



## **Systems to support scholarly social media: a qualitative exploration of enablers and barriers to new scholarship in academic medicine**

## **Systèmes de soutien des réseaux sociaux scientifiques : une exploration qualitative des catalyseurs et des obstacles aux nouvelles études en médecine universitaire**

Teresa M Chan, Brandon Ruan, Daniel Lu, Mark Lee et Yusuf Yilmaz

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### Résumé de l'article

**Introduction :** Alors que le milieu universitaire commence à intégrer les technologies de communication modernes dans ses structures d'enseignement, il existe à la fois des facteurs favorables et des obstacles à l'adoption de ces innovations par les chercheurs. Les premiers adoptants des réseaux sociaux scientifiques, que ce soit dans un cadre éducatif, de réseautage lié à la recherche ou d'application des connaissances, sont sans doute les mieux placés pour mettre en évidence aussi bien les facteurs favorables que les facteurs défavorables présents dans leur environnement de travail.

**Méthodes :** Les auteurs ont mené une étude selon la théorisation ancrée qui s'inscrit dans un courant constructiviste afin de cibler les éléments de l'expérience d'importants utilisateurs des réseaux sociaux scientifiques (p. ex. Twitter). Les participants ont été recrutés par échantillonnage en boule de neige et invités à des entretiens semi-structurés. Trois chercheurs ont analysé les transcriptions reçues selon la méthode de la comparaison constante. Par souci de rigueur, nous avons procédé à une vérification de l'analyse et à un contrôle des participants.

**Résultats :** Dix-sept influenceurs émergents dans le domaine des réseaux sociaux scientifiques ont été recrutés. Après un codage axial, les 30 catalyseurs et les 21 obstacles à l'utilisation des réseaux sociaux scientifiques ont été mis en correspondance avec trois sphères d'influence : personnelle, institutionnelle et virtuelle. Les chercheurs proposent un cadre qui organise ces catalyseurs et ces obstacles autour d'un point de basculement où la durabilité devient possible.

**Conclusions :** De multiples facilitateurs et obstacles ont été décrits pour influencer les utilisateurs de réseaux sociaux dans le domaine de la médecine universitaire. La classification de ces facteurs sur une échelle par type de cadre (personnel, institutionnel et virtuel) laisse entrevoir les structures sous-jacentes des écosystèmes universitaires qui sont propices au développement des réseaux sociaux et des innovations de ce type.

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## Systems to support scholarly social media: a qualitative exploration of enablers and barriers to new scholarship in academic medicine

## Systèmes de soutien des réseaux sociaux scientifiques : Une exploration qualitative des catalyseurs et des obstacles aux nouvelles études en médecine universitaire

Teresa M Chan,<sup>1</sup> Brandon Ruan,<sup>1</sup> Daniel Lu,<sup>2</sup> Mark Lee,<sup>1</sup> Yusuf Yilmaz<sup>1,3</sup>

<sup>1</sup>McMaster University, Ontario, Canada; <sup>2</sup>University of British Columbia, British Columbia, Canada; <sup>3</sup>Department of Medicine, Ege University, Izmir Turkey

Correspondence to: Teresa M Chan; email: [teresa.chan@medportal.ca](mailto:teresa.chan@medportal.ca)

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### Abstract

**Introduction:** As academia begins to incorporate modern communication technologies into its scholarly structures, there are both enablers and barriers which foster academics' uptake of these innovations. Those who are early adopters of academic social media - whether it be for education, research-related networking, or knowledge translation - may therefore be best positioned to highlight both enablers and barriers within their work environments.

**Methods:** The authors conducted a constructivist grounded theory study to discern what prominent practitioners of academic social media (e.g. Twitter) have encountered in their careers. Participants were recruited via a snowball sampling technique and invited to participate in semi-structured interviews. Three investigators engaged in constant comparative analysis of incoming transcripts. To enhance rigour, we conducted an audit of the analysis and a participant member check.

**Results:** Seventeen emerging influencers in the field of academic social media were recruited. After axial coding, the 30 enablers and 21 barriers to academic social media use were mapped to three spheres of influence: personal, institutional, and virtual. The investigators propose a framework that organizes these enablers and barriers around a tipping point where sustainability becomes possible.

**Conclusions:** Multiple enablers and barriers were described to influence social media users within academic medicine. By organizing these facets into a personal, institutional, and virtual framework along a spectrum, we can begin to understand the underlying structures that potentiate the academic ecosystems in which social media and similar innovations may flourish.

### Résumé

**Introduction :** Alors que le milieu universitaire commence à intégrer les technologies de communication modernes dans ses structures d'enseignement, il existe à la fois des facteurs favorables et des obstacles à l'adoption de ces innovations par les chercheurs. Les premiers adoptants des réseaux sociaux scientifiques, que ce soit dans un cadre éducatif, de réseautage lié à la recherche ou d'application des connaissances, sont sans doute les mieux placés pour mettre en évidence aussi bien les facteurs favorables que les facteurs défavorables présents dans leur environnement de travail.

