JACC: CASE REPORTS VOL. 2, NO. 2, 2020


EDUCATIONAL CORNER

VOICES IN CARDIOLOGY

# The Kardashian Index of Cardiologists

## Celebrities or Experts?

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Social media have pervaded all strata of society, and cardiologists are no exception to this phenomenon. Social media has changed the way we communicate, including the dissemination of novel scientific findings to physician colleagues, allied health care professionals, and patients. Clinicians may also use social media to boost their visibility and interact with other scientists to engage in discussions focused on their research. A high number of "likes" and comments on a social medium post are intuitively more appealing and augment the perceived importance of an article. Recently, cardiologists have also begun to use social media to discuss findings published in a manuscript, attracting peer and even patient engagement (1,2). All major cardiology conferences such as the American College of Cardiology have social media ambassadors and editors who tweet important presentations and news from the scientific sessions to keep their followers updated. The presence of medical journals, clinicians, and clinical investigators on social media has made their published content more accessible and available to a wider audience.

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Some cardiology journals such as *Circulation* have also made their articles available for free if accessed through their social media handles, making journal content more readily available to a wider audience (3). Physicians can share posts from relevant journals on their own social media handles or provide further commentary in the form of "Tweetorials" or "Twitter chats" to increase dissemination. Free access to articles and resharing on social media increase the article views and eventually the number of citations for the journals and the physicians (4-6). Additionally, it has been suggested that journals with more followers have a higher impact (7). On the contrary, *Circulation* conducted a randomized study observing the number of page views received by articles exposed to and not exposed to social media over the course of 1 year (8). The study editors did not find any differences between the pages viewed among the articles in the social media and those in control groups.

Tweets and increased social media publicity allow researchers to come across useful citations which they might have missed or overlooked during their publications search. The evidence regarding the increase in citations following tweets is mixed. A total of 10% to 20% of articles on PubMed are tweeted at least once (9); however, another survey revealed that a high percentage of people who tweeted the articles had no relationship to academia and were unlikely to cite the article (10). Therefore, tweets may increase the buzz around the article, but its correlation with more citations is ambiguous. In this context, the "Kardashian index" (aka, the "K-index") was recently proposed to study the correlation between the number of citations for a physician and/or scientist and the number of followers they have on Twitter (11).

After conducting a search for the top 100 cardiology hospitals in accordance with the most recent issue of *U.S. News and World Report*, 1,500 cardiologists were randomly selected from these top hospitals. Of these 1,500 cardiologists, only 238 were found

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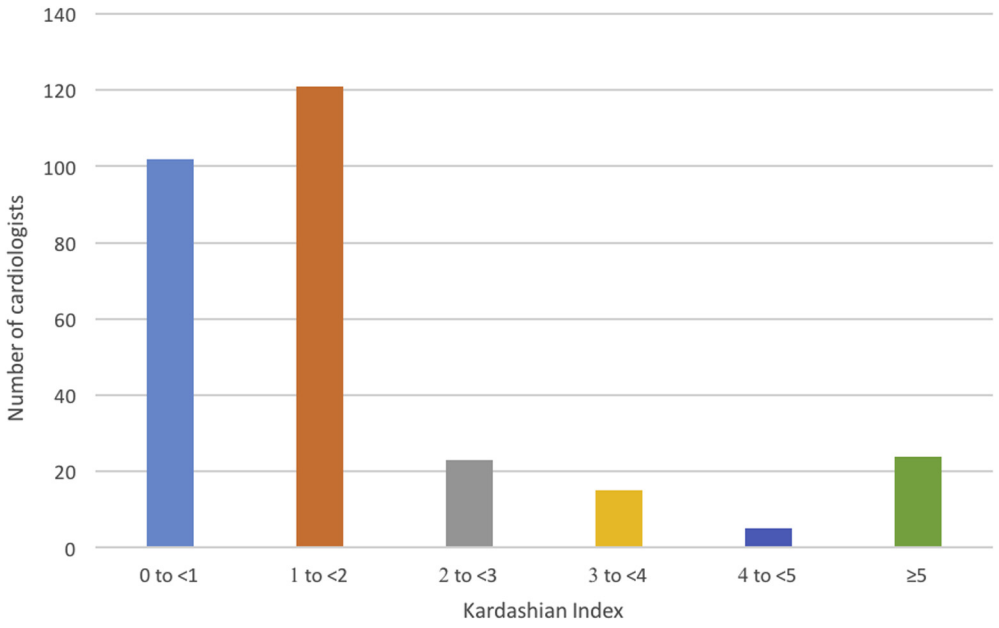
ISSN 2666-0849 https://doi.org/10.1016/j.jaccas.2019.11.068

