

Seventy Percent of Abstracts Presented at the AANA Annual Meeting Are Later Published



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Purpose: To assess the future publication rates of abstracts presented at AANA annual meetings between 2015 and 2019. **Methods:** Abstracts presented at the 2015-2019 AANA annual meetings were identified. The PubMed and Google Scholar databases were searched for a corresponding manuscript for each abstract using the name of the first author, abstract title, and keywords. A level of evidence and anatomic category were assigned to each abstract. For each corresponding manuscript identified, the authors, journal of publication, journal impact factor (IF), time to publication, and number of citations were recorded. **Results:** Overall, 70.5% of abstracts presented at the 2015-2019 AANA annual meetings (275 of 390) went on to future publication, with 63.6% (248 of 390) achieving publication within 3 years. The median time to publication from presentation was 12.8 months. *Arthroscopy* (29.8%) was the most frequent journal of publication. The average IF of publishing journals was 4.92 ± 3.41 , with 61.8% of manuscripts (170 of 275) published in journals with an IF of at least 4.00. Published manuscripts received an average of 36.30 ± 47.6 citations per manuscript. A stronger level of evidence was associated with an increased likelihood of future publication ($P = .008$). **Conclusions:** Pre-publication literature presented at the AANA annual meetings has continued to be associated with a strong likelihood of future publication in *Arthroscopy* and *Arthroscopy, Sports Medicine, and Rehabilitation*, as well as other respected peer-reviewed journals. **Clinical Relevance:** Exposure to pre-publication literature may have an impact on clinical management. It is important to understand the quality of research presented in abstracts from AANA annual meetings. Knowing how many abstracts are ultimately published in peer-reviewed journals provides an indicator of the quality and reliability of the research.

Subspecialty conferences of orthopaedic societies are important for sharing knowledge, building inter-professional relations, and improving clinical management.¹ Since the inception of the Arthroscopy Association of North America (AANA) in 1981, the AANA annual meeting has been an integral platform for sports medicine surgeons to present pre-publication literature.² With an increasing number of abstracts submitted for presentation in recent years, the quality of presented literature is unknown.³⁻⁵ High-quality orthopaedic literature provides evidence-based insights, ensuring that health care

professionals can make informed decisions and deliver effective care.⁶

Exposure to pre-publication literature may have a substantial impact on clinical management. Therefore, it is crucial to evaluate the quality of presented research so that conference attendees can determine the reliability of presented information.⁷ Previous literature has quantitatively defined the quality of presented abstracts by evaluating the future publication rate, which has been found to range from 34.2% to 71% for various orthopaedic society meetings.^{1-3,8-13} Prior reviews of abstracts presented at AANA annual meetings have reported an overall publication rate between 49% and 67.3%, which is comparable to other orthopaedic sports medicine societies, such as the American Orthopaedic Society for Sports Medicine.^{3,5,8,14,15}

Given that the most recent review of abstract publication rates for AANA meetings analyzed data from 2011-2014, an updated evaluation was warranted to determine the future disposition of submitted investigations. The purpose of this study was to assess the future publication rates of abstracts presented at AANA annual meetings between 2015 and 2019. We

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hypothesized that there would be no change in the future publication rate of presented abstracts in comparison to prior reviews, the publication rate would be independent of individual abstract factors, and published manuscripts would have strong academic metrics.

Methods

The conference programs of the 2015-2019 AANA annual meetings were publicly accessed through the *Arthroscopy* website and were reviewed for presented abstracts. For each presented abstract, the title, author(s), and keyword(s) were recorded. Abstracts were independently categorized by anatomic location (i.e., knee, shoulder, hip, elbow, foot and/or ankle, or other) and level of evidence (LOE) by 2 reviewers (T.S. & B.M.), with disputes determined by a third reviewer (B.K.). The LOE was determined using the Elsevier LOE rating system (New York, NY).¹⁶ On the basis of this system, Level I evidence is the strongest (randomized controlled trials and meta-analyses) and Level IV is the weakest (case series). The PubMed and Google Scholar databases were then searched by 2 independent reviewers using the abstract title and the name of the first author. If no published manuscript was identified, a second search was performed using the first author's name and keywords from the abstract. If no associated manuscript was identified, the names of the remaining authors were then searched, along with the same keywords. If an identified manuscript retained the same focus of the initial abstract but had an altered title, it was considered published. For identified manuscripts, the author names, date of publication, publishing journal name, journal impact factor (IF), and number of citations were recorded. The IF of each publishing journal was obtained using the 2021 two-year IF listed on the respective journal's website. This methodology is similar to that of previous reviews assessing the future publication rates of abstracts presented at AANA meetings.^{3,9,15}

The overall future publication rate and the 3-year publication rate were determined. We used a 3-year publication rate for comparison to previous reviews of publication rates from orthopaedic society meetings. The overall publication rate was used for calculations involving the IF and number of citations. The time to publication was defined as the number of months between the conference date and the manuscript publication date. Abstracts that were published before presentation were represented as negative integers in their respective calculations.

