# Social Media Metrics and Bibliometric Profiles of Neurosurgical Departments and Journals: Is There a Relationship?

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BACKGROUND: **Social media plays an increasingly important role in dissemination of knowledge and raising awareness of selected topics among the general public and the academic community.**

OBJECTIVE: **To investigate the relationship between social media metrics and academic indices of neurosurgical programs and journals.**

METHODS: **A 2-step online search was performed to identify official social media accounts of neurosurgical departments that were accredited by the Accreditation Council for Graduate Medical Education and the Royal College of Physicians and Surgeons of Canada. Dedicated neurosurgery and spine journals' social media accounts also were identified through an online search on SCImago Journal and Country Rank portal. Nonparametric tests were performed with bootstrapping to compare groups and to look for correlations between social media and academic metrics.**

RESULTS: **We identified 36 social media accounts officially affiliated with academic neurosurgical institutions. These accounts represented 22 of 119 neurosurgical programs in North America (18.4%). The presence of a social media account for neurosurgical departments was associated with statistically significant higher values of academic impact metrics ($P < 0.05$). Specific social media metrics for neurosurgical department accounts, however, did not correlate with any values of academic indices. For journals, there were 11 journals present on social media and had greater academic metrics compared with journals without social media presence ($P < 0.05$).**

CONCLUSIONS: **Social media presence is associated with stronger academic bibliometrics profiles for both neurosurgical departments and journals. The impact of social media metrics on indices of scientific impact in neurosurgery is not known.**

## INTRODUCTION

Social media is a relatively recent online phenomenon, encompassing text and multimedia-based communication. With the recent surge in use of social media networks, the association between social media metrics and academic productivity for institutions, journals, and individual researchers has become a topic of interest. Our research group recently published a descriptive analysis of the current use of social media in neurosurgery and found important variability in popularity of social media networks across different neurosurgical institutions, journals, and societies[1]; however, the association of this variability on academic productivity has yet to be determined.

Herein, we report an exploratory analysis to investigate the relationship between social media metrics and academic indices of neurosurgical programs and journals with a focus on both cranial and spine surgery. In the current academic climate, this is especially important, given the emphasis placed on productivity within neurosurgical departments and recently identified

**Key words**
- Bibliometric
- Neurosurgery
- Social media

**Abbreviations and Acronyms**
IQR: Interquartile range
SJR: SCImago Journal Rank

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associations between social media visibility and measures of academic impact, such as journal citations.[1-3]

## METHODS

### Social Media Accounts

Here, we used a comprehensive, 2-stage search strategy to determine the number of social media accounts for academic neurosurgical departments and journals. The full details of the search strategy have been previously published.[1] To summarize in brief, the first stage involved an online search via the use of Facebook and Twitter search engines in November 2015 with the following general keywords in combination: "*neurosurgery, neurosurgical, neurological, neurology, brain, spine, surgery, surgical, department, division, institute, journal*." In the second stage, the official websites for academic neurosurgical departments that are accredited by the Accreditation Council for Graduate Medical Education and the Royal College of Physicians and Surgeons of Canada were searched for external links to dedicated Facebook and Twitter accounts.

For journals, we searched the SCImago Journal and Country Rank website (http://www.scimagojr.com/) with the aforementioned keywords to identify those journals focused on neurosurgery and spine. SCImago includes the journals and country scientific indicators reflective of the data from the Scopus Database.

### Social Media Metrics

The following data were collected from each social media account identified: 1) metrics of attendance/popularity, the number of "likes" for Facebook pages, and "followers" for Twitter accounts; and 2) metrics of account activity and engagement, the "number of tweets," "twitter likes" or "favorite," as well as the "Klout score." The Klout score is a social media engagement metric between 1 and 100 that measures a Twitter account's influence on social networks (https://klout.com).[4,5]

### Academic Metrics

After identifying all official social media accounts for neurosurgical departments and journals, we extracted academic productivity indices of U.S. and Canadian neurosurgical programs from recently published data.[6,7] We included the following metrics: ih(5)-index, summed h-index, total publications, and number of citations. Definitions of these metrics are detailed in the original publications.[6-8] For journals, we included the most updated numbers for h index and SCImago Journal Rank (SJR) indicator as listed in their website. SJR indicator was selected instead of the Thomson Reuters's Impact Factor because it was available to all our screened journals.

### Statistical Analysis

Statistical analysis was performed only for departments with a bibliometric profile listed in Taylor et al.[6]/Lozano et al.[7] publications and for all journals that had SJR indicator/h-index. The mean, median, SD, and interquartile range (IQR) for social media metrics were calculated. Our statistical approach acknowledged that our data violated assumptions for parametric analysis, which has been described previously in studies involving social media metrics.[3,9,10] For this reason, we performed nonparametric tests with bootstrapping to evaluate: 1) whether there were any differences in academic indices of departments and journals based on their presence on social media (Mann–Whitney U test), and 2) to look for a correlation between social media and academic metrics among departments and journals that were present on social media (Spearman rank-order correlation test). Bootstrapping is a distribution-independent resampling method for data with insufficient sample size and complicated distribution. The strength of the relationship was described by the correlation coefficient. *P* values are based on 2-sided tests, and values less than 0.05 were considered significant. All statistical analyses were performed with SPSS version 21 (IBM Corp, Armonk, New York, USA).

