

# The Evolution of the Internet and Social Media: A Literature Review

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**Abstract:** This article reviews and analyses factors impacting the evolution of the internet, the web, and social media channels, charting historic trends and highlight recent technological developments. The review comprised a deep search using electronic journal databases. Articles were chosen according to specific criteria with a group of 34 papers and books selected for complete reading and deep analysis. The 34 elements were analysed and processed using NVIVO 12 Pro, enabling the creation of dimensions and categories, codes and nodes, identifying the most frequent words, cluster analysis of the terms, and creating a word cloud based on each word's frequency. The review presents updated information about technological trends, marketing, and chronological elements regarding the evolution of the internet and social media.

**Key words:** Internet, social media, web, technology, globalisation.

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## 1. Introduction

Globalisation is not a recent phenomenon as it emerged during the 19th century as a result of the British industrial revolution that impacted global trade [1]. In fact, the world has faced many globalisation waves across several centuries. The most recent wave, known as Globalisation 4.0, is defined as "a means to comprehend how profoundly the context for governance and cooperation is changing due to the Fourth Industrial Revolution" [2], [3]. This new wave is shaped by the digital and technological innovations that directly impact our daily lives, changing our habits, attitudes and even shaping our culture. Schwab [4], the pioneer of this concept, stated that the fourth industrial revolution is described by a "much more ubiquitous and mobile internet, by smaller and more powerful sensors that have become cheaper, and by artificial intelligence and machine learning" (p. 12). Additionally, this revolution originated from the merging of digital, physical, and biological transformations impacting modern society directly and intensely [3], [5].

The impact occurs as a result of many new technologies such as artificial intelligence (AI), robotics, the internet of things (IoT), autonomous vehicles, 3D printing, nanotechnology, biotechnology, materials science, energy storage, quantum computing and finally, the recent increase of social media channels [4], [6]. Although these systems are interrelated in complex ways, one common element that influences them is the

"internet" and the "web".

This review will discuss themes regarding the internet, the web, social media and new trends driven by emerging technologies. It has been argued that many individuals cannot live without the internet and, consequently, without creating and processing data [7]. In the modern world, we are surrounded by equipment connected to the internet that accesses the world wide web. Every day we create new data through the internet, web, or social media channels because data is built through relationships, and individuals are catalysts in this process of interaction as we are inherently social beings. Thus, one click, a friend you have on social media, equipment in your house connected to the internet, or a notification you clicked on your smartphone, are all generating data that fuel our relationship with the web and internet technologies [8]. It is impossible for many people to live in this world without being connected anymore, which is a new way of building relationships and networks. Generation Z and those born after them have never lived and experienced a world without the internet and social media. They were born in a connected world, touching screens, doing many virtual tasks at the same time, and often watching three to five screens simultaneously [9], [10]. Therefore, discussing the evolution of the internet, the world wide web, and social media networks are necessary to understand our relationship with these digital elements and comprehend our role within the fourth industrial revolution.

## **2. Methodology**

This paper relies on the literature review as a research method aiming to create a foundation for advancing knowledge, contrasting concepts, chronologically reviewing the topic, and producing insights about the main themes [11].

The literature review comprised of a deep search using electronic journal databases such as: ScienceDirect, Elsevier, JSTOR, Emerald, Springer, Sage, Pubmed, and Research Gate. Articles were chosen according to the following criteria: 1. Must be peer-reviewed; 2. The number of citations; 3. Relationship of the keywords and abstract with the topic covered in this paper; 4. The reliability and validation of research methods.

Books were used to sustain the chronological events covered in the text. Blogs and websites were used to complement these because topics related to technology, the internet and social media are frequently published in these sources. Additionally, blogs were carefully selected according to: 1. If the website provides security by an SSL certificate; 2. Clear privacy policy available; 3. Contact information available; 4. The trust Seal was verified through words like "secure and verified"; 5. The quality of content provided; 6. If the content was fully referenced; 7. Based on the quality of reviews available online.

Sources collected were sorted through Excel, listing all the articles and books, classifying them by title, authors, journal, publisher, year, number of citations, descriptors, abstract, location, objectives, the methodology used, sample size, measurement methods, results, and the main conclusions of each study. Also, all the papers were stored in a folder as a data bank.

