The Impact of #365Papers: A Daily Scientific Twitter Campaign to Disseminate Exercise Oncology Literature

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Abstract

Purpose: Many health researchers and practitioners use Twitter to stimulate scientific dialogue and collaboration among peers, as well as the general public. In 2018, the Clinical Exercise Physiology Lab (CEPL) undertook a year-long scientific Twitter campaign (#365Papers) where one peer-reviewed publication related to cancer and exercise/physical activity was tweeted per day. Features of this campaign included Throwback Thursdays (selected article published before 2018) and guest tweeters (article chosen by other exercise oncology researchers). We report on the impact of the #365Papers campaign based on Twitter Analytics data (i.e., engagement rate). We also explore how engagement rate differed depending on publication features (e.g., type of research, journal impact factor, Altmetric Attention Score) and campaign features (i.e., Throwback Thursdays, guest tweeters). **Methods:** Campaign data were obtained from Twitter Analytics (Twitter, 2020: San Francisco, USA). Publication information (i.e., type of research, journal) was extracted by screening titles and abstracts, while each publication's Altmetric Attention Score was obtained using the Altmetric Bookmarklet (Digital Science, Holtzbrinck Publishing Group, 2020: Stuttgart, Germany). Twitter Analytics data were summarized using descriptive statistics. Differences in engagement rate were analyzed based on research type (e.g., randomized controlled trial), journal impact factor, Altmetric Attention Score, and if the publication was posted as part of a Throwback Thursday or by a guest tweeter. **Results:** The #365Papers Twitter campaign received a total of 688,117 impressions and 22,124 engagements, with a median engagement rate of 3.2% and the majority of engagement from URL clicks (n=8279; 37%). The mean monthly increase in CEPL Twitter account followers was 48 ($\pm$18). Engagement rate did not differ based on type of research (p=0.53), journal impact factor (r=-0.06; p=0.27), Altmetric Attention Score (r=0.01; p=0.80), nor if the tweet was part of a Throwback Thursday (p=0.97). However, guest tweets had significantly higher engagement rates versus non-guest tweets (median: 3.6% vs. 3.1%; p=0.01). **Conclusion:** Our findings suggest the potential of a daily scientific Twitter campaign to stimulate peer and public engagement and dialogue around new scientific publications, especially when prominent figures in the research field are incorporated into the campaign process.

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ABSTRACT

Purpose: Many health researchers and practitioners use Twitter to stimulate scientific dialogue and collaboration among peers as well as the general public. In 2018, the Clinical Exercise Physiology Lab (CEPL) undertook a year-long scientific Twitter campaign (#365Papers) where one peer-reviewed publication related to cancer and exercise/physical activity was tweeted per day. Features of this campaign included Throwback Thursdays (selected article published before 2018) and guest tweeters (article chosen by other exercise oncology researchers). We report on the impact of the #365Papers campaign based on Twitter Analytics data (i.e., engagement rate). We also explore how engagement rate differed depending on publication features (e.g., type of research, journal impact factor, Altmetric Attention Score) and campaign features (i.e., Throwback Thursdays, guest tweeters). **Methods:** Campaign data were obtained from Twitter Analytics (Twitter, 2020: San Francisco, USA). Publication information (i.e., type of research, journal) was extracted by screening titles and abstracts, while each publication's Altmetric Attention Score was obtained using the Altmetric Bookmarklet (Digital Science, Holtzbrinck Publishing Group, 2020: Stuttgart, Germany). Twitter Analytics data were summarized using descriptive statistics. Differences in engagement rate were analyzed based on research type (e.g., randomized controlled trial), journal impact factor, Altmetric Attention Score, and if the publication was posted as part of a Throwback Thursday or by a guest tweeter. **Results:** The #365Papers Twitter campaign received a total of 688,117 impressions and 22,124 engagements, with a median engagement rate of 3.2% and the majority of engagement from URL clicks (n=8279; 37%). The mean monthly increase in CEPL Twitter account followers was 48 (±18). Engagement rate did not differ based on type of research (p=0.53), journal impact factor (r=-0.06; p=0.27), Altmetric Attention Score (r=0.01; p=0.80), nor if the tweet was part of a Throwback Thursday (p=0.97). However, guest tweets had significantly higher engagement rates versus non-guest tweets (median: 3.6% vs. 3.1%; p=0.01). **Conclusion:** Our findings suggest the potential of a daily scientific Twitter campaign to stimulate peer and public engagement and dialogue around new scientific publications, especially when prominent figures in the research field are incorporated into the campaign process.

