A Study of the Relationship between High X (Twitter) Mentions and Citation Counts in the Field of Telemedicine: A Co-relational Analysis

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ABSTRACT-

In the "X" (formerly Twitter) platform, people share information and express their views, reviews, likes, dislikes and findings through tweets and retweets. In the scientific community, sharing new findings is a trend on X to reach maximum visibility among peers. The discussion on X could be a critical source for finding research gaps for further study. This study aims to analyze the influence of X mentions on citation counts. The selected topic, "Telemedicine", played an essential role during the COVID-19 pandemic when social distancing was mandatory. During that period, social media was the most effective way of scientific discussion. The five most relevant keywords in the title were used to extract data from Altmetrics explorer. The data of the first top 50 X mentions of papers were downloaded for each keyword for the study. After the removal of duplicate entries, a data set of 245 unique papers was considered for the study. The finding revealed a positive correlation between high X mentions and Dimension® citation counts. The p-value is 0.013 (for 245 papers) signifies the positive co-relation and the influence of X mentions has only a 2.5% increase in citation counts. The study indicates that there is a positive correlation between X mentions and citation count, but it is not conclusive that X mentions are not the only cause of high citations. The researchers may use X to promote their publications for greater visibility which will help to attract more citations.

Keywords: Altmetric, Citation counts; Dimensions, Social Networking Site, Telemedicine, Twitter, X.

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INTRODUCTION

"X" is Twitter's rebranded identity, envisioned by Elon Musk, who acquired Twitter in 2022 on July 2023, Twitter replaced the iconic blue bird logo with a stylized "X" logo and removed the Twitter name from its websites, apps, and headquarters. X is an American Social Media Company. It is a microblogging social networking site and helps in disseminating information to a large community. The shot communication or micro-blogging on X is largely discussed, criticized, and shared. People on social media. People express their likings & dislikings and share them with others for information. Posting scientific on social media platforms play a critical role in the wider visibility/impact of research. X can be used by researchers in a variety of

ways. Some potential applications of X for researchers include:

- Staying up-to-date on the latest developments in their field: Researchers can use X to search for and follow relevant hashtags, accounts, and conversations to keep abreast of the latest news and research in their area of interest.
- Sharing research and findings: X can be used to share research papers, presentations, data sets, and other materials with a wide audience, helping to promote and disseminate research.
- Building and maintaining professional networks: Researchers can use X to connect with other researchers and experts in their field, which can be helpful for collaboration and finding funding opportunities.
- Participating in online conferences and workshops: Many conferences and workshops now have X hashtags that allow attendees to participate in virtual discussions and networking events.
- Enhancing visibility and impact: X can help researchers build their personal brand and increase the visibility of their research, which can lead to more citations and opportunities for collaboration.
- Crowdsourcing: Researchers can use X to gather data from large groups of people by asking questions and running surveys.
- Identifying research gaps: X can be used to identify areas of research that are lacking attention and to identify potential collaborators.
- Understanding public perception of research: X can be used to track public opinion and understand how different areas of research are being perceived by the general public.

The importance of Altmetric Attention Score

Altmetric is a metric which signifies the social impact of scientific research. "Altmetrics are metrics and qualitative data that are complementary to traditional, citation-based metrics. They can include (but are not limited to) peer reviews on Faculty of 1000, citations on Wikipedia and in public policy documents, discussions on research blogs, mainstream media coverage, bookmarks on reference managers like Mendeley, and mentions on social networks such as X. Sourced from the Web, Altmetric can tell you a lot about how often journal articles and other scholarly outputs like datasets are discussed and used around the world" ("What Are Altmetrics?," 2015)

The Altmetric scores define the social impact of research. This is the alternative to bibliometrics. Social media play a vital role here. Not just citation is only a metric used for article-level metrics but also views, downloads, shares, saves, bookmarks, tags, likes, recommends, and discussions are also counted for article-level metrics (Bornmann, 2014). The Altmetric data sources include "bookmarking, reference managers, recommendation services, comments on articles, microblogging, Wikipedia, and blogging" (Priem & Hemminger, 2010). About "93% of PLOS Biology research articles published since June 2012 have been discussed on Twitter, and 63% mentioned on Facebook" (Fenner, 2013), describe the four benefits of altmetrics compared with traditional metrics: "(1) Broadness: altmetrics measure impact beyond science, (2) Diversity: altmetrics can measure the impact of scholarly products other than papers, (3) Speed: altmetrics permit impact to be measured shortly after the publication of a paper (or the completion of other products), (4) Openness: as a rule, it is easy to obtain altmetric data" (Wouters & Costas, 2012).

The Altmetric score is represented as a colourful donut, "The colors of the Altmetric donut each represent a different source of attention" ("The Donut and Altmetric Attention Score," 2015). Figure 1 shows the Twitter (X) logo; The color represents X mentions, and the Altmetric representation of X mentions. An example of high X mentions of the article.

"Telemedicine 2020 and the next decade" is shown in the figure. In the altmetric attention score X (tweets and retweets) is assigned to 0.25 as the weightage, whereas the highest weightage is given to news, i.e. eight (8).

