



## AOA Critical Issues in Education

# The Effect of the COVID-19 Pandemic on Orthopaedic Residency Program Social Media Utilization

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**Introduction:** The COVID-19 pandemic created an unprecedented challenge for orthopaedic surgery residency applicants when away rotations were canceled and interviews were held virtually. The authors hypothesized that (1) Instagram would have more total social media accounts compared with Twitter or Facebook, (2) most social media accounts on all platforms would be created during 2020, and (3) the average number of Instagram followers would be higher among highly ranked programs.

**Methods:** A list of Accreditation Council for Graduate Medical Education-accredited orthopaedic surgery residency programs ( $n = 202$ ) that were ranked by reputation was acquired from Doximity. Public Instagram, Facebook, and Twitter profiles of orthopaedic surgery residency programs were identified through a manual search. Variables assessed on each social media platform were all available summary statistics provided by the social media platform. Instagram accounts were categorized into 5 tiers based on numeric reputation ranking, with 40 programs in each tier (except tier 5 with 42 programs). Descriptive statistics were calculated, and continuous data were presented as mean  $\pm$  standard deviation. Goodness-of-fit regression values were calculated for observed trends.

**Results:** One-hundred seventy-four social media accounts were identified. There was a higher percentage of Instagram accounts (66.1%) compared with Facebook (13.2%) or Twitter (20.7%). From 2010 to 2020, an exponential increase ( $R^2 = 0.88$ ) of social media accounts was observed during 2020. Instagram profiles (77.2%, 98/115 [95 in 2020, 3 in 2021]) were created after the cancellation of away rotations in May 2020. Instagram profiles had  $1,029 \pm 522.4$  average followers, more than Facebook and Twitter. Tier 1 residency programs had the largest average follower count with  $1,462.4 \pm 584.3$  followers.

**Conclusion:** Social media presence increased exponentially during 2020. Instagram was the social media platform with the most accounts. Many Instagram accounts were created during 2020, and most were created after away rotations were canceled during the COVID-19 pandemic. Instagram accounts averaged the most followers. Top tier orthopaedic residency programs had a greater number of accounts and average followers than lower tier programs.

Data Availability: All data collected were publicly available.

**Disclosure:** The **Disclosure of Potential Conflicts of Interest** forms are provided with the online version of the article (<http://links.lww.com/JBJSOA/A333>).

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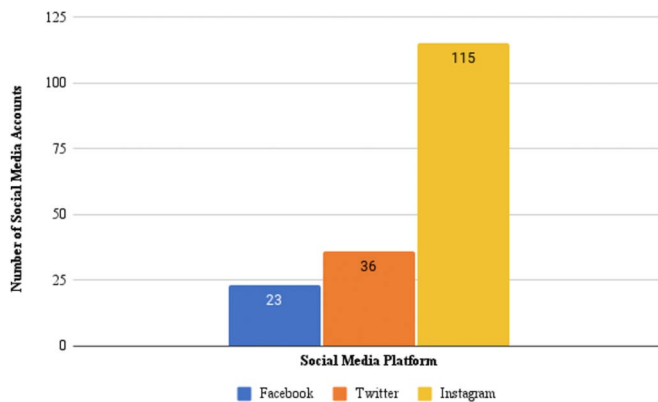


Fig. 1  
Social media accounts identified as representing orthopaedic surgery residency programs, stratified by social media platform.

## Introduction

Orthopaedic surgery residency positions remain competitive, and the application process has become impersonal because of programs being overwhelmed by the increasing number of applications received<sup>1</sup>. During a traditional application cycle, away rotations have been considered extremely important to successfully matching into orthopaedic surgery by providing prospective applicants a chance to form connections and showcase their strengths to a program<sup>2</sup>. In addition, away rotations allow residency programs to familiarize themselves with visiting students beyond what can be determined from a paper application alone<sup>1-4</sup>.