Statistical analysis was performed using Microsoft Excel (Microsoft, Redmond, WA) and SPSS (version 29; IBM, Armonk, NY). Data were analyzed using descriptive statistics with means, standard deviations, and percentages where appropriate. Two-proportion z tests were

performed to test for significance of associated variables, and Pearson χ^2 tests were conducted for bivariate comparisons of all categorical variables. $P < .05$ was defined as the level of statistical significance.

Results

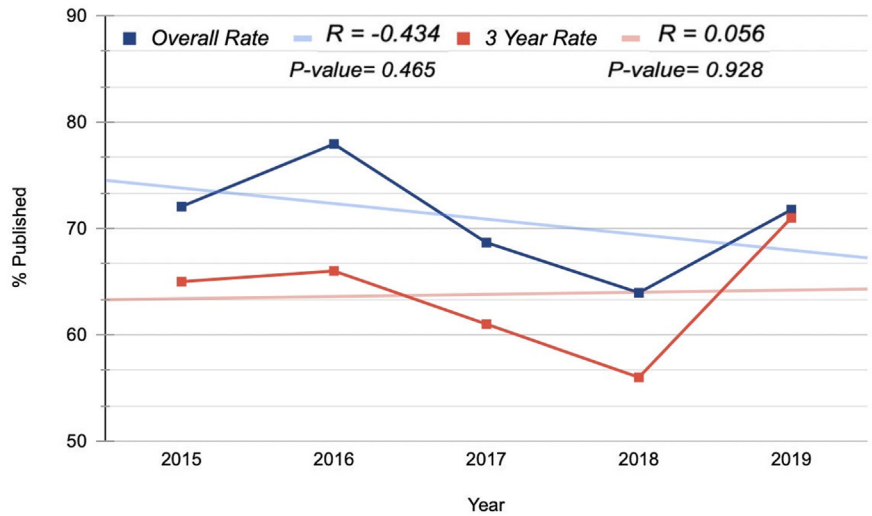
Overall, 70.5% of all abstracts presented at the 2015-2019 AANA annual meetings (275 of 390) went on to publication, with 63.6% (248 of 390) achieving publication within 3 years of presentation date (Fig 1). The mean time to publication from presentation date was 12.8 months (range, -7 to 79 months) (Fig 2). There was a change in the number of authors from the presented abstract in 41.1% of published manuscripts (113 of 275), with an increase in the number of authors (86.73%, 98 of 113) more common than a decrease in the number of authors (13.27%, 15 of 113) ($P < .001$). The LOE was significantly associated with an increased likelihood of publication ($P = .008$) (Table 1). Anatomic location studied in the abstract ($P = .649$) and number of authors ($P = .135$) were not found to be associated with and increased likelihood of publication.

Corresponding manuscripts were published in 39 unique journals. The most frequent journal of publication was *Arthroscopy* (29.8%, 82 of 275), followed by *The American Journal of Sports Medicine* (21.1%, 58 of 275) and the *Orthopaedic Journal of Sports Medicine* (9.5%, 26 of 275). There were 8 manuscripts (2.91%) published in *Arthroscopy*, *Sports Medicine*, and *Rehabilitation* (ASMAR). The mean IF of publishing journals was 4.96 ± 3.41 (Table 2). Most manuscripts (61.8%, 170 of 275) were published in journals with an IF of at least 4.00. Published manuscripts received an average of 36.30 ± 47.6 citations per manuscript (range, 0 to 383 citations).

Discussion

The most important finding of this study is that the abstracts presented at AANA annual meetings had a high rate of future publication by journals with strong IFs, with corresponding articles resulting in considerable numbers of citations. The overall future publication rate of abstracts presented at the 2015-2019 AANA annual meetings was 70.5%, with a 3-year publication rate of 63.6%. Baweja et al.⁹ analyzed AANA conferences from 2011-2014 and found an overall publication rate of 67.2%, with 63.4% of abstracts being published within 3 years. Lehman et al.¹⁵ reviewed the publication rate of abstracts presented at AANA conferences from 2004-2012 and reported an overall publication rate of abstracts of 67.3%, with a 3-year publication rate of 57.8%. In comparison to previous reviews, our study showed no difference from the publication rate reported by Baweja et al. ($P = .485$) but an increased future publication rate compared with that reported by Lehman et al. ($P = .031$). This represents consistency in

Fig 1. Although there was a weak negative correlation between year and percentage published for the overall publication rate and a slight positive correlation for the 3-year publication rate, the R values were not significant. This finding suggests that the publication rate of abstracts presented at the 2015-2019 AANA annual meetings remained consistent across all years.



