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Exploring the concept of digital well-being: A bibliometric analysis

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Abstract
The increased penetration and adoption of digital technology in the lives of individuals raised concern about the impact of ongoing organizational and global digital transformation on an individual's digital well-being. This study aims to analyze the state of research in the area of digital well-being. A bibliometric analysis was conducted on 102 papers for the period 2016-2023. The performance analysis is used to provide a clear understanding of the growth of the field of research along with the scope of conducting research in the field of digital well-being. Further scientific mapping analysis provides the key terms that are important to understand and explore the dimension of digital well-being. The data set has been retrieved from Web of Science and Scopus databases, which is further analyzed with the help of Bibliometrix R. The study found a substantial increase in research in the area of digital well-being. The research is being published in profound quality journals with high impact factors, stating the growing interest and quality of research in this field. Lastly, the study found major themes and terms that are highly explored to examine the domain of digital well-being.

Keywords: Bibliometric analysis, digital transformation, digital well-being, well-being.

Introduction
The use of personal digital devices has evolved over time as a result of the deep integration of digital devices into everyday life. An increasing amount of digital usage can be witnessed all around the world. With this advent of the digital revolution, a need to research how the digital transformation affects human well-being has arisen. Various organizations and researchers have suggested the need to understand the concept of digital well-being in the ambit of the contemporary increase in digital device usage. Where the organizations like Google introduced its "Digital Well-being" initiative in 2018 (Google, 2018) [11], highlighting the need to find a balance with the technology usage and regulating the digital distractions (Dennis, 2021; Google, 2018) [7, 11]. Researchers have viewed the radical concept of digital well-being from various angles. Initially, digital well-being was majorly associated with the screen time spent on digital technologies, but with the rapid digital transformation and increased adoption of digital technologies, the researchers are exploring digital well-being as a more elaborate and holistic concept.

The researchers have proposed potential benefits and pitfalls of this dramatic spike in using digital technologies (Büchi, 2021) [2]. Furthermore, researchers have suggested that the smartphones and internet usage are the contributory factors in altering the levels of an individual's well-being, along with that smartphone addictions, digital device usage, and the optimal balance between constant connectivity and disconnectivity are found to have associations with various well-being and health dimensions (Bellini *et al.*, 2019; Burke *et al.*, 2010; Clark *et al.*, 2018; Jones, 2011; Lyngs, 2019; Orben & Przybylski, 2019a; Roffarello & Russis, 2019) [1, 3, 5, 16, 18, 23, 27].

Even though a plethora of research can be found in the domain of digital well-being, there is still a lack of fundamental consensus on defining the constructs of digital well-being. The researchers have viewed digital well-being from various perspectives, this research aims to provide the highly researched and most prominent themes used to understand the scope of digital well-being. This paper aims to analyze the current trends and growth of the concept of digital well-being. The focus of this study is to highlight the scope of conducting research in the field of digital well-being.

The bibliometric study is split into two parts: (I) performance analysis (it helps in analyzing the performance and productivity of the scientific literature based on various research metrics) (Donthu *et al.*, 2021) [9], and (II) science mapping (it provides structured bibliographic maps that describe intellectual connections, structural connections, and conceptual as well as social structures of the research field) (Cobo *et al.*, 2011; Donthu *et al.*, 2021) [6, 9]. The first section uses citation-related metrics, publication-related metrics, and country-related metrics to examine the growth, quality, impact and current state of research in the field of digital well-being. Whereas, the second section uses co-word analysis to examine the various terms that are being explored for the theme under study as well as highlighting the future trends in this area of research.

The study intends to answer the following research questions:

RQ1: What is the current pattern of research in the field of digital well-being?

RQ2: What are the research constituents explored under the scope of digital well-being?

