Original Article

Social Media in Hip Arthroscopy Is an Underused Resource That Enhances Physician Online Reputation

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Purpose: To analyze the impact of professional social media (SM) presence, activity level, and physician practice–specific variables on online ratings and rating frequency for hip arthroscopists across 3 leading physician review websites (PRWs). **Methods:** The Arthroscopy Association of North America and American Orthopaedic Society of Sports Medicine directories were queried to identify practicing hip arthroscopists. Physicians included were residency-trained surgeons practicing within the United States. Surgeon ratings, comments, and reviews were compiled from 3 PRWs (Google, Healthgrades, Vitals). Google searches assessed for professional Facebook, Twitter, and Instagram accounts and demographic information. Surgeons were considered active if they posted the month before data collection. Logistical regression and a univariate model analyzed effects of demographic factors and other variables on SM use and PRW statistics. **Results:** In total, 555 surgeons met inclusion criteria (93.2% male, 6.8% female); 41% had a professional SM account (27.4% Facebook, 24.3% Twitter, 12.1% Instagram). Few surgeons with SM actively posted (30.5% Facebook, 43.7% Twitter, 37.3% Instagram). Surgeons with any SM had significantly greater number of ratings on all review websites ($P < .001$). Linear regression revealed academic physicians had lower number of ratings ($P = .002$) and average ratings ($P < .001$). Instagram users had an average 12.4 more ratings. Surgeons more likely to use SM resided in greater population cities (990 vs 490 [per 1,000]) with higher surgeon density (3.3 vs 2.2). **Conclusions:** Most hip arthroscopists have no professional SM, and fewer frequently post content. SM presence significantly increases the number of ratings on PRWs but does not affect overall rating. Surgeons using SM practice in more populous cities with more competition. Academic surgeons had fewer ratings and lower average ratings. A professional Instagram account can increase the number of online ratings. **Clinical Relevance:** Understanding how SM presence affects an orthopaedic surgeon's practice may provide information on how surgeons best connect with patients.

As the world becomes more reliant on technology and data, patients are increasingly turning to the internet as their primary source of information when selecting a physician. Social media (SM) and physician review websites (PRWs) enable patients to educate themselves before making an appointment with a provider. In a 2020 survey, 71% of patients used online reviews as the first step in finding a doctor, and 43% of patients commented that they would go out of their insurance network for a doctor with more favorable reviews. The same survey reported that use of PRWs increased from 25% in 2013 to 90% in 2020.[1] Surprisingly, when choosing a doctor, patients reported that they hold user comments and ratings in greater

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regard than surgeon experience or specialization.[2] Physicians may be skeptical of the reliability and validity of PRWs; however, the substantial impact of these websites cannot be disputed. Therefore, it may benefit surgeons to seek opportunities to improve these online metrics and market themselves to prospective patients.

Physicians across various surgical specialties have published on the value that a SM profile can add to their practice, yet SM use by doctors as a marketing tool greatly lags behind that of the general population.[3-5] It has been shown that a professional SM account can increase the number of ratings and comments on PRWs for orthopaedic surgeons in other subspecialties.[6,7] SM provides a means to disseminate medical information and market oneself to potential patients through a personally tailored online image. Haeberle et al. reported on the conflicting SM patterns in hip arthroscopy, as patients primarily use Instagram to share their rehabilitation experiences and physicians use Twitter for educational discussions with other providers.[8,9] A study analyzing hip arthroscopy prevalence from 2004 to 2016 in the state of New York reported that the greatest incidence of hip arthroscopy was performed in the 30- to 39-year age group, whereas the largest growth of procedures was seen in the 10- to 19-year age group.[9] It is well-established that the younger populations is far more likely to use SM than their older counterparts.[10] Given these trends, SM may be a particularly powerful marketing tool for hip arthroscopists to connect with their younger patient population. Studies have shown the impact of SM on online ratings across other medical specialties; however, there is currently limited data to determine if SM usage by hip arthroscopy surgeons leads to improved reviews on PRWs.[3-6,11,12]

The purpose of the current study was to analyze the impact of professional SM presence, activity level, and physician practice—specific variables on online ratings and rating frequency for hip arthroscopists across 3 leading physician websites. Our secondary aim was to analyze variation in SM presence based on residency graduation year, city population, and surgeon density. The authors hypothesized that having an active SM presence would increase physician's overall rating and number of ratings across all PRWs. We additionally expected that more recent graduates in larger cities with a higher density of surgeons would be more likely to have a professional SM account.