KEYWORDS: Twitter, exercise oncology, science communication, knowledge translation, social media

INTRODUCTION

Increasingly, many health practitioners and researchers are using social media to stimulate dialogue and collaboration with their peers, such as through online discussion forums, blogs, and social networking sites (e.g., Facebook, Twitter, LinkedIn).[1–4] Among health practitioners, social media has been used to facilitate communication across multiple disciplines (e.g., physicians, pharmacists, public health), namely through professional networking, education and training opportunities for students, and coordinating healthcare delivery/practice (e.g., sharing clinical guidelines, clinical consultation).[5] In tandem, health researchers have been reported to use social media to share and discuss research findings, discover collaboration and job opportunities, and keep up to date with current literature.[6] Of note, the increased use of social media among health researchers has given rise to alternative measures of research impact (i.e., Altmetric Attention Score), which captures the overall online attention a research article receives, in addition to traditional measures of research impact (e.g., h-index).[7,8] Each source of online attention (e.g., Twitter, news networks, blogs) is weighted differently, depending on its relative reach (e.g., news networks have a weighting of eight versus Twitter's weighting of one), and an automated algorithm generates a score for a given research publication based on the weightings of each source of online attention.[8] Social media platforms may also present a viable alternative to traditional in-person conferences, which is especially relevant given limitations posed during events such as the COVID-19 pandemic and calls to lower the carbon footprint associated with in-person conferences.[9–11]

From a knowledge generation and translation perspective, social media has been reported to be used to identify potential areas of health research (e.g., via monitoring discussions of a particular health-related subject or evaluating the prevalence of a disease/condition), recruit prospective participants, deliver an intervention, and disseminate research findings among key end users (e.g., clinicians, policy makers, patients).[12] For instance, Elliott et al. conducted a multiple case study of initiatives to engage stakeholders in pediatric health (e.g., clinicians, organizations, caregivers, parents) over social media.[13] Each initiative had a defined knowledge translation objective (e.g., engagement, dissemination), unique communication strategy (i.e., posting type, frequency), staffing/resource requirements, and method of evaluation (e.g., participant feedback).[13] However, given growing concerns about the spread of scientific misinformation among the general public, researchers and other stakeholders should develop practices and standards to balance patient and public engagement while ensuring clear, accurate, and accessible dissemination of health-related research on social media.[14,15]

One increasingly popular option to engage health practitioners, researchers, patients, and other stakeholders in health research is online journal clubs, particularly on Twitter.[16–18] Twitter is a microblogging platform where users can post short messages ("tweets") and then interact with them by "liking" or "retweeting." Posts are restricted to 280 characters, but photos (up to four), videos (up to one), and Graphics Interchange Formats (GIFs; up to one) can be added without counting against the character limit. Tweets about a similar topic can be grouped together using a hashtag and users can "follow" other users to see content they tweet, like, or retweet. The impact of a tweet is measured using Twitter Analytics, with key metrics including: (i) impressions (total number of times a tweet has been seen); (ii) engagement (total number of tweet interactions, including likes, retweets, and URL clicks); (iii) engagement rate (number of engagements divided by the number of impressions); and (iv) number of new followers (Table 1).[19,20] Registered users are individuals with a Twitter account, who can tweet and like/retweet tweets, whereas unregistered users do not have a Twitter account and can only read tweets/click on URL links and hashtags.[7] Twitter Analytics data provides an idea of the cumulative interest in a tweet from when the tweet was created up to the point when the Twitter Analytics data was pulled. For example, if a tweet was posted on January 1, 2018, and the Twitter Analytics data for that tweet extracted on January 1, 2021, the Twitter Analytics would measure the interest the tweet had received from when it was originally posted until January 1, 2021 (i.e., over a three-year period).