The COVID-19 pandemic created an unprecedented challenge for medical students preparing to apply for orthopaedic surgery residency programs. On May 11, 2020, the Association of American Medical Colleges (AAMC) issued recommendations that discouraged away rotations and supported virtual interviews<sup>5</sup>. Eventually, the announcement of virtual interviews and a Universal Interview Offer Day (UOD) were actions taken by the Council of Orthopaedic Residency Directors (CORD) to adapt to limitations set forth by the coronavirus-19 (COVID-19) pandemic<sup>6</sup>. The National Residency Matching Program provided survey data regarding the effect of COVID-19 on the 2021 Match from applicants and program directors. The depersonalization from loss of audition rotations and in-person interviews was a concern to applicants across all specialties, and nearly 60% of program directors reported a first-time reliance on social media as a strategy for engagement in 2021<sup>7</sup>. In addition, limited information is available on orthopaedic

surgery program webpages, and programs determine how they present their information<sup>8</sup>. The limited available information led to applicants and residency programs searching for alternative methods to acquire and disseminate information in the 2021 residency “Virtual Match.”

The primary purpose of this study was to investigate the presence and basic account information for orthopaedic surgery residency programs on Instagram, Twitter, and Facebook. A secondary purpose was to determine whether higher ranked orthopaedic surgery residency programs had a greater presence on social media. The authors hypothesized that (1) Instagram would have more total social media accounts compared with Twitter or Facebook, (2) most social media accounts on all platforms would be created during 2020, and (3) the average number of Instagram followers would be higher among highly ranked programs.

## Methods

This study was exempt from Institutional Review Board approval because all data collected were from publicly available social media accounts. To ensure comparability of account summary statistics; all data were extracted on April 24, 2021.

**Determination of Orthopaedic Surgery Residency Programs**  
A list of Accreditation Council for Graduate Medical Education (ACGME)-accredited residency programs (n = 202) from Doximity was obtained<sup>9</sup>. Doximity is a free medical social networking application providing a publicly available list of residency programs ranked numerically (1 through 202) based on reputation. The number of programs reported by Doximity is comparable with previous reports of a total of 210 programs (MD, n = 161; DO, n = 41; Military, n = 8) before the existence of ACGME as the lone accreditation body<sup>1,9-12</sup>.

## Search Strategy and Inclusion Criteria of Orthopaedic Surgery Residency Program Accounts

Searches were performed to identify Instagram, Twitter, and Facebook accounts associated with each of the 202 orthopaedic surgery residency programs ranked by Doximity. The search strategy was standardized and performed on a single search engine (Google). The primary search was “[Program name] orthopaedic residency [social media platform].” If the search did not return a social media account eligible for inclusion, “[Abbreviated program name] ortho res [social media platform]” was searched. If this search did not return a social media account eligible for inclusion, a search was performed for the residency program’s

TABLE 1 Social Media Account Summary Statistics Collected for Facebook, Twitter, and Instagram

	Facebook	Twitter	Instagram
Mean number of posts (±SD)	N/A	101.8 (±197.2)	54.8 (±68.6)
Mean number of followers (±SD)	126.9 (±151.7)	430.9 (±478.5)	1,029.3 (±522.4)
Mean number of accounts followed (±SD)	N/A	192.6 (±309.4)	291.9 (±291.2)

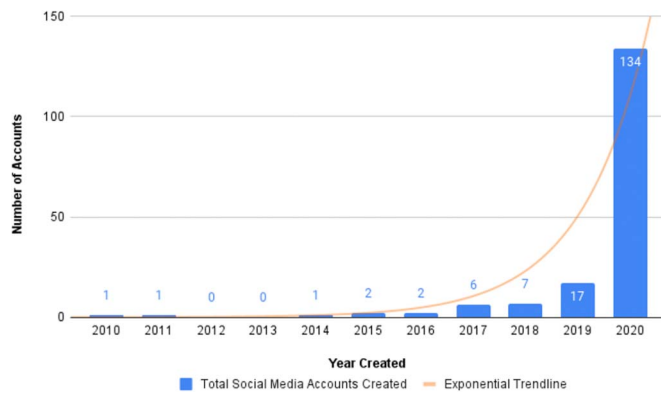


Fig. 2 The total number of Instagram, Facebook, and Twitter social media accounts identified as orthopaedic surgery residency programs from 2010 to 2020.

affiliated hospital: “[Affiliated hospital] orthopaedic residency [social media platform].” If no social media account eligible for inclusion was identified, “[Abbreviated affiliated hospital] ortho res [social media platform]” was searched as the final method to locate eligible orthopaedic surgery residency program social media accounts. In addition, programs identified during a search for a different program were eligible to be evaluated for inclusion.