Methods

Study Population

Methodology for this study was adapted from Damodar et al.[6] The AOSSM and AANA public member directory was queried on March 1, 2021, using the member directory specifying hip within the dropdown menus on both sites to identify all members. Inclusion criteria for this study were residency-trained AOSSM and/or AANA members who actively perform hip arthroscopies within the United States. To identify members who perform hip arthroscopy, a manual search on either institutional or personal physician websites was conducted (A.H.) to determine presence of verbiage specifically mentioning the surgeon performing hip arthroscopy as part of their practice. If a physician had a profile on both AOSSM and AANA, they were only counted once within the data set. Exclusion criteria included members no longer in practice, individuals practicing outside of the United States, those who did not have a Doctor of Medicine (M.D.) or Doctor of Osteopathic Medicine (D.O.) degree, and current residents or fellows. Surgeon density was calculated by the number of hip arthroscopists from the AANA/AOSSM database practicing in the same city, and population data were collected from the United States Census Bureau.[13]

Physician Review Website Data

Three highly reputable PRWs were analyzed: Google reviews, Healthgrades, and Vitals. These sites are recommended by the reputation industry at 100%, 88%, and 94% respectively.[14] Google searches were used to confirm information on surgeon training (M.D. vs D.O.), practice city, and institution type (academic vs private). Healthgrades was accessed to obtain age, residency graduation year, presence of a "personalized bibliography" (i.e., a Healthgrades-specific section where physicians have the option to describe their background and training), a "care philosophy" (i.e., a Healthgrades-specific 1000-character section where physicians have the option to describe their approach to treating and caring for patients), number of ratings, and overall rating (out of 5). From Vitals, we recorded: years of experience, Castle Connolly award status (i.e., an award given to "top doctors" as nominated by their peers and confirmed by a physician-led research team), overall rating (out of 5), number of ratings, and number of comments. From Google reviews, we recorded: overall rating (out of 5), number of ratings, and number of comments. If residency graduation year was not accessible on Healthgrades, the PRW Doximity was queried.

Characterization of SM Use

Each surgeon was searched on Google.com using a predetermined search string ("First name" "Last name" "MD or DO") and the first 10 search results were reviewed to determine whether the surgeon had a website, defined as institutional (profile within a private practice or larger academic institutional website) or personal (website solely devoted to the specific surgeon.) Then, to evaluate the presence of a professional

SM account, the authors added the name of 1 of 3 SM platforms to the initial search string ("Facebook," "Twitter," or "Instagram"). We reviewed the first 10 results on Google.com for the presence of a professional SM account, defined as an account on any platform that was not clearly associated with a larger private practice or academic institution. Of note, private or personal SM accounts were excluded in this analysis as they would not be accessible to patients and are not used for professional purposes. Any SM accounts that did not specifically link the doctor to being an orthopaedic surgeon or that were not clearly intended to be used as a marketing tool to patients were excluded as well. Having a SM presence was defined as having a professional account on at least one SM platform. SM accounts were considered active if they posted content in the month before data collection (February 2021).

Statistical Methods

The χ^2 or Fisher exact test was used for analyses of categorical variables. Continuous variables were assessed with Mann–Whitney *U* tests, given the nonparametric nature of our data. Correlational analysis was performed with Pearson's correlations to assess number of ratings and average ratings across all sites. Logistical regression analysis was performed to analyze demographic factors that may predict SM use. A multivariable, univariate model was constructed to examine the effect of multiple independent variables on our primary outcome. The data are presented as absolute differences with 95% confidence intervals (CIs). For all analyses of average rating, surgeons with <5 ratings on each respective site were removed to exclude incomplete rating data. All statistical analysis was carried out on Statistical Package for the Social Science (SPSS), version 26 (IBM Corp., Armonk, NY). Statistical significance was defined at *P* value of <.05.

Results

Surgeon Demographics

The initial search of AANA and AOSSM databases yielded 1,387 surgeons. In total, 555 surgeons met inclusion criteria and were included in analysis, with a mean of 11.0 ± 7.4 (range, 11-36) years removed from residency. Most surgeons were male (93.2%), had an M.D. degree (93.7%), were located in the Northeast (31.5%), and worked in private practice (72.2%). On average, surgeons resided in cities with a mean of 2.7 ± 3.2 (range, 1-18) other hip arthroscopists and mean city population of 7.0 ± 17.7 (range, 0.01-100.8) per 100,000 people.

SM Use

Slightly less than one-half of the surgeons included in the analysis had any form of SM presence (230 surgeons, 41.4%), with Facebook and Twitter being more popular (27.7% and 24.3%, respectively) than Instagram (12.1%). However, only a minority of those with SM actively posted on these platforms: 30.5%, 43.7%, 37.3% of surgeons posted in the month of February 2021 on Facebook, Twitter and Instagram, respectively.