Although journal clubs have been a long-standing approach to discuss and critically appraise scientific literature, they were geographically constrained to educational and health institutions before the advent of social media and corresponding increase in online interaction.[16] Several key characteristics of online platforms (i.e., Twitter) have facilitated the transition from in-person to virtual journal clubs, such as usable conversational features (e.g., "likes", "retweeting"), ability to generate real-time dialogue, flexibility in geographical location and time zone, and ease of accessibility.[16] A review by Stoneman and Hiremath found, as of 2020, there were 27 active journal clubs on Twitter, which had a median longevity to-date of 5.7 years and were predominately from medical specialties (e.g., endocrinology, rheumatology).[17] Most journal clubs met once per month, although the frequency of meeting ranged from once per week to once every six months.[17] Specific to oncology, Loeb et al. facilitated a year-long Twitter-based journal club in 2017 where participants (e.g., researchers, clinicians, patients, caregivers) from 15 different counties convened once per month to discuss research related to prostate cancer, which was presented by the given study's authors.[21] The number of participants at each monthly journal club varied from 33 to 88, most of whom were clinicians, whereas the number of tweets generated per month ranged from 114 to 267.[21]

Another scientific communication initiative that has become popular on Twitter, particularly among researchers, is #365Papers, where the user will read and post about one scientific publication per day. This method can help researchers stay up to date with current literature by making reading a daily habit, while also increasing the diversity and breadth of research read. In 2018, we undertook our own #365Papers campaign, where we posted one publication related to exercise/physical activity and cancer per day to our research group's Twitter account (@CEPL_UBC). We also sought to incorporate several techniques used by Twitter journal clubs, such as incorporating content experts and/or authors and posting a short summary/questions about the article.[16,21] Through these campaign features, we aimed to disseminate and stimulate dialogue about exercise oncology literature to not only health researchers and practitioners, but also the general public.

To our knowledge, this campaign was the first to share research related to exercise oncology on Twitter and to do so on a daily basis. Here, we describe the campaign's impact using Twitter Analytic metrics and explore how impact differed given characteristics of the campaign (e.g., a tweet by a content expert) and publication (e.g., journal impact factor, Altmetric Attention Score). We also present recommendations for future use of social media for knowledge exchange and dissemination in health-related research.

Table 1. Definitions of common Twitter Analytics metrics.

Twitter Analytics Metric	User type	Definition
Impressions	Registered	Total number of times registered users have seen a tweet.
Engagement	Registered	Total number of times registered users have interacted with a tweet.
Retweets	Registered	When registered users repost/share a tweet with their followers; the tweet will then be saved on their account page and show up on their followers' feeds. Registered users can also "quote" a tweet, where they retweet a tweet and add their own comment alongside it.
Likes	Registered	A sign of enjoying or agreeing with a tweet; will allow registered users to bookmark a tweet as part of their "like" list. These tweets will not appear on a registered user's account page but will show up on their followers' feeds.
Replies	Registered	When registered users comment on a tweet.
URL clicks	Both unregistered and registered	When users and registered users click on the URL in a tweet to access the article
User profile clicks	Both unregistered and registered	When users and registered users click on the @CEPL_UBC twitter handle and go to the profile.
Detail expands	Both unregistered and registered	When users and registered users click on a tweet to view more details about it.
Hashtag clicks	Both unregistered and registered	When users and registered users click on #365Papers to view all the tweets associated with the campaign.
Media views	Both unregistered and registered	When users and registered users click on a picture or video posted in a tweet.
Engagement rate	Registered	(Total number of engagements / total number of impressions) x 100%; the percentage of registered users who choose to interact with a tweet after seeing it
New followers	Registered	Number of new registered users who subscribe to the @CEPL_UBC Twitter account

METHODS
#365Papers Twitter Campaign Development and Procedures
The Clinical Exercise Physiology Laboratory (CEPL) is a research group based in Vancouver, Canada, focusing on using exercise and physical activity to improve clinical and patient-reported outcomes among cancer survivors. The #365Papers campaign was directed by a core team of four individuals. Three were affiliated with the CEPL (two research trainees (LM, SW) and the Principal Investigator (KLC)) and one colleague (KL) was at another research institution (University of Victoria; Victoria, Canada).

Each team member was assigned a week for a given month, where, for each day of that week, they selected a publication and tweeted the link and a short summary and/or questions about the paper. In addition, each team member was responsible for managing and moderating the Twitter feed during the weeks to which they were assigned. The respective team member was also responsible for screening user comments/interaction, flagging any that were problematic and removing them, and resolving any conflict that arose.