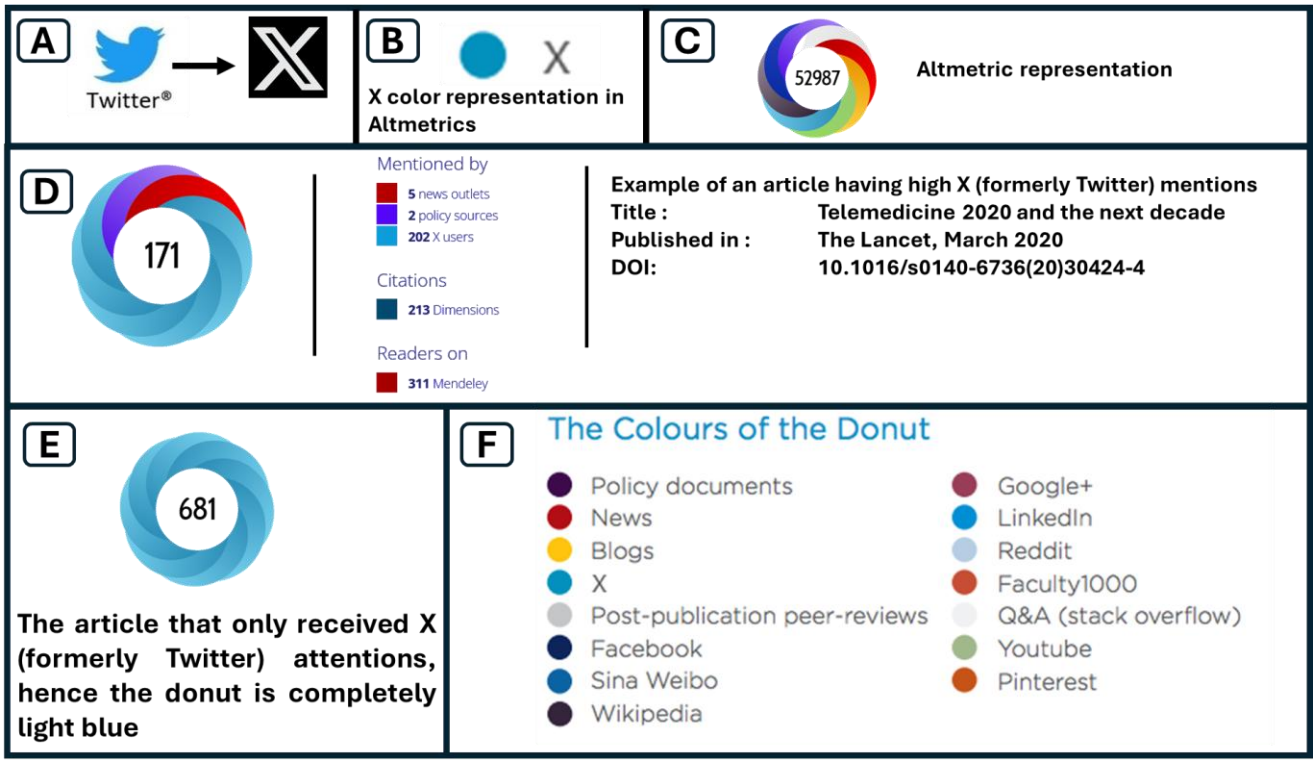

Figure 1: (A): X Logo; (B) X color representation in Altmetric donut; (C) A representation of a altmetrics (Image source Altmetrics); (D) Example of a Altmetric donut with adequate X mentions and citations, (E) An Illustration of a single color donut associate with only X mentions (F) The different color code of Altmetric. Image Source: *https://www.altmetric.com/*

The mentions in the form of sharing, commenting and retweeting also counted as a part of the Altmetric attention score. The more X mentions will yield, the more Altmetric score; one of the best examples is the illustrated example in figure 1(D).

X's Impact

Studies confirm that citations are important in indicating journal quality (Walters & Markgren, 2019), (Zhao & Wang, 2019). High-quality journals have a high rate of citations, which increases the journal's impact factor, which is an internationally accepted quality parameter for journals. X plays a vital role in the wide circulation of research outcomes, which is extensively discussed among the scientific communities; this will enhance citation. On the other hand, Salajegheh & Dayari (2019) conducted a study on medical journals and found that Altmetric plays a significant role in improving journal quality.

About Telemedicine

Telemedicine is the application of Information and Communication Technology (ICT in the medical and health service sectors. There is no one unique definition of Telemedicine. The term was coined in the 1970s, which literally means "healing at a distance"(Strehle & Shabde, 2006). This signifies the use of ICT to improve patient outcomes by increasing access to care and medical information (Światowa Organizacja Zdrowia, 2010).

OBJECTIVES OF THE STUDY

The primary objective of the study is to analyze the impact of X discussions and their impact on article citation counts.

- To identify the highly discussed papers on Telemedicine on X
- To measure the impact of X discussion on the subject domain of Telemedicine
- To know the influence of X promotion on citation count.