Demographics subdivided by SM use are provided in Table 1. Only surgeon density (3.3 vs 2.2, $P = .045$), city population (9.9 vs 4.9, $P = .044$), and years in practice (11.9 vs 10.4, $P = .002$) were found to be significantly greater for those with SM accounts. Academic surgeons constituted significantly more of the Twitter users (31.2% vs 21.8%, $P = .021$), and M.D. degree holders constituted significantly more of the Instagram users (12.9% vs 0%, $P = .015$). On logistical regression analysis, years in practice (odds ratio 1.027 95% CI 1.003-1.051; $P = .028$) and surgeon density (odds ratio 1.116, 95% CI 1.050-1.185; $P < .001$) were found to be statistically significant. The percentage of surgeons with at least 1 professional SM account across each state is presented in Fig 1.

Analysis showed that 314 (38.9%) surgeons in their first 10 years of practice used SM, whereas 172 (45.4%), 47 (42.6%), and 17 (47.6%) surgeons in 11-20 years, 21-30 years, and 31-40 years in practice used SM, respectively (Fig 2). There was no statistically significant difference on SM use between these groups.

Physician Ratings

A total of 403 (72.6%), 458 (82.5%), and 420 (75.7%) surgeons had ratings on Google, Healthgrades, and Vitals, respectively. The average number of ratings on Google was 24.8 ± 38.8 (range, 0-408), with an average score of 4.6 ± 0.4 (range, 2.0-5.0) and average number of comments of 16.5 ± 27.2 (range, 0-387). The average number of ratings on Healthgrades was 33.1 ± 45.9 (range, 0-503), with an average score of 4.4 ± 0.5 (range, 2.5-5.0) and average number of comments of 11.9 ± 18.0 (range, 0-157). The average number of ratings on Vitals was 27.4 ± 32.9 (range, 0-276), with an average score of 4.3 ± 0.5 (range, 2.6-5.0) and an average number of comments of 11.9 ± 18.0 (range, 0-157). A total of 70 (12.6%) surgeons were Castle Connolly award recipients.

PRW data broken up by SM presence, including each individual platform, are given in Table 2. Those with SM had significantly greater number of ratings and comments on all 3 sites. However, on multivariate linear regression analysis, the number of ratings was not impacted by SM use (Table 3). Those who worked in private practice had a significantly greater number of ratings, with a mean increase of 38.7 ratings. Similarly, average rating on each site was not impacted by SM use (Table 3). Surgeon density, practice setting, and years in practice were found to be statistically significant contributors but were not consistent across all 3 sites (Table 3).

Table 1. Surgeon Demographics Stratified by Social Media Usage

	Social Media*			Facebook*			Twitter*			Instagram*		
	No (%)	Yes (%)	*P* Value	No	Yes	*P* Value	No	Yes	*P* Value	No	Yes	*P* Value e
Sex			.913			.838			.280			.606
Male	303 (58.6)	214 (41.4)		373 (72.1)	144 (27.9)		394 (76.2)	123 (23.8)		453 (87.6)	64 (12.4)	
Female	22 (57.9)	16 (42.1)		28 (73.7)	10 (26.3)		26 (68.4)	12 (31.6)		35 (92.1)	3 (7.9)	
Practice			.403			.454			**.021**			.203
Academic	86 (55.8)	68 (44.2)		115 (74.7)	39 (25.3)		106 (68.8)	48 (31.2)		131 (85.1)	23 (14.9)	
Private	239 (59.8)	161 (40.3)		286 (71.5)	114 (28.5)		313 (78.3)	87 (21.8)		356 (89.0)	44 911.00	
No. of surgeons in same city	2.2 ± 2.1	3.3 ± 4.3	**.045**	2.6 ± 3.1	2.9 ± 3.5	.478	2.4 ± 2.7	3.5 ± 4.5	.169	2.4 ± 2.6	4.8 ± 5.6	**<.001**
City population (per 100k)	4.9 ± 13.8	9.9 ± 21.8	**044**	6.6 ± 17.3	8.0 ± 18.7	.644	5.9 ± 15.9	10.4 ± 22.2	.065	5.4 ± 14.7	18.4 ± 29.8	**<.001**
Membership			.390			.228			.580			.372
AANA	17 (48.6)	18 (51.4)		21 (60.0)	14 (40.0)		26 (74.3)	9 (25.7)		33 (94.3)	2 (5.7)	
AOSSM	263 (59.8)	177 (40.2)		323 (73.4)	117 (26.6)		337 (76.6)	103 (23.4)		387 (88.0)	53 (12.0)	
Both	45 (56.3)	35 (43.8)		57 (71.3)	23 (28.7)		57 (71.3)	23 (28.7)		68 (85.0)	12 (15.0)	
Years in practice	10.4 ± 7.4	11.9 ± 7.3	**.002**	10.6 ± 7.4	12.2 ± 7.1	**.003**	10.5 ± 7.3	12.7 ± 7.4	**<.001**	11.2 ± 7.4	9.9 ± 7.4	.080
Degree			.110			.148			.538			**.015**
M.D.	300 (57.7)	220 (42.3)		372 (71.5)	148 (28.5)		392 (75.4)	128 (24.6)		453 (87.1)	67 (12.9)	
D.O.	25 (71.4)	10 (28.6)		29 (82.9)	6 (17.1)		28 (80.0)	7 (20.0)		35 (100)	0 (0)	
Region			.818			.173			.167			.305
NE	101 (57.7)	74 (42.3)		125 (71.4)	50 (28.6)		137 (78.3)	38 (21.7)		149 (85.1)	26 (14.9)	
SE	51 (58.0)	37 (42.0)		66 (75.0)	22 (25.0)		62 (70.5)	26 (29.5)		79 (89.8)	9 (10.2)	
MW	74 (63.2)	43 (36.8)		93 (79.5)	24 (20.5)		82 (70.1)	35 (29.9)		107 (91.5)	10 (8.5)	
W	51 (58.0)	37 (42.0)		57 (64.8)	31 (35.2)		73 (83.0)	15 (17.0)		74 (84.1)	14 (15.9)	
SW	48 (55.2)	39 (44.8)		60 (69.0)	27 (31.0)		66 (75.9)	21 (24.1)		79 (90.8)	8 (9.2)	