Review of Literature

The researchers have defined the concept of digital well-being as the impact of digital technologies that ensure better human well-being (Burr *et al.*, 2020) [4]. In addition, it is viewed as the digital technology usage by an individual in such a manner that it leads to better mental and physical health in the digitally overridden environment (Thomas *et al.*, 2022) [31]. On the other hand, Büchi (2021) [2] suggested that digital well-being is weighing the impact of digital media use on one's well-being. Where it is suggested to have three important dimensions: Holistic digital practices of an individual, harnessing the harms or benefits of those digital practices, and the effects of those harms and benefits on individual well-being (Gui & Büchi, 2021) [13]. Researchers have further suggested that the ability to maintain digital well-being is generally dependent upon the individual's self-regulation of their digital device usage (Burr *et al.*, 2020; Dennis, 2021) [4, 7]. Wherein, it's an individual's responsibility to unplug from digital devices, regulate digital device usage, and practice self-control for attaining digital well-being (Thomas *et al.*, 2022) [31]. The researchers have suggested that the area of digital well-being is not merely the impact of internet usage or screen time on an individual's well-being, rather it is a broader term encapsulating the impact of overall digital transformation on an individual's well-being.

Methodology

The study uses bibliometric analysis to examine the current research trends in the field of digital well-being. Furthermore, bibliometric analysis helps in analyzing the current intellectual structure and research topics in the field under the study (Donthu *et al.*, 2021) [9]. The current study uses performance analysis-related metrices and science mapping to examine the underlying research questions. Primarily, for analyzing the performance of the research area the publication productivity-related metrics are used in this domain along with the total citation-related metrics. Secondarily, for mapping the scientific production the co-word analysis has been administered. It examines the content on the documents based on the author's keywords, highlighting the thematic relationship between the key terms or words (Donthu *et al.*, 2021) [9].

Data Collection and Screening

The initial search was administered by identifying the key strings, and database selection. On June 08, 2023, and the relevant papers were gathered from the 'Scopus' (133) and 'Web of Science' (53) databases (See Table 1). Publications were derived from the databases by carrying out a combination of the following string search ("digital well-being") limited to the following terms appearing in the title or abstract. The initial results were filtered by: Document Type (Article), and Language (English). The search resulted in a total of 186 articles from Scopus and Web of Science databases, which were considered for the further analysis. The data was screened and filtered based on the Prisma (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) checklist (Page *et al.*, 2021) [25]. The further exclusion was done based on the duplicate removal, a total of 44 duplicates were removed resulting in the inclusion of only 142 papers. The final screening and filtration were based on the title and abstract of the study, which resulted in a finalized list of 102 papers after the exclusion of 40 papers. The bibliometric analysis was administered on the 102 articles with the help of Bibliometrix R software.

Table 1: Data extraction

Database	String	No. of Studies*
Scopus	Title-Abs-Key ("Digital well-being")	133
Web of Science	"Digital well-being" (All Fields)	53

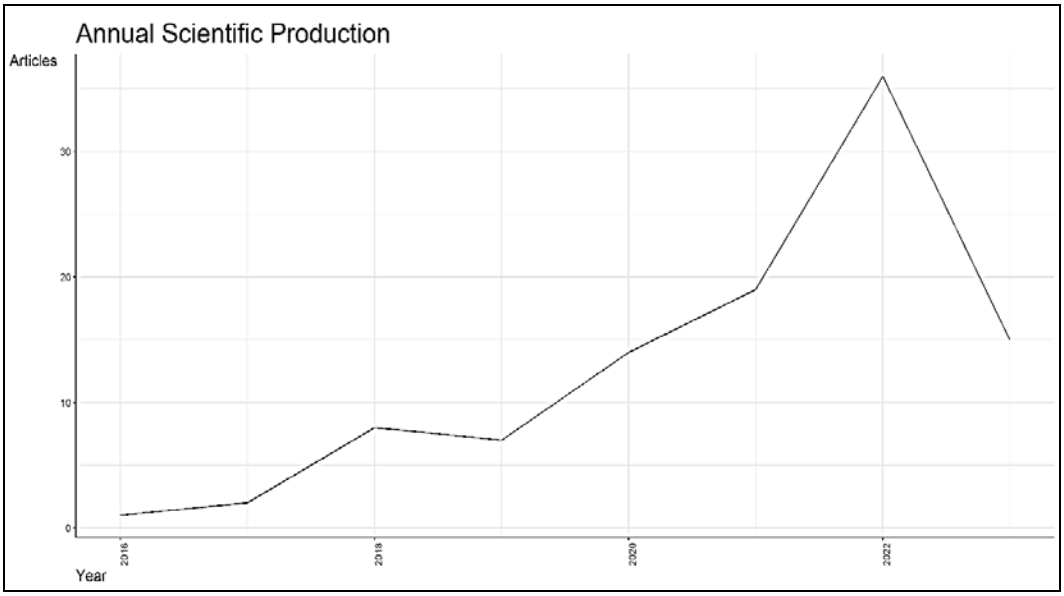
Note: * These studies were found in the initial string search, before the screening process.