the quality of abstracts presented at recent meetings, which may be due to a more competitive acceptance process for abstracts to be presented.^{3,4} Gowd et al.⁸ performed a review of another orthopaedic sports medicine subspecialty organization, the American Orthopaedic Society for Sports Medicine. Analyzing the 2011-2015 meetings, they reported an overall abstract publication rate of 50.7%, with 44.7% of publications occurring within 2 years. These data indicate that the AANA conference upholds a publication rate comparable, if not superior, to other prominent conferences in the field.^{1,4,5,8,10-13} It is important to note that the publication rate alone does not accurately reflect the quality or impact of the research presented. However, the high future publication rate of abstracts suggests that the AANA annual meetings continue to be a

valuable platform for disseminating research in the field of orthopaedic sports medicine.

Andersen et al.¹⁷ conducted a systematic review of several biomedical journals, revealing that the overall time span from submission to publication ranged from 91 to 639 days. Moreover, the review looked at 2 intermediate steps in the publication process: the time it takes for a paper to be accepted after submission and the time it takes for an accepted paper to be finally published. The time from submission to acceptance ranged from 50 to 276 days, and the time from acceptance to actual publication varied from 11 to 362 days.¹⁷ Comparatively, the mean time to publication from the presentation date at the AANA conferences between 2015 and 2019 was found to be approximately 12.8 months. The fact that the mean time to publication

Fig 2. Although a few abstracts were published before their presentation date and a few outliers saw delayed publication, the vast majority of abstracts from the 2015-2019 AANA annual meetings made it to publication within a span of 3 years from their initial presentation.

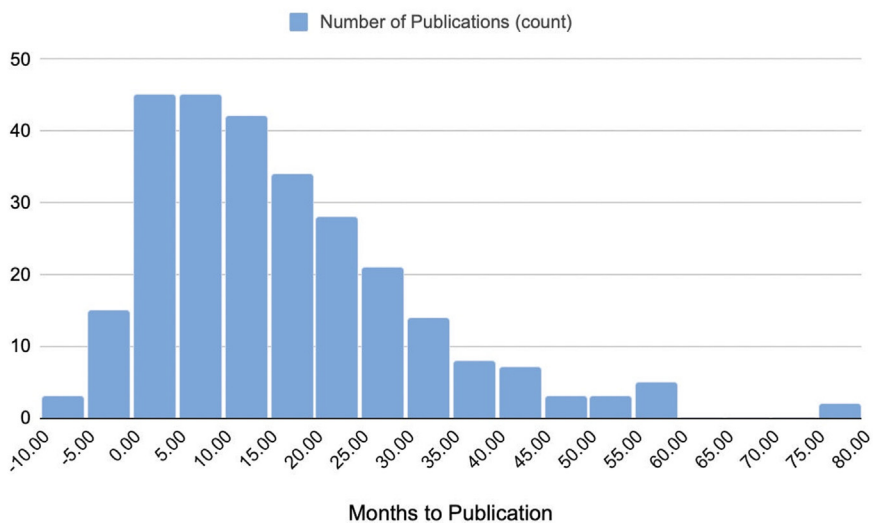


Table 1. Abstract Factors Associated With Publication

	Published, %	Not Published, %	P Value*
No. of authors			.135
1-3	61.7	38.3	
4-6	74.0	26.0	
≥7	67.7	32.3	
Anatomic category			.649
Knee	75.4	24.6	
Shoulder	68.4	31.6	
Hip	65.6	34.4	
Elbow	75.0	25.0	
Foot and/or ankle	68.0	32.0	
Other	61.5	38.5	
Level of evidence			.008†
I	77.4	22.6	
II	62.8	37.2	
III	64.6	35.4	
IV	86.1	13.9	
Nonclinical	73.9	26.1	

*The Pearson χ^2 test of independence was used to determine associations of variables.

†Statistically significant at $P < .05$.

for AANA conferences falls in line with the findings of the aforementioned systematic review implies that the publication process for AANA research follows a similar pattern to that of other biomedical journals. Several factors contribute to these time spans, including the peer review process, revisions required by reviewers and editors, and overall workload of the journal; therefore, researchers should be aware of these timelines when planning their publication strategies.

The most frequent journals of publication were *Arthroscopy*, *The American Journal of Sports Medicine*, and the *Orthopaedic Journal of Sports Medicine*. *Arthroscopy* maintains the “right of first refusal” for all abstracts presented at AANA meetings, which requires all associated manuscripts to first be submitted to this journal. Manuscripts can only be submitted to other journals once they have been denied acceptance for publication in *Arthroscopy*; therefore, abstracts from AANA meetings may be more likely to be published in *Arthroscopy* than any other journal.^{1,4,10,11} An additional consideration is

the 2019 launch of ASMAR, the open-access journal associated with the AANA. ASMAR has the same editorial team as *Arthroscopy*, and authors are likely encouraged to submit their manuscripts to ASMAR if they are not accepted by *Arthroscopy*. Only a small proportion of corresponding manuscripts were published in this journal, primarily because of its recent inception; however, as time progresses, the number of published abstracts is likely to substantially increase.