NOTE. Values in bold indicate statistical significance.

D.O., Doctor of Osteopathic medicine; M.D., Medical Doctorate; M.W., Midwest; N.E., Northeast; SE, Southeast; SW, Southwest; W, West.

*Continuous data are provided as mean ± standard deviation, and categorical data are provided as a number (percentage).

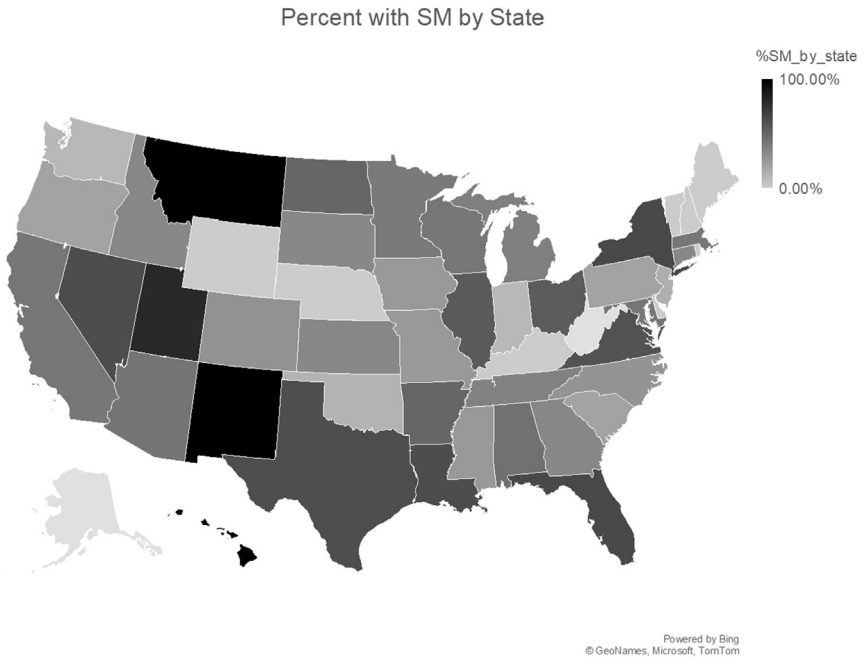

Fig 1. The percentage of hip arthroscopy surgeons in each state with any form of SM use varies greatly nationally. (SM, social media.)