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**Résultats :** Dix-sept influenceurs émergents dans le domaine des réseaux sociaux scientifiques ont été recrutés. Après un codage axial, les 30 catalyseurs et les 21 obstacles à l'utilisation des réseaux sociaux scientifiques ont été mis en correspondance avec trois sphères d'influence : personnelle, institutionnelle et virtuelle. Les chercheurs proposent un cadre qui organise ces catalyseurs et ces obstacles autour d'un point de basculement où la durabilité devient possible.

**Conclusions :** De multiples facilitateurs et obstacles ont été décrits pour influencer les utilisateurs de réseaux sociaux dans le domaine de la médecine universitaire. La classification de ces facteurs sur une échelle par type de cadre (personnel, institutionnel et virtuel) laisse entrevoir les structures sous-jacentes des écosystèmes universitaires qui sont propices au développement des réseaux sociaux et des innovations de ce type.

## Introduction

Social media can no longer be ignored as a source of data for scholarly discourse and clinical work.<sup>1,2</sup> The recent COVID-19 pandemic has highlighted how crucial social media can be in affecting not only our lives, but also public policy and information dissemination.<sup>3-7</sup> Social media can also allow users to rapidly gather new information for their professional development.<sup>6</sup> Over the past two decades, social media platforms have become increasingly integrated into academia. This field has blossomed as a mechanism by which educators teach, and scientists engage in knowledge translation or networking.<sup>8</sup> However, the process by which this has occurred is unclear. Some of those at the leading edge of this area, such as foundational leaders in social media-based education or knowledge translation have described that they have had poor, if any, support for engaging in these novel activities.<sup>9</sup>

To date, few empirical studies have examined the experiences of those who have marshalled the transition of academic medicine into the era of social media. Only recently have scholars such as Riddell and colleagues attempted to quantify and qualify the impact of social media influencers within the digital communities of practice around education and knowledge translation.<sup>10</sup> While many commentaries exist about the evolution of this field over time,<sup>11-13</sup> there is little evidence that has been formulated to help aggregate these experiences and report the experience of these novel opinion leaders and knowledge brokers. As with most academic pursuits, it is likely that the local context in which individuals exist may either enable (foster and support) or hinder (act as a barrier or hindrance) their activities - and this may include social media.

More recently, there has been an emergence of what many consider as digital scholarship.<sup>14-16</sup> Much of the literature on the topic of digital scholarship has included social media activities as a form of digital scholarly work, and as such there has been an increased interest in these forms of scholarly communication. The acceptance of these concepts, however, likely influences the local adoption of the practices consistent with high-level social media academic work (e.g. education, scholarly discourse). Thus, in this study, our objective was to engage influential social media users in an exploration of the factors that both enable or inhibit the emergence of new forms of academic scholarship within academic medicine.

## Methods

We conducted a constructivist grounded theory (CGT) study to discern what enablers or barriers prominent practitioners of academic social media had encountered in their careers.<sup>17</sup> Due to the emerging nature of our present phenomenon, we elected to adopt a CGT approach to develop new conceptualizations of how these new academic practices were being fostered.

### Research team

Our analytic team consisted of a diverse group of researchers including researchers that actively used social media for academic work, and those who did not. Three investigators (TC, DL, BR) engaged in constant comparative analysis of incoming transcripts, whilst two research team members (ML, YY) engaged in a full audit of proceedings to ensure trustworthiness and rigor of the analysis, especially keeping our lead investigator reflexive about her inferences. The project team met regularly to ensure that all members remained reflexive about the codes, themes, and analysis. Specific efforts were made to ensure our principal investigator (TC) and coinvestigator with ample social media experience (YY) reflected on their own experiences and declared these to the rest of the team, most of whom were less seasoned either in their academic experiences or their social media usage.

### Participant recruitment and sampling

Our study engaged a digital network of scholars whose academic work features, or heavily employs, social media. Each of the participants brings with them not only a digital participation within the online world, but also their own local academic contexts. Although initial sampling was within the field of emergency medicine, the snowball sampling method allowed us to recruit participants from interdisciplinary health professions.

We recruited participants via a snowball sampling technique, starting with a random selection of the most influential<sup>18</sup> emergency physicians from Twitter, a popular social media platform. Our intention was to ask those who has previously been categorized as having influence via the Riddell paper to name those with similar or different influence and expertise. Furthermore, our initial recruitment of emergency physicians from Riddell's list was justified due to their increased likelihood of having extensive experiences pertaining to knowledge translation on social media based on their extensive followings.<sup>10</sup> Previously, these individuals had been measured by various

analytic measures of influence on Twitter (in-degree centrality, eigenvector centrality, and betweenness centrality) and were found to be of high influence within this network.<sup>10</sup> Then, since we note that the field of social media is rapidly evolving, we engaged in a snowball sampling technique to stay ahead of the rapidly changing nature of the field.<sup>18</sup> Initial participants were approached through Twitter or by institutional email. Subsequently nominated participants were contacted in a similar fashion. We had two main aims: 1) to understand the nature of those who had been successful in their merging of social media and academic work (i.e. those who had gained reputational benefit or jobs within their organizations for their social media-related work); and 2) how they overcame barriers. Due to these aims, we did not sample from those who identified as non-users within this study. We aimed to identify barriers met by those who had been successful thus far in the journey of engaging in social media-based scholarship. We chose to focus on those who are excelling, and omit those who identified as non-users, because if those who excel are experiencing these barriers, then these likely exist for others as well.