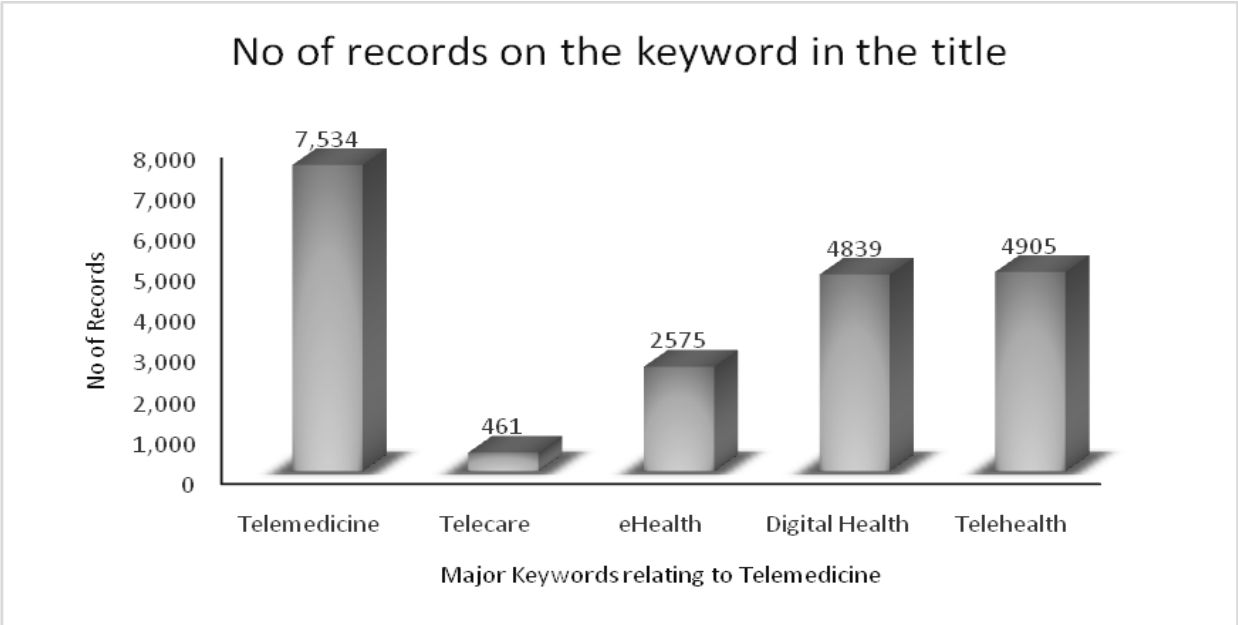

Figure 2: Number of record retrieved from Altmetric explorer, using these five most relevant keywords in the title, in the topic Telemedicine

- To identify the journals having high X mentions in the field of Telemedicine
- To justify the low weightage for the X mentions in the altimetric score

SCOPE AND LIMITATION OF THE STUDY

The study has two primary hypotheses that are:

H1: X mentions do not have any significant influence on citation counts

H2: X mentions have a significant influence on citation counts.

METHODOLOGY

Data Source

The Altmetric explorer (https://www.altmetric.com/explorer/login) free Librarian access version was used as a data source, for the searching and retrieval of articles related to the keywords.

Data Exploration Strategy

In the study, the Altmetric data was harvested from Altmetric® explorer on December 19, 2022. The data mining using the keyword "Telemedicine"; "Telecare"; "Telehealth"; "eHealth", and "Digital Health" in the source title. The identified keywords are too close in nature and well associated with each other.

Data Retrieval

Being a free version, only the first 50 articles could be harvested from the retrieved data. So the retrieved data was sorted in descending order of high X-mentioned articles and harvested the first 50 articles for analysis. A total of (50 X 5) 250 publications were retrieved on these five keywords, out of which five titles were found to be duplicates; hence, the total sample size is 245.

Data Analysis Tools

Microsoft® Excel with EXSTAT Cloud add-on was used for data analysis. The linear regression analysis and the Pearson correlation coefficient formula was used to find out the relation between the X mentions and the number of citations recorded by Dimensions®.

The Sample

The whole collected Sample was arranged in descending order of their X mentions before putting any statistical test.

Limitation

The study is limited to the most relevant keyword present in the title and collected only the top 50 X mentions and their related data.

Table 1: Journals having high X mentioned having at least five records

S. No.	Title of the Journal	No. of Records
1	Journal of Medical Internet Research	35
2	JAMA: Journal of the American Medical Association	14
3	New England Journal of Medicine	8
4	British Medical Journal	7
5	The Lancet	6
6	JAMA Internal Medicine	6
7	NPG Digital Medicine	6
8	JAMA Network Open	6
9	JAMA Psychiatry	5
10	BMJ Open	5
11	Health Affairs	5
12	Age & Ageing	5

Limitation

The study is limited to the most relevant keyword present in the title and collected only the top 50 X mentions and their related data.

ANALYSIS AND INTERPRETATION OF DATA

The search result of these keywords in the Altmetric explorer platform is elaborated in Figure 2. The highest number of records (7534) was found in the keyword Telemedicine, and the lowest no of records (2575) was found with the keyword Telecare, whereas the keyword Digital Health and Telehealth yield 4839 and 4905 respectively, which is almost equal number of result and the eHealth yield 2575, which is fourth in the number.