Using the databases cited above, 122 papers and books were identified. After reading their titles, abstracts, keywords and evaluating them according to the criteria listed above. A group of 34 articles and books were selected for deep analysis and complete reading, thereby enriching this research paper with reliable content. The 34 elements were reviewed and analysed and processed using NVIVO 12 Pro for Windows software, enabling the creation of dimensions and categories, codes and nodes, identifying the most frequent words, cluster analysis of the words, and creating a word cloud based on each word's frequency of use.

Through the analysis of the results, it was possible to use the NVivo software to create a word cloud based on the most recurrent words (Fig. 1), the diagram illustrating the most coded elements (Diagram 1) and the

frequency of the 20 most commonly recurring words (Table 1). This method permits effective filtering and allows the possibility to objectify the process by discussing the clustering results. Also, this action can be seen along with the text, mainly regarding the selected historical aspects. Beyond that, the word cluster analysis was important to organise the selected studies and helped to identify important information, thus being essential in conducting this literature review.



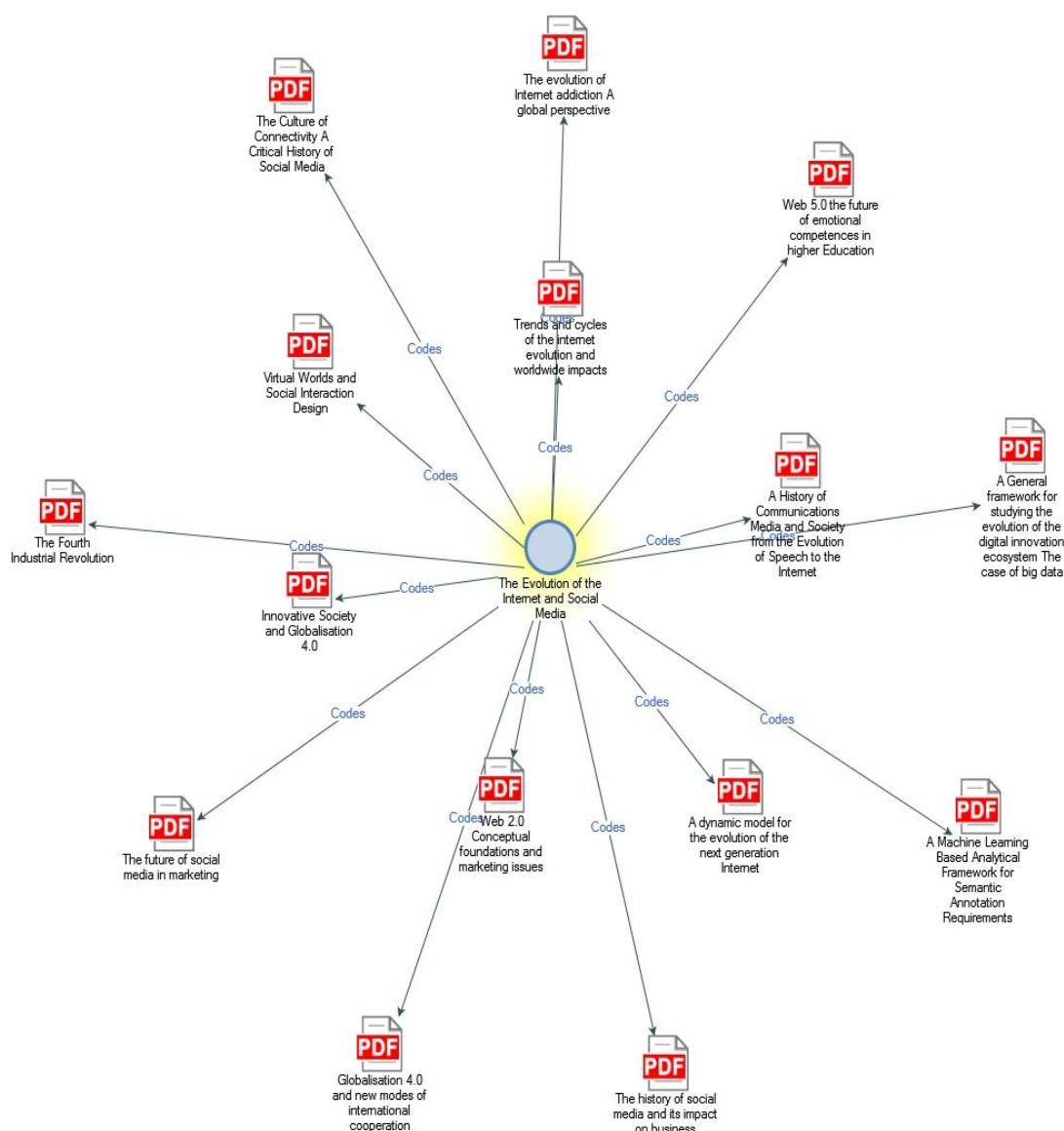
Source: Elaborated by the author based on NVIVO 12 Pro for Windows software (2021)

