

Use of Data Science to Analyse the Relationship between Social Media Usage and Mental Health Outcomes

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Abstract: The digital 2022 global overview research estimates that 4.6 billion individuals, or 58.4% of the global masses, were active social media users worldwide in January 2022. This indicates a recent acceleration of greater than 10%. Meanwhile, WHO (WHO, 2022) estimates that the number of individuals influenced by mental illness issues is rising at a pace of 13% annually. Limited study has been done on any potential links between using social networks and mental health and it is interesting and attaining attraction to explore from different dimensions. Therefore, this study investigates the dynamic use of social media and how it affects users' mental well-being. Based on the analysis, excessive use of social media platforms might lead to sadness and anxiety. By concentrating on Facebook, Whatsapp, and Instagram, this study conducted a comprehensive investigation of association among these two components. Research emphasizes distinct tools of data science for analysis, which is the subject of the study based on data collection and the exploratory data analysis (EDA) approach. A database is prepared by covering the time period of 2010 to 2023 and a PRISMA structure was formulated by exploring existing research articles from PubMed, PMC, ScienceDirect and Google Scholar to determine the data, trend related with the theme of this research that is discussing the connection among social networking sites and mental disorders. The outcome indicates that specifically, adolescent age groups are severely affected by emotional elements including anxiety, depression, and other problems. The recommendations are also highlighted in the study to overcome the challenges associated with excessive use of social media platforms and mental health issues.

Keywords: Social media platform and mental health, social media addiction and mental illness, Data science.

1. Introduction

1.1 Trend of Social Media

In a broad sense, the term "social media" encompasses mobile and web sites that offers people to interact with one another within a virtual community (such as Twitter, LinkedIn, Instagram, and Facebook), through which they are able to share, co-create, or transmit various kinds of internet-based material and information, such as data, messages, photographs, or clips (Ahmed et al. 2019). Presently, use of

social media and its influence enhances multiple folds into people's daily lives; hundreds of them spend lots of time on it on a daily basis. User varies from roughly 70 percent among middle-aged and older people to in excess of 97% among adolescents and young adults. The active social media users throughout the world in January 2022 reached a total of roughly 4.6 billion (4,623 million), or 58.4% of the global masses, according to the digital 2022 global overview study as shown in figure 1. This shows an acceleration of more than 10% in recent years.