Identified accounts were evaluated according to following the inclusion criteria. Any program containing “residency” in their profile name or description was included. If “residency” was not included as described, social media accounts were evaluated for the presence or absence of elements of residency recruitment, such as virtual open house, virtual away information, resident profile, informational post about residency program, post about participating in UOD, resident “hangouts” outside of the hospital, and information about newly matched applicants (year 2021). The presence of 2 or more of these elements qualified an account for inclusion. Finally, social media posts such stating “we are the orthopaedic residency program at...” or similar statements were included in the analysis.

Excluded profiles were those not meeting the previously described inclusion criteria (i.e., the department of orthopaedic surgery Instagram page).

**Account Summary Statistics**

Each included social media account was separately assessed for basic account information, including the presence of an orthopaedic residency program profile, total number of posts, total number of followers or likes, number of accounts followed, and date of creation. This information is publicly available on the account profile page.

Twitter and Facebook provide an account date of creation. However, Instagram does not provide a date of creation. Instagram profiles' date of creation was identified by evaluating the initial post, which was frequently an introductory post. Because this is a surrogate for the date of creation, each available Instagram account's date of creation was reviewed and agreed upon during the data collection process.

Facebook allows users to create a profile, page, or group<sup>13</sup>. All reported Facebook accounts in this study were a page. The

purpose of a page is to represent an organization to distribute information. Pages can be liked or followed, and these summary statistics are provided by Facebook along with the date a page was created. Pages do not follow accounts of their own. In addition, Facebook does not provide a total number of posts as a summary statistic for pages. The summary statistic extracted for comparison across social media platforms was the total number of followers, and total number of page likes was not included for comparison.

**Determination of Orthopaedic Surgery Residency Tier**

Orthopaedic surgery residencies were assigned tiers (n = 5) based on their Doximity reputation ranking (40 in tiers 1-4, 42 in tier 5).

**Statistical Analysis**

Descriptive statistics were performed in Microsoft Excel for each social media platform and for Instagram accounts (n = 15) stratified by tier. Given the low number of accounts, Facebook (n = 24) and Twitter (n = 36) were not analyzed by tier. R<sup>2</sup> goodness-of-fit values were calculated to provide objective measures of observed trends.

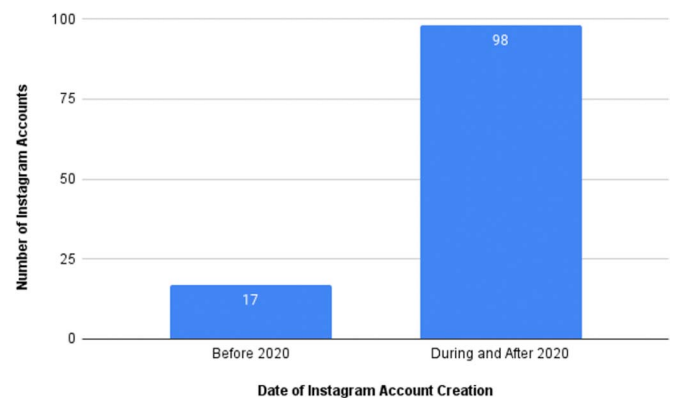


Fig. 3-A

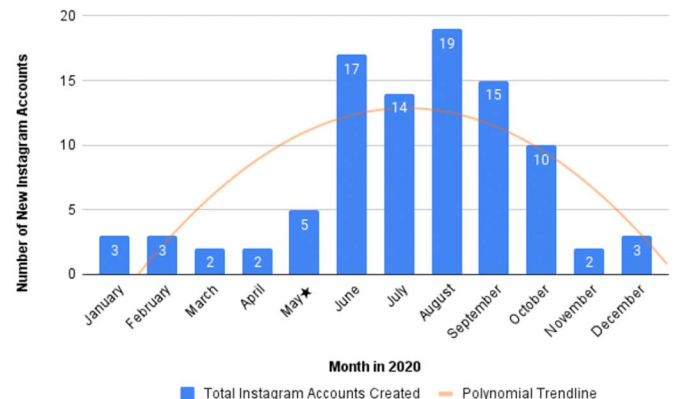


Fig. 3-B

**Fig. 3-A** Comparison of creation date for orthopaedic surgery residency Instagram accounts relative to the year 2020. **Fig. 3-B** The number of new orthopaedic surgery residency program Instagram accounts created in 2020 by month. The asterisk represents when away rotations were cancelled on May 11, 2020<sup>5</sup>.