## RESULTS

### Social Media and Academic Metrics

***Academic Departments.*** There were 119 programs accredited by the Accreditation Council for Graduate Medical Education and Royal College of Physicians and Surgeons of Canada. Our search yielded 36 social media accounts officially affiliated with academic neurosurgical institutions (20 Facebook and 16 Twitter). Fourteen departments had both Facebook and Twitter accounts, 6 departments had Facebook accounts, and 2 departments had Twitter accounts. These accounts represented 22 of 119 neurosurgical programs in North America (18.5%). One hundred four departments had bibliometric profiles listed in Taylor et al.[6]/Lozano et al.[7] publications. Fifteen departments (all without social media presence except one) were excluded from our analysis because they were not listed among departments with academic metrics. **Supplementary Table 1** shows all 119 academic departments that were included or excluded from our analysis.

The total number of likes on Facebook was 23,997 (mean: 1199.85, SD: 1368.9, range: 208–6085, median: 793, IQR 865) and total number of followers on Twitter was 13,121 (mean: 874.7, range: 66–2071, SD: 618, median: 650, IQR 900). All departments with both social media and academic metrics in neurosurgery are shown in **Table 1**. University of Southern California was the most followed department on Facebook and Twitter, followed by University of Toronto on Facebook, and University of Texas Health Science Center, San Antonio on Twitter. All eligible social media accounts in our analysis belonged to U.S. programs except one account from Canada (University of Toronto).

***Journals.*** We identified 38 journals in the SCImago Journal and Country Rank website with interest in neurosurgery and spine surgery. All journals had available SJR/h-index records. **Supplementary Table 2** shows a complete list of all screened journals. Eleven of 38 screened neurosurgical journals (28.9%) had social media accounts (11 Facebook, and 11 Twitter). The total number of likes on Facebook was 50,157 (mean: 4559.7, SD: 4892.8, range: 28–16,500, median: 3410, IQR 3371) and total number of followers on Twitter was 31,906 (mean: 2900.5, SD: 2635.4, range: 10–8290, median: 3672, IQR 3956). All neurosurgical and spine journals with both social media and academic metrics are shown in **Table 2**.

**Table 1.** Social Media and Academic Metrics for Neurosurgical Departments (Ranked Alphabetically)

| | Social Media Metrics* | | | | | Academic Metrics† | | | |
|---|---|---|---|---|---|---|---|---|---|
| University | Facebook Likes | Twitter Followers | Twitter Likes | No. Tweets | Klout Score | ih(5)-Index | Summed h-Index | Total Publications | Total Citations |
| Barrow Neurological Institute | 746 | NA | NA | NA | NA | 26 | 513 | 365 | 3547 |
| Carolinas Medical Center | 943 | NA | NA | NA | NA | 5 | NA | 19 | 238 |
| Columbia University | 464 | 635 | 0 | 960 | 41 | 25 | 410 | 291 | 2843 |
| Cornell University | 459 | 650 | 4 | 179 | 32 | 24 | 179 | 204 | 2043 |
| Duke University | 986 | 769 | 38 | 472 | 40 | 27 | 298 | 263 | 3783 |
| Louisiana State University Shreveport | 208 | 66 | 3 | 30 | 23 | 8 | 94 | 97 | 264 |
| Oregon Health & Science University | 840 | NA | NA | NA | NA | 20 | 241 | 166 | 2264 |
| Stanford University | 422 | 351 | 85 | 785 | 45 | 26 | 342 | 279 | 3534 |
| University at Buffalo | 1296 | 589 | 2 | 243 | NA | 22 | 185 | 146 | 2812 |
| University of Arizona | 419 | NA | NA | NA | NA | 5 | 42 | 14 | 85 |
| University of California, Los Angeles | 747 | NA | NA | NA | NA | 36 | 467 | 360 | 6038 |
| University of California, San Diego | 571 | 1303 | 0 | 61 | 27 | 16 | 225 | 129 | 843 |
| University of Cincinnati | 1621 | 1425 | 62 | 1400 | 41 | 17 | 225 | 137 | 1046 |
| University of Michigan | 1525 | 536 | 9 | 140 | 37 | 17 | 202 | 241 | 1791 |
| University of Minnesota | 889 | 937 | 13 | 742 | 41 | 10 | 96 | 53 | 302 |
| University of North Carolina at Chapel Hill | NA | 381 | 1 | 60 | 27 | 8 | 56 | 19 | 174 |
| University of Southern California | 6085 | 2071 | 166 | 568 | 41 | 15 | 297 | 159 | 1062 |
| University of Texas Health Science Center San Antonio | 1423 | 1898 | 44 | 358 | 41 | 8 | 69 | 27 | 189 |
| University of Toronto | 3574 | 1414 | 118 | 488 | 41 | 50 | 1117 | 1217 | 13434 |
| University of Washington | 306 | 96 | 0 | 52 | 23 | 21 | 291 | 187 | 1847 |
| Virginia Commonwealth University | 473 | NA | NA | NA | NA | 18 | 148 | 69 | 1315 |