All literature included in the campaign involved published peer-reviewed research (e.g., systematic review, randomized controlled trial (RCT), cross-sectional study) on exercise/physical activity related to cancer, along with other associated topics, such as physical activity behaviour change, health promotion theory, and general principles of physical rehabilitation, exercise physiology, and research design and methodology. All research was published in 2018 or prior. There were no other selection criteria for publications used in the campaign. To ensure no duplicate article was posted, the #365Papers team kept track of the following information in a shared document: (i) date; (ii) article title, author, and year; (iii) brief description of intervention/population/subject area; and (iv) team member who posted the article. However, if an article was a follow-up study to another article that had already been posted, the link to the original article was also provided in the tweet.

A key feature of the #365Papers campaign included "Throwback Thursdays," a common theme used on Twitter, where a publication published prior to the last 12 months was tweeted every Thursday. There was no other date range criterion set for the selection of papers. Further, eight weeks of the campaign incorporated a "guest tweeter," featuring another content expert (e.g., researcher, clinician) or trainee in the exercise oncology field. The guest tweeter selected and summarized publications for a given week and emailed this information to the #365Papers core team, who tweeted it to the CEPL Twitter account. The guest tweeter was then tagged in the subsequent tweet (Table 2).

Table 2. List of tweeters in the #365Papers campaign.

Name (Week featured)	Twitter Handle	Number of Twitter followers*	Affiliation
Guest Tweeters			
Kelcey Bland (March 5 – 11)	@kelceybland	1090	PhD Candidate Mary MacKillop Institute for Health Research, Australia
Jennifer Edgecombe (August 13 – 19)	@Jen_Edgecombe	358	Clinical Exercise Physiologist Kamloops, Canada
Dr. Amy Kirkham (May 14 – 20)	@amyakirkham	1275	Assistant Professor University of Toronto, Canada
Dr. Bolette Rafn (October 29 – November 4)	@BoletteRafn	120	Postdoctoral Fellow Rigshospitalet, Denmark
Normand Richard (December 17 – 23)	@Nrmnd_Rchrd	162	Clinical Exercise Physiologist Vancouver, Canada
Dr. Kathryn Schmitz (July 30 – August 5)	@fitaftercancer	2967	Professor Penn State University, USA
Dr. Nicole Stout (July 2 – 8)	@NicoleStoutPT	5974	Research Assistant Professor West Virginia University, USA
Dr. Keith Thraen-Borowski (April 9 – 15)	@KTB_PhD	1297	Assistant Professor Loras College, USA
Core Team (@CEPL_UBC)			
Dr. Kristin Campbell	@KLCampbellPhD	2355	Professor CEPL Principal Investigator University of British Columbia, Canada
Dr. Kirstin Lane	@kirstin_lane	68	Assistant Professor University of Victoria, Canada Clinical Exercise Physiologist
Logan Meyers	@loganmeyers	56	CEPL MSc student (completed) University of British Columbia, Canada
Sarah Weller	@_sarahweller	3021	CEPL MSc student (completed) University of British Columbia, Canada

*Legend: *as of January 18, 2021.*

Outcomes
The outcomes of the campaign are reported as: (i) publication information (i.e., research type, journal impact factor, Altmetric Attention Score); and (ii) Twitter Analytics data (e.g., impressions, engagements, engagement rate).

Data Extraction

Twitter Analytics data were obtained in October 2020 from Twitter Analytics (Twitter, 2020: San Francisco, USA; analytics.twitter.com). Each publication's current Altmetric Attention Score was obtained using the Altmetric Bookmarklet (Digital Science, Holtzbrinck Publishing Group, 2020: Stuttgart, Germany; altmetric.com), which can be incorporated for free into any Internet browser and allows users to see the Altmetric Attention Score for any publication with a Digital Object Identifier (DOI). Additional publication information (i.e., research type, year of publication, journal) was extracted by screening titles and abstracts. If available, each journal's 2018 impact factor (i.e., average number of citations publications received over the last two years) was obtained from the open-access SCImago Journal and Country Rank website (SCImago Lab, 2020: Madrid, Spain; scimagojr.com), which compiles publication and citation information contained in the Scopus® database (Elsevier B.V., 2020: Amsterdam, Netherlands; scopus.com).