**TABLE II Instagram Account Followers Categorized by Tier**

Statistic Regarding Number of Followers	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Mean	1,462.4	932.5	869.9	734.7	619.2
Median	1,333.0	1,031.5	1,023.0	780.0	651.0
SD	584.3	412.7	290.9	276.0	345.4
Skew	3.5	-0.4	-1.4	-1.4	-0.2

**Results**

*All Social Media Platforms*

One-hundred seventy-four social media accounts on Instagram, Twitter, or Facebook were identified as belonging to orthopaedic surgery residency programs. There was a higher percentage of Instagram accounts (66.1%) compared with Facebook (13.2%) or Twitter (20.7%) (Fig. 1). Instagram had more average followers and followed more accounts than Facebook or Twitter, whereas more average posts were made on Twitter (Table I). All summary statistics had a non-normal distribution.

From 2010 to 2020, an exponential increase ( $R^2 = 0.88$ ) in social media accounts was observed, with many new accounts (134/171, 79.3%) identified during the year 2020 (Fig. 2). Three Instagram accounts were created in 2021.

*Instagram*

Overall, 56.9% (115/202) of all residency programs had Instagram profiles dedicated to their orthopaedic surgery residency program. Most Instagram accounts were created in 2020 or later (98) compared with only 17 existing before the year 2020 (Fig. 3-A). After the cancellation of away rotations in May 2020, 85.2% (98/115, 95 in 2020 and 3 in 2021) of the Instagram accounts were created. The distribution of new accounts created by month in 2020 centered around the months immediately after the AAMC recommendations regarding away rotation ( $R^2 = 0.53$ ) (Fig. 3B).

Tier 1 programs (ranked 1-40) had the largest number of programs (34/40, 85%) identified as having Instagram accounts (Table II). There was a negatively linear relationship ( $R^2 = 0.96$ ) between increasing tier and number of programs identified (Fig. 4-A). In addition, this study determined that tier 1 programs had the largest average number of followers (1,462.4 ± 584.3), with a negatively linear ( $R^2 = 0.84$ ) relationship for subsequent tiers (Fig. 4-B). The distribution of average followers was non-normal.

The average number of accounts followed by each program’s Instagram separated by tier was tier 1 (333.5 ± 269.3), tier 2 (212.8 ± 177), tier 3 (370.8 ± 329.4), tier 4 (131.4 ± 92.4), and tier 5 (424.5 ± 540.4).

*Twitter*

A total of 17.8% (36/202) programs had Twitter profiles dedicated to their residency.

*Facebook*

A total of 11.4% (23/202) programs had Facebook profiles dedicated to their residency.

**Discussion**

The most important finding of this investigation is that 77% (134/174) of orthopaedic surgery residency social media accounts were created in the year 2020, which was shown to be an exponential increase. Although correlation does not equal causation, many (98) Instagram accounts have been created since the cancellation of away rotations (May 11, 2020) compared with all existing Instagram accounts (17) prior. Linear relationships were identified for Instagram accounts categorized by tier for the number of identified accounts and average follower account.

This study supports the authors’ hypotheses by (1) demonstrating Instagram (n = 115) as the most identified platform