NA, not available.
*Time of search for social media metrics: November 26, 2015.
†Academic metrics were all from the 2009 to 2013 time window and compiled from Taylor et al.[6]/Lozano et al.[7]

### Associations Among Social Media Metrics and Bibliometric Profiles

***Academic Departments.*** As mentioned previously, 15 departments were excluded. Therefore, 104 departments were compared against each other on the basis of social media presence. The presence of a social media account for departments was associated with statistically significantly greater values of academic impact metrics (ih(5)-index, summed h-index, total publications, and total citations) on Mann–Whitney U test (Table 3). Among the 21 departments with both types of metrics, none of the social metrics had statistically significant correlation values with any of the academic indices; the number of tweets had the most positive correlation values with academic metrics. Table 4 shows Spearman rank-order correlation test values for all metrics in our analysis.

***Journals.*** Journals with social media accounts had significantly greater values of H-index and SJR on Mann–Whitney U test ($P < 0.001$) (Table 5). In comparison with academic departments, correlation values were greater, and there was a significant correlation between number of tweets and SJR as shown in Table 6.

## DISCUSSION

The use of social networks among all age groups is growing rapidly, with a recent population survey estimating that 74% of online adults use social media.[1,10] Although platforms such as Facebook and Twitter predominate, other multimedia platforms, including Instagram and YouTube, also are becoming integral to our daily online communications.

In medicine, social networks are important tools for both researchers and health providers, allowing knowledge dissemination, open access to publications, fundraising opportunities, patient education, and health promotion. The impact of social media on the academic productivity and visibility of individual

**Table 2.** Social Media and Academic Metrics for Neurosurgical Journals (Ranked Alphabetically)

| | Social Media Metrics* | | | | | Academic Metrics† | |
|---|---|---|---|---|---|---|---|
| Journal | Facebook Likes | Twitter Followers | Twitter Likes | No. Tweets | Klout Score | H-Index | SJR |
| *European Spine Journal* | 173 | 10 | 0 | 12 | 18 | 89 | 1.26 |
| *Journal of Neurology, Neurosurgery and Psychiatry* | 10,054 | 3672 | 1113 | 8444 | 52 | 152 | 2.42 |
| *Journal of Neurosurgery* | 3410 | 4384 | 0 | 730 | 44 | 159 | 1.74 |
| *Journal of Neurosurgery: Pediatrics* | 3410 | 4384 | 0 | 730 | 44 | 30 | 0.65 |
| *Journal of Neurosurgery: Spine* | 3410 | 4384 | 0 | 730 | 44 | 54 | 1.44 |
| *Journal of Neurosurgical Anesthesiology* | 1916 | 37 | 0 | 1563 | 25 | 45 | 0.78 |
| *Neurosurgery* | 16,500 | 8290 | 95 | 2661 | 52 | 152 | 1.37 |
| *Neurosurgery Quarterly* | 28 | 54 | 0 | 642 | 25 | 14 | 0.11 |
| *Neurosurgical Focus* | 3410 | 4384 | 0 | 730 | 44 | 56 | 0.87 |
| *Spine* | 1299 | 1505 | 0 | 5636 | 42 | 183 | 1.59 |
| *Surgical Neurology International* | 6547 | 802 | 0 | 519 | 34 | 9 | 0.47 |

SJR, SCImago Journal Rank.
*Time of search for social media metrics: November 17, 2015.
†H-Index, and SJR: both compiled from SCImago Journal and Country Rank portal website.

researchers, departments and journals, however, remains controversial.[11] To our knowledge, this is the first exploratory study to focus on the correlation between social media metrics and the academic impact of neurosurgical departments and journals.