Data Analysis

Medians and minimums/maximums were calculated for each Twitter Analytics outcome. A Kruskal-Wallis test was done to compare engagement rates of different research types (e.g., RCT, review) and engagement rates of the various guest tweeters. Wilcoxon rank sum tests were done to compare the engagement rate of Throwback Thursday tweets versus non-Throwback Thursday tweets and guest tweets versus non-guest tweets. Spearman's rho was calculated for engagement rate versus journal impact factor and engagement rate versus Altmetric Attention Score. Statistical significance was set at $p < 0.05$ and all tests were two-tailed. All statistical analyses were done in R Version 4.0.3.[22]

RESULTS

Description of Publications

Between January 1, 2018, and December 31, 2018, 365 publications were posted to the CEPL Twitter account. Most (n=183; 50%) were published in 2018, while 128 (35%) were published between 2013-2017 and the remainder (n=53; 15%) prior to 2012. The publications covered many different cancer types and information related to developing therapeutic exercise interventions for cancer populations, with the majority focused on breast cancer (n=134; 37%), prostate (n=31, 8%), and colorectal (n=25; 7%) cancers. The most common research type was reviews (n=91; 25%), the majority of which were systematic reviews and/or meta-analyses (n=58; 64%), followed by RCTs (n=80; 22%), cross-sectional studies (n=38; 10%), and cohort studies (n=32; 9%). If available, journal impact factor (as of 2018) ranged from 0 to 206.85 (median=3.55), while the Altmetric Attention Score (as of October 2020) ranged from 0 to 8530 (median=15).

Twitter Analytics Data

The #365Papers campaign received a total of 688,117 impressions and 22,124 engagements (as of October 28, 2020). The median number of daily impressions was 1279 (minimum=297, maximum=20,230) and the median number of daily engagements was 40 (minimum=3, maximum=592), resulting in a median engagement rate of 3.2%. The daily engagement rate of each tweet is displayed in Figure 1, along with the mean weekly and monthly engagement rates. The majority of engagement was from URL clicks (n=8279; 37%), likes (n=4344; 20%), detail expands (n=3304; 14%), and retweets (n=2700; 12%). No problematic comments or user interactions were flagged by the #365Papers team, nor did any conflict between users have to be resolved. Followers increased by an average of 48 (±18) per month, with the greatest increase being 81 new followers in March 2018 (Figure 2). Over the duration of the #365Papers campaign, the number of followers to the CEPL Twitter account increased from 38 (January 1, 2018) to 612 (December 31, 2018) (+574; 1510%).

Figure 1. Daily, weekly, and monthly engagement rate of the #365Papers campaign. *Note:* Weekly and monthly engagement rate is displayed as the average daily engagement rate over the span of each week and month, respectively. *Legend:* green bars represent the daily engagement rates of guest tweets.

Differences in Engagement Rate

Engagement rate was not statistically different based on research type (p=0.53), as well as between Throwback Thursday and non-Throwback Thursday tweets (median: 2.9% vs. 3.2%; p=0.97) (Figure 3). Engagement rate also was not significantly different between the various guest tweeters (p=0.28). Further, there was no correlation between engagement rate and journal impact factor (r=-0.06; p=0.27), nor engagement rate and publication Altmetric Attention Score (r=0.01; p=0.80). However, guest tweets had significantly higher engagement rates compared to non-guest tweets (median: 3.6% vs. 3.1%; p=0.01) (Figure 4).
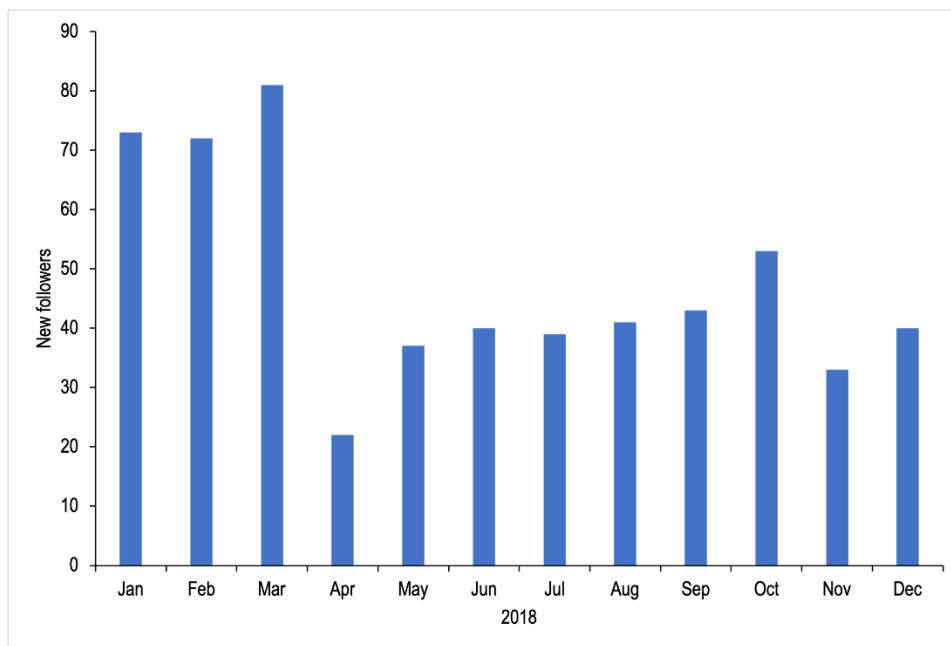