Active SM accounts made up 40.2% of all accounts. There were no differences in demographics between those who were active posters and those who were inactive, with respect to sex (active: 93% male, inactive: 94% male, $P = .832$), practice type (active: 72% private, inactive: 67% private, $P = .429$), or years in practice (active: 11.8 years, inactive: 12.1 years, $P = .914$). Univariate regression analysis of SM activity effects of ratings and comments showed no difference between groups with respect to the number of ratings, overall rating, or number of comments across all sites. For Google, number of ratings were 26.5 ± 33.5 for inactive users versus 38.0 ± 49.4 for active ($P = .101$), overall rating was 4.6 ± 0.4 for inactive and 4.7 ± 0.3 for active ($P = .094$), and the mean number of comments was 17.8 ± 20.2 for inactive and 25.4 ± 29.0 for active ($P = .067$). For Healthgrades, number of ratings were 40.8 ± 45.0 for inactive users versus 48.0 ± 68.0 for active ($P = .863$), overall rating was 4.4 ± 0.5 for inactive and 4.4 ± 0.5 for active ($P = .825$), and the mean number of comments was 25.5 ± 33.9 for inactive and 28.3 ± 43.8 for active ($P = .819$). For Vitals, number of ratings were 33.9 ± 32.3 for inactive users versus 34.3 ± 42.7 for active ($P = .245$), overall rating was 4.4 ± 0.5 for inactive and 4.4 ± 0.4 for active ($P = .633$), and the mean number of comments was 15.8 ± 21.5 for inactive and 15.5 ± 22.2 for active ($P = .398$). The total average rating was 4.5 ± 0.4 for inactive users and 4.5 ± 0.3 for active users ($P = .348$), whereas the total number of ratings was 85.9 ± 86.4 for inactive users and 104.5 ± 131.6 for active users ($P = .593$).

Correlational analysis showed negligible to moderate positive correlation between the 3 PRWs and number of ratings as well as average ratings. The correlations are as follows for number of ratings: Google versus Healthgrades, $R = 0.501$ $P < .001$; Google versus Vitals, $R = 0.289$ $P < .001$; and Vitals versus Healthgrades, $R = 0.593$, $P < .001$. The correlations are as follows for average rating: Google versus Healthgrades, $R = 0.424$ $P < .001$; Google versus Vitals, $R = 0.171$ $P = .008$; and Vitals versus Healthgrades, $R = 0.362$, $P < .001$. No correlations were found between the number of ratings and the average rating on each site individually or across multiple sites.

Discussion

The major findings of this study are that a minority (41%) of hip arthroscopists have a professional SM

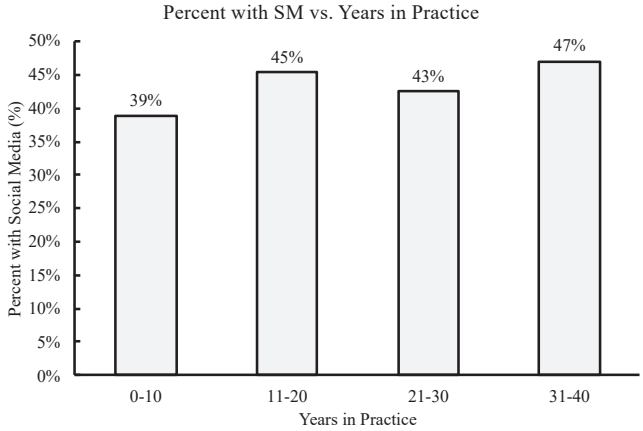

Fig 2. There are no statistically significant differences in SM use between hip arthroscopists when stratified into subsets based on years in practice. (SM, social media.)

Table 2. Surgeon Ratings and Online Review Site Metrics Based on Social Media, Surgeon Density, and City of Practice Population

