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Research Article

Bibliometric Analysis of Research Output on Smartphone Addiction from 2000 to 2023

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ABSTRACT

The utilization of mobile phones has been steadily and rapidly increasing in recent years. Research publications are crucial for keeping information up to date. Recently, there has been a growing study endeavor focused on the utilization of mobile phones. This research seeks to uncover the global growth pattern of Smartphone addiction research, the contributions made to the area, the current subjects that are trending in the field, the primary themes that dominate the field, and the behavioral addiction patterns in nations that are influential in this field. A bibliometrics analysis was conducted using 1673 publications obtained from the PubMed database. These publications were sourced from 450 journals and books and covered the period from 2000 to 2023. Based on the study's findings, the literature on Smartphone addiction has had a notable increase since 2011, with the highest growth rate of articles being 15.73% in 2022. The Journal of Behavioral Addictions and Addictive Behaviors are the most prolific journals in the discipline, with 159 publications each. The Catholic University of Korea has the most significant collaboration with 147 published papers. The most productive countries in terms of publications are Korea, with 111 publications, and China, which has the highest number of publications. The current focus of discussion in the field of Smartphone addiction revolves around the utilization of addictive behaviors and internet usage. This study conducted a thorough examination of the existing knowledge in the area of Smartphone addiction and offered a comprehensive viewpoint on the subject. Additionally, this study presents potential avenues for future investigation.

Keywords: Bibliometric Analysis, Research Output, Smartphone, Addiction, Dendographam, Bibliometrics, India.

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INTRODUCTION

In the past two decades, there has been a significant increase in technological advancements, particularly in the realm of digital information, such as internet networking (Sanou, 2015). The digital revolution has significantly altered the way we communicate, educate, entertain, and present ourselves in society, due to the widespread use of electronic gadgets. During this era, individuals in their teenage years and early adulthood have been introduced to mobile technology since their early years. As a result, children and adolescents are significantly impacted by this technology. They are commonly referred to as the digital, millennial, or generation (Young, 2010). The current generation is increasingly susceptible to mobile addiction due to the rapid changes in contemporary culture, which result in parents being busier and having less control over their children. Additionally, high job expectations and academic pressures contribute to this vulnerability. Furthermore, exposure to remarkable technological advancements fulfills their needs and assists them in overcoming their challenges. Due to the pervasive nature of technology in modern society, it is increasingly difficult to differentiate between excessive and functional internet usage. The publication titled "Kuss DJ and Van 2013" In recent years; there has been a significant surge in research focused on the rising mental health issue known as Internet addiction (e.g. Griffiths, 2009; Young, 2010). Internet addiction, classified as a behavioral addiction, shares similarities with substance-related addictions. It is characterized by symptoms such as mood alteration, salience, lenience, withdrawal, conflict, and relapse. The presence of several neurobiological data supports the claim that this addiction shares similarities with other addictions (Kussand Griffiths, 2012). The dependence on technology serves as a fitting illustration of behavioral addiction (Gerhart, 2017; Selvi *et al.*, 2019). The Internet and mobile devices play a crucial part in this influence. There is a growing consensus that the use of cellphones, social media, video games, and similar technological advancements can be just as addictive as smoking tobacco, using medications

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without a prescription, consuming illegal substances, or engaging in gambling activities (Alter 2018; Christakis 2019). Specifically, digital addiction encompasses more than just Internet use. It involves addiction to both online activities and offline activities that involve the use of digital devices, such as offline game addiction (Almourad *et al.*, 2020; Christakis, 2019). The citation "Meng *et al.*, 2022" refers to a publication by Meng and colleagues in the year 2022. The worldwide occurrence of mobile addiction has been recognized to be approximately 27%, with social media addiction affecting nearly 17% of individuals. Internet addiction has been reported to be around 15%, while cyber-sex addiction affects approximately 8% of people. Game addiction is observed to be nearly 6%. These statistics highlight the potential addictive qualities associated with the use of digital technologies. According to Rideout and Robb's (2019) research, 59% of parents believe that their children are hooked to electronic devices, whereas 50% of young adults acknowledge being addicted to cell phones. According to a study conducted by Ericsson in 2021, it was found that young people exhibit the highest levels of addiction to cell phones. Furthermore, multiple studies have revealed that a significant number of parents perceive their children as being dependent on electronic gadgets, while adolescents themselves acknowledge their addiction to Smartphones (Buabbas *et al.*, 2021; Matthes *et al.*, 2021). The introduction of Smartphones has brought both advantages and disadvantages. However, it has also led to an increase in the rate of Smartphone addiction, which has had a significant impact on people's lives and has garnered the attention of researchers studying interventions. This study utilized various elements like publication growth aims, top trends keywords, top author productivity, top nation, co-authorship, word occurrence analysis, relevant affiliation, sources, conceptual structure map, and snaky diagram.