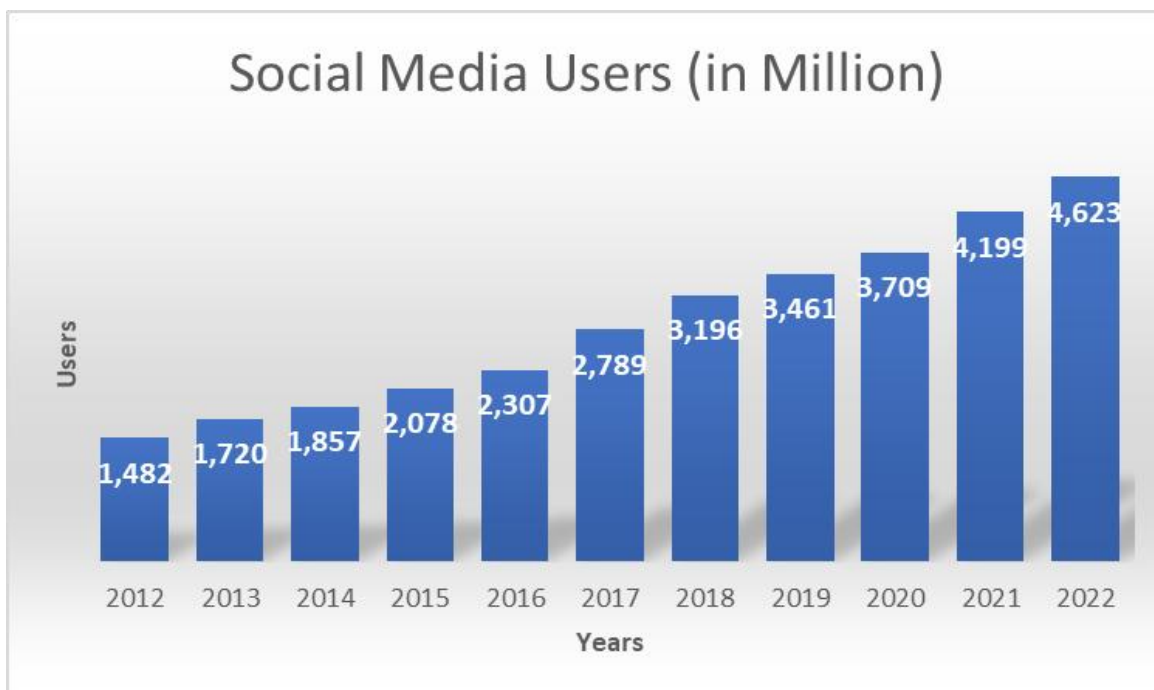


Figure 1: Social media users (globally in million) (Kemp. S., 2022)

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According to the survey (Kemp. S., 2022), WhatsApp, Instagram, and Facebook are the three most famous social media platforms, with the proportion of internet users who are between the ages of 16 and 64 showing that WhatsApp is the most famous platform.

1.2 Social media and Mental Health

Despite being a critical component of human flourishing, mental health is frequently disregarded and vilified. The WHO (WHO, 2022) estimates that the number of individuals influenced by mental abnormalities issues is rising at a pace of 13% annually. With two hundred and sixty four million people suffering from anxiety along with two hundred and eighty million individuals affected by depression, these wellness situations are the most alarming in the world (Hull, M., 2022; Searing, L., 2022). Nevertheless, there are several other direct and indirect components that will accelerate. The use of technology, particularly social media, has been identified as a contributing component that are responsible for intensifying mental health difficulties. Social media has been linked to erratic sleeping habits, sadness, and anxiety. (Meier & Reinecke, 2021) also raises concerns about the adverse consequences that large use of digital platforms may associated with adolescent mental issues. Several scholars (Coyne, S. M et al., 2020; Karim, F et al., 2020), stated that individuals with a range of mental disorders, such as depressive disorders, psychotic disorders, or other serious mental health conditions, make use of social networking sites at a level comparable to the entire population.

There are different aspects of using social media regarding mental illness that continue to be the subject of discussion. The association among social media and mental health can be explored by the “Displaced Behavior Theory”. The intention is that individuals who spend a longer period performing sedentary functioning like excessive use of social platforms, spend fewer hours in direct social contact, neither of which were considered to prove preventive against mental illnesses (Coyne, S. M et al., 2020). Several distinct social norms and theories found that social media use had a negative influence on mental illness because it altered the way users engaged with, maintained, and viewed their social networks (Rahman, N. A et al., 2013).

1.3 Data Science and its utility

Data science is an interdisciplinary field that combines scientific techniques, procedures, formulas, and systems to glean information from both structured and unstructured data. To analyze and comprehend complex data sets, it incorporates knowledge from a variety of fields, such as statistics, mathematics, computer science, and domain-specific knowledge. Though data science can offer insightful information, it's important to analyze the results carefully and take the larger context into account. The objective is to advance our understanding of the intricate interactions between social media use and mental health outcomes, rather than merely finding correlations. Thus, research emphasizes distinct tools of data science for analysis, which is the subject of the study based on data collection and the exploratory data analysis (EDA) approach.

2. Literature Reviews

This study (Beyari, H., 2023) examines how social media use and an upsurge in mental disorders in Saudi Arabia are interrelated. A total of a sample of 385 young Saudi Arabians is included in the sample size under consideration for the analysis. To gather information on various virtual platforms features and aspects, a self-assessed questionnaire was formulated. The study compared the influence of social media components on mental health by analysing data using the “Analytical Hierarchical Process (AHP)”. Study results showed that privacy was the least important of these factors, while entertainment was among the most essential. The most significant factors in bad mental health, according to the research, were likes, comments, and follows. Karim, F et al., (2020) explores in his work that difficulties with mental health are made worse by social media. This in-depth investigation provides an overview of the influence of social platform use on mental health. After implementing distinct filtering factors in all 16 papers are chosen. Two mental health outcomes—*anxiety* and *depression*—were used to categorise the findings. Spending hours on social platforms and other related functions has a significant effect on the area of mental health.