The first evaluation of social media metrics as predictors of scientific impact was published in 2011, which reported a significant positive correlation between the number of tweets and citations and academic bibliometric profiles.[3] Subsequently, others have investigated similar relationships for additional social media metrics, including the number of "likes" on Facebook.[12] The results of these studies are inconsistent but mostly trend toward a positive correlation between social media usage and academic productivity. *Circulation* recently evaluated the role of social networks in promoting their own articles in a prospective randomized trial, which failed to demonstrate any significant effect on readership and article downloads.[13] Other cross-sectional and prospective studies, however, have shown that greater social media presence may be associated with greater citation rates and readership numbers for publications.[3,11,14]

**Table 3.** Comparison of Academic Indices According to the Social Media Presence for Neurosurgical Departments

| | Departments with a Social Media Account | Departments without a Social Media Account | *P* Value |
|---|---|---|---|
| Number of departments ($n = 104$) | 21 | 83 | |
| ih(5)-Index, mean (mean rank) | 19.2 (67.14) | 13.03 (48.80) | 0.012* |
| Summed h-Index, mean (mean rank) | 274.8 (64.88) | 160.3 (46.91) | 0.013* |
| Total publications, mean (mean rank) | 211.5 (67.12) | 106.8 (48.80) | 0.012* |
| Total citations, mean (mean rank) | 2354.9 (67.43) | 1001.2 (48.72) | 0.009* |

*Statistically significant at level of 0.05 on Mann-Whitney *U* test, which ranks values from lowest to highest and compares average ranks between groups "*mean rank*."

**Table 4.** Spearman Rank-Order Correlation Test Values for Social Media and Academic Metrics for Neurosurgical Departments*

| | ih(5)-Index | Summed h-Index | Total Publications | Total Citations |
|---|---|---|---|---|
| Facebook likes | 0.019 | 0.132 | 0.060 | 0.055 |
| Twitter followers | −.174 | 0.028 | −.242 | −.190 |
| Twitter likes | 0.130 | 0.238 | 0.127 | 0.182 |
| No. Tweets | 0.303 | 0.446 | 0.286 | 0.275 |
| Klout score | 0.213 | 0.372 | 0.234 | 0.214 |
| Total users *Facebook likes + twitter followers* | −.113 | 0.041 | −.071 | −.088 |

*None of correlation coefficient values were significant at the level of 0.05.

**Table 5.** Comparison of Academic Indices According to the Social Media Presence for Neurosurgical Journals

| | Journals with Social Media Account | Journals without Social Media Account | *P* Value |
|---|---|---|---|
| Number of journals, $n = 38$ | 11 | 27 | |
| H-Index, *mean (mean rank)* | 85.7 (28.5) | 22.9 (15.8) | <0.001* |
| SJR, *mean (mean rank)* | 1.15 (29.32) | 0.36 (15.5) | <0.001* |

*Statistically significant at level of 0.01 on Mann-Whitney *U* test, which ranks values from lowest to highest and compares average ranks between groups "*mean rank.*"

**Table 6.** Spearman Rank-Order Correlation Test Values for Social Media and Academic Metrics for Neurosurgical Journals

| | H-Index | SJR |
|---|---|---|
| Facebook likes | 0.733 | 0.343 |
| Twitter followers | 0.303 | 0.354 |
| Twitter likes | 0.372 | 0.472 |
| No. Tweets | 0.588 | 0.614* |
| Klout score | 0.408 | 0.556 |
| Total users, *Facebook likes + twitter followers* | 0.368 | 0.530 |

SJR, SCImago Journal Rank.
*Statistically significant at level of 0.05.

What can the neurosurgical community learn from this analysis? Our data broadly suggest that increased social media presence is associated with increased academic productivity, although no specific social metric is correlated with any citation index. These findings may not be causal but rather reflect the trend that larger, more academically established neurosurgical institutions (who may be better positioned to have greater academic output) are able to allocate resources to the creation and maintenance of a social media presence. Conversely, the online presence itself may plausibly augment the visibility and accessibility of the institution or journal, promoting a positive cycle of publicity and possibly improving citation indices.[2] Although no causality between social media presence and academic productivity is implied by our analysis, it is certainly within reason that presence on new research-specific networks, such as ResearchGate, may improve publication viewership and citation indices.

The limited literature relating social media to academic presence, all in non-neurosurgical disciplines, has trended towards positively correlating social media metrics with academic productivity indices. In neurosurgery, however, we found no such correlation. This may be related to the limited size of the neurosurgical community relative to other medical disciplines, or the amount of time spent in social media use among neurosurgical online users. Within neurosurgery, this correlation may continually be reassessed as the social media presence of departments and publishing groups increases in breadth and scope.

As with other studies evaluating the impact of the social network phenomenon, our study is limited in various respects. First, our search was limited to Facebook and Twitter and did not capture other social networks. The search strategy itself also may be limited by the use of key words and lack of standardized guidelines to search metrics. Furthermore, due in part to the relatively small neurosurgical community, our statistical analysis may be hampered by small samples sizes and not being able to control for the many other factors that were not available (duration of social media presence, marketing budget, hospital patient volume, number of visits for official websites, etc.) that drive social media prominence. Finally, any analysis of social media metrics occurs as a snapshot in time; however, online networks are dynamic by their nature, with rapid shifts in membership and content, which may be easily manipulated by third party-applications or account owners.