Data Analysis

Current Pattern of Research

This section addresses the research question one i.e., to examine the contemporary status of research in this field under investigation. The progression of the research in the area of digital well-being was analyzed for the period of 2016 to 2023 (Figure 1). The research growth can be broken down into three timescales. The first timescale for the period of 2016-2018, reflects a gradual growth and budding interest of researchers in the domain of digital well-being, where the global digitalization was gaining pace with the rapid growth of social media users (Dixon, 2023) [8] and increased world-wide internet penetration where the share of internet population went from 42% to 53% from 2016-2018 (Petrosyan, 2023) [26]. The individuals have reflected an increased adoption of mobile devices into their lives during this time period (Taylor, 2023) [30], making the researchers to probe deep into the effects for digital devices on human well-being. The second time scale for the period of 2019-2021 projects a significantly high increase in the publications generating a high tide of researcher's interest to understand the relationship between digitalization and human well-being. As this time period is associated with the pandemic era, we can witness a very huge increase in social media usage, mobile device usage and internet usage (Dixon, 2023; Petrosyan, 2023; Taylor, 2023) [8, 26, 30]. Lastly, the period of 2022-2023 highlights the post-pandemic period. The resultant effect of high technology adoption and usage has led to the examination of the addictive nature of technology on one's well-being. The

rapid increase in the research on digital well-being can be a resultant effect of increased global digital transformation and digital device adoption. The increasing penetration of digital technology is suggested to be transforming the lives of individuals and generating an accumulating need to probe the impact of digital transformation on multiple dimensions of human well-being (Gluckman & Allen, 2018) [10]. Furthermore, annual scientific production is witnessing a growth rate of 47.24%, where it highlights the growing interest in the field of digital well-being (see Figure I). The dip in the graph for the year 2023 is because the data has been extracted till 08 June 2023. However, the data for the year 2023 is projecting the similar growth rate. The area of digital well-being is comparatively new and budding area with an increased growth in research productivity.



Source: Prepared by the researcher

Fig 1: Research Production (2016-2023)

The country scientific production (in terms of the number of documents published) is used to analyze the current status of research among the countries. The United States of America has produced the highest number of documents (18), followed by the Germany and United Kingdom with 16 and 15 document production respectively (see Table 2). Followed by several European countries producing research in the field of digital well-being.

Table 2: Country-wise scientific production

Rank	Country	Frequency
1	USA	18
2	Germany	16
3	UK	15
4	Netherlands	12
5	Switzerland	10
6	Italy	8
7	Portugal	7
8	Finland	6
9	Belgium	4
10	Romania	4

Source: Prepared by the Researcher

However, South Asian countries are also following a similar trend where Singapore (N=4) and India (N=3) have produced not a high number of articles yet they have started probing the domain of digital well-being. North American, European countries, and East Asian countries lead the country-wise scientific production (number of articles produced). The key reason behind the growing interest of researchers in South Asian countries in this field of study is suggested to be due to the gradual filling up of the digital divide over the past few decades (United Nations Conference on Trade and Development, 2021) [32].

Table 3 highlights the top five highly cited research papers in the field of digital well-being. Where the high number of citations and the high impact factors reflect the influence of journals in this field of research (Donthu *et al.*, 2021) [9]. The impact factors and the citations found for the current theme under the study highlight it growing importance of the domain of research.