METHODOLOGY

This study examined the research area of intervention programmes for Smartphone addiction by gathering literature from the PubMed database. Throughout the hunt, a multitude of diverse documents were produced. Out of the original 1673 documents obtained from 450 journals, books, and other sources, only a certain number remained after adhering to the PRISMA procedure. The current investigation was ultimately concluded with the aid of these materials. Furthermore, all publication data in PubMed, excluding the years 2000-2023, was taken into account for the inclusion criterion. Significantly, we have included literature published in PubMed as an extra requirement. The research presented provides an analysis of the data obtained from examining scale, time, space, and composition, specifically focusing on Smartphone Addiction. "Time" pertains to the examination of the duration of the 1894 investigations. The term "space" pertains to the analysis of the geographical distribution of research capacity. The term "composition" pertains to the examination of the visualization network depicted in Figure 1.

DATA ANALYSIS AND DISCUSSION

It was observed from Figure 2 that the growth of smart-phone addiction research with annual growth rate is 13.88% and the highest research growth rate is 15.73% was recorded in the year 2022 which is followed by 13.94% in the year 2021, from the beginning with 0.16$ in the year 2000, lowest growth rate was recorded 0.16% in the year 2003 and 2006. The number of publications published from 2000 to 2023 shows that addiction-related research of Smartphone addiction began in earnest after 2006. As well, it is evident that new and noteworthy advancements have been made over the decade spanning 2010 to 2023, concerning Smartphone addiction. It was found the relative growth rates of the publication are not consistent during the study period.

All the keywords were chosen for analysis 1 total of 6319 keywords were found. The keyword 'humans' was found used 1242 times, followed by male 888, female 801 times and internet 647 times adolescent 585 times, and least Hostility, Reaction Time/Physiology, Electro acupuncture, Korea, Photic Stimulation/Methods, Hospitalization, Personality Inventory/ Statistics and Numerical Data with 5 times string was used to perform a keyword search. Top most trend keywords are given in visualization map of keywords are presented in Figure 3.

This data is revealed in the Figure 4 performance of the top ten dynamic authors based on their publications to the Smartphone addiction literature. Among the numerous publications in the publication count, Griffiths had 74(4.42%) articles with a high position in the rankings followed by Kim DJ 61(3.65%), Potenza M N 45(2.69%), Choi J S 41(2.45%), Dong G 39(2.33%), King D L 32(1.91%), Brand M 31(1.85%), Kuss DJ 29(1.73%), Ko CH 28(1.67%), and Yen CH 28(1.67%). It can be said that Griffiths has more contribution on writing Smartphone Addiction research.

A list of the top ten publications of PubMed related to smart phone addiction is included in Table 1. It was evident from the number of documents from 2000 to 2021 that South Korea was the leading country, as it had 111 with frequency of 0.62 MCP Ratio of 0.135 of the documents. Followed China with frequency of 0.2167 and MCP ratio of 0.308 and Netherlands 18 article with frequency of 0.1 and MCP ratio of 0.5.

The Visualization network of co-authorship among different authors 17 clusters is shown in Figure 5.

We used VOS viewer software to perform analysis on most occurrences of words are shown in Figure 6 meant to be network-based reference images from the PubMed database with 108 items, 4 clusters. Selected keywords in the title and abstracts of scientific publications that are related to the topic of addiction were found to include the words in cluster 1 Adolescent with 585 occurrences, Surveys and questionnaire have 310 occurrences, Cross-sectional studies with 207 occurrences, in cluster 2

Table 1: **Top Ten Publication Countries with MCP Ratio.**

Country	Articles	Freq	SCP	MCP	MCP Ratio
Korea	111	0.61667	96	15	0.135
China	39	0.21667	27	12	0.308
Netherlands	18	0.1	9	9	0.5
Saudi Arabia	3	0.01667	3	0	0
Australia	1	0.00556	1	0	0
Bhutan	1	0.00556	0	1	1
Cyprus	1	0.00556	1	0	0
Egypt	1	0.00556	1	0	0
France	1	0.00556	1	0	0
Iran	1	0.00556	1	0	0
Spain	1	0.00556	0	1	1
Turkey	1	0.00556	1	0	0
Ukraine	1	0.00556	1	0	0

SCP=Single Country Publication, MCP=Multiple Country Publication.