Figure 2. Number of new followers (per month) to the CEPL Twitter account during #365Papers campaign.
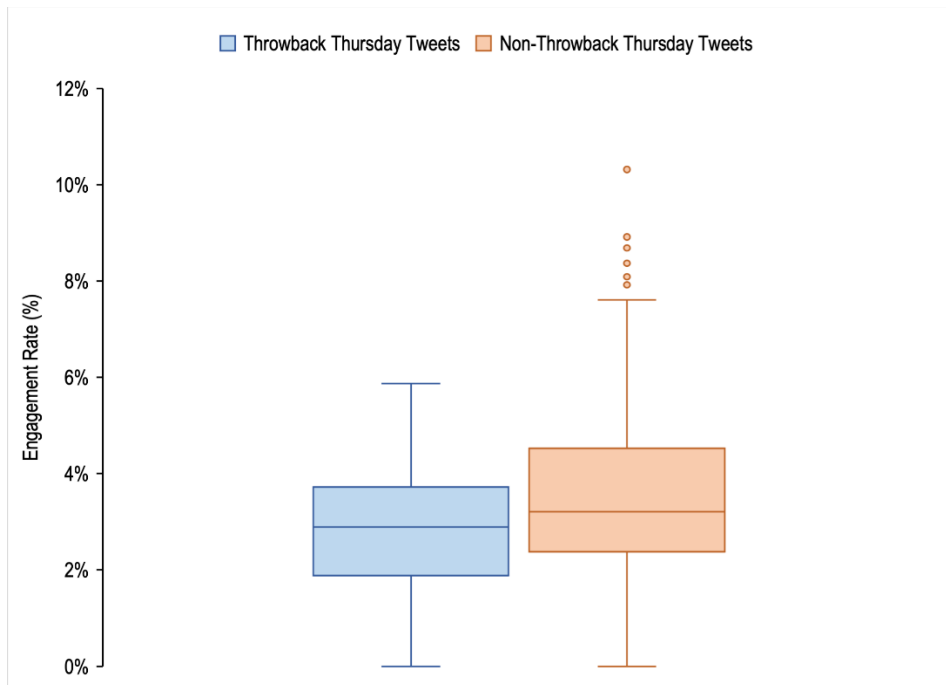
Figure 3. Difference in engagement rate between Throwback Thursday Tweets and Non-Throwback Thursday Tweets
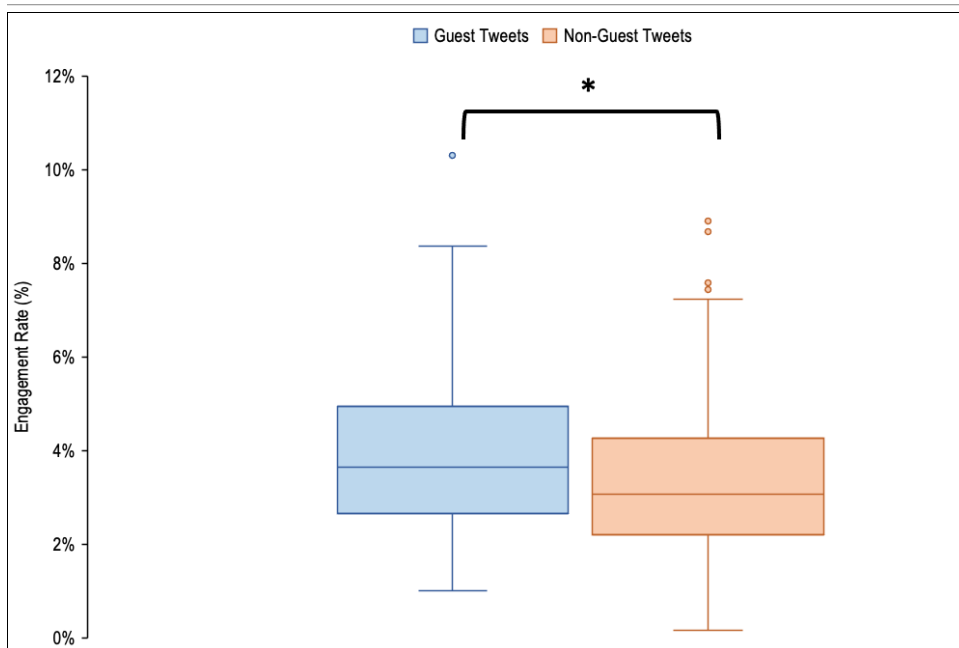