Table 3: Highly Cited Documents

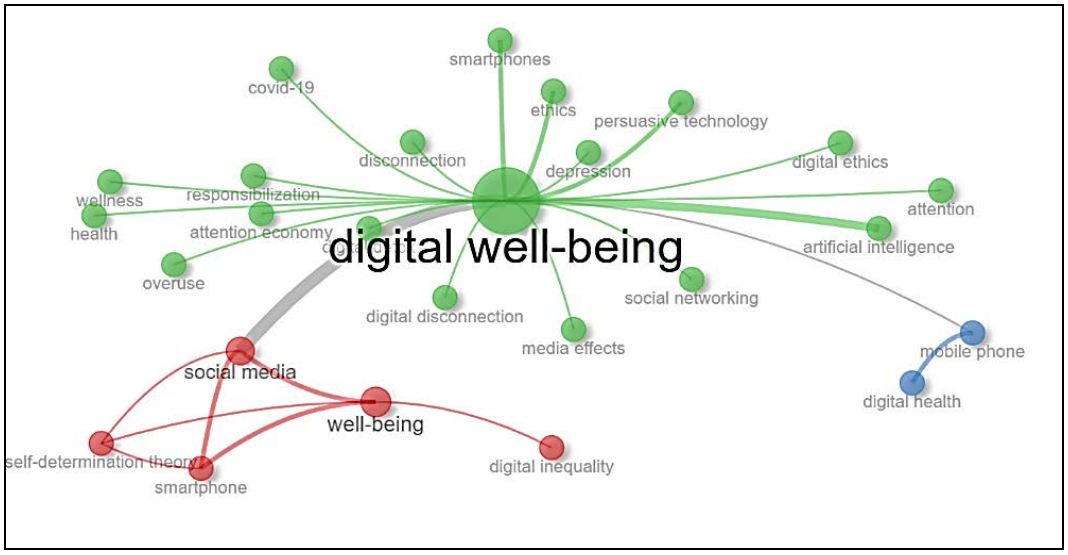
S No.	Author(s)	Title	TC	Source	Impact Factor
1	(Burr, *et al.*, 2020) [4]	The ethics of digital well-being: A thematic review	177	Science and engineering ethics	3.77
2	(Gui, *et al.*, 2017) [14]	Digital Well-Being: Developing a New Theoretical Tool for Media Literacy Research	136	Italian Journal of Sociology of Education	0.40
3	(Gui & Bu, 2019) [12]	From Use to Overuse: Digital Inequality in the Age of Communication Abundance	77	social science computer review	4.418
4	(Meier, 2022)	Studying problems, not problematic usage: Do mobile checking habits increase procrastination and decrease well-being?	26	Mobile Media and Communication	5.13
5	(Stankov & Gretzel, 2021) [28]	Digital well-being in the tourism domain: mapping new roles and responsibilities	42	Information Technology & Tourism	6.093