This study (Ulvi, O et al., 2022) focused on three social media sites and conducted a comprehensive evaluation of social networking and psychological well-being. An investigation and extraction of paper from empirical analysis on the incorporation among social platforms and psychological well-being were accomplished through meta-analysis, relying on selection criteria observed from existing research. To identify studies discussing the connection between social networking platforms and psychological wellness, a search for published material covering the period from 2010 to 2020 has been carried out using PRISMA. The findings show that intensive use of social platforms, especially those that are susceptible, is related with anxiety and other psychological illnesses. The study (Koehler & Parrell, 2020) conducted research on mental health professionals (N = 95) who were used to gather qualitative and quantitative data. According to non-parametric analyses and statistical analysis, individual responses to social platform usage and its effects on mental well-being are influenced by their past education, an agency's values, and their credentials. Qualitative research identified three psychiatric disorders linked to uncontrolled social platform use: poor self-esteem, increased sadness, and higher levels of anxiety.

The objective of the present research (Nazari, A et al., 2023) was to ascertain how student mental well-being and the use of social platforms relate to one another. A self-assessed question on demographics, social platform, challenging use of social platform, and psychological wellness was used to gather the data. The paper demonstrates the considerable correlation among distinct social aspects such as mental health condition, marriage status, family income and use of social platforms. Additionally, there was a strong incorporation among inadequate use of social platforms and worse mental situation status and higher mental health scores. A lower mental health condition was substantially correlated with income and utility of social platforms.

2.1 Research Gap

A number of systematic studies on mental health have been conducted. There isn't much research that mixes social media and is conducted within a social science framework, nevertheless, as a result of the literature's strong concentration on medical science. There hasn't been much study on any possible associations between using social platforms and mental well-being as it is an interesting topic in the digital age. Therefore, this study investigates the dynamic usage of social media and how it affects users' mental health.

2.2 Research Question

- Explore how data science analysis helps to determine Social media affect mental health?
- Determine the use of different social media platforms and their influence on user mental health based on data science?

2.3 Importance of the Study

This research attempts a systematic evaluation based on EDA of all pertinent resources with the goal of bridging the knowledge gap by looking at the effects of social media on psychological well-being, which is physical inactivity, which, converted into critical risk of health issues if intensive use on addiction takes place. This research is prominent because it gives detailed review by experts of literature's emphasis, which may help the authors provide the possibility of recognizing the forthcoming interest associated with the changing dynamics of digitalization and technology driven approaches that qualify for academic attention. This study is quite helpful since it sheds light on the way in which the review of articles may support researchers in presenting possibilities with a view to figuring out upcoming issues relating to psychological wellness methods that seek scientific attention.

2.4 Research Objectives

- To find how data science analysis helps to determine Social media affect mental health.
- To determine the use of different social media platforms and their influence on user mental health based on data science.

2.5 Scope and Limitation

The study comprehensively focuses on three types of social media platforms, i.e., Facebook, Instagram, and WhatsApp, to analyse their influence on the mental health of users. Thus, the scope of the research is to explore the use of distinct social media platforms and their influence on user mental health by covering these three platforms. This became a limitation as this research paper only emphasised these three social media platforms. Another limitation is the methodology used, i.e., the secondary approach, which restricted the use of only existing evidence while ignoring the real ground picture that can be obtained by primary research.

3. Research Methodology

Exploratory Data Analysis (EDA) is an approach based on data analysis and visualization to find patterns, trends, and linkages that might guide future analyses. To effectively implement the EDA component of data science analysis, this study uses a systematic review, which is a scholastic synthesis of information on a subject that has been methodically articulated. It uses crucial techniques to identify, classify, and evaluate pertinent research. An evidence-based conclusion is developed after a systematic review gathers and interprets data from previously published research on the subject and then analyzes, characterizes, critically evaluates, and summarizes interpretations.