Figure 4. Difference in engagement rate between Guest and Non-Guest tweets. *Legend:* * represents a statistically significant difference between the engagement rate of Guest and Non-Guest tweets.

DISCUSSION

Here, we report on the outcomes of #365Papers, a year-long scientific Twitter campaign where one peer-reviewed publication related to cancer and exercise/physical activity was posted daily in 2018. This initiative was inspired by two increasingly popular scientific communication approaches on Twitter: journal clubs and other #365Papers campaigns. We aim to demonstrate the potential of our campaign to disseminate exercise oncology literature among health researchers, practitioners, and the general public. Overall, our engagement rate was similar to that of other health-related scientific Twitter accounts.[23,24] To our knowledge, we were the first group to collect Twitter Analytic data on a #365Papers campaign and the first to calculate engagement rate (i.e.,

the percentage of our campaign's tweets that registered users chose to interact with). Other scientific Twitter journal clubs have extracted their Twitter Analytic data, but only reported on the number of new followers and overall impressions (i.e., the number of times registered users saw a tweet, but not necessarily interacted with it).[25,26]

We found the #365Papers campaign had the highest engagement rate when prominent figures in the exercise oncology field were incorporated into the campaign as "guest tweeters," which may be due to the exercise oncology research community already having an established Twitter presence.[9,27] For example, many guest tweeters (e.g., Dr. Kathryn Schmitz, Dr. Nicole Stout) have over 1000 followers (Table 2). Thus, a tweet from a guest tweeter with a large number of followers may have had greater reach and correspondingly higher engagement rate. However, engagement rate did not differ between the various guest tweeters nor by research type. Engagement rate was not related to journal impact factor or publication Altmetric Attention Score. Overall, these findings suggest engagement rate improved based on who tweeted the publication (i.e., a high-profile researcher and/or clinician in the exercise oncology field) rather than features of the publication itself. Correspondingly, we recommend future scientific social media campaigns incorporate activity and/or content from prominent individuals in the field to enhance campaign impact.

Applications

While additional research is required to understand if Twitter can improve overall citations for a research publication, social media can be an effective tool to aid in knowledge exchange and dissemination efforts and can provide a low-budget, environmental alternative to in-person conferences.[7,9,13] Of note, the first Exercise Oncology Twitter Conference (ExOncTc) was held in October 2018, featuring almost 70 presenters from 13 countries and reaching about 5000 total engagements.[9] Health practitioners and researchers who are interested in undertaking a Twitter-based scientific campaign in the future may find a once-a-year event such as a conference to be more feasible than conducting a daily initiative such as #365Papers. Although the #365Papers campaign succeeded in generating online attention and impact, the #365Papers team often found it difficult to balance the time demands of the campaign with other research, clinical, and teaching priorities. As such, we recommend other health practitioners and researchers who undertake a similar initiative to consider the time and staffing requirements for a daily communication strategy and connect with other colleagues and students who may be able to help.