Note: TC = Total Citation
Source: Prepared by the Researcher

Constituents of digital well-being

The co-word co-occurrence analysis examines the actual content of the documents rather than citation or publication indicators (Donthu *et al.*, 2021) [9]. The unit of analysis used in the current study is "author keywords". The co-word analysis produces clusters of words with an assumption that the words that frequently appear together are thematically similar. The analysis produced three prominent thematically similar clusters. Where the influence of a node over a cluster is measured based on the betweenness of centrality of that node. The betweenness of centrality is the ability of a node to carry information among the other nodes (Donthu *et al.*, 2021) [9]. The first cluster has the node "digital well-being" with the highest betweenness (335) sharing a thematic similarity with the terms "smartphones", "social networking", "wellness", "depression", "overuse", "digital disconnection" etc. (See Figure 2). This highlights that the researchers are exploring the domain of digital well-being as the relationships between the above derived thematically similar terms. For instance, Büchi (2021) [2] has explored the concept of digital well-being as the impact of digital media use on an individual's well-being. On the other hand, Vanden Abeele & Nguyen (2022) [34] have suggested that one of the major issues in maintaining digital well-being is the ability to manage digital disconnection. Similarly, the second cluster highlights the thematic associations between mobile phones and digital health, with the betweenness of centrality being 26 for mobile devices making it the controlling node over the cluster (See Figure 2). In line with the findings in this cluster and based on the theory of digital well-being, Irimiás *et al.* (2021) [15] explored the role of mobile devices and their usage on one's well-being. Where they suggested that mobile devices play different roles in the life of an individual and the better management of mobile device usage can lead to effective management of digital well-being. Subsequently, (Vanden Abeele & Nguyen, 2022) [34] suggested that mobile devices lead to 24x7 connectivity which poses challenges to an individual's well-being. Magni *et al.* (2022) examined the impact of mobile usage on an employee's well-being, highlighting that the excessive usage of mobile devices poses negative outcomes or costs in terms of an employee's physiological well-being, psychological and relational well-being. On the similar lines, Lutz *et al.* (2020) [17] suggested that mobile devices and connectivity enabled via them negatively impact an employee's well-being. This cluster highlights that the digital well-being is a thematic function of the relationship between mobile device usage and one's well-being. The third cluster highlights "social media", "smartphone" and "well-being" as the main nodes in this cluster with "social media" having the highest betweenness of 110 and well-being at 51 (See Figure 2). Researchers have highlighted that social media over-utilization is one of the core concerns while understanding the concept of digital well-being (Vanden Abeele *et al.*, 2022) [34]. Where social media technologies are identified to pose a risk for an individual's digital well-being (Steinert *et al.*, 2022) [29]. Social media is found to be affecting the emotional life of an individual and in turn alter the levels of their digital well-being (Steinert *et al.*, 2022) [29]. However, Meier (2022) [20] suggested that social media use is not only concerned with the screen time and technology addiction, rather it also incorporates the concept of technoscience. The perceived technological interruptions or interference as well as the urge to check the social media is found to alter the levels of affective well-being (Meier, 2022) [20]. The third thematic cluster highlights the role of social media in understanding digital well-being. On the other hand, the researchers have suggested that the scope of understanding digital well-being is very broad and rather it can be better understood with the help of holistic concepts of digital transformation and digital technologies (Gluckman & Allen, 2018; OECD, 2019) [10, 21].

The co-word analysis highlights various terms and dimensions that are crucial for understanding the concept of digital well-being. Furthermore, these terms highlight the forthcoming trend in this area.



Source: Derived from Bibliometric

Fig 2: Co-Word Co-Occurrence Network

Conclusion and Future Scope

The study highlights the current state of the research in the field of digital well-being. It was discovered that the researchers began probing the specific domain of digital well-being in the year 2016, where it has witnessed an exponential growth from 2019 onwards. The root cause for this growth is increased global digital penetration and digital device usage enabled during the Covid-19 pandemic, dynamic digital technologies (availability of affordable digital tools, ease of using digital technologies, etc.), and growing digital infrastructure (affordable internet, faster connectivity, etc.). The rapid digital transformation has raised a need to investigate its impact on an individual's well-being.

The country-wise contribution shows that the United States has produced the highest number of studies. Wherein, the reason behind this could be that the United States is the world's most digitally competitive country as of 2021 (Statista, 2022) [35]. Furthermore, the United States is the third most active internet user (Statista, 2022) [35]. South Asian countries have also reflected growth in the number of publications and citations over the past few years. However, the rigour of research in the field of digital well-being in South Asian regions is still weak. The bibliometric analysis conducted in the field of digital well-being produced various indicators of the growth in the current field, researchers' interest, and country-wise production. Where the regions in North American and European countries are leading in probing the field of digital well-being. However, with the increased digital penetration, the South Asian countries are also witnessing an increased interest in the field of digital well-being, further highlighting that the investigation in this area is a research issue that is both timely and relevant. Furthermore, the top highly cited documents and the most prolific journals found in this field of study highlight the ongoing rigour and increasing impact of the research.

The co-word analysis produces the most important themes and terms being explored in the domain of digital well-being. The study found the highly examined terms under the theme of digital well-being as "mobile phones", "smartphone", "social networking", "social media", "media effects", "wellness", "digital overuse", "digital health", "depression" and "well-being". Wherein, the analysis further projects the critical role of digital disconnection and the pervasive attitude of technologies in exploring the upcoming trends in the field of digital well-being.

A large amount of research is conducted from the perspectives of adolescents (Meier, 2022; Orben, 2020; Orben & Przybylski, 2019b) [20, 22, 24]. The study highlights the need of conducting more research in the area of the business domain. The Covid-19 pandemic and the adoption of the work-from-home model have increased the penetration and usage of digital technology, which has potentially impacted the lives of individuals, highlighting the need to study the digital well-being of employees.

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