3.1 Research Method & Design

To investigate the connection among social media sites (Facebook, Instagram, and Whatsapp) consumption and mental wellness, a literature review was carried out utilising PRISMA standards. Studies involving articles published between 2010 to 2023 were identified by employing a multi-database search. To look at the connections between various social media platforms and mental health, articles from the databases PubMed, PMC, ScienceDirect and Google Scholar were chosen. Since PubMed and PMC resources are so publicly available and since the database includes MEDLINE resources, it supplements and complements ScienceDirect and Google Scholar, which has extensive coverage in terms of multidisciplinary scientific research. The search keywords were chosen to widely cover the many definitions and analyses of social media and mental health in the literature that has already been published.

3.2 Research Approach

Inclusion criteria: The selection criteria for the internet-based resources involve only considering journals from English-language publishers. To build the database, information from the 13 years between 2010 and 2023 was gathered. Only papers that demonstrated the use of social media, such as Facebook, Whatsapp, and Instagram, were chosen. Along with all age groups, both sexes, publications that are older than a decade, all nations, and all origins.

Exclusion criteria: The papers are published in different languages, papers from various time periods except mentioned above, other papers related to social media, mental health having distinct aspects.

3.3 Study Selection

Based on above inclusion and exclusion criteria an appropriate database is prepared which comprehensively illustrated through PRISM structure-

4. Analysis of Study

To determine the trend of social media on mental health, a tool like EDA is used in this research, which collects data from existing articles related to the theme of the research and converts it into useful information. The data analysis

section comprehensively interprets the research questions by analyzing the existing studies through a systematic review.

Question 1. To find how data science analysis helps to determine Social media affect mental health?

Despite the fact that social media has numerous advantages for individuals, including better chances for self-expression

and higher self-esteem (Best et al. 2014), many of these advantages are still not widely acknowledged by society. However, prior studies found that negative impacts included a greater risk of trauma, social exclusion, depressive symptoms, and bullying (Best et al. 2014). Overall, there are several mental risks associated with use of social media as illustrated in the figure 2 below-

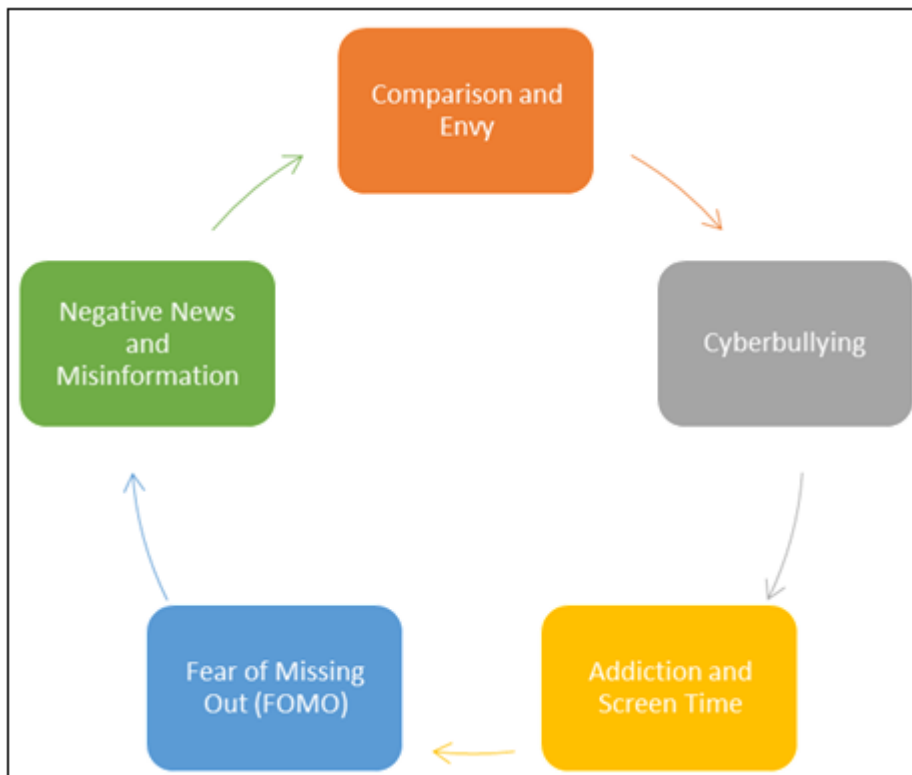


Figure 2: Social media use and related challenges

From this insight, these challenges can be examined under three distinct and crucial influences and associated with social media usage and mental well-being are identified by exploratory data science analysis. They are: (1) effect on symptoms; (2) dealing with aggressive encounters; and (3) effect on day-to-day activities.