## CONCLUSIONS

We assess here the relationship between social media metrics and scientific productivity indices for neurosurgical departments and journals. Social media presence is associated with stronger academic bibliometrics profiles, for both neurosurgical departments and journals. These findings may stimulate interest in social media within the neurosurgical community to improve academic collegiality and publication dissemination. Further study is required to quantify the direct impact of social media presence on citation indices.

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**Supplementary Table 1.** List of all 119 Screened Neurosurgical Departments for Academic and Social Media Metrics (Alphabetical Order)

| No. | University | Bibliometric Profile* | Facebook Account | Twitter Account | Facebook Link | Twitter Link | Included in analysis? |
|---|---|---|---|---|---|---|---|
| 1. | Albany Medical Center | Yes | No | No | NA | NA | Yes |
| 2. | Albert Einstein College of Medicine | Yes | No | No | NA | NA | Yes |
| 3. | Allegheny General Hospital | Yes | No | No | NA | NA | Yes |
| 4. | Baylor College of Medicine | Yes | No | No | NA | NA | Yes |
| 5. | Brigham & Women's Hospital | Yes | No | No | NA | NA | Yes |
| 6. | Brown University School of Medicine | Yes | No | No | NA | NA | Yes |
| 7. | Carolinas Medical Center | Yes | Yes | No | https://www.facebook.com/carolinaneurosurgery/ | NA | Yes |
| 8. | Case Western Reserve University | Yes | No | No | NA | NA | Yes |
| 9. | Cedars-Sinai Medical Center | Yes | No | No | NA | NA | Yes |
| 10. | Cleveland Clinic | No | No | No | NA | NA | No |
| 11. | Colorado University | Yes | No | No | NA | NA | Yes |
| 12. | Columbia University | Yes | Yes | Yes | https://www.facebook.com/columbianeuro/ | https://twitter.com/ColumbiaNeuro | Yes |
| 13. | Cornell University | Yes | Yes | Yes | https://www.facebook.com/WeillCornellBrainandSpine | https://twitter.com/WCMCBrainSpine | Yes |
| 14. | Dalhousie University | No | No | No | NA | NA | No |
| 15. | Dartmouth University | Yes | No | No | NA | NA | Yes |
| 16. | Duke University | Yes | Yes | Yes | https://www.facebook.com/dukeneurosurgery/ | https://twitter.com/Dukeneurosurg | Yes |
| 17. | Emory University | Yes | No | No | NA | NA | Yes |
| 18. | Geisinger Health System‡ | Yes | No | No | NA | NA | Yes |
| 19. | George Washington University | Yes | No | No | NA | NA | Yes |
| 20. | Georgetown University | Yes | No | No | NA | NA | Yes |
| 21. | Georgia Regents University | Yes | No | No | NA | NA | Yes |
| 22. | Henry Ford Hospital | Yes | No | No | NA | NA | Yes |
| 23. | Indiana University | Yes | No | No | NA | NA | Yes |
| 24. | Johns Hopkins University | Yes | No | No | NA | NA | Yes |
| 25. | Loma Linda University | Yes | No | No | NA | NA | Yes |
| 26. | Louisiana State University Shreveport | Yes | Yes | Yes | https://www.facebook.com/UniversityNeurosurgery | https://twitter.com/Uneurosurgery | Yes |
| 27. | Louisiana State University, New Orleans | Yes | No | No | NA | NA | Yes |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 28. | Loyola University | Yes | No | No | NA | NA | Yes |
| 29. | Massachusetts General Hospital | Yes | No | No | NA | NA | Yes |
| 30. | Mayfield Clinic/University of Cincinnati | Yes | Yes | Yes | https://www.facebook.com/MayfieldClinic/ | https://twitter.com/MayfieldClinic | Yes |
| 31. | Mayo Clinic, Florida | Yes | No | No | NA | NA | Yes |
| 32. | Mayo Clinic, Rochester | Yes | No | No | NA | NA | Yes |
| 33. | McGill University | No | No | No | NA | NA | No |
| 34. | McMaster University | No | No | No | NA | NA | No |
| 35. | Medical College of Wisconsin | Yes | No | No | NA | NA | Yes |
| 36. | Medical University of South Carolina | Yes | No | No | NA | NA | Yes |
| 37. | Methodist Houston | Yes | No | No | NA | NA | Yes |
| 38. | Mount Sinai School of Medicine | Yes | No | No | NA | NA | Yes |
| 39. | National Capital Consortium | No | No | No | NA | NA | No |
| 40. | National Institutes of Health (NIH) | Yes | No | No | NA | NA | Yes |
| 41. | New York Medical College | Yes | No | No | NA | NA | Yes |
| 42. | New York University | Yes | No | No | NA | NA | Yes |
| 43. | Northwestern University | Yes | No | No | NA | NA | Yes |
| 44. | NSLIJ/Hofstra University | Yes | No | No | NA | NA | Yes |
| 45. | Ohio State University | Yes | No | No | NA | NA | Yes |
| 46. | Oregon Health & Science University | Yes | Yes | No | https://www.facebook.com/OHSUNeurologicalSurgery/ | NA | Yes |
| 47. | Penn State University | Yes | No | No | NA | NA | Yes |
| 48. | Rush University Medical Center | Yes | No | No | NA | NA | Yes |
| 49. | Saint Louis University | Yes | No | No | NA | NA | Yes |
| 50. | Semmes-Murphey Clinic/University of Tennessee, Memphis | Yes | No | No | NA | NA | Yes |
| 51. | Southern Illinois University‡ | Yes | No | No | NA | NA | Yes |
| 52. | St. Joseph's Hospital and Medical Center/Barrow Neurological Institute | Yes | Yes | No | https://www.facebook.com/bnineurosurgery/ | NA | Yes |
| 53. | Stanford University | Yes | Yes | Yes | https://www.facebook.com/stanfordneurosurgery/ | https://twitter.com/StanfordNeuroS | Yes |
| 54. | SUNY/Upstate Medical University | Yes | No | No | NA | NA | Yes |
| 55. | Temple University | Yes | No | No | NA | NA | Yes |
| 56. | Thomas Jefferson University | Yes | No | No | NA | NA | Yes |

