

Original Research

# Trends in Pediatric Orthopaedic Publications by Language

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## Abstract:

**Introduction:** English publications have been found to be more widely cited than publications in other languages leading to a higher impact in various fields. Many authors have thus focused on publishing in English so as to reach the largest audience possible; however, important non-English publications remain a vital part of the peer-reviewed literature. This study sought to understand the relative quantities of pediatric orthopaedic publications written in the top 10 languages published in PubMed.

**Methods:** The 10 languages with the most publications in PubMed were analyzed. These included English, German, Chinese, French, Russian, Japanese, Spanish, Polish, Italian, and Portuguese. All publications in orthopaedics and pediatric orthopaedics were pulled for each language. Publication rates were analyzed by individual language and by English versus non-English.

**Results:** A total of 522,099 publications were analyzed between 1960-2020. English publications accounted for 93.1% of all orthopaedic publications and 91.4% of pediatric orthopaedic publications. When analyzing by individual language, German, French, and Chinese accounted for the greatest number of non-English publications with 24.9%, 21.2%, and 20.0% of non-English pediatric orthopaedic publications, respectively.

**Conclusion:** In the 10 languages analyzed in this study, 8.6% of pediatric orthopaedic publications were written in non-English languages. When performing systematic reviews, care should be taken to assess literature published in these languages, specifically German, French, and Chinese, as they account for the greatest number of non-English publications. This will ensure that no relevant constituent studies are missed in qualitative syntheses due to lack of translation or access.

**Level of Evidence: IV**

**Key Concepts:**

- Pediatric orthopaedic publications written in non-English languages represent 8.6% of publications analyzed.
- German, French, and Chinese represent the non-English languages with the most amount of pediatric orthopaedic publications.
- Further efforts to assess literature published in other languages will ensure that no relevant constituent studies are missed in qualitative syntheses due to lack of translation or access.

**Introduction**

Systematic reviews seek to analyze and summarize published information on specific topics by reviewing all relevant peer-reviewed publications. One assumption for these investigations is that the author will be able to obtain all available publications in order to determine which articles are relevant to their topic of interest. Access to a wide variety of articles is crucial for systematic reviews to continue to advance understanding of pediatric orthopaedics.

In attempts to find common ground in research, English has become the default language for many conferences and scientific talks across the world. Approximately 98% of all scientific manuscripts are written in English.<sup>1</sup> Pediatric orthopaedic publications have been analyzed and found that 90 of the 135 most cited English articles originate from the United States.<sup>2</sup> Understanding which non-English languages are utilized in publishing will help eliminate systematic bias in identifying constituent studies for systematic reviews and meta-analyses.

To the authors' knowledge, no existing study has focused on analyzing pediatric orthopaedic publications by language. The current study sought to quantify publication rates in pediatric orthopaedics for the 10 languages with the highest volume of publications. The authors hypothesize that while English manuscripts will make up the vast majority of pediatric orthopaedic publications, a substantial number of publications will still be written in non-English languages.

**Methods**

Utilizing PubMed's advanced search function, the number of publications written in each individual language in the database was calculated. The 10 languages with the greatest number of publications in PubMed were then identified. These included Chinese, English, French, German, Italian, Japanese, Polish, Portuguese, Russian, and Spanish. All orthopaedic publications by language were pulled using the following search parameters: "Insert language"[Language] AND (orthopedics OR orthopaedics OR ortho). Similarly, pediatric orthopaedic publications by language were pulled using the following search parameters: "Insert language"[Language] AND (orthopedics OR orthopaedics OR ortho) AND (pediatrics OR pediatric OR peds OR kids OR kid OR adolescent OR child OR children). When searching for non-English languages, all keywords were also translated to the respective non-English language through the use of a native speaker or translation services and added to the search parameter. For example, for Spanish, the search parameter included "ortopedia" as a translation for orthopaedics.

Publications between 1960 and 2020 were included for analysis. Descriptive statistics were used to ascertain the number and proportion of publications in each language by year over the study period. Analysis was performed by individual language and English versus non-English languages. Univariate linear regression was performed on the percent of pediatric orthopaedic publications written

in non-English languages from 1960 to 2020. IBM SPSS Statistics 22 for Windows was used for analysis.