### Data collection & processing

Each participant partook in a semi-structured interviews. Our interview guide is contained in the Appendix B. This interview guide specifically sought to sample across a prior conceptual framework that included three types of new scholars: Critical Clinicians, Translational Teachers, and Interactive Investigator.<sup>11</sup> Research assistants (AM, BR) were both trained via simulated interviews. All interviews were done via Zoom teleconferencing (Zoom Video Communications, Inc., San Jose, CA, USA). Our audio files were transcribed verbatim and transcripts were de-identified.

### Data analysis

We analyzed the transcripts in groups of 2-4 transcripts at a time in line with the constant comparative method technique. For our analysis, we were sensitized to the conceptual framework depicting social media scholars as translational teachers, interactive investigators, and/or critical clinicians, as well by various sociological literature including Grodzins' characterization of the "tipping point" phenomenon.<sup>19,20</sup> As we iteratively generated codes aligned with various enablers and barriers throughout our coding process, we would further identify areas for exploration in subsequent interviews. The analysis team (TC, DL, BR) met multiple times over four months, analyzing

transcripts for relevant themes and expanding our code book each time. Relevant codes were iteratively organized until we reached thematic sufficiency within our dataset about enablers and barriers. To ensure sufficiency, we interviewed two more participants beyond the point where we felt we achieved theoretical sufficiency to check that there were no additional themes that seemed to be found in these last two interviews. Our team then met to conduct a round of axial coding to identify further relationships and patterns within the codes, ultimately generating a new conceptual framework for explaining how enablers and barriers potentially foster or hinder academic progress in social media.

### Rigor & trustworthiness

After our analysis, two research team members (ML, YY) conducted a full audit of our analysis trail in line with previous methodological descriptions<sup>21</sup> and our own prior work in this area.<sup>2</sup> This pairing of auditors was selected since they were balanced in their use of social media (ML used it mainly for personal tasks; YY used it more in the professional realm). Separately, each of our auditors were given full access to primary transcripts and the codebook. They were also given access to our initial manuscript draft which explained our findings. Our auditors were charged with ensuring our coding was robust and accurately reflected our original content. Due to the global COVID-19 pandemic<sup>22</sup>, and respectful that many of our participants were frontline clinicians, we truncated our member check process by sending out a Google Document link for comment by our participants from November 22-December 16, 2020. We wished to make this as seamless as possible and reduce the burden of correspondence and created this method by which we could anonymously gather feedback about our analysis during this unprecedented time. We posted our results section for commentary for three weeks and notified participants that they could comment within that window.

Of note, this study was part of a larger umbrella project within a program of research. For the purposes of this paper, we analyzed only one of two interview parts within the larger umbrella study. This division in reporting the study results was part of the umbrella study plan, and unique analyses were conducted to ensure data sufficiency for all parts of the study.

**Ethics:** This project received ethical approval from our research ethics board (#5609).

**Reporting:** We adhered to the Standards for Reporting Qualitative Research (SRQR) guidelines throughout this paper.

## Results

### Demographics

We interviewed 17 experts (M=10, F=7) in the field of academic social media. All of the interviewees identified with the educator role (17/17, 100.0%), most of them were clinicians (15/17, 88%) and researchers (13/17, 76%). Of the interviewed participants, 6/17 (35%) were assistant professors, 1/17 (6%) was an associate professor, and 4/17 (24%) were full professors. Specialties included in this study were: Emergency Medicine (12/17, 70%), Internal Medicine (1/17, 6%), Obstetrics and Gynecology (1/17, 6%), and Medical Education (2/17, 12%).

Most interviewees resided in the United States (8/17, 47%) or Canada (5/17, 29%), while others were in other countries (4/17, 24%). Participants also identified social media platforms used for professional work. As expected, all participants identified using Twitter (17/17, 100.0%) for professional work; some reported having a Google Scholar (10/17, 59%), ORCID (8/17, 47%) profile, and using Facebook professionally (8/17, 47%).

The average interview duration was 30.6 minutes long, ranging from 18.6 minutes to 52.1 minutes. Each interview yielded an average of 10.5 pages of transcript. All participants took part in the member check to review our results, but the process only yielded three pieces of substantive feedback which were incorporated into our analysis.

### Overview

Fifty-seven codes were originally discerned within our data, with enablers ( $n = 35$ ) and barriers ( $n = 22$ ) categorized by the analysis team. During axial coding we coalesced several codes resulting in a final list of 30 enablers, 21 barriers and 2 codes we felt were best described by the concept of the “tipping point.” During the axial coding phase, our team placed these enablers and barriers into three spheres of influence: personal, institutional, and virtual. Based on these findings, we have created a framework that may explain how these enablers and barriers interact to affect the development of academic social media. Figure 1 (Appendix A) shows our final coding schema represented as a framework that lists all final 53 codes, broken down into the personal, institutional, and virtual levels. Table 1

(Appendix A) depicts this framing of our overall enablers and barriers along with the participant quotes.

### Enablers

The enablers that were described by our participants fell into the three domains: personal, institutional, and virtual.