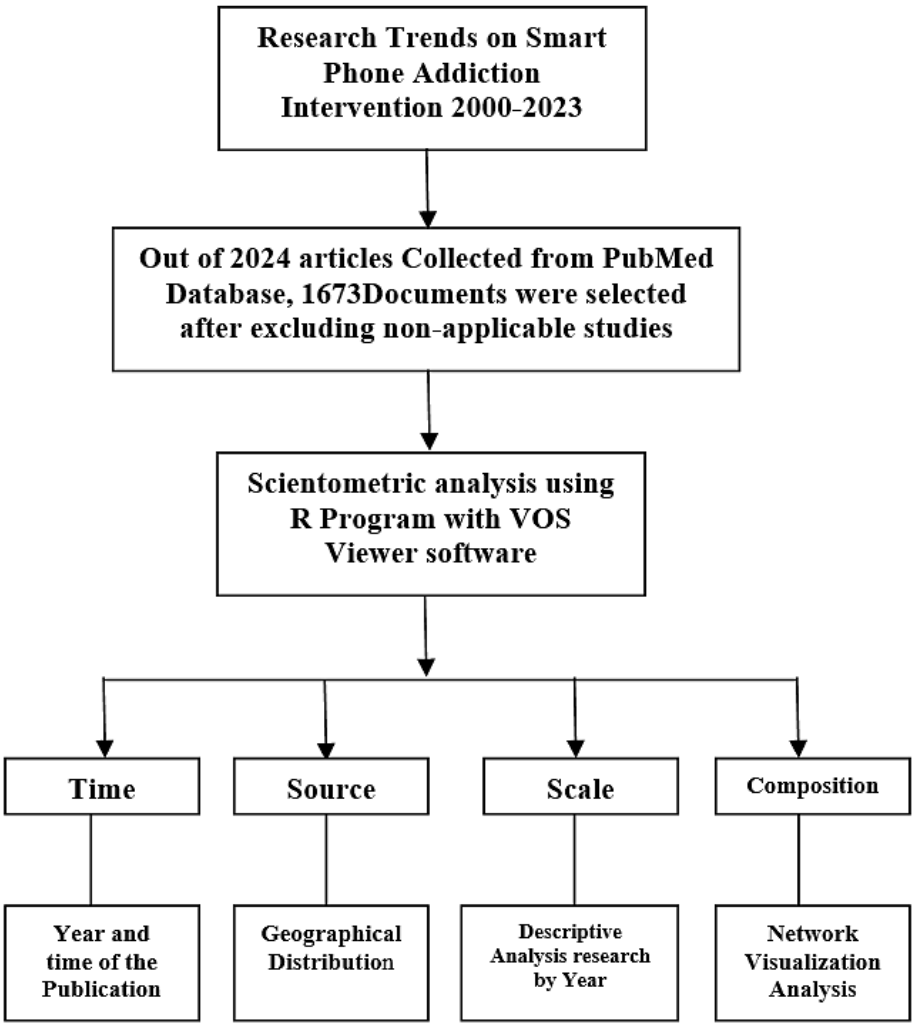

Figure 1: Research Framework.

humans with 1242 occurrences, Internet with 647 occurrences, video games with 182 occurrences, in cluster 3 video games/ psychology with 99 occurrences, reproducibility of results with 86 occurrences, diagnostic and statistical manual of mental disorders and psychometrics both have 68 occurrences in cluster 4 male with 888 occurrences, female 801 occurrences, adult 565 occurrences, young adult 534 occurrences.

The Catholic University of Korea is the most productive institution publishing 159 publications on Smartphone addiction. This is followed by Beijing Normal University publishing 140 publications, Nottingham Trent University publishing 102 publications in the third position. followed by Seoul 87 publications, Kaohsiung Medical University published 72 articles, SMG-SNU Boramae Medical Center 72 publications, Yale University School of Medicine 68 Publications, Zhejiang Normal University 65 Publications, University of Toronto64 Publications, And Yonsei University College of Medicine Published 63 Publications, According to Figure 7, it can be said that especially the affiliations in the smartphone addiction is the catholic university of Korea.