### Results

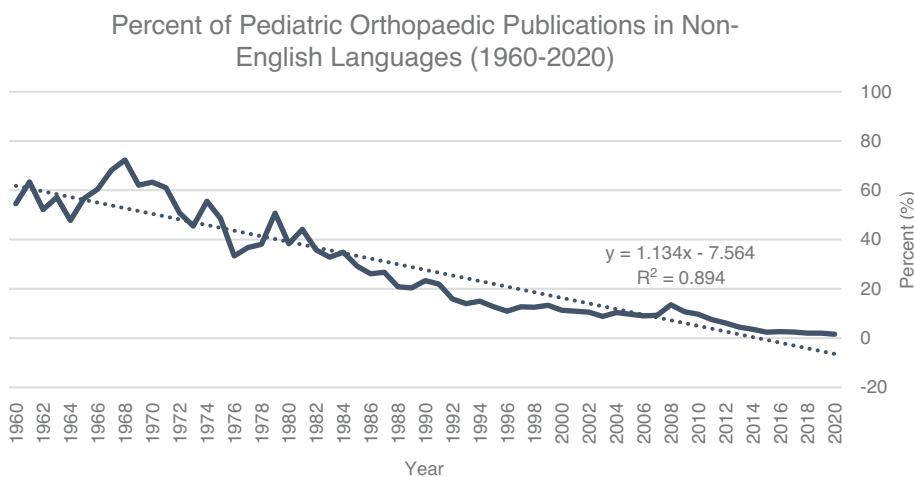
A total of 522,099 publications were analyzed between 1960-2020 for all languages. English publications accounted for 93.1% of all orthopaedic publications and 91.4% of pediatric orthopaedic publications (Table 1). German, French, and Chinese represented

the non-English languages with the most publications in both total orthopaedics (30.0%, 10.6%, and 24.9% of non-English publication, respectively) and pediatric orthopaedics (24.9%, 21.2%, and 20.0% of non-English pediatric orthopaedic publications, respectively).

Figure 1 demonstrates the percent of pediatric orthopaedic publications by year in non-English languages. Between 1960 and 1980, pediatric publication

**Table 1. Orthopaedic Publications and Pediatric Orthopaedic Publications by Language from 1960 to 2020**

Language	Total Orthopaedic Publications (n)	Percent of Orthopaedic Publications (%)	Pediatric Orthopaedic Publications (n)	Percent of Pediatric Orthopaedic Publications (%)
English	454,370	93.1	90,923	91.4
Non-English	33,425	6.9	8,579	8.6
German	10,030	2.1	2,135	2.1
Chinese	8,316	1.7	1,718	1.7
French	3,559	0.73	1,820	1.8
Russian	2,727	0.56	669	0.67
Japanese	2,592	0.53	383	0.38
Spanish	2,558	0.52	690	0.69
Polish	1,740	0.36	638	0.64
Italian	1,610	0.33	450	0.45
Portuguese	293	0.06	76	0.08



**Figure 1.** Percent of pediatric orthopaedic publications in non-English languages between 1960 and 2020 with linear regression trendline.

rates fluctuated around 50% for non-English languages, however, in the past 40 years, rates began to decrease until 2020 where 1.6% of pediatric publications were written in non-English languages. Using a univariate linear regression trendline, a decrease of 1.13% per year was noted ( $R^2=0.894$ ) (Figure 1).

## Discussion

This study sought to understand trends in pediatric orthopaedic publications by language. We found that English represents 93.1% of all orthopaedic publications and 91.4% of pediatric orthopaedic publications between 1960 and 2020. The percentage of pediatric orthopaedic publications written in non-English languages has decreased by 1.1% per year since 1960; however, there remains a substantial proportion of non-English primary literature in the past 20 years from which investigators are likely to attempt qualitative and quantitative syntheses. With 8.6% of pediatric publications analyzed being written in non-English languages, a significant amount of research is inaccessible to physicians who do not speak those languages. This can lead to systemic bias in the highly cited systematic review and meta-analysis literature.