**Personal enablers:** We found that personal enablers fell into degrees of impact. When first getting started, participants identified that two of the weakest personal enablers were their own ability to develop credible visibility within social media and the ability of social media to help catalyze their own careers. These two initial themes, notably, seemed to synergize with each other - participants noted that they first developed and gained visibility in various platforms and, as a corollary, this visibility acted as a catalyst for accelerating their own careers. Once more immersed in the social media space, participants felt further enabled when their social media platforms could align with other roles they possessed.

Meanwhile, our participants identified that on a personal level, their academic social media use was further enabled by personal mentorship and scholarly collaborations (e.g. research opportunities). Another participant (F2) highlighted that their research opportunities existed purely due to their social media interactions.

These new opportunities were characterized by our participants as a stronger enabler, especially those which were seen as career advancing. However, by establishing “followership” and gaining influence within their social media circles, participants may have inadvertently created new hierarchies. One participant (M3) reflected upon these issues here:

Finally, our analysis revealed that once influence was established, participants were able to use this to impact communities outside their own social media circle. This influence and its impact were seen by our team as the strongest enabler. Specifically, they observed that influence allowed participants to have greater effect within their areas of expertise in advancing thinking around clinical practice or disseminating scientific content online to a greater clinical audience.

Participants were also noted to use their influence to shine light upon less visible issues or use their influence to raise the profiles of less recognized colleagues. Of course, all of this influence was deemed to carry with it the potential of unintentionally amplifying inaccurate or invalid research.

**Institutional enablers:** Participants were asked to identify the organizations with the most influence in their online activities, which included their hospitals, their universities, or their blog or podcast group. We found that there were fewer prominent institutional enablers which potentiated our participants' involvement in social media. For instance, if an institution was permissive of social media use, then this allowed individuals to participate initially. Similarly, institutions that were 'hands-off' allowed some of our participants to simply self-direct their own development, largely free from institutional restrictions. Other participants noted their institutions would require some level of approval before individuals could proceed with their social media activities, which may have served as a weak endorsement of their activities via their permission procedures. Other institutional influences included asking social media users to declare their conflicts of interest, which signaled a more formal adoption of such activity necessitating the inclusion of traditional academic measures. Participants view institutional enablers as stronger if they felt that they were part of an academic group that valued social media participation.

Another institutional enabler was the creation of formal social media positions within academic or scholarly institutions – this was an enabler that many participants felt strongly influenced their productivity and work within social media. Examples of these would be social media editors for scientific journals, institutional blog editors, and leadership roles within administration or training programs.

The enablers identified by our group to be the strongest were when participants felt both supported and recognized by their academic communities. When participants felt that their groups or communities of practice rallied behind them to amplify their work, this encouraged their continued interest within acting as an active academic in social media.

**Virtual enablers:** The third grouping of enablers were properties that participants identified within their virtual lives. Beyond personal and institutional enablers, there was a strong theme that virtual community-based enablers were frequently helpful for those seeking to engage in social media within academia.

Another enabler is existence of a well-populated and lively virtual spaces where academics can interact via social media. Many felt that social media helped to potentiate

networking between like-minded academics and researchers, especially internationally. However, this ability to interact is not unique to social media when compared to venues such as conferences or calls. That said, many participants felt that within this fertile ground laid the opportunity to rapidly learn about advances in their own fields and engage in a diversity of exposures to content outside of their usual reading.

The perception was that the virtual space allowed for an expanded world, enabling participants to view themselves in a new professional light. Participants described the importance of active engagement by one's own virtual community of practice as an intrinsic enabler to their academic social media work. And, although participants were wary that in the virtual world this may expose them to disagreements from factions outside of their usual circles, they still noted that the benefits of having a robust community where they could have engagement with numerous participants outweighed the potential risks. Participants felt that within this virtual world, there was increased potential for more productive conversations, sharing of tacit knowledge between professionals, and the amplification of high-quality resources.

Participants identified this virtual world as one in which traditional hierarchy was thought to be flattened, while others noted that there were simply new hierarchies which formed due to social media users' expanded influence due to a broader audience. Access to these new community members and audiences were deemed to be strong enablers of their social media-related work.

## Barriers

**Personal barriers:** Some of the barriers to conducting academic work via social media included the perceived time spent in this area. Since many participants continued to do work in these arenas, most felt these were not strong barriers to their academic social media work. However, since this work was often unpaid (or at least underpaid), participants would often find that their social media-related academic work was done when their schedules allowed for it.

Other barriers identified our participants were the lack of monetary or administrative support or restrictions in platform functionality/design. These were viewed as strong deterrents by our participants – some of whom saw these as unsurmountable hurdles. Another barrier included personal perceptions of certain platforms. Participants felt

that certain social media platforms were of greater importance for their professional usage than others. Their preferences and perceptions affected their thinking of how to best use these platforms.

Participants described that the strongest barriers to engagement in academic social media was deemed to be a lack of knowledge or training and fears around the potential for reputation damage due to possible perceptions of unprofessionalism.

Due to the potential amplification of their perspectives via social media, participants worried about the potential ramifications of their personal social media reflections (e.g. political) reaching a broader audience, and possibly affecting their reputation.