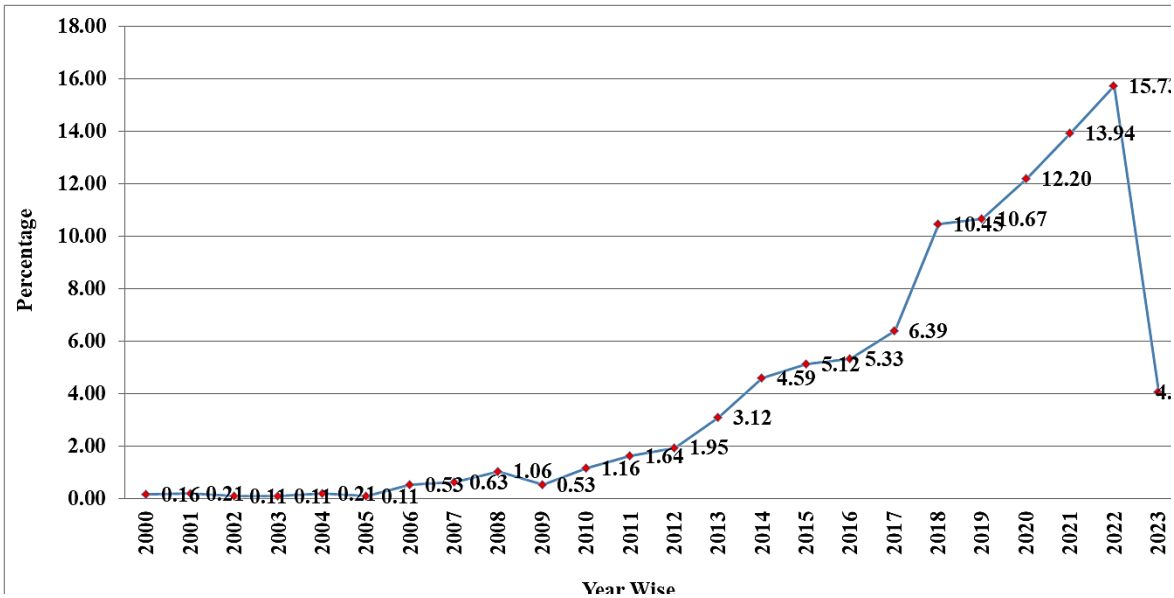

Figure 2: Growth of Smartphone Addiction Research.

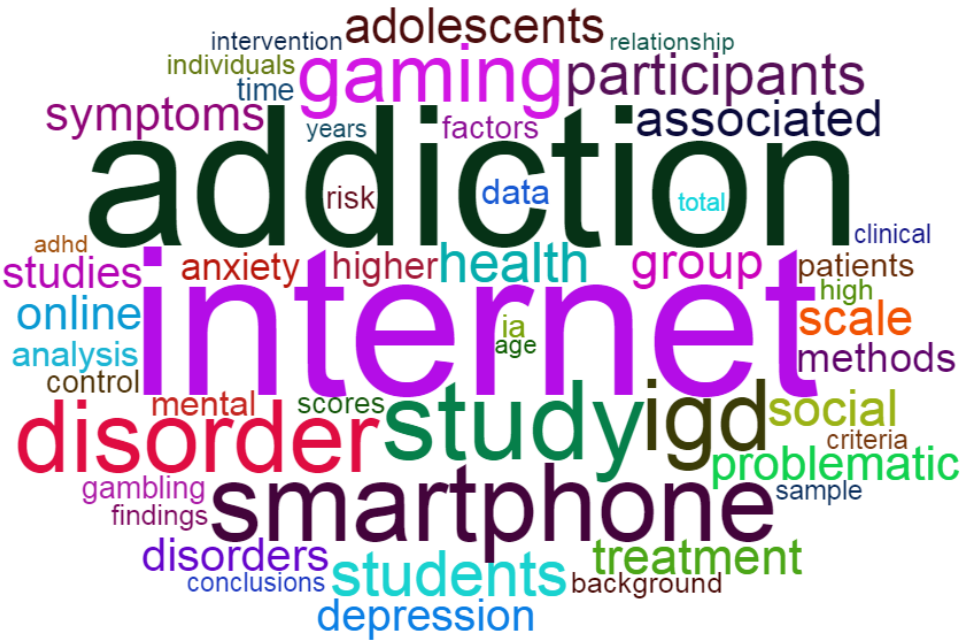

Figure 3: Top Trend Keywords.

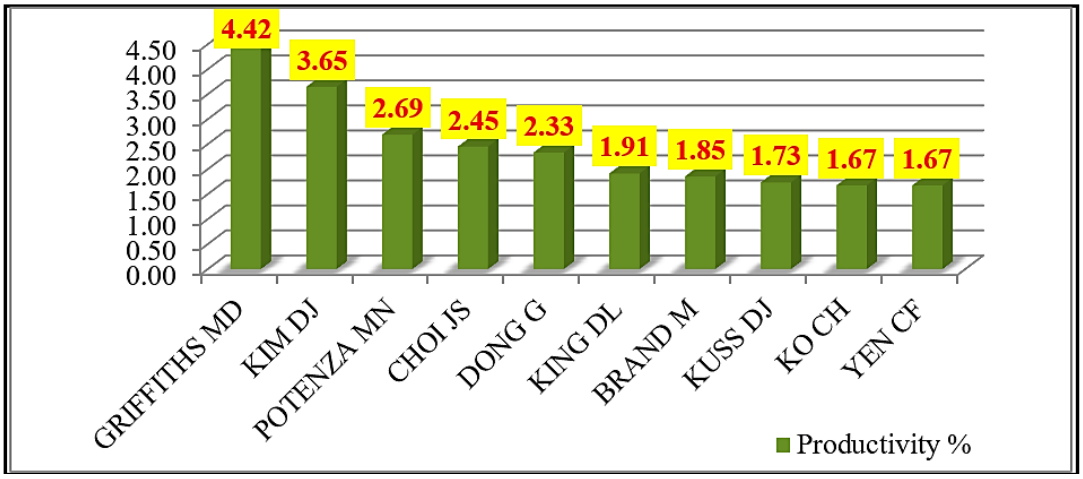

Figure 4: Top Authors Productivities.