A good number of publications are observed in most of the medicinal journals, which are multidimensional in nature. A journal having at least five top X-mentioned articles is listed in Table 1. The articles published in the journal "Journal of Medical Internet Research" have high X mentions (among the top 50 X mentions). This has been observed that medical society journals have a high number of X mentions.

In the study, the subject of Telemedicine and the co-related keywords in the title was considered. The top 10 X mentions are illustrated in Table 2. The highest X mentions (n= 3753), has only 27 citations count, published in the journal "BMC Medical Informatics and Decision Making" has the title "Assessing patient safety in a pediatric telemedicine setting: a multi-methods study"; and which indicates there is a least co-relation between X mentions and citation count. The article having the second highest X mention was 1642, having surprisingly zero citations (might be due to a preprint and Dimensions may not be indexing this preprint, published in

Table 2: Top 10 articles having the highest X mentions (all keywords)

S. No.	Publication details	X mentions	Dimensions citations
1	Haimi, M., et al., (2020). Assessing patient safety in a pediatric telemedicine setting: A multi-methods study. *BMC Medical Informatics and Decision Making*, *20*(1), 63. https://doi.org/10.1186/s12911-020-1074-7	3753	27
2	Doornek, T., Shao, N., Burton, P., Ceddia, F., & Fraile, B. (2022). Antibody response following covid-19 boosters during the omicron wave in the united states: A decentralized, digital health, real-world study [Preprint]. Infectious Diseases (except HIV/AIDS). https://doi.org/10.1101/2022.07.31.22278173	1642	0
3	Hollander, J. E., & Carr, B. G. (2020). Virtually perfect? Telemedicine for covid-19. New England Journal of Medicine, 382(18), 1679–1681. https://doi.org/10.1056/NEJMp2003539	1189	1968
4	Haimi, M., & Gesser-Edelsburg, A. (2022). Application and implementation of telehealth services designed for the elderly population during the COVID-19 pandemic: A systematic review. Health Informatics Journal, 28(1), 146045822210755. https://doi.org/10.1177/14604582221075561	1111	3
5	Li, X., Dunn, et al., (2017). Digital Health: Tracking Physiomes and Activity Using Wearable Biosensors Reveals Useful Health-Related Information. PLOS Biology, 15(1), e2001402. https://doi.org/10.1371/journal.pbio.2001402	630	268
6	Haidt, J., & Allen, N. (2020). Scrutinizing the effects of digital technology on mental health. Nature, 578(7794), 226–227. https://doi.org/10.1038/d41586-020-00296-x	621	41
7	de Jong, M. J., et al., (2017). Telemedicine for management of inflammatory bowel disease (myIBDcoach): A pragmatic, multicentre, randomized controlled trial. The Lancet, 390(10098), 959–968. https://doi.org/10.1016/S0140-6736(17)31327-2	548	209
8	Kickbusch, I., et al., (2021). The Lancet and Financial Times Commission on governing health futures 2030: Growing up in a digital world. The Lancet, 398(10312), 1727–1776. https://doi.org/10.1016/S0140-6736(21)01824-9	547	39
9	Tuckson, R. V., Edmunds, M., & Hodgkins, M. L. (2017). Telehealth. New England Journal of Medicine, 377(16), 1585–1592. https://doi.org/10.1056/NEJMsr1503323	541	499
10	Greenhalgh, T., A'Court, C., & Shaw, S. (2017). Understanding heart failure; explaining telehealth – a hermeneutic systematic review. BMC Cardiovascular Disorders, 17(1), 156. https://doi.org/10.1186/s12872-017-0594-2	503	89

Table 3: Top 10 articles having the highest X mentions in each keyword in the title Keyword in the title: "Telemedicine"