Fig. 1. Word cloud using NVivo by the analysis of sources.

Table 1. The Frequency of Most 20 Recurrent Words

Word	Length	Count	Weighted Percentage (%)
social	6	1305	0.60
media	5	1023	0.47
new	3	1005	0.47
internet	8	966	0.45
one	3	733	0.34
data	4	716	0.33
world	5	688	0.32
people	6	650	0.30
see	3	656	0.30
network	7	613	0.28
information	11	589	0.27
also	4	559	0.26
time	4	549	0.25
use	3	519	0.24
networks	8	471	0.22
global	6	405	0.19
human	5	403	0.19
many	4	402	0.19
research	8	406	0.19

Source: Elaborated by the author based on NVIVO 12 Pro for Windows software (2021)



Source: Elaborated by the author based on NVIVO 12 Pro for Windows software (2021)

Diagram 1. The most coded elements.

The word cloud represents the most frequent words in the database, thus providing the reader with a quick way to notice the main topics covered in this article. Additionally, the diagram represents the most coded articles during the author's analysis and review process, providing reliability and validation to this research.

The method used was essential to demonstrate, explain, and evaluate current, existing literature. Furthermore, through this review analysis, previous research in this area was compared and contrasted.

Finally, this paper aims to inform and serve as a reference for studies about technology and social media, where the insights discussed and outlined here can be used to enrich research projects and be a guide to explore aspects of the main topics such as the evolution of the internet from a chronological point of view, and the discussions about the transition of channels towards reaching the popular social media networks. The literature databases discussed above do not provide materials discussing the evolution of the internet, the Web and social media in a unique paper. Therefore, this research makes a unique contribution to the fields of technology and social media. Also, the chronology outlined in this paper offers an easy and efficient possibility to be informed about the themes explored in this article. Thus, this study has the potential to

enable researchers and other interested parties to develop a greater understanding of the evolution of the internet and social media.

### **3. Literature Review**

The internet brought a significant change in the way we communicate and relate with one another. Most research and business ideas come from recognising a problem that could satisfy and supply the needs of a particular population, society or powerful organisation [12]. In the case of the internet, what was needed was a means of inter-communication in a more flexible and interconnected manner relying on the accessibility set by the law of supply and demand in the post-second world war context [13]. Computers already existed at that time; however, they were not connected. They were a basic machine compared to the computer we know today [14].

In 1969, The North American government's department of defence created the Advanced Research Projects Agency Network (ARPANET), a set of computers and computer protocols (a sort of lingua franca for machines) that would link not only the defence establishment's computers in a distributed network but their computers in other departments, research centres and universities, thus permitting various PCs to connect among themselves on a single network [14]. However, ARPANET was not useful and accessible to the entire population and not even many universities, federal institutions and/or businesses [14]. Computer companies produced and sold computers that served only as a reader and stored some limited input data. The leading trigger group interested in a more interconnected system was scientists wishing to trade information pertaining to research and development progress [14], [15].

"What was needed, they said, was a network of networks, a massive grid that would enable every scientist to talk to every other scientist no matter what network he or she was on. As many parties and interests were involved, it took well over a decade, a lot of negotiation, and a boatload of money to create this "inter-network."

Poe [14], (p. 213)

Another vital development was the email in the 1960s. The email was initially a technique to exchange messages between one computer and another; however both computers were required to make connections online [16].

The innovative ARPANET continued its development over the 70s and the scientists Robert Kahn and Vinton Cerf finally created the Transmission Control Protocol and Internet Protocol, or TCP/IP. It is a communication model that set guidelines for how data could be transferred between various networks [17].