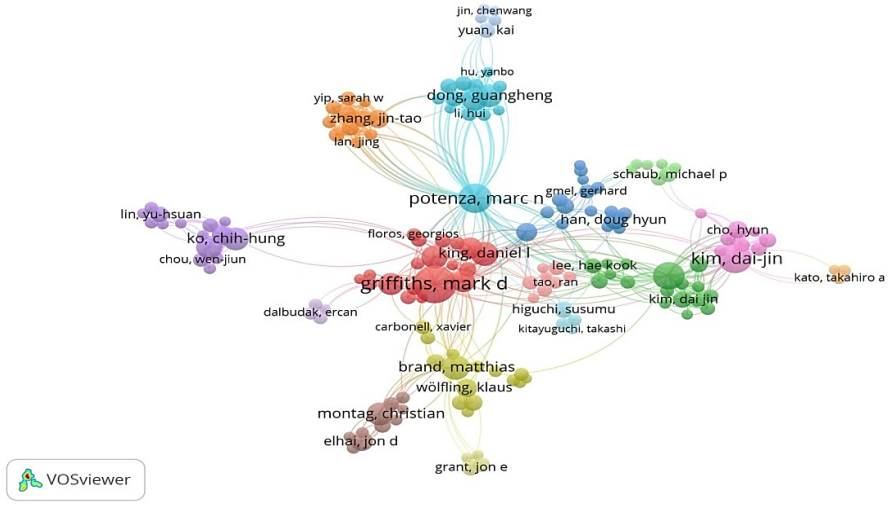

Figure 5: Co-Authorship of Smartphone Addiction Research.

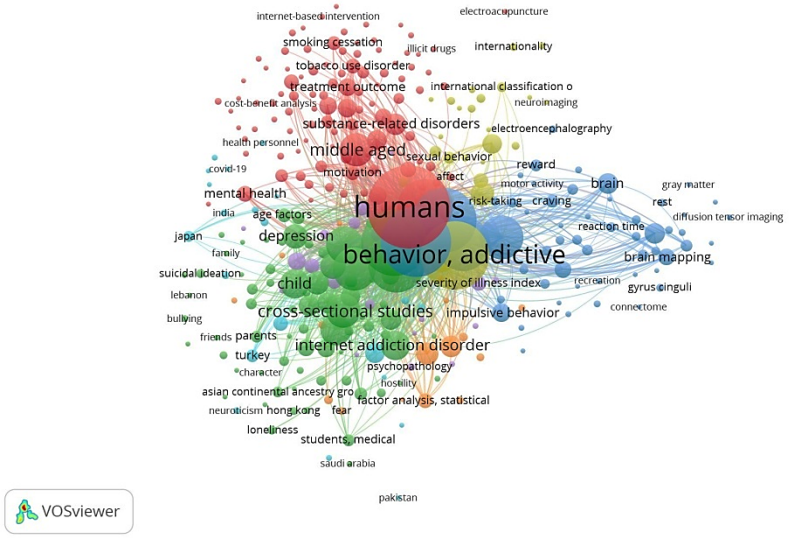

Figure 6: Most Occurrences of Words in Cell phone Addiction Research.

