An analysis of the relationship between academic impact and social media influence

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ABSTRACT

It is becoming increasingly common for academics to engage with each other, and the wider public, using social media. Twitter is often the platform of choice. In this work we have examined the relationship between traditional indicators of academic influence and success on social media. We show that academic reputation alone is not sufficient to develop a strong social media following. Rather, the main route to a triumphant social media profile is to engage regularly using this medium.

INTRODUCTION

In 2006, developers did not envisage Twitter becoming the information powerhouse it is today. Initial brainstorming for the project intended to create a new social network based solely on 140-character messages which could be sent via SMS, and early users were primarily microbloggers [1]. However, with Facebook already possessing a 'status update' tool, and a range of blogging sites already available, the early Twitter was not seen as catering for an unfilled niche in the social media market. Twitter's focus eventually switched; the platform became a utility for sharing live information on current news with strangers [2]. Short messages, and constantly updating streams, have made Twitter ideal for sharing thoughts on live events.

Twitter has now become the networking tool of choice for academia. Less intimate profiles give an advantage over Facebook for fostering professional relationships, whilst the ability to provide live updates from conferences, and share current research outside of your immediate contacts, makes it more versatile than LinkedIn. The public engagement potential, via the widely varied Twitter community, is also attractive. Nevertheless, there is a reluctance from some academics to engage with these tools; one anecdotal view is that Twitter detracts from academic credibility. Counter to this view, an investigation of social media engagement by nano-scientists in the USA found a positive link between increases in H-index (a measure of academic success) and popularity on Twitter [3].

In this study we sought to better understand the benefits of Twitter for academics at different stages of their career. Theoretically, a user providing a stream of high quality content, which is of interest to their target audience, should achieve a high level of impact via social media. Furthermore, this should serve to increase their academic visibility.

METHODS

Collection of Twitter metrics

Data for 172 individuals with profiles on both Twitter and Google Scholar were collected. Initial participants were selected from academics known to the author, with further participants then selected by systematically scanning both the 'Followers' and 'Following' lists of participants already in the study. This approach was taken to avoid selecting unusually active Twitter users, and to allow a range of early and late career academics to be selected. Information collected from participants' Twitter profiles included i) number of Tweets ii)

number of Followers (users who follow them) iii) number following (users who they follow) iv) "favourite" count (the number of Tweets in the user's 'Favourites' list). We also made use of http://www.retweetrank.com to determine a user's 'retweet ranking'; a measure of overall influence on Twitter. Due to the large number of inactive Twitter profiles we found that some users had a retweet rank of zero. Such users were excluded from this study.

Collection of Academic metrics

Google Scholar was used to collect academic citation data. Names acquired from Twitter were used to search Google Scholar, using profile picture and location information to verify that both accounts belonged to the same person. We gathered information for i) overall number of citations ii) the year of first citation (used as an indicator of academic age) and H-index. The latter is a measure of both productivity and impact over an entire career tends to be higher for older researchers [4]. Note that citation metrics can vary across databases [5]. Google Scholar was chosen since it covers both conference proceedings and primary journals whilst Scopus and Web of Science do not [6]. We acknowledge that Google Scholar accesses more "grey literature" but this does not cause large changes in H [7]. Additionally, as we were looking at trends across the whole dataset, uniform inflation H should not be problematic. Individuals with a H-index of above 80 were not included in our analysis. Such individuals were rare and their inclusion skewed the overall analysis. Our final dataset comprised 156 participants.

RESULTS

Relationship between Twitter metrics, H-index and academic age

First, we divided academics into bins on the basis of their H-index. Thus, individuals fell into H-index bins of 0-9, 10-19, 20-29 and so on. For each bin we then calculated the average retweet rank. The data are shown in Figure 1A as a box plot. In this plot the upper and lower boundaries of the box represent 75th and 25th percentiles respectively, the whiskers represent 95% confidence intervals and the median is shown by a bold line. Outliers are shown as dots. Overall, this analysis suggests a positive correlation between H-index and retweet rank. This trend is most pronounced when H exceeds 50. No difference was seen between genders (data not shown). In a similar analysis we examined the relationship between academic age (i.e. the year in which an individual was first cited) and H-index. As expected, there was a clear correlation between these two metrics (Figure 1B). We expected to see a similar relationship between academic age and retweet rank. However, within age groups examined, this trend is hardly apparent (Figure 1C). The oldest age group (first citation pre-1988) and the youngest (2008-2012) show a clear difference ($p < 0.05$) but there is no statistically significant difference between the other groups.