By the mid-1980s, ARPANET adopted TCP/IP, and from there, researchers started to build the "network of networks" – the "internet", thus most important institutes and universities in the USA and some overseas, were finally connected and communicating through the internet [14]. Despite this, the first internet was not accessible, and usability required a high level of expertise. Then, a young British man working in a Swiss lab called Tim Berners Lee decided to design a possibility to transform the internet into a more accessible and collaborative instrument as he noticed that there was growing interest in the capacity to access information on computers or communicate effectively with others through computers [15].

From 1989 to 1990, Berners Lee created the revolutionary "World Wide Web" or simply the web. It is an element of the internet defined as a techno-social system to enable humans to interact based on technological networks, in other words, the standard way to access and transmit data online in the form of websites and hyperlinks [14], [17], [18]. The system is designed to operate and co-operate with people to enhance an individual's cognition, communication and collaboration [18].

The evolution of the World Wide Web can be divided into four stages, Web 1.0, Web 2.0, Web 3.0 and Web 4.0 [12].

Table 2. The Evolution of the World Wide Web

Web	Period	Brief Description	References
1.0	1990 - 2000	The read-only web, used as a system of cognition.	[8], [18].
2.0	2000 - 2010	The read-write web.	[19].
3.0	2010 - 2020	The semantic web is designed to decrease human tasks and decisions and leave them to machines by providing machine-readable content on the web.	[18], [20].
4.0	2020 - 2030	Web 4.0 is characterised as a read-write-execution-concurrency web with intelligent interactions. It intends to act like a human brain creating interrelationships between human and machine. "Web 4.0 will give users unique and interconnected social and personal lives".	[12], [18].

Source: Elaborated by the author based on (Berners-Lee, 1998 [19]; Hassanzadeh and Reza Keyvanpour, 2011 [20]; Aghaei, Mohammad Ali and Hadi Khosravi, 2012 [18]; Benito-Orsorio *et al.*, 2013 [17]; Capadisli *et al.*, 2016 [8]; Ahmadfaizar, 2020 [12]; David, 2020 [21]; The Evolution of the Web, 2021 [22]).

The number of active internet users worldwide was estimated to be 4.57 billion as of July 2020, comprising 59 per cent (%) of the entire world population [23]-[25]. As the web has become more accessible and popular, smartphones utilising new technologies such as 4G, 5G and very soon 6G, became the vital channel for internet access worldwide as mobile internet users account for 91 per cent (%) of total internet customers [23]-[25]. This reflects how the internet and web have ended up being relatively vital to individuals, professionals, and companies across the globe. The rise in modern technology has also resulted in professional communication moving from written kind to digital kind such as emails, online meetings, WebEx seminars, Webinars, and many other digital possibilities. Due to the recent corona virus outbreak, there has also been an increase in the number of people working from home online as well as dealing with new technologies, platforms, software, and social media networks [26].

Today, people, experts and companies are making use of social media on an everyday basis, sharing details, or promoting their company or brands. Although there are many benefits of social media, the disadvantages are no less. One example of benefits for organisations might be the increased knowledge exchange efficiency or improved customer relations. On the other hand, as a disadvantage, we can consider social media due to their transparent and unmediated nature may collide with political systems and cultural values in different societies [27].

Emile Durkheim, a French sociologist, recognised by several as the father of sociology, and Ferdinand Tonnies, a German sociologist, were the pioneers of social networks during the late 1800s [16], [28]. They believe that individuals sharing values and beliefs, consequently interacting among them and creating a relationship, might generate social groups within society [28]. Also, from 1837, the radio and telephone



were utilised for social communication [29].

Although social networks have progressed throughout the years and in the contemporary world involved the use of electronic media, they did not begin with the computer, they started with the telephone [16], [29].

Throughout the 1950s, phone phreaking, the term coined for the telephone network's rogue browsing, began [30]. This process was accomplished using homemade electronic devices that enabled unapproved access to the telephone system to make free phone calls. Phreaks were able to locate telephone company test lines as well as conference circuits and could hack right into company unused voice mail boxes to host the first blogs and podcasts [16], [30], [31].