1) Effect on Symptoms:

According to numerous studies (Ulvi, O et al., 2022; Riehm, K. E et al., 2019), using social media sites, in particular excessive usage and a expending hours on social platforms, seems to enhance the possibilities of numerous mental abnormalities symptoms and low mental health, specifically in adolescent. According to Stiglic and Viner (2019), screen usage has been shown to have adverse outcomes for mental health including worsening anxiety and depressive symptoms. In recent research, adolescent's mental condition has been negatively impacted by social media use, since it puts pressure on them to compete in society and makes them feel more alone because they've been rejected online. (Rideout and Fox 2018). Several studies have proposed that the worsening psychological conditions incorporated with social platform use may be a consequence of the fact that it eliminates interpersonal contact among distinct age groups, especially adolescents (Asibong, U et al., 2020), could lead to loneliness (Beyari, H., 2023), and might have adverse impact on distinct aspects of wellbeing and physical health. The results of these investigations (Keles, B et al., 2022)

show a clear connection amongst the use of social media and psychological disorders that might not be observed in investigations involving individuals in general, and they highlight the significance of continuing to examine how social media use may affect the severity of symptoms and whether any preventive measures can be found to lessen these risks.

2) Dealing with Aggressive Encounters

Popular social networking sites might generate and intensify the situation in which individuals may be harmed by offensive remarks or posts. Cyberbullying is a type of online hostility that is aimed towards particular people, colleagues or friends, and is considered to be more harmful than the casually hurtful words that are posted online. Previous studies, mainly involving young people, have found a connection between mental health and cyberbullying. Some studies have been done on online harassment in adults or how the incorporation found among mental well-being and cyberbullying may transform relying on how often a person uses social media. In order to predict adult cyberbullying, the research (Schodt, K. B et al., 2012) found correlation among three indices of mental disorder conditions—depression, anxiety, and drug use—interacted with social media usage and gender. In order to ascertain the relationship between three factors, including cyberbullying, insufficient sleep, and physical activity, which have been proposed as possible mediators of the effects, a longitudinal

research of 12,866 young people aged thirteen and sixteen in England was carried out (Viner, R. M et al., 2019). According to the findings, females who use social media extremely often may experience mental health problems as a result of exposure to cyberbullying, loss of sleep, or inactivity.

Lee, M. H. et al., (2023) found that cyberbullying victimisation was common (24.4%), and 13.0% of people reported engaging in it in the previous six months. The perpetration of cyberbullying and being a victim of it were both strongly related with male gender, but the victimisation of oneself online was positively connected with social media addiction. Cyberbullying is often committed for psychological reasons, such as obtaining control and having favourable opinions regarding it. In contrast to social media addiction, which was linked to a greater predisposition to despair, anxiety, and stress, cybervictimization increased the likelihood of experiencing these conditions. These studies highlight the dangers of bullying on social networking sites and the link with unhealthy psychological conditions.

3) Effect on day-to-day Activities-

Social media usage patterns have the potential to affect people's daily activities and offline interactions. Torous and Keshavan (2016) discussed the hazards of social media use with regard to privacy, confidentiality, and unexpected effects of sharing personal health information online. Concerns have also been expressed about inadequate or conflicting medical data discussed on social media, as well as the possibility that individuals could not be conscious of such information (Moorhead et al. 2013, Ventola 2014). This happens to be particularly true when platforms promote

prevalent material, irrespective of whether or not it originates from a reliable source.

It is impossible to ignore the fact that online social networking addiction is a global issue and is getting worse. Any addiction may directly affect a person's psychological health. Adolescents have been witnessed experiencing unpleasant feelings as a result of their dependence on and obsession with online platforms for a variety of distinct reasons. Young people may be more likely to participate in hazardous behaviours (such as consuming alcoholic beverages and using other drugs) if they come into contact with social media displaying these activities (Nesi, & Prinstein, 2015). Internet-based materials that address self-harm and suicide may also be simple to find, which might increase the risk of suicide amongst adolescents who already at risk. But prior studies (Robb M. B., 2019) repeatedly demonstrated a link between operating an electronic device prior to bedtime and a variety of inferior sleep consequences, including "shorter sleep duration, worse quality sleep, and daytime tiredness". According to Naslund and Aschbrenner (2019), the risks associated with using social media were closely tied to a variety of aspects of daily life, including worries about risks to one's work, anxiety about judgement and stigma, effects on one's connections, and the possibility of receiving hostile treatment or physical harm.