**Institutional barriers:** Several types of institutional barriers were also identified by our participants. Some of the more easily overcome barriers included lack of transparency within institutions about social media use such as unclear policies or unwritten guidelines. The lack of transparency and open support or guidance, potentiated 'lone wolf' behaviors by some of the participants, causing participants to carve out their own paths.

Other institutional barriers included the lack of formal recognition or official mandates and the lack of incorporating social media activities into formal reward structures or academic promotion. Similarly, a loss of a position (e.g. being terminated from employment) related to social media was felt to be a big barrier to engagement in social media.

Some of the strongest barriers were deemed to be negative perceptions of social media by a participant's institution. If participants felt their institutions or specialty did not consider their work as scholarly, then this was deemed to be a barrier to engaging fulsomely in academic social media usage. For example, one participant (M2) highlighted how social media advocates might be dismissed as a 'pure commentator.'

**Virtual barriers:** Within the virtual space, some of the barriers were the heterogeneity and lack of control in choosing audiences within the virtual space. Innate to open social media platforms, these spaces often include individuals of varying levels of expertise and naiveté on different topics.

Another barrier to participation in social media was the perception that the virtual space was increasingly

becoming similar to other previous more traditional forms of dissemination and engagement. The line of reasoning is that initially many individuals had floated towards social media participation because of its disruptive properties of historically upending hierarchy or changing traditional power dynamics in academia. But with the increasing involvement of institutions and other formal academic entities, participants were wary that their social media spaces were beginning to mirror so many other parts of their lives that it held very little added value anymore.

### The "tipping point"

Described in sociology, the tipping point is a time at which a group dramatically increases uptake of a previously rare practice. First described by Morton Grodzins this concept was popularized by Malcolm Gladwell.<sup>19,20</sup> Within our study, we found that many participants described two key phenomena that resulted in the increased use and formalization of social media within academia. These were overriding concepts that underpinned a shift in thinking towards social media, rather than just simply being an enabler. These phenomena acted as precipitants for further work since they usually represented a fundamental valuing within a larger grouping of individuals - therefore a "tipping point" in the thinking of those within the system.

Such precipitants included the increasing development of a social media-enabled culture both within and outside of medicine. The increase in the acceptance of social media culturally outside and then within medicine were felt to be inflection points in many of the narratives generated by our participants.

Another factor that likely contributed to increasing adoption of social media practices by individuals and institutions is the increasing acceptance of social media within academic circles - especially with the evolution of social media's applications towards research and scholarship. As social media has transitioned from novelty to acceptability within the academic domain, this has precipitated a tipping point for academic social media.

## Discussion

Based on the recollections of our participants, we were able to identify a multitude of barriers and enablers that fostered the initial and continued growth of multiple academics within the social media space. These enablers and barriers act to either foster or stifle the aspirations of social media-avid academics seeking to engage in social media-related scholarly work. Interestingly, regardless of

whether our participants most identified as translational teachers, critical clinicians, or interactive investigators, all three groups tended to describe similar enablers and barriers. Of course, those who saw themselves as investigators tended to emphasize the opportunities for engaging in research, but so too did individuals who identified as educators.

Interestingly, our results are similar to those in other spheres around fostering innovation, transformation, or disruption.<sup>23-25</sup> As new scholarly approaches develop, outgrowths of new disciplines can spring forth from more traditional academic structures. In many ways the collection of enablers and barriers are like the ground beneath a nascent set of seedlings. Without hospitable conditions for growth from their surrounding academic ecosystem, academics in new domains - such as social media - cannot flourish. If those with the potential to do great academic work within the social media space are met with resistance and unnecessary bureaucracy, then these individuals may very well cease their pursuits. But, if there are positive conditions within an academic's institution, then these can enable individual academics to become very successful within social media.

With the proper academic conditions, all types of novel scholarship can begin to flourish. As it has been established before, new faculty members within an academic ecosystem are often met with a tacit barrier to entry; there is as much a hidden curriculum for faculty as there is for students.<sup>26</sup> Socialization within a welcoming scholarly ecosystem is of crucial importance to faculty success, and while measures such as mentoring can help to bridge this gap<sup>26-27</sup>, the symbolic structures of how and what we reward or support are also crucial.<sup>28-30</sup> The failure to show support for junior faculty members' academic interests have shown to correlate with individuals leaving academia.<sup>31</sup>

As they grow, scholarly ecosystems begin to grow in complexity and sophistication. As individuals are fostered, they can then begin to network via social media, creating broader and more complex webs between members within various virtual communities of practice.<sup>30,32-34</sup> These individuals intercalate and foster each other, nurturing the growth of more complex and resilient systems that can generate scholarly ideas<sup>1</sup>, spark research collaborations<sup>35</sup>, and connect previously unconnected parties in robust interactions.<sup>11</sup>

The changing pressures within the virtual world can certainly have a great effect in enabling or hindering the development of individuals within this space. Similarly, one need only make a small spark with an uncouth or perceivably unprofessional remark, and a runaway incendiary response may occur – leading to a veritable social media-based firestorm. Our participants had certainly noted that small lapses in professionalism in the social media space might be easily amplified and may result in professional ruin. This corresponds with many of the hesitations expressed in early social media writing on e-professionalism and the possible hazards of social media for students and clinicians.<sup>2,36-42</sup> This intersects well with how individuals and their digital professional lives may develop as a unique phenomenon, alongside their real-life professional identity.<sup>43</sup> It also highlights how these two identities are inextricably intertwined and may intersect.<sup>43</sup>