Relationship between frequency of twitter use, Twitter metrics and H-index

We next turned our attention to how differences in the way that academics use Twitter might influence their social media following. For example, it would seem logical that more frequent engagement with other academics via Twitter should lead to a higher retweet rank, more retweets, and a greater number of followers.

Surprisingly, the relationship between retweet rank and tweeting frequency was poorly correlated (Figure 2A). However, there was a striking correlation between the number of tweets that a users posts and the number of followers that they attract (Figure 2B). This was the case regardless of H-index (compare different coloured data points in Figure 2B).

Relationship between frequency of twitter use and H-index

The analysis in Figure 2B suggests that the frequent use of Twitter is the easiest way to generate interest in a user's profile. We next determined if highly engaged Twitter users fell into any particular academic group (Figure 3). Academic success not found to be a key predictor of tweeting frequency; no distinct difference in tweet count was observed between lower and higher H-indices. More surprisingly, academic age also seems to be a poor predictor of Tweeting frequency (data not shown) contrary to the view that social media is a tool predominated by the young.

DISCUSSION

As expected, academic success is positively correlated with success on Twitter. This was most prevalent above an H-index of 50, which we can theorise is a 'threshold point' at which an academic becomes known in the wider scientific community. We were surprised however to find that the role of H-index was minor in comparison tweet count. High Tweet frequency was strongly correlated with numbers of followers, and also had an impact on retweet ranking. We conclude that H-index serves to enhance the benefits gained from Tweeting regularly and provides a buffer for those Tweeting less frequently. In conclusion, successful Tweeters do more than just set up an account and let their academic reputation do the work; they're providing a regular stream of useful content to their followers.