	Social Media*			Facebook*			Twitter*			Instagram*		
	No	Yes	*P* Value	No	Yes	*P* Value	No	Yes	*P* Value	No	Yes	*P* Value
Google	214 (65.8)	189 (82.2)	**<.001**	269 (67.1)	134 (87.0)	**<.001**	296 (70.5)	107 (79.3)	**.047**	350 (71.7)	53 (79.1)	.204
No. of ratings	19.1 ± 35.8	31.2 ± 41.1	**<.001**	22.1 ± 38.0	30.2 ± 39.9	**.002**	21.5 ± 34.7	33.9 ± 47.5	**.01**	22.9 ± 38.6	37.2 ± 38.1	**<.001**
Rating	4.6 ± 0.5	4.7 ± 0.4	.524	4.6 ± 0.5	4.7 ± 0.4	.668	4.6 ± 0.5	4.7 ± 0.4	.956	4.6 ± 0.5	4.8 ± 0.3	.148
No. of comments	12.6 ± 29.0	20.9 ± 24.4	**<.001**	14.6 ± 28.8	20.3 ± 23.4	**<.001**	14.2 ± 26.5	22.9 ± 28.2	**.003**	15.1 ± 27.6	25.5 ± 23.2	**<.001**
Healthgrades	252 (77.5)	206 (89.6)	**<.001**	314 (78.3)	144 (93.5)	**<.001**	339 (80.7)	119 (88.1)	**.048**	402 (82.4)	56 (83.6)	.808
No. of ratings	24.5 ± 34.3	43.7 ± 55.3	**<.001**	27.7 ± 37.9	44.9 ± 58.2	**<.001**	28.5 ± 37.2	46.1 ± 63.0	**<.001**	33.1 ± 47.2	32.9 ± 35.2	.558
Rating	4.4 ± 0.6	4.4 ± 0.5	.697	4.4 ± 0.6	4.4 ± 0.5	**.016**	4.4 ± 0.6	4.4 ± 0.5	.886	4.4 ± 0.5	4.5 ± 0.6	.349
No. of comments	13.2 ± 20.2	26.6 ± 38.1	**<.001**	15.8 ± 23.9	26.8 ± 40.0	**<.001**	16.8 ± 25.6	26.1 ± 40.1	**.007**	19.0 ± 30.9	20.6 ± 25.6	.478
Personalized biography	93 (30.0)	104 (45.8)	**<.001**	123 (32.0)	74 (48.4)	**<.001**	136 (33.6)	61 (46.2)	**.009**	167 (35.4)	30 (46.2)	.091
Care philosophy listed	87 (28.2)	95 (41.9)	**.001**	115 (30.1)	67 (43.8)	**.003**	126 (31.2)	56 (42.7)	**.015**	159 (33.8)	23 (35.4)	.804
Vitals	228 (70.2)	192 (83.8)	**<.001**	286 (71.5)	134 (87.0)	**<.001**	308 (73.3)	112 (83.6)	**.016**	370 (75.8)	50 (75.8)	.991
No. of ratings	21.8 ± 28.1	34.0 ± 36.8	**<.001**	24.3 ± 30.0	34.2 ± 37.6	**.016**	24.1 ± 29.0	36.5 ± 40.6	**.006**	27.8 ± 33.6	24.9 ± 27.6	.715
Rating	4.3 ± 0.5	4.4 ± 0.4	**.039**	4.3 ± 0.5	4.4 ± 0.5	**.021**	4.3 ± 0.5	4.4 ± 0.4	.610	4.3 ± 0.5	4.6 ± 0.4	**.003**
No. of comments	8.6 ± 13.2	15.7 ± 21.7	**<.001**	10.0 ± 15.0	15.9 ± 22.5	**.013**	10.3 ± 16.4	16.1 ± 21.2	**.010**	11.9 ± 18.2	11.4 ± 16.7	.663
Wait time, min	16.1 ± 8.3	16.9 ± 9.8	.684	15.8 ± 8.1	17.8 ± 10.5	.154	16.6 ± 9.2	16.4 ± 8.7	.945	16.8 ± 9.0	14.0 ± 8.9	**.016**
Castle Connolly Award	36 (11.1)	34 (14.8)	.200	45 (11.3)	25 (16.2)	.114	50 (11.9)	20 (14.8)	.381	62 (12.7)	8 (11.9)	.855
Total average rating	4.4 ± 0.5	4.5 ± 0.4	.349	4.4 ± 0.5	4.5 ± 0.3	.443	4.4 ± 0.5	4.5 ± 0.4	.665	4.4 ± 0.4	4.6 ± 0.3	**.003**
Total no. of ratings	47.0 ± 70.7	93.3 ± 106.9	**<.001**	54.0 ± 79.5	98.2 ± 107.8	**<.001**	56.1 ± 74.7	97.8 ± 122.4	**<.001**	64.9 ± 92.3	76.0 ± 75.0	**.046**

NOTE. Values in bold indicate statistical significance.

*Continuous data are provided as mean ± standard deviation, and categorical data are provided as a number (percentage).

presence and an even smaller percentage of surgeons with SM actively post content to their profile (40.2%). Surgeons with a SM profile had a significantly greater overall number of ratings (+53) and comments (+28) on the PRWs. Contrary to our hypothesis, a SM online presence did not significantly correlate with an increase in average rating pooled across all 3 PRWs, and activity level did not affect rating or number of comments/ratings either. Damodar et al.[6] and Donnally et al.[7] reported similar findings in analysis of SM impact on PRW metrics for adult reconstruction and spine surgeons. Given that the majority of hip arthroscopy surgeons have overwhelmingly positive ratings (4.4/5 without SM, 4.5/5 with SM) with minimal variability between surgeons (i.e. standard deviation of 0.3-0.5), it is plausible that patients use total number of ratings/reviews as a proxy for surgeon reliability and reputation when selecting a hip arthroscopist. A 2020 survey reported that 79% of consumers selected quantity of online reviews as “fairly important” or “very important” when choosing a local business. The majority (87%) of responders from this same survey consider online reviews important in medicine, which represented the greatest of all industries surveyed.[15] While those who use SM may also more frequently encourage patients to leave reviews on PRWs, the actual rating appears to be more representative of the patient experience and not a reflection on the provider having SM. Ultimately, the validity of PRWs and online reviews is inconsistent as there is no way to confirm whether the information posted by patients for accuracy. It has been established in the literature that there is inherent bias to the type of patient that leaves a review.[16-19] It is important for physicians to foster a positive experience for all patients but to remain cognizant of which patients may be inclined to leave a review, especially in the context of elective procedures in hip arthroscopy.