Continues

**Supplementary Table 1.** Continued

| No. | University | Bibliometric Profile* | Facebook Account | Twitter Account | Facebook Link | Twitter Link | Included in analysis? |
|---|---|---|---|---|---|---|---|
| 57. | Tufts Medical Center | Yes | No | No | NA | NA | Yes |
| 58. | Tulane University | Yes | No | No | NA | NA | Yes |
| 59. | Université de Montréal | No | No | No | NA | NA | No |
| 60. | Université de Sherbrooke | No | No | No | NA | NA | No |
| 61. | Université Laval | No | No | No | NA | NA | No |
| 62. | University at Buffalo | Yes | Yes | Yes | https://www.facebook.com/ubneurosurgery/ | https://twitter.com/UB_Neurosurgery | Yes |
| 63. | University of Alabama, Birmingham | Yes | No | No | NA | NA | Yes |
| 64. | University of Alberta | No | No | No | NA | NA | No |
| 65. | University of Arizona | Yes | Yes | No | https://www.facebook.com/UANeurosurgery | NA | Yes |
| 66. | University of Arkansas | Yes | No | No | NA | NA | Yes |
| 67. | University of British Columbia | No | No | No | NA | NA | No |
| 68. | University of Calgary | No | No | No | NA | NA | No |
| 69. | University of California, Davis | Yes | No | No | NA | NA | Yes |
| 70. | University of California, Irvine | Yes | No | No | NA | NA | Yes |
| 71. | University of California, Los Angeles | Yes | Yes | No | https://www.facebook.com/UCLA-Neurosurgery-179782942050505/ | NA | Yes |
| 72. | University of California, San Diego | Yes | Yes | Yes | https://www.facebook.com/ucsdneuro/ | https://twitter.com/UCSDNeuroSurg | Yes |
| 73. | University of California, San Francisco | Yes | No | No | NA | NA | Yes |
| 74. | University of Chicago | Yes | No | No | NA | NA | Yes |
| 75. | University of Florida | Yes | No | No | NA | NA | Yes |
| 76. | University of Illinois, Chicago | Yes | No | No | NA | NA | Yes |
| 77. | University of Illinois, Peoria | Yes | No | No | NA | NA | Yes |
| 78. | University of Iowa | Yes | No | No | NA | NA | Yes |
| 79. | University of Kansas | Yes | No | No | NA | NA | Yes |
| 80. | University of Kentucky | Yes | No | No | NA | NA | Yes |
| 81. | University of Louisville | Yes | No | No | NA | NA | Yes |
| 82. | University of Manitoba | No | No | No | NA | NA | No |
| 83. | University of Maryland | Yes | No | No | NA | NA | Yes |
| 84. | University of Medicine and Dentistry of New Jersey | Yes | No | No | NA | NA | Yes |
| 85. | University of Miami | Yes | No | No | NA | NA | Yes |
| 86. | University of Michigan | Yes | Yes | Yes | https://www.facebook.com/umich.neurosurgery/ | https://twitter.com/umichneuro | Yes |
| 87. | University of Minnesota | Yes | Yes | Yes | https://www.facebook.com/UMNNeurosurgery?ref=nf | https://twitter.com/umnneurosurgery | Yes |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 88. | University of Mississippi | Yes | No | No | NA | NA | Yes |
| 89. | University of Missouri | Yes | No | No | NA | NA | Yes |
| 90. | University of Nebraska | Yes | No | No | NA | NA | Yes |
| 91. | University of New Mexico | Yes | No | No | NA | NA | Yes |
| 92. | University of North Carolina at Chapel Hill | Yes | No | Yes | NA | https://twitter.com/UNCneurosurgery | Yes |
| 93. | University of Oklahoma | Yes | No | No | NA | NA | Yes |
| 94. | University of Ottawa | No | No | No | NA | NA | No |
| 95. | University of Pennsylvania | Yes | No | No | NA | NA | Yes |
| 96. | University of Pittsburgh | Yes | No | No | NA | NA | Yes |
| 97. | University of Puerto Rico | Yes | No | No | NA | NA | Yes |
| 98. | University of Rochester | Yes | No | No | NA | NA | Yes |
| 99. | University of Saskatchewan | No | No | No | NA | NA | No |
| 100. | University of South Florida | Yes | No | No | NA | NA | Yes |
| 101. | University of Southern California | Yes | Yes | Yes | https://www.facebook.com/USCNeurologicalSurgery/ | https://twitter.com/NeurosurgeryUSC | Yes |
| 102. | University of Texas Health Science Center San Antonio | Yes | Yes | Yes | https://www.facebook.com/UTHSCSANeurosurgery/ | https://twitter.com/uthscsaneuro | Yes |
| 103. | University of Texas Southwestern | Yes | No | No | NA | NA | Yes |
| 104. | University of Texas, Galveston‡ | Yes | No | No | NA | NA | Yes |
| 105. | University of Texas, Houston | Yes | No | No | NA | NA | Yes |
| 106. | University of Toronto | Yes | Yes | Yes | https://www.facebook.com/UOfTNeurosurgery/ | https://twitter.com/UofTNeuroSurge | Yes |
| 107. | University of Utah | Yes | No | No | NA | NA | Yes |
| 108. | University of Vermont | Yes | No | No | NA | NA | Yes |
| 109. | University of Virginia | Yes | No | No | NA | NA | Yes |
| 110. | University of Washington | Yes | Yes | Yes | https://www.facebook.com/uwmednsi | https://twitter.com/UWNeurosurgery | Yes |
| 111. | University of Wisconsin | Yes | No | No | NA | NA | Yes |
| 112. | Vanderbilt University | Yes | No | No | NA | NA | Yes |
| 113. | Virginia Commonwealth University | Yes | Yes | No | https://www.facebook.com/VCU-Neurosurgery-383577098370248/ | NA | Yes |
| 114. | Wake Forest University | Yes | No | No | NA | NA | Yes |
| 115. | Washington University | Yes | No | No | NA | NA | Yes |
| 116. | Wayne State University | Yes | No | No | NA | NA | Yes |