One participant noted during our member check that this present work may have less direct bearing on those later in their careers, as the aforementioned enablers and barriers will not be as relevant for them to navigate. While this may be true, we note that by better understanding the way in which the systems of new academic work can enter into reality, we may better foster new emerging forms of scholarship. For those with more seniority within our systems, the implications for our work would be how they might help junior colleagues navigate the murky waters of academia when they seek to enhance a new scholarly domains or topics, and to help junior faculty understand how to better foster the development of an academic ecosystem around them in that novel domain.

## Limitations

There are a number of limitations to our study, the first of which is our first author's proximity to the subject content and participation within the world of academic social media. To address this, she engaged in activities to ensure her own reflexivity, and the team attempted to assist her with this through discussion and auditing. Participant transcripts were also de-identified prior to her review.

Another limitation was that our sampling procedure may have only given us access to those who have continued to flourish and be successful within social media-based academic work. Those who did not succeed may not have been represented by those who have been identified as leaders within the field. It is important to interpret our results considering the limited scope of our initial sampling



technique of seeking insights from those who have been successful in engaging in social media-based academic work.

## Conclusions

In summary, while there are personal factors that may enable or hinder social media savvy individuals in their personal journey towards using social media for academic purposes, institutional, and virtual factors may have a notable influence on their ultimate success. Moreover, the appreciation of the surrounding academic ecosystems that exist around an individual (either within their institution, or virtually) can help academic leaders discover ways to potentiate new successes in nascent domains within the health professions. Using social media as a test case, we have developed a novel conceptualization that allows us to view how a new form of scholarship enters into the structures of academic medicine. This new conceptual framework may be useful as a lens to understand why new forms of scholarship might find or lose their foothold in academia.

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## Appendix A. Tables and figures

	Barriers	Tipping Point Precipitants		Enablers
Personal	<ul style="list-style-type: none"> <li>Lack of Knowledge Training</li> <li>Greater potential for damage to reputation (unprofessionalism)</li> </ul>	<ul style="list-style-type: none"> <li>Lack Of Support</li> <li>Restrictions in platform functionality</li> </ul>	<ul style="list-style-type: none"> <li>Time spent</li> <li>Unpaid or Underpaid Work</li> <li>Subject to schedule allowances</li> </ul>	<ul style="list-style-type: none"> <li>Social media as a career catalyst</li> <li>Developing social media credibility and visibility</li> <li>Social media roles align with others roles</li> <li>Mentorship</li> <li>Research opportunities</li> <li>Career advancing</li> <li>Followerships create a new hierarchy</li> <li>Having great reach to influence practice or thinking in field</li> <li>Using influence to shine a spotlight on less visible issues</li> <li>Using influence to push or criticize personally aligning-content</li> <li>Responsibility to raising less recognized scientist's recognition</li> <li>PROVISO - potential damage done by amplifying bad research</li> </ul>
Institutional	<ul style="list-style-type: none"> <li>Negative perceptions of social media from the hospital or institution</li> <li>Lack or loss of Position</li> <li>Is not considered scholarly</li> <li>Being dismissed for being a pure commentator</li> </ul>	<ul style="list-style-type: none"> <li>Lack of incorporation into promotion or other reward structures</li> <li>No Official Mandate</li> <li>Lack of formal recognition</li> </ul>	<ul style="list-style-type: none"> <li>Lack of Transparency</li> <li>Self-directed and largely free from institutional restrictions</li> <li>"Lone Wolf" phenomenon</li> </ul>	<ul style="list-style-type: none"> <li>Needing approval to associate with institution!</li> <li>Conflicts of interest declaration</li> <li>Formal social media position with scholarly institution</li> <li>Being part of an academic specialty or institution that valued social media</li> <li>Permissive of social media use</li> <li>Support and recognition within community</li> <li>Amplification by your group or community of practice</li> </ul>
Virtual	<ul style="list-style-type: none"> <li>Similar to previous or traditional forums for dissemination and engagement</li> </ul>	<ul style="list-style-type: none"> <li>Varying levels of expertise</li> <li>Audience naivety</li> <li>Heterogeneity and lack of control in choosing audience</li> </ul>	<ul style="list-style-type: none"> <li>Transitioning towards acceptability from novelty</li> <li>Social Media-Enabling culture</li> </ul>	<ul style="list-style-type: none"> <li>Fertile ground for academics</li> <li>Diversity and exposure to content outside of your usual reading</li> <li>Learning about advances in your field</li> <li>International collaborations</li> <li>Enables networking with like-minded researchers</li> <li>Sharing tacit knowledge</li> <li>Productive Conversation (Although can have disagreeing factions at times)</li> <li>Active engagement by your group or community of practice</li> <li>Virtual Community of Practice</li> <li>Expanded audience/influence</li> <li>Selects and amplifies quality resources</li> <li>Flattens hierarchy</li> </ul>

Figure 1. Enablers and barriers at the personal, institutional, and virtual levels.