The IF of a journal has been reported to be an accurate indicator of journal quality.¹⁸ It is widely recognized that prominent peer-reviewed journals tend to prioritize the publication of manuscripts of noteworthy quality, which demonstrate substantial contributions to the field.¹⁹ Thus, an indirect way of assessing the quality of manuscripts of abstracts is to evaluate the IF of the publishing journal. The IFs of *Arthroscopy* and ASMAR are 5.973 and 1.64, respectively. A large percentage of abstracts from 2015-2019 meetings were published in journals with an IF of 4.0 or greater. Although the mean IFs of journals have increased over time, most orthopaedic journals have an IF below 4.0.^{20,21} In a review of 2006-2010 AANA meetings, Kay et al.²² reported that journals publishing Level I studies had a mean IF of 4.80 whereas journals publishing Level II, III, or IV studies had a mean IF of 2.58. Given that journals publishing Level I studies from the 2015-2019 AANA conferences have a mean IF of 7.18 and journals publishing Level II, III, and IV studies have a mean IF of 4.75, the research being disseminated through these conferences is clearly influential and widely cited. The rise in the journal IFs of corresponding manuscripts could be due to improved research methodologies, elevated conference reputation, and a stronger LOE.

Furthermore, the large number of citations of the corresponding manuscripts is representative of the manuscripts’ impact within the field, although this was not assessed in previous evaluations. In contrast to the study of Kay et al., our study revealed a substantial association between the LOE and the publication rate.²¹

Table 2. Most Common Journals Publishing Studies Presented at 2015-2019 AANA Annual Meetings

Journal	Impact Factor	n	% of Total
Arthroscopy	5.973	82	29.82
The American Journal of Sports Medicine	7.01	58	21.10
Orthopaedic Journal of Sports Medicine	3.401	26	9.45
Knee Surgery, Sports Traumatology, Arthroscopy	4.114	17	6.18
Journal of Shoulder and Elbow Surgery	3.507	14	5.09
The Journal of Bone & Joint Surgery	5.284	11	4.00
Arthroscopy, Sports Medicine, and Rehabilitation	1.64	8	2.91
Journal of Knee Surgery	2.501	7	2.55
Journal of Pediatric Orthopaedics	2.537	4	1.45
The American Journal of Orthopaedics	1.159	4	1.45

Whereas the overall number of Level I studies did not significantly increase compared with the 2006-2010 AANA conferences ($P = .453$), there was an increase in the proportion of Level I studies being published (77.4% vs 53.5%, $P = .017$).²¹ The significant association between the publication rate and the LOE underscores the importance of rigorous study designs. Our findings suggest improvement in the quality of research presented at the AANA annual meetings from 2015-2019.

Limitations

This study is not without limitations. Although a thorough search was independently performed by 2 reviewers to identify published manuscripts, it is possible that there were published manuscripts that were not identified given that only 2 databases were used. In addition, studies that underwent significant changes in title or authorship may have been incorrectly recorded as unpublished. Subjectivity existed in our classification of abstract anatomic categories and LOEs, although this was performed independently by 2 authors with disputes determined by a third author. In the evaluation of journal quality, the 2021 two-year IF listed on each journal's website was used, which may not have been representative of the journal's IF at the time of publication. Because this review was conducted in 2023, it used a total time-to-publication window ranging from 8 years to 4 years. Given that the upper limit of our time-to-publication calculation was 79 months (approximately 6.5 years), abstracts from more recent years that were not published at the time of our search still have the potential for publication. However, under-reporting of the future publication rate would only further strengthen the high-quality research presented at AANA annual meetings.

Conclusions

Pre-publication literature presented at the AANA annual meetings has continued to be associated with a strong likelihood of future publication in *Arthroscopy* and *ASMAR*, as well as other respected peer-reviewed journals.

Disclosure

The authors report the following potential conflicts of interest or sources of funding: N.A.S. reports a relationship with Arthroscopy Association of North America (AANA) that includes board membership. N.A.S. served as 2012-2013 AANA president and served on the AANA Board of Directors beginning in 2008. N.A.S. serves on the AANA Education Foundation and is the current foundation chair. N.A.S. has served on the *Arthroscopy* Board of Trustees and is the board's current chairperson. All other authors declare that they have no known competing financial interests or personal

relationships that could have appeared to influence the work reported in this paper. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

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