**FIGURE 1** Number of Cardiologists Having a Kardashian Index in Different Ranges




on Twitter. This emphasizes the fact that, despite the proclamation of how Twitter has become a growing force in cardiology, only a minority of practicing cardiologists are on Twitter. The K-index was calculated by using the following formula: K-index = $Ft/F$, where $Ft$ is the number of followers a physician has on Twitter, and $F$ is the number of followers a physician should have based on the that physician's number of citations ($C$) (11). The $F$ factor was further calculated using the formula: $F = 43.3\ (C)^{0.32}$ (11). A higher K-index suggests that a physician may be over-celebrated due to his or her active presence on social media. Physicians with a K-index >5 are considered to be "Kardashians" of the academic world (11).

We observed that the majority (n = 156) of cardiologists had a low K-index ranging between 0 and 2, indicating that most cardiologists are not just "social media sensations," and factors other than just the number of followers also influences their citations and success (**Figure 1**). For instance, the duration of the presence of physicians on social media also varies; some renowned and established cardiologists may have been comparatively new to Twitter, resulting in fewer followers but high citations and, ultimately, a low K-index. On the contrary, the increased number of followers could simply be attributed to the cardiologist already having a high number of citations or being renowned in their field, which attracts more followers. Very few (n = 25) cardiologists had a K-index above 5 and could be called Kardashians, demonstrating that the Kardashian phenomenon does exist. Similar results were observed in a previous report of genomic biologists who observed a positive correlation between the number of followers and the number of citations with only few scientists being termed "Kardashians."

Further differences were noted regarding sex and specialty. Prior studies have reported a low percentage of female scientists on Twitter (11). Only 17 cardiologists in the present survey were women and, of these, very few (n = 3) had an inflated Twitter following according to the K-index. The usage of social media may also vary by specialty attributed to the fact that some subspecialties may be considered more in demand and attract more interest from the community and younger physicians and, hence, are more active on social media. In the present survey, the authors found a greater percentage of interventional cardiologists and electrophysiologists on Twitter. The highest median K-index was found in interventional cardiology followed by electrophysiology. The use of social media has become ubiquitous in interventional cardiology (12,13). A survey of social media-savvy cardiologists in the United States showed that 20% were interventional cardiologists, 7% were electrophysiologists, and the remainder were general cardiologists and from other cardiovascular specialties (14).

Although the evidence regarding the influence of social media on the citations received by an article is vague, the adoption of social media by some physicians is still relatively new. As the use and reach of social media grow, it is expected to become a necessity rather than a choice. As this phenomenon unfolds, and more up and coming cardiologists from the younger "social media generation" become actively involved in academic research, K-index patterns should be expected to change in the near future. It would be interesting to further investigate if the number of citations increased exponentially after a physician joined or became more active on social media.

It is important to realize that Kardashian index in and of itself has limited scientific value, and for this commentary, the authors included only a selected group of "Twitteratis." However, with the intermingling of academic research and social media, the authors feel the analytics between citations and social media use are interesting for the wider medical community and patients as well. Our work reinforces the fact that very few cardiologists are "Kardashians" of social media. This can serve as a reminder to the general public and lay press that "tooting your own horn" does not necessarily equate with more impactful work.

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**KEY WORDS** citations, social media