Table 1. Themes & representative quotes from study on the ecosystem which enables or hinders use of social media in academia

Theme	Quote	Participant
Enablers leading to increased ability to engage in academic social media		
Personal Enablers	"I would assume that I had almost no credibility when starting out. I was an [an] unheard of no name doctor working in our community who had done the non-academic route into emergency medicine in Canada....I think credibility just came with time.... And you begin to build a relationship of trust."	M1
	"My role as a clinical educator is definitely embedded and integrated with my social media use. But again, it is not a requirement or sort of formal part of my role, but I think it is the one which happily aligns with it and supports my formal role."	F1
	"I also do... interact with people that I would consider my bosses at work, who also have social media accounts. Although that is very formal and professional, they do interact with me on social media on occasion and that has not been problematic. From my perspective it has certainly led to more professional opportunities."	M2
	"[M]y whole research career is founded on the relationships that I have made online. So, you know by reading and sharing a few papers and then having people get in touch with me and be excited about the types of things that I am excited about, make a collaboration and then we do more research. All of those connections for me have come online.."	F2
	"There are still hierarchies within social media. You know someone with 500 followers and someone with 500,000 followers are very different creatures. And I think that there is a tendency, I sometimes perceive that there is a tendency for people to be a little too enthusiastic about or overly accepting of FOAM without really appreciating the potential downsides.."	M3
	"I think the educators in emergency medicine have a lot of sway on potentially modifying practice in a rapid national or international way because we have so much of our community online. So, I do think that it changes the medicine that we practice, it changes the things that we talk about. It changes the studies that we are aware of. And ultimately, I think it does translate down to changing the care that we are providing to patients in some way."	M2
	"I think there is also potential benefit for people who ... are trying to be noticed for doing great works.... c you get the benefit of having someone who is able to be a magnifier or a megaphone for someone who is talking about really important things"	M4
	"I think that there are downsides to it as well. I have seen misinformation propagated through FOAM. I have seen people you know often junior people just uncritically accept what a more senior person has said. In fact, I have been that person where I have made misstatements on social media that have been accepted and it is only in hindsight that I have realized that they are misstatements."	M3
	"And so emergency medicine is crazy on social media. Everybody in emergency medicine seems to have social media accounts. And I think the educators in emergency medicine have a lot of sway on potentially modifying practice in a rapid national or international way because we have so much of our community online."	M2
	"...Part of my role also is I spend about 40% of my time as social media or the digital media editor for [journal] which is financially supported from the [national organization]."	M6
Institutional Enablers	"So, at [F1's Hospital], the hospital social media account tends to retweet a lot of things that I tweet. They like to be mentioned in tweets that we might be saying. For instance, it is if it is a paper that we published it is the same with the University. I would say they are generally quite proactive and positive about promoting the work of the clinicians and academics in the organization. And they will often initiate things."	F1
Virtual Enablers	"I am certainly into [FOAM] and believe...wholeheartedly that it is a total game changer for medical education. I think that we are starting to see really, really neat opportunities in terms of digesting information together and reflecting on our practice together that can happen in synchronicity online. That it is just very powerful for trainees and particularly for people who are in practice when you know you don't have an academic half day to go back to every week.."	F2
	"I think that there has been a lot readier access to information and also a far bit of improved access to wisdom."	F1
Barriers leading to decreased ability to engage in academic social media		
Personal Barriers	"The biggest almost certainly is just where the community is. And so, the medical community [is] built up within Twitter. And so, it is by far the most valuable that I have found. I tried to also avoid platforms that are going to suck my time away from medicine. And so, unfortunately, we know that these social media platforms are designed to keep you on the platform to be addictive. And I find YouTube and Facebook are particularly bad for that. So, I don't like to take my content through those platforms because I find that I go to read one article and then 45 minutes later I have run down a rabbit hole."	M1
	"I have played with Instagram, but I don't find a huge professional use for that at all."	F1
	"As [it] has been incredibly well described there [are] a lot of potential threats to professionalism. There are just a lot of opportunities to kind of say something embarrassing or damaging to your career. Or something that can get you in trouble at your local institution. Or potentially as a medical student [that] could theoretically get themselves into a situation where they say something that gets them blackballed during residency match."	M6

Institutional Barriers	<i>"I have also experienced close friends who have had big missteps on social media that have really affected their jobs. One of them, losing her job based on social media interactions."</i>	M5
	<i>"So... my focus is on evidence-based emergency medicine. I was probably one of the only ones to focus on that. When I started the podcast in 2011, there wasn't really a whole lot out there for evidence-based medicine like there is now."</i>	M1
	<i>"Like I said I started it from... a place where they knew I was doing it. And since that time, I literally try not to ask .... There is often not a lot of tolerance for anything veering from the norm. and so I try not to make a point of being on social media too much. I have the very strong suspicion that if I directly asked permission then I would be told no. And... I think the administration views the use of social media as problematic at best, potentially dangerous with little return for the institution."</i>	M5
	<i>"I do suspect that those who only work in the social media sphere and don't really do scholarship in the traditional way are likely to be dismissed or not contributing like that."</i>	M2
	<i>"I think the disadvantage is... if the people who were doing the critiquing aren't ...com[ing] from it with the perspective which is inaccurate... or if they have misunderstandings, then that can be sometimes hard to reign in. We didn't know if they are kind of opinions that aren't necessarily that rigorous academically then that can kind of get spread around. It is then hard for observers to distinguish what is kind of truth from opinion."</i>	F3
Virtual Barriers	<i>"I guess at the end of the day my main thought would be that this is no different than any other space that we existed in. It is just another place where we are people and where we are people trying to do our job and hopefully trying to do our job well. I think we often 'other' the digital space, but it is really just an extension of real life with perhaps some magnified risks and magnified benefits. But I don't think that at the end of the day it is [a] different place for us."</i>	F2