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Figure 1

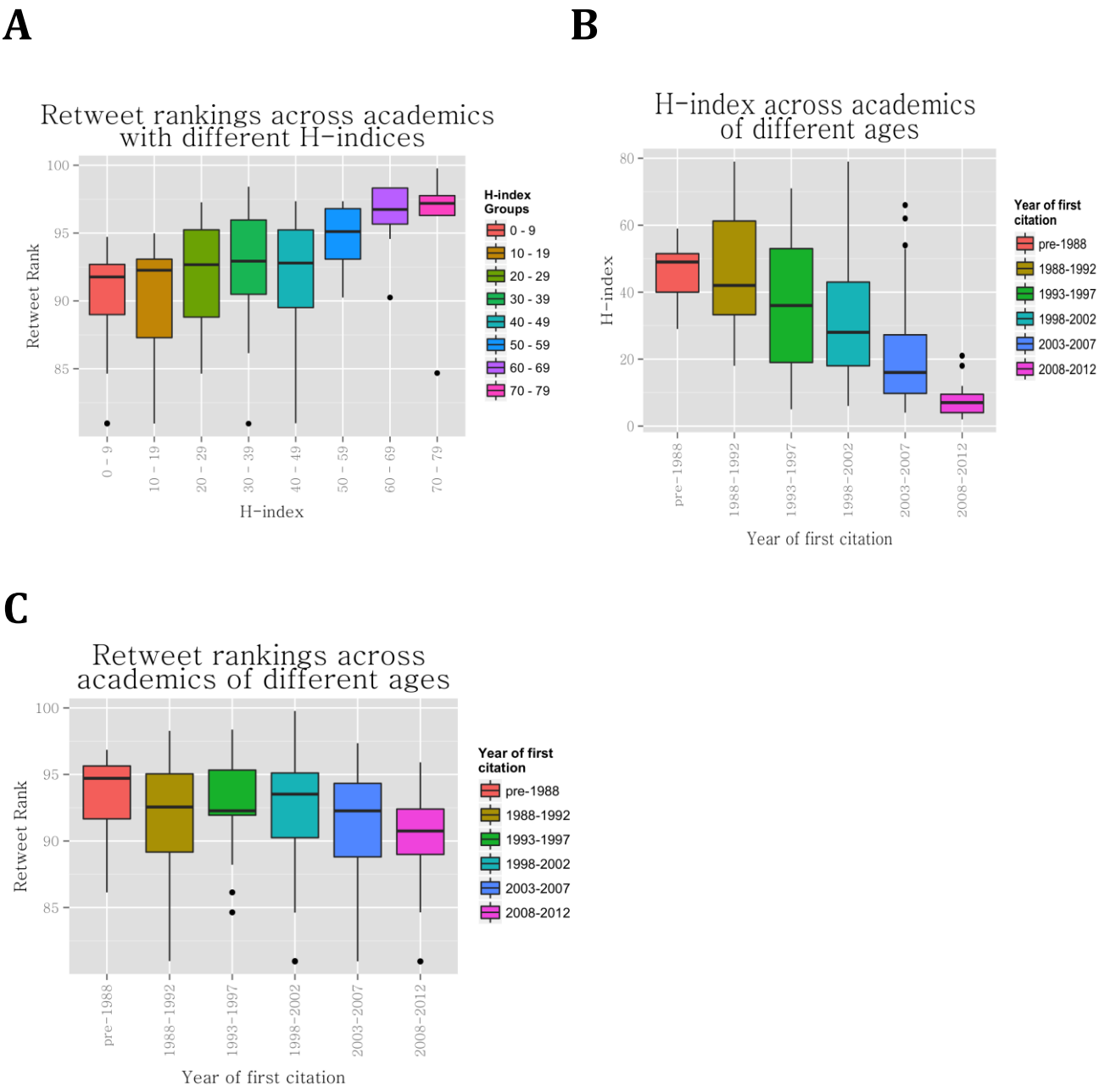
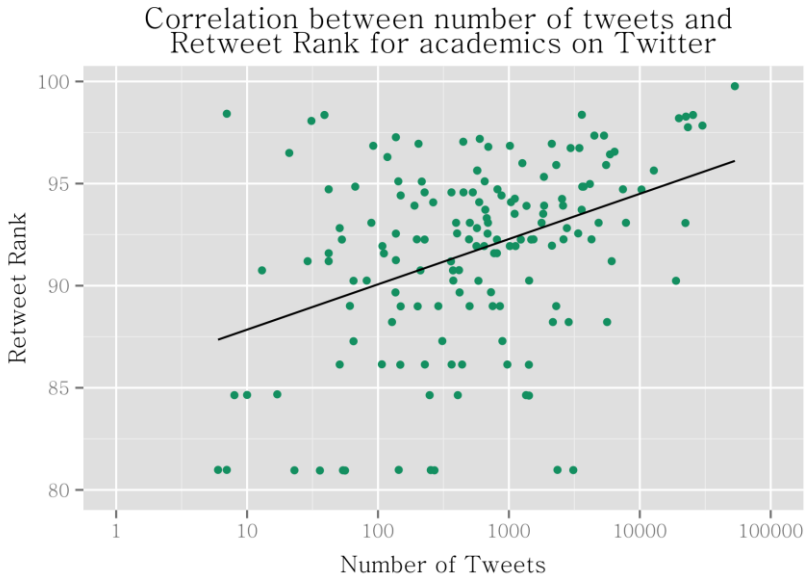


Figure 1: Relationship between indicators of academic impact and social media influence. A. Relationship between retweet rank and H-index. The panel shows a box plot illustrating the relationship between H-index and retweet rank. The upper and lower boundaries of the box represent 75th and 25th percentiles respectively, the whiskers represent 95% confidence intervals and the median is shown by a bold line. Outliers are shown as dots. B. Relationship between H-index and academic age. C. Relationship between retweet rank and academic age.