Contrary to popular belief, social media was developed during the 1970s [32]. The development of a real-time virtual world with role-playing games, interactive fiction, and online chat so-called MUD, initially called Multi-User Dungeon, Multi-User Measurement, or Multi-User Domain, is largely message-based which requires users to type commands making use of a natural language [32]. Therefore, the MUD created relationship and interaction among users, even though access to it was restricted to a small number of users. The popularisation and creation of the internet and the world wide web were the catalysts to establish connexion among computers that came years later [32].

Another example appeared in 1978, recognised as BBS, a basic synonym for bulletin board system [16]. Individuals log in to the system to submit, download and install a software application, read information, or exchange messages with others. In the early years, bulletin boards were accessed via a telephone line. Early bulletin board systems did not have shade or graphics. Bulletin board systems were the predecessors of the World Wide Web [16], [32].

Several social networking websites were produced in the 1990s after the development of the World Wide Web. Some examples include 6 Degrees, BlackPlanet, Asian Opportunity, and MoveOn. They were the most popular ethnic community social networking sites but with restricted functions and limited possibilities to connect with friends [16], [33]. These social networking websites have been online where individuals could connect among them, including sites for public policy advocacy and social media-based upon internet of contacts design [34]. Other examples were the launch of QQ in China that was earlier utilised for instant messaging service, Skyrock as a French Blogging service, LunarStorm started as a community site, and Cyworld was a renowned Korean discussion forum tool [33].

Additionally, blogging was developed in the 90s, and the first blog was created in 1994 by Justin Hall on Links.net, and in 1997 the term "weblog" was invented by Jorn Barger as the term reflected the process of "logging the web" [33], [35]. Thus, users started to share their personal life in their blogs, and companies began to make promotions in their blogs and third-party blogs, very similar to banner ads that can be seen on Facebook and other social media nowadays. Lately, Peter Morholz shortened "weblog" to "blog" in 1999 as the most popular term and the one we know today. At that time, it was already possible through Blogs and Emails to exchange messages and interact with peers and people in general [36] (p. 168).

This relationship intensified from 2000 onwards, clearly impacted by globalisation, the popularisation of the internet, the rise of the middle class in emerging countries, and integration of markets worldwide, consequently a relevant increase of individuals' dynamism all over the globe [37]. This created demand for a new product in the market to facilitate relationships and interaction among people. In 2000, social media channels started to appear with new technologies, well designed, with new interaction tools and possibilities for personalisation [38].

The number of social media networks rapidly increased and changed the interaction of individuals, companies' businesses, marketing, education, films, and friendship, based on social networking. Amongst those that were released were LunarStorm, 6 levels, Cyworld, Ryze, and Wikipedia about 2000. In 2001, Fotolog, Skies Blog and Friendster were launched, and in 2003, MySpace, LinkedIn, LastFM, Tribe.net and

Hi5. In 2004, prominent names like Facebook (Harvard), Orkut, Dogster, and Mixi advanced. During 2005, big names like Yahoo! 360, YouTube, and Black Earth all arrived [16], [33], [38], [39].

In 2006, Twitter appeared, offering a possibility for users to follow each other and write small post messages with a maximum of 140 characters. Arguably the most interesting fact around that time was that in 2007, a massive wave of shares started to occur within social media channels. Thus, the first videos "going viral" on YouTube happened at that time. One of the best examples is the video of "Charlie bit my finger". This short video has received so far over 878 million views, one of the most famous videos of YouTube, yielding to Charlie's family about \$1.3 million in royalties, nearly 850 million hits on YouTube, and transforming his adorable children into accidental viral superstars [40]. It is impressive how a non-intentional video went viral effortlessly and how powerful online engagement is where celebrities can easily be created from social media unexpectedly. The disadvantage might be a lack of preparation to deal with the excesses of fame and money. Even though it is a popular video, nowadays, there are videos produced by influencers, singers or celebrities reaching over 1 billion views. For example, "Baby Shark Dance" is the most viewed video so far. During the corona virus pandemic, the video reached 7.24 billion views due to children staying at home and interacting more with YouTube videos [41].