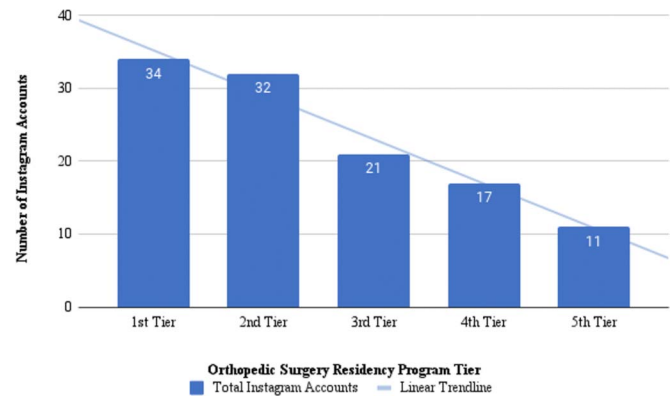


Fig. 4-A

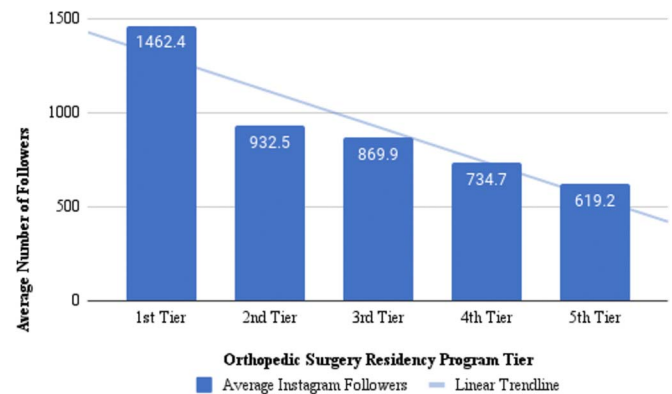


Fig. 4-B

**Fig. 4-A** The total number of Instagram accounts of orthopaedic surgery residency programs, categorized by Doximity tier. **Fig. 4-B** The average number of Instagram followers of orthopaedic surgery residency program accounts, categorized by Doximity Tier.

compared with Twitter (n = 36) and Facebook (n = 23), (2) demonstrating that orthopaedic surgery residency programs increased their presence on social media during the year 2020, and (3) the number of followers demonstrated a linear relationship with the tier of an orthopaedic surgery residency program.

Yong et al.<sup>14</sup> described a survey to orthopaedic surgery residency applicants from the 2018 and 2019 Match with 259 respondents. Of 14 items categorized as resources to orthopaedic surgery residency applicants, Instagram accounts were ranked last in frequency of use by applicants. An additional survey to 2021 Match applicants determined residency program social media accounts assisted applicant understanding of where to apply and knowledge of a specific orthopaedic residency program<sup>15</sup>. The increase in social media accounts identified by this study occurred during the same period.

Precautions in response to the COVID-19 pandemic have markedly affected the orthopaedic residency application process with unprecedented restrictions on in-person away rotations and interviews. Orthopaedic residency programs have adapted with novel methods of residency recruitment as evidenced by the substantial increase in social media presence of residencies identified in this study. Dermatology and otolaryngology also experienced an increase in identified social media accounts during the same period<sup>16,17</sup>. Interestingly, these specialties, like orthopaedic surgery, are historically competitive and medical students also complete away rotations<sup>18-20</sup>. In addition, there has been a positive response to the introduction of virtual away rotations, open houses, question and answer sessions, and tours in various programs in other specialties<sup>21,22</sup>. Owing to the ongoing nature of the COVID-19 pandemic, there will likely be a continued usage of social media and virtual opportunities as applicants value the insight into program culture once obtained from in-person experiences<sup>22,23</sup>. Despite a recent announcement by COD<sup>24</sup> in support of in person interviews, the COVID-19 Delta variant has created an unknown for interviews during the upcoming application cycle. Social media has become an identifiable avenue of residency recruitment for orthopaedic surgery programs.

### Limitations

This observational study has several limitations. The use of a Google search strategy could lead to missed active orthopaedic surgery residency program accounts. The authors were unable to identify managers of the social media accounts to request a definitive date of creation. The authors were unable to account for institutional policies that may limit a program's use

of social media platforms. There is known increased utilization of social media each year before COVID-19, and this study lacks methodology to determine whether changes in social media utilization were because of normal year-to-year increase or by the COVID-19 pandemic<sup>25</sup>. The studies reviewed to ensure all programs were included in this study are from various time points, and programs gaining/losing accreditation may not be accounted for<sup>1,9-11</sup>. It was beyond the scope of this study to determine the influence of social media presence on applicant's perception of programs and whether programs with a strong social media presence increased their number of received applications. Finally, we did not assess the followers of these accounts to assess who is receiving the information programs put onto their social media accounts. Future investigation is needed on the benefits of social media account creation for applicants and on temporal analysis of account activity, such as frequency of posts and rate of increase in followers over time.

### Conclusion

The social media presence of orthopaedic surgery residency programs increased exponentially during the year 2020. Instagram was identified as the platform with the most accounts. Most Instagram accounts created in 2020 were created after an announcement that away rotations would not be a part of the 2020 to 2021 Match cycle because of the COVID-19 pandemic. Instagram accounts averaged more followers than Twitter or Facebook. Top tier residency programs, as determined by Doximity ratings, had a greater number of identified accounts and average followers than lower tier accounts. Social media has become an identifiable avenue of residency recruitment for orthopaedic surgery residency programs. ■

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