Sr. No.	**Publications details**	**X mentions**	**Dimensions citations**
1	Haimi, M., Brammli-Greenberg, S., Baron-Epel, O., & Waisman, Y. (2020). Assessing patient safety in a pediatric telemedicine setting: A multi-methods study. BMC Medical Informatics and Decision Making, 20(1), 63. https://doi.org/10.1186/s12911-020-1074-7	3753	27
2	Hollander, J. E., & Carr, B. G. (2020). Virtually Perfect? Telemedicine for Covid-19. New England Journal of Medicine, 382(18), 1679–1681. https://doi.org/10.1056/NEJMp2003539	1189	1968
3	de Jong, M. J., van der Meulen-de Jong, A. E., Romberg-Camps, M. J., Becx, M. C., Maljaars, J. P., Cilissen, M., van Bodegraven, A. A., Mahmmod, N., Markus, T., Hameeteman, W. M., Dijkstra, G., Masclee, A. A., Boonen, A., Winkens, B., van Tubergen, A., Jonkers, D. M., & Pierik, M. J. (2017). Telemedicine for management of inflammatory bowel disease (myIBDcoach): A pragmatic, multicentre, randomized controlled trial. The Lancet, 390(10098), 959–968. https://doi.org/10.1016/S0140-6736(17)31327-2	548	209
4	Lam, K., Lu, A. D., Shi, Y., & Covinsky, K. E. (2020). Assessing Telemedicine Unreadiness Among Older Adults in the United States During the COVID-19 Pandemic. JAMA Internal Medicine, 180(10), 1389. https://doi.org/10.1001/jamainternmed.2020.2671	452	301
5	Martinez, K. A., Rood, M., Jhangiani, N., Kou, L., Boissy, A., & Rothberg, M. B. (2018). Association Between Antibiotic Prescribing for Respiratory Tract Infections and Patient Satisfaction in Direct-to-Consumer Telemedicine. JAMA Internal Medicine, 178(11), 1558. https://doi.org/10.1001/jamainternmed.2018.4318	423	68
6	Aiken, A., Lohr, P., Lord, J., Ghosh, N., & Starling, J. (2021). Effectiveness, safety and acceptability of no-test medical abortion (termination of pregnancy) provided via Telemedicine: A national cohort study. BJOG: An International Journal of Obstetrics & Gynaecology, 128(9), 1464–1474. https://doi.org/10.1111/1471-0528.16668	410	84
7	Roberts, E. T., & Mehrotra, A. (2020). Assessment of Disparities in Digital Access Among Medicare Beneficiaries and Implications for Telemedicine. JAMA Internal Medicine, 180(10), 1386. https://doi.org/10.1001/jamainternmed.2020.2666	283	179
8	Grossman, D., & Grindlay, K. (2017). Safety of Medical Abortion Provided Through Telemedicine Compared With In Person. Obstetrics & Gynecology, 130(4), 778–782. https://doi.org/10.1097/AOG.0000000000002212	274	74
9	Barnett, M. L., Ray, K. N., Souza, J., & Mehrotra, A. (2018). Trends in Telemedicine Use in a Large Commercially Insured Population, 2005-2017. JAMA, 320(20), 2147. https://doi.org/10.1001/jama.2018.12354	271	209

10	Shaw, S. C., Davis, L.-J., & Doherty, M. (2022). Considering autistic patients in the era of Telemedicine: The need for an adaptable, equitable, and compassionate approach. BJGP Open, BJGPO.2021.0174. https://doi.org/10.3399/BJGPO.2021.0174	263	4
Keyword in the title: "Telecare"			
11	Greenhalgh, T., Wherton, J., Sugarhood, P., Hinder, S., Procter, R., & Stones, R. (2013). What matters to older people with assisted living needs? A phenomenological analysis of the use and non-use of telehealth and telecare. Social Science & Medicine, 93, 86–94. https://doi.org/10.1016/j.socscimed.2013.05.036	252	203
12	Greenhalgh, T., Procter, R., Wherton, J., Sugarhood, P., & Shaw, S. (2012). The organizing vision for telehealth and telecare: Discourse analysis: Table 1. BMJ Open, 2(4), e001574. https://doi.org/10.1136/bmjopen-2012-001574	205	137
13	Greenhalgh, T., Procter, R., Wherton, J., Sugarhood, P., Hinder, S., & Rouncefield, M. (2015). What is quality in assisted living technology? The ARCHIE framework for effective telehealth and telecare services. BMC Medicine, 13(1), 91. https://doi.org/10.1186/s12916-015-0279-6	157	121
14	Henderson, C., Knapp, M., Fernández, J.-L., Beecham, J., Hirani, S. P., Beynon, M., Cartwright, M., Rixon, L., Doll, H., Bower, P., Steventon, A., Rogers, A., Fitzpatrick, R., Barlow, J., Bardsley, M., & Newman, S. P. (2014). Cost-effectiveness of telecare for people with social care needs: The Whole Systems Demonstrator cluster randomized trial. Age and Ageing, 43(6), 794–800. https://doi.org/10.1093/ageing/afu067	135	41
15	Oliver, D. (2017). David Oliver: Telehealth and telecare need a different approach. BMJ, j5108. https://doi.org/10.1136/bmj.j5108	109	6
16	Brintazzoli, G. (2017, March 6). Telecare is more than just technology – it has the power to create care networks for older people. The Conversation. http://theconversation.com/telecare-is-more-than-just-technology-it-has-the-power-to-create-care-networks-for-older-people-70360	101	0
17	Howard, R., Gathercole, R., Bradley, R., Harper, E., Davis, L., Pank, L., Lam, N., Talbot, E., Hooper, E., Winson, R., Scutt, B., Ordonez Montano, V., Nunn, S., Lavelle, G., Bateman, A., Bentham, P., Burns, A., Dunk, B., Forsyth, K., … Gray, R. (2021). The effectiveness and cost-effectiveness of assistive technology and telecare for independent living in dementia: A randomized controlled trial. Age and Ageing, 50(3), 882–890. https://doi.org/10.1093/ageing/afaa284	95	20
18	Steventon, A., Bardsley, M., Billings, J., Dixon, J., Doll, H., Beynon, M., Hirani, S., Cartwright, M., Rixon, L., Knapp, M., Henderson, C., Rogers, A., Hendy, J., Fitzpatrick, R., & Newman, S. (2013). Effect of telecare on use of health and social care services: Findings from the Whole Systems Demonstrator cluster randomized trial. Age and Ageing, 42(4), 501–508. https://doi.org/10.1093/ageing/aft008	65	90
19	Hinman, R. S., Campbell, P. K., Lawford, B. J., Briggs, A. M., Gale, J., Bills, C., Kasza, J., Harris, A., French, S. D., Bunker, S. J., Forbes, A., & Bennell, K. L. (2020). Does telephone-delivered exercise advice and support by physiotherapists improve pain and/or function in people with knee osteoarthritis? Telecare randomized controlled trial. British Journal of Sports Medicine, 54(13), 790–797. https://doi.org/10.1136/bjsports-2019-101183	65	51