Continues

**Supplementary Table 1.** Continued

| No. | University | Bibliometric Profile* | Facebook Account | Twitter Account | Facebook Link | Twitter Link | Included in analysis? |
|---|---|---|---|---|---|---|---|
| 117. | West Virginia University | Yes | No | No | NA | NA | Yes |
| 118. | Western University | No | No | Yes | NA | https://twitter.com/westernu_nsx | No |
| 119. | Yale University | Yes | No | No | NA | NA | Yes |

NA, not available.
*Profile listed in Taylor et al.[6]/Lozano et al.[7] studies.

**Supplementary Table 2.** List of All 38 Screened Neurosurgical Journals for Academic And Social Media Metrics (Alphabetical Order)

| No. | Journal | H-Index* | SJR* | Facebook Account | Twitter Account | Facebook Link | Twitter Link | Included in analysis? |
|---|---|---|---|---|---|---|---|---|
| 1. | *ArgoSpine News and Journal* | 2 | 0.12 | No | No | NA | NA | Yes |
| 2. | *Asian Spine Journal* | 5 | 0.3 | No | No | NA | NA | Yes |
| 3. | *British Journal of Neurosurgery* | 47 | 0.48 | No | No | NA | NA | Yes |
| 4. | *Central European Neurosurgery* | 5 | 0.5 | No | No | NA | NA | Yes |
| 5. | *Chinese Journal of Contemporary Neurology and Neurosurgery* | 6 | 0.12 | No | No | NA | NA | Yes |
| 6. | *Clinical Neurology and Neurosurgery* | 49 | 0.46 | No | No | NA | NA | Yes |
| 7. | *Clinical Neurosurgery* | 21 | 0.35 | No | No | NA | NA | Yes |
| 8. | *Egyptian Journal of Neurology, Psychiatry and Neurosurgery* | 2 | 0.12 | No | No | NA | NA | Yes |
| 9. | *European Spine Journal* | 89 | 1.26 | Yes | Yes | https://www.facebook.com/European-Spine-Journal-Worldwide-Excellence-in-Evidence-480610772110129/ | https://twitter.com/EurSpineJournal | Yes |
| 10. | *International Journal of Spine Surgery* | 9 | 0.25 | No | No | NA | NA | Yes |
| 11. | *Japanese Journal of Neurosurgery* | 5 | 0.11 | No | No | NA | NA | Yes |
| 12. | *Joint Bone Spine* | 53 | 0.56 | No | No | NA | NA | Yes |
| 13. | *Journal of Craniovertebral Junction and Spine* | 7 | 0.23 | No | No | NA | NA | Yes |
| 14. | *Journal of Korean Neurosurgical Society* | 17 | 0.38 | No | No | NA | NA | Yes |
| 15. | *Journal of Neurological Surgery, Part A: Central European Neurosurgery* | 5 | 0.34 | No | No | NA | NA | Yes |
| 16. | *Journal of Neurology, Neurosurgery and Psychiatry* | 152 | 2.42 | Yes | Yes | https://www.facebook.com/JNNP.BMJ/ | https://twitter.com/JNNP_BMJ | Yes |
| 17. | *Journal of Neurosurgery* | 159 | 1.74 | Yes | Yes | https://www.facebook.com/Journal-of-Neurosurgery-Publishing-Group-149829721737847/timeline | https://twitter.com/thejns | Yes |