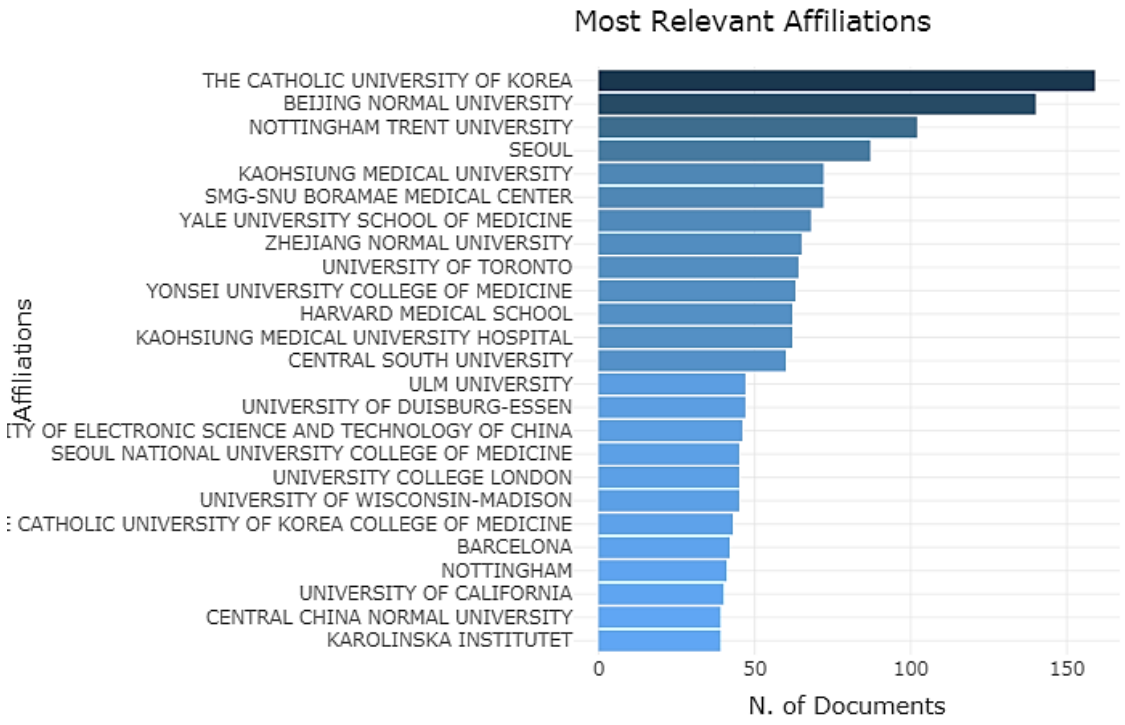

Figure 7: Most Relevant Affiliations.

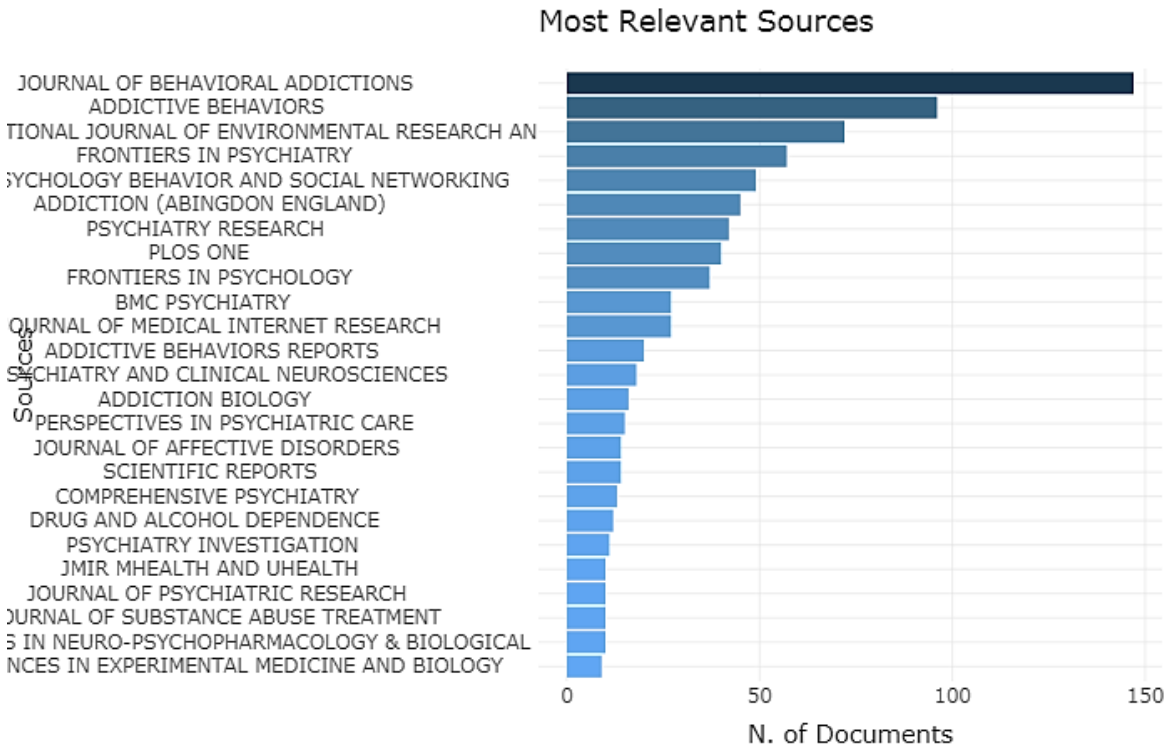

Figure 8: Most Relevant Sources.

The Journal titled Journal of Behavioral addictions is the most productive journal with 147 publications in smart-phone addiction. This is followed by Addictive Behaviors with 96 publications, International Journal of Environmental Research and Public Health with 72 Publications, Frontiers in Psychiatry with 57 Publications, Cyberpsychology Behavior and Social Networking with 49 Publications, Addiction (Abingdon England) With 45 Publications, Psychiatry Research with 42 Publications, PLOS One with 40 Publications, Frontiers in Psychology with 37 publications. It is to be noted from Figure 8 the utmost influence to this field generally arises from journals in the Behavioral studies.