20	Steils, N., Woolham, J., Fisk, M., Porteus, J., & Forsyth, K. (2021). Carers' involvement in telecare provision by local councils for older people in England: Perspectives of council telecare managers and stakeholders. Ageing and Society, 41(2), 456–475. https://doi.org/10.1017/S0144686X1900120X	60	6
Keyword in the title: "Telehealth"			
21	Haimi, M., & Gesser-Edelsburg, A. (2022). Application and implementation of telehealth services designed for the elderly population during the COVID-19 pandemic: A systematic review. Health Informatics Journal, 28(1), 146045822210755. https://doi.org/10.1177/14604582221075561	1111	3
22	Tuckson, R. V., Edmunds, M., & Hodgkins, M. L. (2017). Telehealth. New England Journal of Medicine, 377(16), 1585–1592. https://doi.org/10.1056/NEJMsr1503323	541	499
23	Greenhalgh, T., A'Court, C., & Shaw, S. (2017). Understanding heart failure; explaining telehealth – a hermeneutic systematic review. BMC Cardiovascular Disorders, 17(1), 156. https://doi.org/10.1186/s12872-017-0594-2	503	89
24	Dorsey, E. R., & Topol, E. J. (2016). State of Telehealth. New England Journal of Medicine, 375(2), 154–161. https://doi.org/10.1056/NEJMra1601705	496	702
25	Ashwood, J. S., Mehrotra, A., Cowling, D., & Uscher-Pines, L. (2017). Direct-To-Consumer Telehealth May Increase Access To Care But Does Not Decrease Spending. Health Affairs, 36(3), 485–491. https://doi.org/10.1377/hlthaff.2016.1130	310	169
26	Shachar, C., Engel, J., & Elwyn, G. (2020). Implications for Telehealth in a Postpandemic Future: Regulatory and Privacy Issues. JAMA, 323(23), 2375. https://doi.org/10.1001/jama.2020.7943	307	192
27	Chang, J. E., Lai, A. Y., Gupta, A., Nguyen, A. M., Berry, C. A., & Shelley, D. R. (2021). Rapid Transition to Telehealth and the Digital Divide: Implications for Primary Care Access and Equity in a Post-COVID Era. The Milbank Quarterly, 99(2), 340–368. https://doi.org/10.1111/1468-0009.12509	281	73
28	Steventon, A., Bardsley, M., Billings, J., Dixon, J., Doll, H., Hirani, S., Cartwright, M., Rixon, L., Knapp, M., Henderson, C., Rogers, A., Fitzpatrick, R., Hendy, J., Newman, S., & for the Whole System Demonstrator Evaluation Team. (2012). Effect of telehealth on use of secondary care and mortality: Findings from the Whole System Demonstrator cluster randomized trial. BMJ, 344(jun21 3), e3874–e3874. https://doi.org/10.1136/bmj.e3874	265	459
29	Greenhalgh, T., Wherton, J., Sugarhood, P., Hinder, S., Procter, R., & Stones, R. (2013). What matters to older people with assisted living needs? A phenomenological analysis of the use and non-use of telehealth and telecare. Social Science & Medicine, 93, 86–94. https://doi.org/10.1016/j.socscimed.2013.05.036	252	203
30	Bradley, K. E., Cook, C., Reinke, E. K., Vinson, E. N., Mather, R. C., Riboh, J., Lassiter, T., & Wittstein, J. R. (2021). Comparison of the accuracy of telehealth examination versus clinical examination in the detection of shoulder pathology. Journal of Shoulder and Elbow Surgery, 30(5), 1042–1052. https://doi.org/10.1016/j.jse.2020.08.016	242	14
Keyword in the title: "eHealth"			