| 18. | *Journal of Neurosurgery: Pediatrics* | 30 | 0.65 | Yes | Yes | https://www.facebook.com/Journal-of-Neurosurgery-Publishing-Group-149829721737847/timeline | https://twitter.com/thejns | Yes |
| 19. | *Journal of Neurosurgery: Spine* | 54 | 1.44 | Yes | Yes | https://www.facebook.com/Journal-of-Neurosurgery-Publishing-Group-149829721737847/timeline | https://twitter.com/thejns | Yes |
| 20. | *Journal of Neurosurgical Anesthesiology* | 45 | 0.78 | Yes | Yes | https://www.facebook.com/Journal-of-Neurosurgical-Anesthesiology-168818886524765/ | https://twitter.com/JNeurosurgAnes | Yes |
| 21. | *Journal of Neurosurgical Sciences* | 27 | 0.39 | No | No | NA | NA | Yes |
| 22. | *Neurosurgery* | 152 | 1.37 | Yes | Yes | https://www.facebook.com/NeurosurgeryCNS/ | https://twitter.com/NeurosurgeryCNS | Yes |
| 23. | *Neurosurgery Clinics of North America* | 43 | 0.57 | No | No | NA | NA | Yes |

Continues

**Supplementary Table 2.** Continued

| No. | Journal | H-Index* | SJR* | Facebook Account | Twitter Account | Facebook Link | Twitter Link | Included in analysis? |
|---|---|---|---|---|---|---|---|---|
| 24. | *Neurosurgery Quarterly* | 14 | 0.11 | Yes | Yes | https://www.facebook.com/Neurosurgery-Quarterly-157970464299283/ | https://twitter.com/Nqonline | Yes |
| 25. | *Neurosurgical Focus* | 56 | 0.87 | Yes | Yes | https://www.facebook.com/Journal-of-Neurosurgery-Publishing-Group-149829721737847/timeline | https://twitter.com/thejns | Yes |
| 26. | *Neurosurgical Review* | 40 | 0.88 | No | No | NA | NA | Yes |
| 27. | *Open Neurosurgery Journal* | 2 | 0.11 | No | No | NA | NA | Yes |
| 28. | *Open Spine Journal* | 1 | 0.12 | No | No | NA | NA | Yes |
| 29. | *Pan Arab Journal of Neurosurgery* | 3 | 0.11 | No | No | NA | NA | Yes |
| 30. | *Pediatric Neurosurgery* | 59 | 0.26 | No | No | NA | NA | Yes |
| 31. | *Seminars in Spine Surgery* | 10 | 0.14 | No | No | NA | NA | Yes |
| 32. | *Spine* | 183 | 1.59 | Yes | Yes | https://www.facebook.com/Spine-An-International-Peer-Reviewed-Periodical-110235899067897/ | https://twitter.com/SpineWebJournal | Yes |
| 33. | *Spine Deformity* | 3 | 0.38 | No | No | NA | NA | Yes |
| 34. | *Spine Journal* | 68 | 1.17 | No | No | NA | NA | Yes |
| 35. | *Stereotactic and Functional Neurosurgery* | 49 | 0.79 | No | No | NA | NA | Yes |
| 36. | *Surgical Neurology International* | 9 | 0.47 | Yes | Yes | https://www.facebook.com/snint/?fref=ts | https://twitter.com/SNInt | Yes |
| 37. | *Turkish Neurosurgery* | 13 | 0.31 | No | No | NA | NA | Yes |
| 38. | *World Neurosurgery* | 68 | 0.63 | No | No | NA | NA | Yes |

NA, Not available; SJR, SCImago Journal Rank.
*H-Index and SJR: both compiled from the most recent results in SCImago Journal and Country Rank portal website.