Many studies have focused on understanding trends in the most cited publications in various orthopaedic fields.<sup>3-8</sup> With 98% of all scientific studies published being written in English, these studies found that the most cited articles in orthopaedics are also written in English.<sup>1</sup> Some journals and conferences will only publish and present works in English.<sup>3,9</sup> In a recent study by Ramirez-Castañeda, the negative effects of using English as the single scientific language was analyzed in Colombia.<sup>10</sup> The study found that 43.5% of papers that are rejected or returned for revisions have to do with English grammatical mistakes. Furthermore, it took Colombian doctors, on average, 96.83 work hours more to publish an article in English compared to Spanish. Even with the extra time and cost to publish in English, 92% of articles published by Colombian doctors are written in English. As an academic pediatric orthopaedic surgeon stated in a recent editorial,

“academic collaboration aims to make research available to everyone interested in it.”<sup>11</sup> With 8.6% of all pediatric orthopaedic publications being written in non-English languages, collaborations through study groups and other methods should be made to provide physicians and researchers with the ability to publish their studies in English without increasing work time or cost.

Morverley et al. determined that the number of orthopaedic journals between 2000 and 2010 increased from 24 to 41.<sup>12</sup> Furthermore, the number of journals related to pediatric orthopaedics specifically increased from three to six. While this may suggest an increased reach of orthopaedic articles in general, in 2009, the *Orthopedic and Traumatology: Surgery and Research (OTSR)* journal was created in an attempt to broaden the reach of the French journal *Revue de Chirurgie Orthopédique et Traumatologique (RCO)*.<sup>9</sup> The use of this new journal has allowed French speaking surgeons to obtain visibility to their previously hidden work. In 1980, nearly 40% of pediatric publications were written in the non-English languages analyzed in this study. Figure 1 shows that for the past 40 years, rates of pediatric orthopaedic publications written in non-English languages has decreased and in 2020, 1.6% of pediatric publications were written in non-English languages. However, qualitative syntheses typically focus on peer-reviewed publications over the past 20 to 30 years. During this timeline, non-English publications accounted for over 20% of all pediatric orthopaedic publication at times (Figure 1). With such a large proportion of studies being written in non-English languages, greater efforts similar to those used through OTSR are still needed to continue to broaden the reach of past and future studies written in non-English languages.

This study has some limitations. Mainly, PubMed does not have access to all publications in orthopaedics, so the total numbers analyzed in this study may not represent all publications for each language. Furthermore, the search parameters used, especially terms not in English, may not account for all possible keywords for orthopaedic publications. This may, if anything, underestimate the

true number of non-English publications. Therefore, the extent of inaccessible publications may be greater than found in this study. Additionally, our methodology did not allow for access to the impact factor of each publication studied and therefore limits our ability to discuss the impact each language studied is having. Future studies should seek to determine the impact factor that pediatric publications are having by language.

## Conclusion

This study found that 93.1% of all orthopaedic and 91.4% of pediatric orthopaedic articles are published in English. Despite the declining proportion of non-English publications, there remains a substantial proportion of non-English primary literature in the past 20 years from which investigators are likely to attempt qualitative and quantitative syntheses. Including non-English literature will broaden the reach of systematic reviews and meta-analyses and will ensure that no relevant constituent studies are missed due to lack of translation or access when constructing these qualitative and quantitative syntheses.

## Disclaimer

N. Pascual-Leone, D. Chipman, and P. Gross: No conflicts of interest to disclose; D. Green: Board/committee member of AAOS, New York County Medical Society, NY State Society of Orthopaedic Surgeons, the PatelloFemoral Foundation, POSNA, and PRISM. Paid presenter/speaker for AO Trauma International. IP royalties for Arthrex, Inc. and paid consultant and presenter for Arthrex. IP royalties in Pega Medical. Editorial board for *Current Opinion in*

*Pediatrics* and receives publishing royalties, along with Wolters Kluwer Health–Lippincott Williams & Wilkins; P. Fabricant: Board/committee member for POSNA and ROCK, editorial/governing board at CORR, paid consultant for WishBone Medical.

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