31	Eccleston, C., Blyth, F. M., Dear, B. F., Fisher, E. A., Keefe, F. J., Lynch, M. E., Palermo, T. M., Reid, M. C., & Williams, A. C. de C. (2020). Managing patients with chronic pain during the COVID-19 outbreak: Considerations for the rapid introduction of remotely supported (eHealth) pain management services. Pain, 161(5), 889–893. https://doi.org/10.1097/j.pain.0000000000001885	502	283
32	Andrews, J. L., Birrell, L., Chapman, C., Teesson, M., Newton, N., Allsop, S., McBride, N., Hides, L., Andrews, G., Olsen, N., Mewton, L., & Slade, T. (2022). Evaluating the effectiveness of a universal eHealth school-based prevention programme for depression and anxiety, and the moderating role of friendship network characteristics. Psychological Medicine, 1–10. https://doi.org/10.1017/S0033291722002033	374	0
33	Higgins, K. S., Tutelman, P. R., Chambers, C. T., Witteman, H. O., Barwick, M., Corkum, P., Grant, D., Stinson, J. N., Lalloo, C., Robins, S., Orji, R., & Jordan, I. (2018). Availability of researcher-led eHealth tools for pain assessment and management: Barriers, facilitators, costs, and design. PAIN Reports, 3(1), e686. https://doi.org/10.1097/PR9.0000000000000686	275	34
34	Granja, C., Janssen, W., & Johansen, M. A. (2018). Factors Determining the Success and Failure of eHealth Interventions: Systematic Review of the Literature. Journal of Medical Internet Research, 20(5), e10235. https://doi.org/10.2196/10235	230	324
35	Greenhalgh, T., & Russell, J. (2010). Why Do Evaluations of eHealth Programs Fail? An Alternative Set of Guiding Principles. PLoS Medicine, 7(11), e1000360. https://doi.org/10.1371/journal.pmed.1000360	218	164
36	Kayser, L., Karnoe, A., Furstrand, D., Batterham, R., Christensen, K. B., Elsworth, G., & Osborne, R. H. (2018). A Multidimensional Tool Based on the eHealth Literacy Framework: Development and Initial Validity Testing of the eHealth Literacy Questionnaire (eHLQ). Journal of Medical Internet Research, 20(2), e36. https://doi.org/10.2196/jmir.8371	205	100
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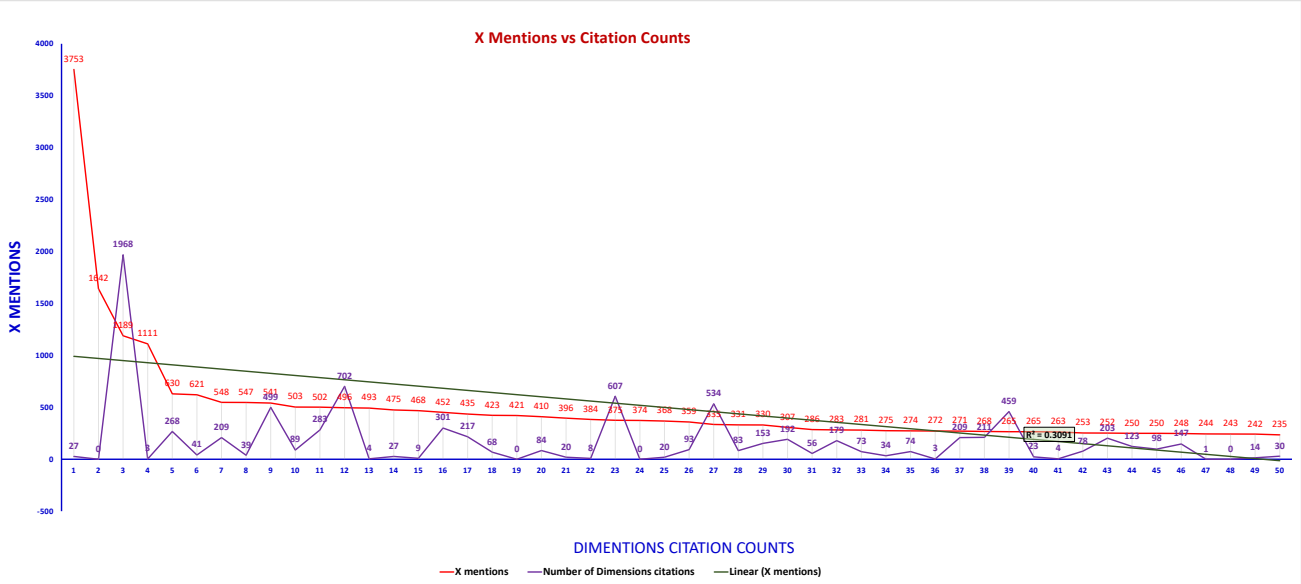

Figure 3: Graph between X mentions and Dimensions citation counts of top first top 50 X mentions publications.