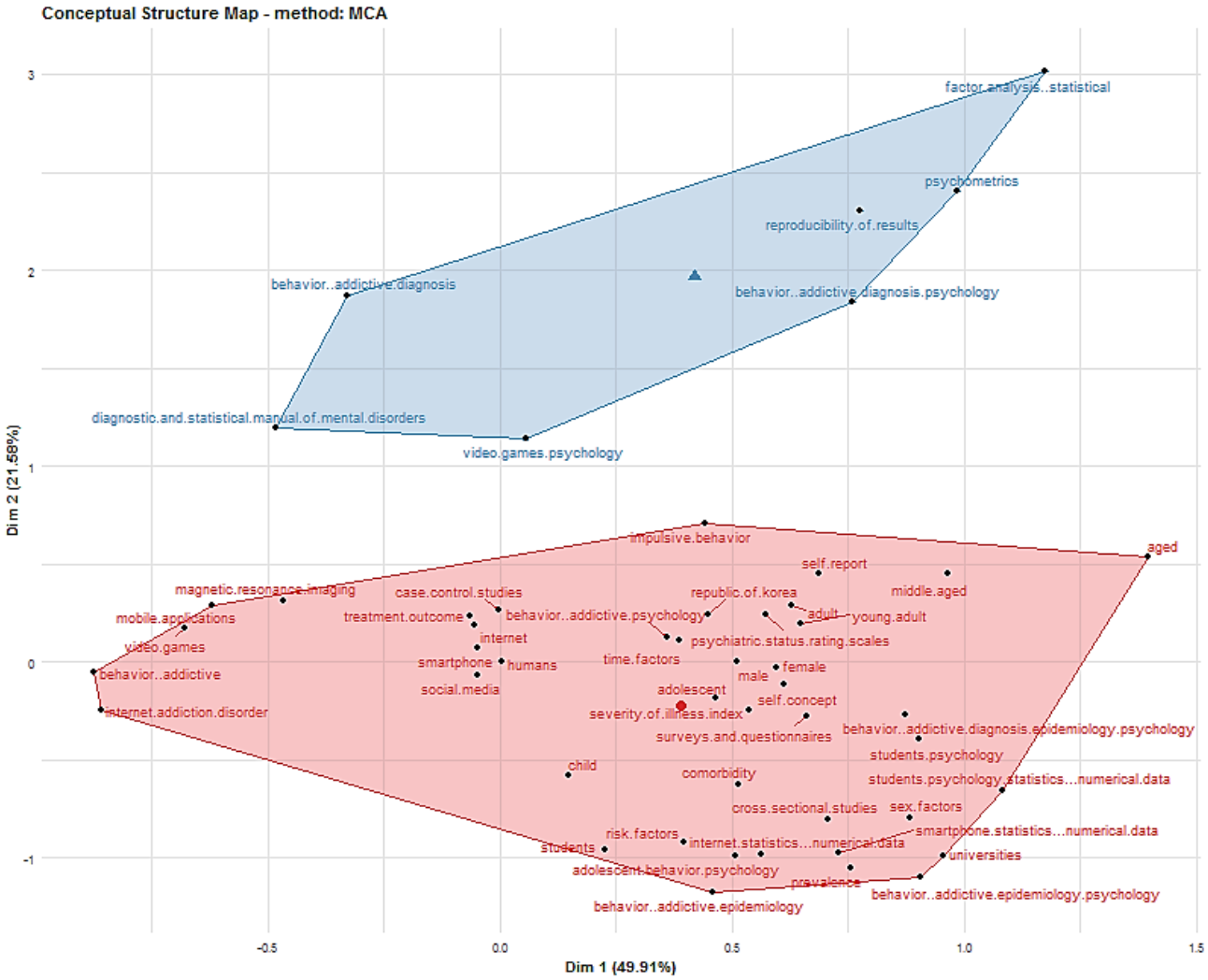

Figure 9: Conceptual structure Map of Smartphone Addiction Research.

The MCA approach developed a conceptual structure map on keywords, as depicted in Figure 9. Simultaneously, this map illustrates the underlying framework of 23 years of study on smartphone addiction. Based on the graph, the MCA achieves the greatest reduction in size for the first two dimensions, which accounts for approximately 71.49% of the overall variability. The proximity of dots in this graph indicates the degree of similarity between the profiles they represent. Each cluster of points corresponds to a unique profile (Wong, Mittas, Arvanitou and Li, 2021). Upon analysing the graph, one can observe the comprehensive and extensive conceptual framework of studies on smartphone addiction. As an illustration, the most notable pink cluster consists of keywords that emphasise various aspects of interactive work, such as "Smartphone", "Adolescent", "Human", "Social Media", "Mobile Applications", "Behaviour", and "Age". The second cluster, represented by the colour blue, mostly pertains to the acquisition of knowledge in the field of psychometrics, specifically in relation to SAR. This cluster comprises keywords such as "addiction" and "video game psychology".