Instagram was the only SM platform that was found to correlate with increased overall number of ratings for hip arthroscopists across all 3 PRWs. Surgeons who used this platform were also younger than their counterparts without Instagram. Within our study, hip arthroscopists use Instagram at a far lower rate than Facebook and Twitter. As of February 2021 in the United States, Instagram was the third most globally used SM platform at 40% usage, behind only YouTube (81%) and Facebook (69%).[10] Unsurprisingly, younger respondents to the survey were much more likely to have an Instagram profile than their older counterparts. The results from our study further confirms the report by Haeberle et al.[8] that hip arthroscopists use Facebook and Twitter at greater rates, despite this particular patient population’s preference to post on Instagram about their rehabilitation experiences. The increased use of Instagram by hip arthroscopy patients is congruent with the overall trends in the age of these

Table 3. Univariate Linear Regression for Factors Influencing Number of Online Physician Reviews and Ratings on Google, Healthgrades, and Vitals

	No. of Ratings							
	G*		HG*		V*		Total*	
	AD (95% CI)	*P* Value	AD (95% CI)	*P* Value	AD (95% CI)	*P* Value	AD (95% CI)	*P* Value
Degree	—	.640	—	.714	—	.939	—	.821
Sex (male)	—	.427	—	.299	—	.070	—	.124
Population (per 100k)	—	.862	—	.586	—	673.000	—	.966
No. of surgeons in same city	—	.956	—	.262	—	.513	—	.432
Practice (academic)	−18.987 (−3.5 to −7.4)	**.001**	−15.2 (−27.7 to −2.7)	**.017**	−8.7 (−16.7 to −0.7)	**.032**	−38.7 (−62.8 to −14.6)	**.002**
Years in practice	—	.437	—	.152	1.3 (0.8-1.8)	**<.001**	1.8 (0.3-3.3)	**.023**
Membership	—	(.108-.738)	—	(.097-.997)	—	(.577-.911)	—	(.474- .177)
Website	Institutional −12.7 (−25.4 to −0.1)	(**.049**-.973)	—	(.584-.842)	—	(.364- .901)	—	(.278-.850)
Social media (no)	—	.333	—	.442	—	.340	—	.270
Facebook (no)	—	.163	—	.358	—	.397	—	.670
Twitter (no)	—	.337	—	.139	—	.206	—	.135
Instagram (no)	—	.634	—	.084	12.4 (1.1-23.8)	**.032**	—	.116
Castle Connolly (no)	—	.351	—	.176	—	.076	—	.072
Wait time (min)	—	.955	—	.510	—	.290	—	.466

	Average Rating							
	AD (95% CI)	*P* Value	AD (95% CI)	*P* Value	AD (95% CI)	*P* Value	AD (95% CI)	*P* Value
Degree	—	.973	—	.991	—	.994		.768
Sex (male)	—	.351	0.380 (0.112-0.647)	**.006**	—	.274	0.187 (0.003-0.371)	**.046**
Population (per 1000)	—	.419	—	.938	—	.350		.527
No. of surgeons in same city	0.03 (0.001-0.068)	**.046**	—	.712	—	.491		.370
Practice (academic)	−0.202 (−0.339 to −0.065)	**.004**	−0.226 (−0.361 to −0.092)	**.001**	—	.310	−0.184 (−0.278 to −0.089)	**<.001**
Years in practice	−0.10 (−0.018 to −0.001)	**.022**	−0.019 (−0.028 to −0.010)	**<.001**	—	.089	−0.012 (−0.018 to −0.006)	**<.001**
Membership	—	(.163-.309)	AOSSM −0.174 (−0.338 to −0.009)	(.039-.454)	—	(.469-.479)		(.177-.406)
Website	—	(.425-.759)	—	(.157-.712)	—	(.145-.894)		(.478-.573)
Social media (no)	—	.204	—	.550	—	.649		.727
Facebook (no)	—	131.000	—	.589	—	.578		.295
Twitter (no)	—	.341	—	.282	—	.948		.319
Instagram (no)	—	.568	—	.278	—	.293		.555
Castle Connolly (no)	—	.786	—	.962	—	.242		.442
Wait time (min)	—	.546	−0.019 (−0.028 to −0.010)	**.001**	−0.021 (−0.026 to −0.015)	**<.001**	−0.012 (−0.017 to −0.007)	**<.001**

NOTE. Values in bold indicate statistical significance.