Figure 2

A



B

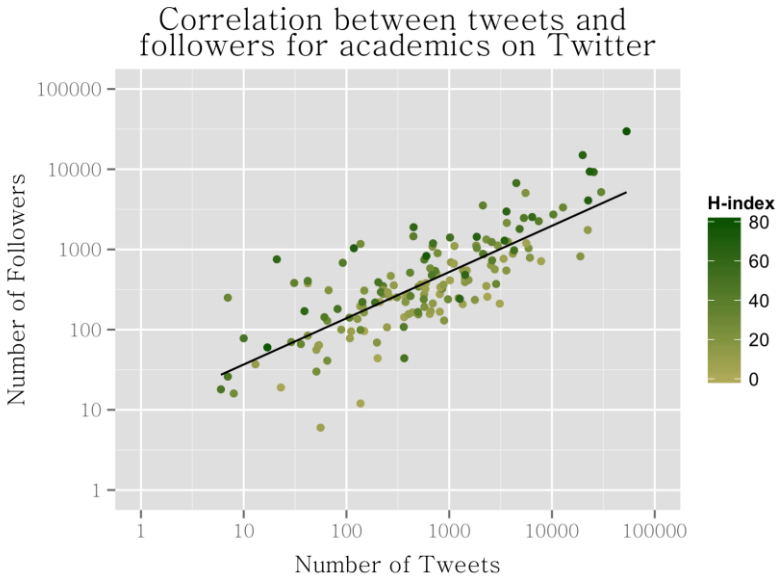


Figure 2: Relationship between Twitter usage and Twitter influence. A. Relationship between tweet frequency and retweet rank. The panel shows a scatter plot depicting the relationship between tweet frequency and retweet rank. B. Relationship between tweet frequency, number of followers, and H-index.

Figure 3

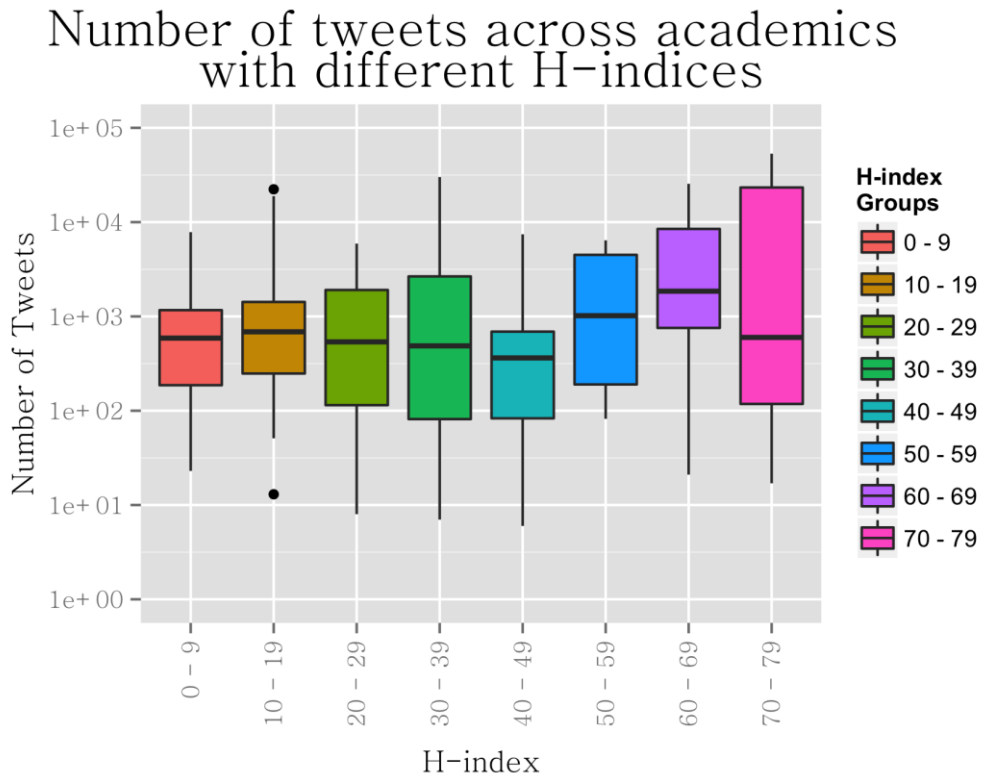


Figure 3: Relationship between tweet frequency and H-index. The figure shows a box plot illustrating the relationship between H-index and tweet frequency. The upper and lower boundaries of the box represent 75th and 25th percentiles respectively, the whiskers represent 95% confidence intervals and the median is shown by a bold line. Outliers are shown as dots.