Further, incorporating patient partners and other key stakeholders in the planning and process of an online scientific initiative. such as #365Papers may help improve the campaign's reach and engagement. Of note, in a multiple case study of social media initiatives to engage stakeholders in pediatric health, Elliott et al. reported the initiatives that stakeholders (e.g., patients, parents) helped conceptualize and facilitate had greater reach and engagement than initiatives that were purely designed and ran by researchers.[13] However, the authors also note the importance of considering the ethics approval process needed to incorporate other stakeholders in the social media campaign process, as well as to capture participant data and verify post content.[13] Involving multiple stakeholders in the planning and dissemination process of scientific social media campaigns may also help improve awareness of the growing spread of health-related misinformation on social media, as well as identify strategies to counteract misinformation. For instance, Chou et al. recommend several approaches health practitioners and researchers can take to address misinformation on social media, such as identifying vulnerable individuals and groups, building their literacy around health, science, and social media, and implementing targeted sharing of evidence-based information.[28]

Limitations

There are four key limitations to the #365Papers campaign and this report. First, because the #365Papers campaign was only conducted for one year, additional longitudinal Twitter Analytics data (both before and after the campaign) are needed to provide insight into the campaign's potential sustainability and longevity over time. Second, the campaign's impact may have been affected by other factors, such as scientific conferences (e.g., American College of Sports Medicine in late May of 2018) and time of year (e.g., holidays), which were not incorporated into the analysis. Third, the algorithm Twitter Analytics uses to calculate engagement rate only takes interactions with registered Twitter users into account (i.e., impressions, engagements) and does not consider how many times a tweet was actually seen or read by individuals who do not have a Twitter account (unregistered users). Fourth, we were unable to collect data on user demographics, as this feature was removed from Twitter Analytics in January 2020.

Collectively, these limitations mean the Twitter Analytics for the #365Papers campaign reported here are only an estimate of its actual impact and lack the context of demographic data. This demographic information would provide valuable input on potential enabling factors of Twitter-based scientific communication initiatives, such as younger age (potentially greater digital literacy and willingness to using social media for scientific communication), geographical location (English-speaking area of the world and time zones that coincide with when the #365Paper tweets were posted), and health practitioners and researchers (may be more likely to use Twitter for research purposes than the general public). Further, the inability to collect demographic data made it difficult to verify if registered users and followers were actual individuals interested in the campaign or Twitter "bots", which is a type of internet software that independently controls a Twitter account and can perform actions such as liking, retweeting, and following. That said,

many of the registered users and followers who interacted with #365Papers tweets were health practitioners and researchers already known to the study team. Ultimately, although the #365Papers team aimed to reach and disseminate exercise oncology literature among health researchers, practitioners, and the general public through this initiative, the lack of demographic and qualitative data collected makes it difficult to assess the extent to which this objective was met.

Recommendations for Future Research

Future analyses of other scientific Twitter initiatives using Twitter Analytics can incorporate longitudinal data and interactions terms to account for other factors that may influence a tweet's impact. However, it is difficult to understand the true impact of scientific Twitter initiatives because Twitter Analytics are calculated using proprietary algorithms, which do not measure how many times a tweet is read or interacted with outside of registered users on Twitter. Other metrics can measure the online impact of a research publication, namely the Altmetric Attention Score, which breaks down the overall online attention a research publication receives by platform (e.g., Twitter, Facebook, blogs)[8]. That said, the Altmetric Attention Score measures the impact of a research publication rather than a tweet, making comparison with Twitter Analytics difficult. Perhaps as interest continues to grow in using social media to disseminate scientific research, additional metrics will be developed to provide a more accurate and comprehensive assessment of the true impact of research online. The current absence of transparent and responsive quantitative metrics highlights the importance of complementing Twitter Analytic data with qualitative analyses of Twitter-based scientific communication initiatives, such as thematic analyses of user dialogue and survey-based feedback from participants.[13,29,30] These data can provide valuable context and understanding of an initiative's reach, impact, and resonance.

CONCLUSIONS

Although further work is needed to understand how best to measure the true impact of research on social media, the results of this report suggest the potential of a daily scientific Twitter campaign to stimulate engagement and dialogue surrounding scientific publications. Additional research is also warranted to elucidate how to integrate quantitative Twitter Analytic metrics with qualitative data to comprehensively capture the reach, influence, and salience of scientific communication Twitter campaigns. Incorporating both quantitative and qualitative engagement data from social media campaigns can help identify content that may be more resonant with specific stakeholder groups, which, in turn, may potentially improve campaign engagement by tailoring material to target audiences.

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