Over the years, many other social media channels appeared, such as Instagram (2010), Snapchat (2011), Vine (2013) and the most recent Tik Tok (2019) and Clubhouse (2020) [42]. These companies appear in the market and boom quickly; however, they can also disappear rapidly. These companies must update their channels daily, be attentive to what is going on in the market and how users have been responding to channels' features. Nowadays, the number of global social network users is about 3.6 billion, expecting a rise to 4.41 billion in 2025 [25], [43], [44]. Facebook is still the market leader with over 2.7 billion monthly active users as of the second quarter of 2020, and Facebook is the most extensive social network worldwide [44].

Recent successes and failures in viral advertising demonstrate how challenging it is for marketing experts to regulate their message as it is released virally. In 2007, the band Radiohead released their album "In Rainbows" online, enabling followers to download it for any quantity of money they picked, including free [45]. Despite almost giving the album away, In Rainbows' digital launch still pulled in more cash than Radiohead's previous album, Hail to the Thief [45]. This situation is also an example of viral marketing defined as a form of marketing that happens when buzz marketing generates word-of-mouth (online or offline) interaction among users, especially on the internet [46]. Today, viral marketing is very present within the digital world, giving possibilities to increase brand awareness and visibility through conversions, views, and shares.

Social media is a catalyst in viral marketing, and it enables an extraordinary quantity of individual, informal communication in real-time from anywhere in the world. There are no boundaries, and it is even complex and difficult to predict what a campaign can reach. Social media permits customers to correspond with peers on other continents yet maintains the discussion as laid-back as a Facebook wall surface message. Besides, blog sites allow us to evaluate a wide array of opinions and have given "breaking information" an entirely new definition.

Nowadays, the most crucial boom concerning social media channels is the growth of digital influencers' worldwide. However, the roots of influencers can be considered a few centuries ago. The pioneer is considered Josiah Wedgwood, a potter who produced ceramic pieces for the British Queen and afterwards became famous for it. We can argue that being influenced by word-of-mouth or social media influencers have the same perspective, and the main difference is the range of people impacted by it today. Currently, digital influencers can reach millions of followers. Thus, their power to influence followers and peers can reach people on a large scale, but the essence relies on the concept of word-of-mouth within marketing,



however in this scenario regarding an online approach. The key to the advancement of the modern version of word-of-mouth marketing is the internet. This new version relies on the dynamism caused by social media and its growth on a large scale worldwide, mainly triggered by marketing activities, organisations, and their brands.

Therefore, we are experiencing a new possibility to communicate with peers and brands. Finally, observing the current scenario, the definition of digital influencers and social media marketing arises. A digital influencer is simply a person with social media who spread their knowledge about a specific niche and encourages fans and followers to take action, thus establishing respect and trust [15], [47]. The internet, the web and social media channels are all connected, these systems are in continuous development, in transition, like a metamorphosis in digital networks, almost always without boundaries.

#### 4. Conclusion

The primary purpose of this paper is to provide objective and coherent information about the evolution of the internet and social media, mainly due to the lack of literature integrating the history of the internet, the web and social media channels with new trends such as globalisation 4.0. The insights discussed and outlined here can enrich research projects and be used as a guide to explore important elements concerning the evolution of the internet from a chronological point of view and discussions about the transition of channels towards reaching the popular social media networks.

In conclusion, the objective of this research was successfully accomplished. The review provides advanced knowledge about the topics covered, delivers consistent secondary data, reliable data analysis, and brings in its essence updated information about new technological trends, marketing, and chronological elements regarding the internet and social media evolution. The digital world has been in transition, changing every day, recent trends will keep arising. After the web 4.0, nobody knows what will occur. Therefore, research is required to understand all systems' challenges, advantages, and disadvantages and possibly predict what will come next. In sum, it is evident that the internet, the web, social media channels, and all technological advances impact individuals' everyday lives, being part of our minds, bodies, and inducing societal change. The future is unpredictable, but we can expect humans, machines, and robots to interact with each other and even be part of each other as one interconnected environment. This is mainly due to the advancements and up-scaling focused on the internet of things, artificial intelligence, machine-learning, brain-computer interfaces and simulated reality (virtual & augmented) and simulation technologies.

#### Conflict of Interest

The authors declare that there is no conflict of interest.

#### Author Contributions

Charles Alves de Castro analysed the data, collected data and wrote the paper; Dr Isobel O'Reilly and Dr Aiden Carthy wrote and proofread the paper; all authors had approved the final version.

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