One of the research covers all these three components in their survey (Todorov, G., 2023) and the finding of the survey indicates that social media had adverse impact on day to day life activities like driving, sleeping and is responsible for intensifying the depressive feeling amongst users in figure 3.

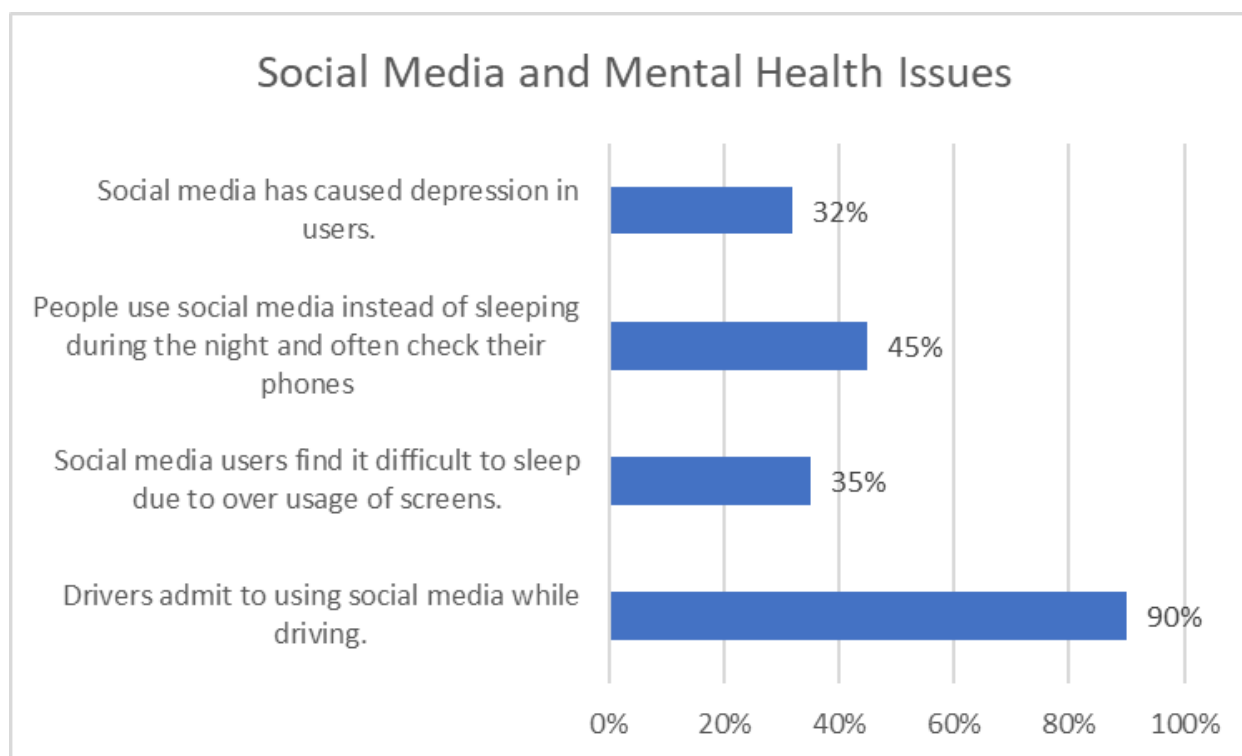


Figure 3: Use of social media and its impact on mental health (Todorov, G., 2023)

Question 2. To determine the use of different social media platforms and their influence on user mental health based on data science?

The use of different social platforms and their impact on user mental well-being can be analysed by examining distinct online platforms such as Whatsapp, Facebook and Instagram.