## Appendix B. Interview guide.

### Questions in the Interview Guide

#### PART 1: Initial Warm Up Questions

1. **Can you describe your current academic status (e.g. rank) and position within your organization? How does social media relate to this role?**
  - *What does your role actually entail from day to day?*
  - *Can you list any places where you use social media to enhance your role?*
2. **What do you see your role on social media as?**
  - a. *What defines a "SM" platform varies:*
    - i. *NA it tends to be Twitter/FB*
    - ii. *Africa sees heavy usage of What's App*
    - iii. *Personal blogs*
    - iv. *Podcasts*
  - b. *Why this platform?*
  - c. *If multiple platforms, why? How do you manage everything?*
  - d. *Do you engage in different platforms for "personal" vs. "professional" use? What drives that choice?*
3. **What social media platforms do you regularly engage in?**
  - a. *What typical activities do you engage in when using social media?*  
*Is there a theme/common thread to your typical activities?*
  - b. *Ex. Do you post a lot of work from your own lab?*
  - c. *Sharing/critiquing of guidelines within a social group?*
  - d. *Manage the social media presence for a group (ex. hospital/university department)*
4. *Do you consume content more than you produce content?*
5. **Given the following descriptions, which of these roles would you say is the best descriptor of you?**
  - a. *Do you feel you fit into more than one?*

#### Descriptions

**Translational Teacher:** Strong, often trained, educators; they work with researchers to help with knowledge translation and getting the word out about new studies/findings. *(the PR)*

**Critical Clinician:** Skilled at critical appraisal, these individuals critique and analyze new studies/findings in an open forum. *(The restaurant critics)*

**Interactive Investigator:** Produce new studies/findings, while engaging with end-users to explain and receive feedback for improving their research. *(The traditional scientist)*

#### Other definitions for participants to use in their discussions

**Skeptics:** Are openly critical of, and/or dislike FOAMed and the surge in social media as a method of rapid knowledge translation for a variety of reasons.

**Agnostics:** While they engage in social media, these individuals typically have no strong opinion on FOAMed itself, positive or negative.

**PART 2: General Questions for all**

1. What got you started using social media?
  - a. *Have you always had a strong online presence?*
  - b. *Personal enjoyment/fulfilment?*
  - c. *Some people see it as a good career move/way to stay current in their field*
  - d. *Was it an institutional requirement/expectation?*
  - e. *Have you changed the platforms you use?*
2. How much time do you spend in a given week producing content?
3. If so, how do you keep your professional and personal identities separate?
4. How do you feel social media/FOAMed has changed or impacted the field of medicine? Your field specifically?
  - a. *Do you think the impact has been positive or negative? Why?*

**PART 3: Particular Identity Questions**

*From here, begin asking questions specific to the role that we have identified them as; if they have self-identified as more than one, or as a different role than pre-assigned, ask the questions for those as well.*

*Critical Clinicians*

1. How did you develop your credibility/visibility as a critic on social media when starting out?
  - a. *What challenges did you face in trying to increase your online “impact factor”?*
2. Why do you engage in open-forum critical appraisal?
3. What advantages does this have over the more traditional peer-review process that make it attractive for you? Any disadvantages?
  - a. *Enjoyment of real time feedback?*
  - b. *Disadvantages – ex. communicating ideas properly on platforms with limited character count;*
4. Do you have anything else you would like to explain about your viewpoints?

*Translational Teachers*

1. What process do you use when choosing what new work you choose to disseminate?
  - a. *Do you work with the same researcher group consistently?*
  - b. *How do you find the work that you post/share*
2. How do you approach communicating with the much broader audience that you can reach with social media?
  - a. *Everyone from senior physicians, to medical students, to the general public can access information on most social media platforms*
  - b. *How do you navigate communicating effectively with this broad audience?*
  - c. *Do you focus your efforts on specific groups?*
3. Do you have anything else you would like to explain about your viewpoints?

*Interactive Investigators*

1. Does advocating largely for your own research via social media pose any challenges?
  - a. *Is it difficult to balance the role of “investigator” with the role of “PR”?*
  - b. *How do you keep these identities separate? Do you?*
2. Has your involvement with social media, and real-time feedback from end users, changed your approach to research? How?
  - a. *Ex. your process for developing questions, how you incorporate feedback into future work, etc?*
3. Do you have anything else you would like to explain about your viewpoints?

**PART 4: Conclusion**

Lastly, is there anything else you want to share with me?