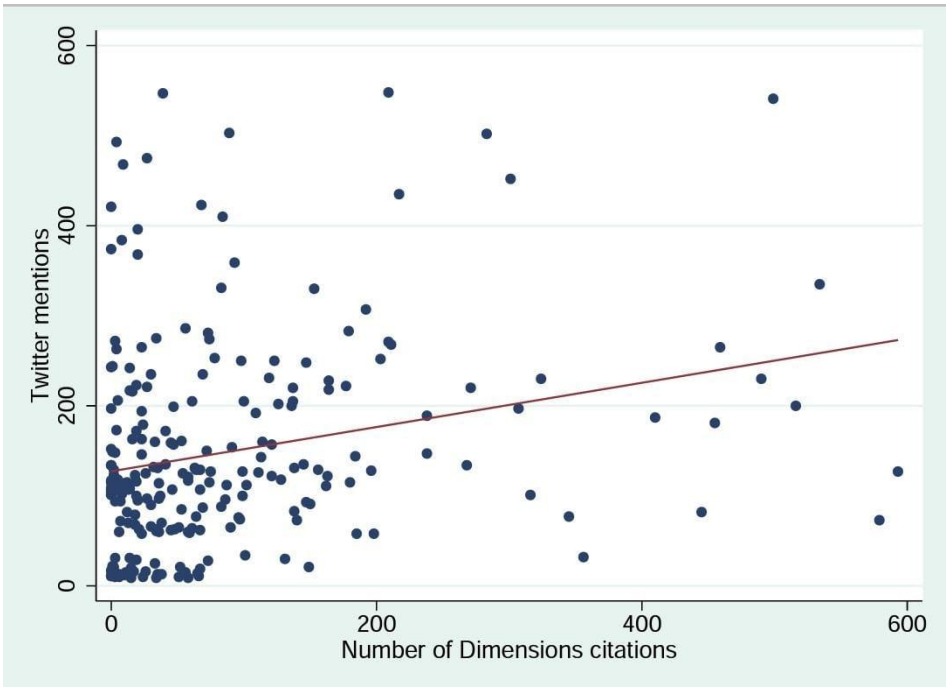

Figure 4: Linear regression Graph between twitter mentions and Dimensions citation counts having value ≤ 600.

medRxiv. The top 4th article has (n=1111) X mentions but has only three citations, but looking at the top third and ninth articles have almost near citations, i.e. X mentions: Dimensions Citations are 1189:1968; 541: 499, respectively. The top X mentions in all five keywords are listed in Table 3.

No conclusion could be made to co-relate that there is an influence of X mentions in fetching citations as there is different result in different cases of X mentions. Hence a statistical method is necessary to test the relationship.

Figure 3 represents only the top 50 X mentions which R^2=0.3091, so R=0.555 simplifies that there is a significant relation between X mentions and citation count. But the real R^2=0.025, so R=0.158 for the whole 245 samples.

The graph (Figure 4) shows the relationship between X mentions and Number of Dimension citations. To take into account any possible bias due to extreme values or outliers, only the X mentions and citations with value less than 600 are considered. Removing the outliers also helps in visualizing the data clearly. The scatter plot and the red line showing the fitted values indicate towards a positive relationship between the two variables, i.e. both the variables move in the same direction. The positive slope of the fitted line and the positive correlation as show before provides evidence that an increase in X mentions is associated with an increase in number of citations.

This indicates a very low (15.8, say 16%) correlation between X mentions and the number of Citations observed.

The value indicates that only 2.5 % of the citation increase will be observed by the influence of X mentions,

The p-value is 0.013 (for 245 samples) signifies the null hypothesis is rejected, and the alternative hypothesis is accepted, but the result shows that there is a minimal influence of X mentions on Citation increase.

Discussion

Many studies were carried out to find out the degree of co-relation between Altmetric attention score with citation scores, and almost all positive correlations were found during their study (Priem et al., 2012); (Bar-Ilan et al., 2012); (Costas et al., 2015); (Thelwall et al., 2013); (Sud & Thelwall, 2014); (Haustein et al., 2014).

The impact of the X study carried out by Betz et al., (2021) on a particular journal i.e. "International Journal of Cardiology. Heart & Vasculature" and found a strong positive relationship between the two factors. Another study was carried out by Ladeiras-Lopes et al., (2020) for the ESC family Journals and found that the citation count is well affected by the wider use of X.

Our Observations are based on the top X mentions received by the articles on Telemedicine and related topic. There is a positive correlation observed between X mentions and citations received.

There is a low influence of X on citation count, i.e. X can influence the increase of 2.5% of citations. The low influence might be the result of the social network is not necessarily within the community but also in networking with other people like friends, non-academic, and other socially connected people. The user-defined tagging also plays an important role; the proper tag will reach the right community and fetch good citations. Furthermore, while this study focused specifically on the field of telemedicine, it is likely that the relationship between X mentions and citation counts holds true for other fields as well. Future research should explore this relationship in other academic disciplines to determine the generalizability of these findings.

CONCLUSION

The study revealed that there is a positive relationship between X mentions and citations. This statement was further validated by testing of hypothesis. Our study has certain limitations, i.e. considering only the top 50 X mentions and their relation to the citation. Considering only 245 articles related to Telemedicine may not be a good representation of thousands of articles published in this subject domain, it is, therefore, our conclusions, especially concerned the influential articles will be accurate, secondly sharing information or research outcome on X does not necessarily mean that people are reading them or commenting on them. The majority of the study recommended a detailed and large-scale study with a qualitative and quantitative one. However, X mentions can not be considered a standard cause of a high citation count. Therefore, further investigation is required to find the relation between references and the author who follow another author and comment on the originator's tweet. Despite the limitation, we believe that there sharing the research result among friends, Scientific, academic and non-academic communities group of the community will bring attain to the researcher in the same domain and fetch citations. The outcome of our analysis revealed that X will be playing a vital role in spreading scientific findings and bringing its positive influence on society. We encourage the researchers to promote the findings on X to expand their reach beyond traditional academic channels and engage with a wider audience.

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