AD, Absolute difference; AOSSM, American Orthopaedic Society for Sports Medicine; CI, Confidence interval; G, Google ratings; HG, HealthGrades ratings; V, Vitals ratings.

*Output provided is relative with the parenthetical reference for each category and is only provided if the independent variable made a significant contribution to the multivariate analysis.

patients that have been reported previously.[11] As the only SM platform to significantly improve overall number of ratings, an Instagram profile can make a tangible impact on a hip arthroscopy surgeon's practice by targeting a platform that their patient population uses most frequently.

There was a significant increase in Twitter usage by surgeons at academic practices compared to those in private practice (31.2% vs 21.8%, respectively.) Academic surgeons using Twitter represented the single greatest proportion of surgeons with 1 of the 3 major SM platforms in either an academic or private practice. Twitter remains a platform used to disseminate information and research between colleagues, as well as a way to increase physician engagement around the time of national conferences.[20,21] The results of this study indicate that SM platform choice by hip arthroscopists is discordant with trends in both the general population and, more importantly, patients undergoing hip arthroscopy.

Our analysis found that hip arthroscopists practicing in larger cities with a higher number of surgeons in the same city were more likely to use SM, more specifically Instagram. Hanzel et al.[22] investigated physician use of Twitter and found the greatest proportion of tweets were sent from major cities. It is possible that these physicians in more populous areas with greater surgeon density are more cognizant of the impact of online ratings and the advantages of self-marketing, leading them to actively seek out modifiable factors such as SM in hopes of attracting more patients. Linear regression modeling found that each additional year in practice led to a statistically significant increase of 1.8 total ratings and a decrease of 0.012 in overall rating, consistent with what has been reported previously, despite these small changes having minimal impact in practice.[6,12,23]

Univariate linear regression analysis revealed that an academic practice was significantly correlated with an average of 38 less ratings pooled across all 3 PRWs, with this trend holding true across each individual PRWs. Number of years in practice also was correlated with an increase in number of ratings and a decrease in average rating when pooled across all 3 PRWs; however, this was not consistent across each individual PRW. An increase in total number of ratings can be attributed to a widened patient base as a surgeon continues to grow their practice. An analysis of plastic surgeons by Economides et al.[3] showed that nonacademic surgeons were more likely to both have a SM account and believe that SM is positive for their field when compared to university-affiliated community surgeons and academic surgeons. Turnipseed[24] reported on the changes in referral patterns for vascular surgeons as SM and PRWs have grown in favor suggesting that SM allows physicians to bypass traditional referral patterns, providing them with a competitive advantage in the market. Private practice surgeons may be more likely to use accessory patient streams, as they cannot rely on the steady referral base that accompanies an academic hospital. They also do not need to abide by oftentimes strict SM guidelines that accompany academic institutions.

Limitations

One limitation of our project is the method by which we assessed for a professional SM account. Providers may have a SM account that was not listed in the first 10 results from the Google search string. There also remains a possibility that some hip arthroscopists use private SM accounts for professional purposes or have their accounts listed under different names. Our definition of active on SM as posting within the previous month may lead to an under-representation of physicians with an active SM presence. Social networking companies use monthly active users as the basis to determine various other metrics; however, each specific SM site does not use the same definition of active. We decided to standardize our definition of active to any posts in the last 30 days to enhance the reproducibility of our study and be congruent with general SM standards.[25] There is no way to differentiate if greater ratings on PRWs are truly caused by SM presence or more a byproduct of these technologically inclined physician's actively encouraging recent patients to use PRWs to give positive reviews. Finally, our analysis is limited by the data set we chose. By using both the searchable AANA and AOSSM databases, we attempted to achieve a dataset that represented the majority of practicing hip arthroscopists. We then secondarily confirmed that these physicians performed hip scopes. It is likely that there are physicians not in these societies that also perform arthroscopy, as well as those that do arthroscopy but either do not have it listed on their website or do not have a website.

Recent analysis by Donnally et al. and Damodar et al. have reported on the underuse of SM in other orthopaedic specialties, including spine surgery and adult reconstruction.[6,7,12] The present study aimed to investigate the impact of SM presence and activity level on PRW ratings and comments for hip arthroscopists, whose patient population is generally much younger than many other orthopaedic surgeons. Future investigation may attempt to assess the effect of different SM content delivery forms and their effect on PRW metrics. Other projects may focus on the correlation of SM use to a surgeon's overall clinical volume and academic productivity.

Conclusions

Most hip arthroscopists have no professional SM, and fewer frequently post content. SM presence significantly increases the number of ratings on PRWs but does not affect overall rating. Surgeons using SM

practice in more populous cities with more competition. Academic surgeons had fewer ratings and lower average ratings. A professional Instagram account can increase the number of online ratings.

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