The significance of the themes in the research can be assessed by their centrality, while the evolution of themes can be traced by their density (Aria and Cuccurullo, 2017). The Three Fields Plot (Figure 10) was used to visually represent the connections between authors, keywords, and subjects through a Sankey diagram. The diagram employed colors to symbolize various elements, with distinct shapes assigned to each. The rectangle's cumulative height increases proportionally with the number of relations it describes. Having more relations contributes to the increased height of the rectangle. This graphic illustrates a significant correlation between the Internet and the terms "humans1242 articles," "Male 888 article," "female 801," "Internet 647," and "adolescent 585." In order to identify addiction-related phrases that start with "types of humans" as well as "disorder," "addiction," "gaming," and "smart phones 178," we thoroughly examined every document in our system that used the keyword addiction.

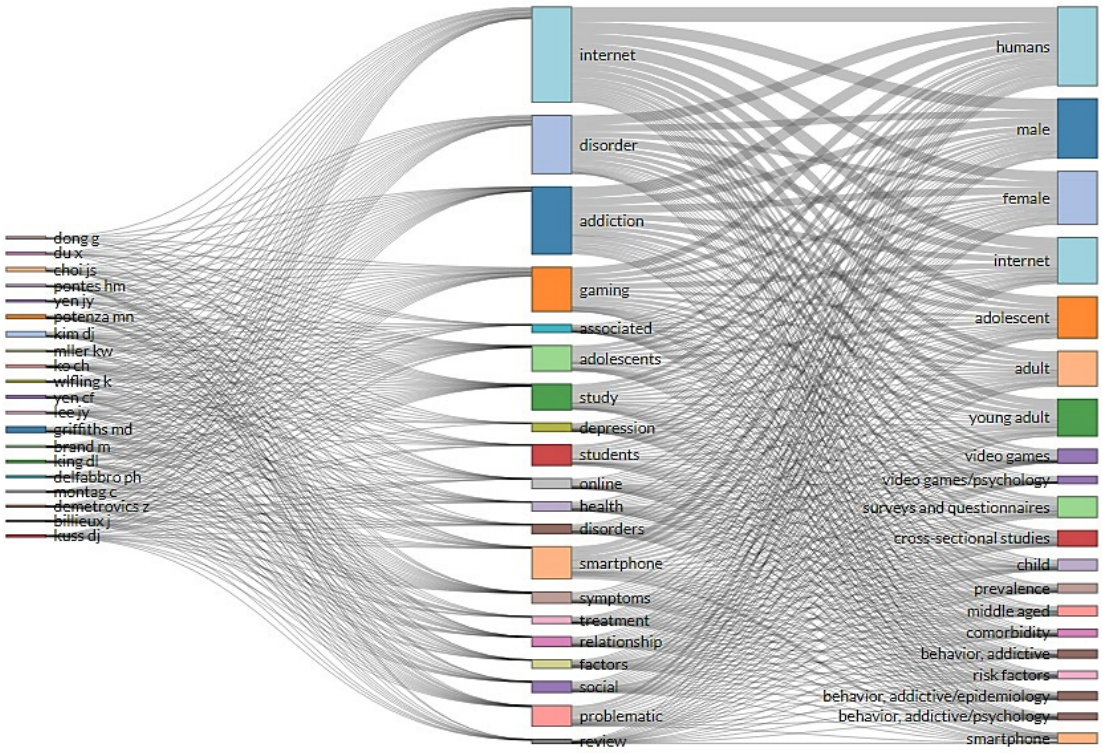

Figure 10: Sankey Diagram of Author, title with Subject of publication.

CONCLUSION

This study has revealed the logical framework of Smartphone addiction, which has exhibited a significant upward trajectory in recent years. It has also identified the contributions made to the area, the current popular issues within the field, the primary themes explored, and the social interaction among nations. The study's findings indicate that the field of smart-phone addiction has been seeing a steady increase, particularly since the early 2000s. Furthermore, the growth of literature on this topic has significantly accelerated since 2010. The most significant contribution to the area was made by behavioral periodicals such as the Journal of Behavioral Addictions. In general, the most significant contributions to the discipline were made by institutions in Korea. Nevertheless, the Catholic University of Korea boasts the highest publishing impact. Upon examining the current popular subjects in the discipline, it is evident that there has been a focus on addiction, human behavior, smart phones, gaming, and the internet in recent years. This investigation also uncovered the primary trends within the topic of smart phone addiction. The primary focal points in the realm of smart-phone addiction were scientific literacy, scientific communication, scientific writing in psychological research, scientific writing in higher education, and ethical considerations in scientific writing.

Furthermore, with these recent advancements, there has been a steady rise in the utilization of smart phones in everyday life. This study has uncovered the impact of research on smart phone addiction in terms of academic journals, institutions, and nations. It has also highlighted the primary themes within this subject and recognized the current popular issues. This study has presented a comprehensive analysis of the extended utilization of smart phones. Future research can undertake a comprehensive analysis by prioritizing studies on smart phone addiction. To achieve this objective, the content analysis method can be employed to conduct a detailed examination of the studies.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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