track: training internal medicine residents as clinician-educators. Acad Med. 2014;89:888-891. [Crossref]
9. Sherbino J, Frank JR, Snell L. Defining the key roles and competencies of the clinician-educator of the 21st century: a national mixed-methods study. Acad Med. 2014;89:783-789. [Crossref]
10. Reynolds HY. In choosing a research health career, mentoring is essential. Lung. 2008;186:1-6. [Crossref]
11. Lawson McLean A, Saunders C, Velu PP, Iredale J, Hor K, Russell CD. Twelve tips for teachers to encourage student engagement in academic medicine. Med Teach. 2013;35:549-554. [Crossref]
12. Bierer SB, Chen HC. How to measure success: the impact of scholarly concentrations on students--a literature review. Acad Med. 2010;85:438-452. [Crossref]
13. Green EP, Borkan JM, Pross SH, Adler SR, Nothnagle M, Parsonnet J, et al. Encouraging scholarship: medical school programs to promote student inquiry beyond the traditional medical curriculum. Acad Med. 2010;85:409-418. [Crossref]
14. Parsonnet J, Gruppuso PA, Kanter SL, Boninger M. Required vs. elective research and in-depth scholarship programs in the medical student curriculum. Acad Med. 2010;85:405-408. [Crossref]
15. de Oliveira NA, Luz MR, Saraiva RM, Alves LA. Student views of research training programmes in medical schools. Med Educ. 2011;45:748-755. [Crossref]
16. Munzer BW, Griffith M, Townsend WA, Burk-Rafel J. Medical student- and resident-authored publications in academic medicine from 2002 to 2016: a growing trend and its implications. Acad Med. 2019;94:404-411. [Crossref]
17. Burk-Rafel J, Jones RL, Farlow JL. Engaging Learners to Advance Medical Education. Acad Med. 2017;92:437-440. [Crossref]
18. Kan CK, Qureshi MM, Paracha M, Sachs TE, Sarfaty S, Hirsch AE. Effect of medical student contributions on academic productivity: analysis of student authorship over time. Adv Med Educ Pract. 2021;12:481-489. [Crossref]
19. Casciato DJ, Ead JK, Rushing CJ, Law RWY, Calaj PM, Mosseri AV, et al. Podiatric medicine and surgery resident-authored publications in the journal of foot and ankle surgery: a systematic review. J Foot Ankle Surg. 2020;59:541-545. [Crossref]
20. Chang Chan AY, Cate OT, Custers EJFM, Leeuwen MSV, Bleys RLAW. Approaches of anatomy teaching for seriously resource-deprived countries: a literature review. Educ Health (Abingdon). 2019;32:62-74. [Crossref]
21. Wilson AB, Notebaert AJ, Schaefer AF, Moxham BJ, Stephens S, Mueller C, et al. A look at the anatomy educator job market: anatomists remain in short supply. Anat Sci Educ. 2020;13:91-101. [Crossref]
22. Clarivate. Web of Science Master Journal List [Internet]. [cited 2024 Jan 2]. [Crossref]
23. International Federations of Associations of Anatomists. Journals represented in FICSP. [Internet]. [cited 2024 Jan 20]. [Crossref]
24. Anatomical Sciences Education. Articles-All issues [Internet]. [cited 2025 Mar 2]. [Crossref]
25. Anatomical Sciences Education Author guidelines Article types [Internet]. [cited 2025 Mar 2]. [Crossref]
26. Moradi S. Publication should not be a prerequisite to obtaining a PhD. Nat Hum Behav. 2019;3:1025. [Crossref]
27. Russell AF, Loder RT, Gudeman AS, Bolaji P, Virtanen P, Whipple EC, et al. A bibliometric study of authorship and collaboration trends over the past 30 years in four major musculoskeletal science journals. Calcif Tissue Int. 2019;104:239-250. [Crossref]
28. Baig SA, Hasan SA, Ahmed SM, Ejaz K, Aziz S, Dohadhwala NA. Reasons behind the increase in research activities among medical students of Karachi, Pakistan, a low-income country. Educ Health (Abingdon). 2013;26:117-121. [Crossref]
29. van Eyk HJ, Hooiveld MH, Van Leeuwen TN, Van der Wurff BL, De Craen AJ, Dekker FW, et al. Scientific output of Dutch medical students. Med Teach. 2010;32:231-235. [Crossref]
30. Mabvuure NT. Twelve tips for introducing students to research and publishing: a medical student's perspective. Med Teach. 2012;34:705-709. [Crossref]
31. Brokaw JJ, O'Loughlin VD. Implementation of an education-focused PhD program in anatomy and cell biology at Indiana University: lessons learned and future challenges. Anat Sci Educ. 2015;8:258-265. [Crossref]
32. Richardson-Hatcher A, MacPherson B, Gould D, Brueckner-Collins J. Assessing the impact of the Graduate Certificate in Anatomical Sciences Instruction: a post-degree survey. Anat Sci Educ. 2018;11:516-524. [Crossref]
33. Abu-Zaid A. Supplements to increase trainee-authored publications pertaining to medical education: a graduate's viewpoint. J Postgrad Med. 2020;66:35-37. [Crossref]
34. Shapiro J, Coggan P, Rubel A, Morohasi D, Fitzpatrick C, Danque F. The process of faculty-mentored student research in family medicine: motives and lessons. Fam Med. 1994;26:283-289. [Crossref]
35. Brancati FL, Mead LA, Levine DM, Martin D, Margolis S, Klag MJ. Early predictors of career achievement in academic medicine. JAMA. 1992;267:1372-1376. [Crossref]