Whatsapp

Ryani, M. A. et al. (2023) conducted a survey, and around 294 samples were collected from health workers in Saudi Arabia. Abnormal levels of stress, anxiety, and depression were present in 48.6%, 55.8%, and 63% of the population, respectively. The results showed that these individuals had a significant risk of experiencing stress, anxiety, and depression, and they acknowledged that using WhatsApp at work may be unpleasant and have an adverse effect on their connections with friends, relatives, and fellow employees. Another paper (Asibong, U et al., 2020) indicates that WhatsApp is the most common social media platform, and around one-third (33.1%) of respondents reported mental distress, while almost one-fifth (20.1%) experienced moderate-to-severe types of Internet addiction. Comparing individuals with mild or no addiction to the internet to those experiencing moderate-to-severe forms, mental discomfort has been shown to be substantially more prevalent.

Facebook

In a study of young individuals, negative comparisons between individuals on Facebook were found to enhance the probability of rumination and the ensuing escalation of symptoms of depression (Feinstein et al. 2013). Frison and Eggermont (2016) found that Facebook use has correlation with a greater incidence of distressed and depressive behaviour. Another research conducted over 972 school students of Thailand, Hanprathet et al. (2015) discovered a substantial link between dependence on Facebook and a state of depressive behaviour. According to Appeal, H. et al. (2016), passive usage of Facebook is associated with societal comparisons and jealousy, which could, in response, cause depression.

Instagram

Giordano, A. L. et al. (2022) examine linked hashtags to see how people who post nonsuicidal self-injury (NSSI) material on Instagram conceptualise self-injury. The findings reveal that NSSI hashtags were most frequently linked to eating problems, overall psychological distress, nervousness, and anxious thoughts, as well as suicidal behavior, depressive disorders, and severe personality disorders. According to findings, three of the five hashtags showed a rise in usage over time; one stayed largely steady, and one saw a decline in usage. According to Moreton & Greenfield (2022), users felt that the existence of cyberbullying and the desire for social approval on Instagram had a detrimental influence on their wellbeing. Rahardjo & Mulyani (2020) conducted a study and collected 259 samples. Their findings on Instagram addiction are 56.9%. The study shows that people who struggle to form social connections in real life owing to low self-esteem attempt to do so through social media, such as Instagram.

The finding shows that social media addiction and its relation to mental disorders are strongly associated with each other, irrespective of the type of social media. Low self-esteem, and social acceptance are some components that play a crucial role to increase excessive hours on social platforms which eventually affect mental well-being.

5. Results

When it comes to use data science approach to comprehensively analysing the effect of social platform use on human emotional well-being. The research broadly found that anxiety, depression and other emotional factors are identified as crucial components that affect the users specifically who belong to the adolescent group of age. There is a significant and frequently reciprocal link between using social media and feelings of anxiety or sadness. This connection was commonly made to unsavoury social media behaviour as also explored from distinct research articles (Lopes, L. S et al., 2022). However, when it comes to analysing the time spent on an online platform and its effect on mental disorders, different preservations are found such as there was no clear direct association between the amount of hours spent on social platforms and depression or related symptoms, but typically, the prolonged activities on social platforms, the worse the results. Vannucci et al. (2017) found an incorporation amongst prolonged activities in social platforms and a rise in serious mental disorder symptoms. A different countrywide survey of young adults discovered an adverse association between excessive usage of social platforms and emotional wellness (Primack et al. 2017). This suggests that more activities on multiple platforms enhance the potential for mental health risks.

The study also highlighted the threat called cyberbullying and finding indicates that (Giumetti & Kowalski, 2022; Moreton & Greenfield, 2022) examine the impact of cyberbullying on health among adolescents and adults accessing social media. The study identified numerous potential social media predictors of cyberbullying, such as inappropriate sharing, duration spent on social networking sites, and personality characteristics. It also emphasize potential detrimental impacts on health that may be associated with social media cyberbullying, such as psychological discomfort, lower life satisfaction, and suicide thinking. It also affects people's daily activities and offline interactions as large screen time is responsible for shorter sleep duration, lower quality sleep, and daytime drowsiness which eventually impact physical health along with work potency. Improper sleep, ineffective physical interaction and long screening hours lead to adversely affecting the day to day life.

The research also identified that, regardless of the social media platform (facebook, instagram or whatsapp), social media addiction and its connection to mental problems are closely correlated. Low self-esteem, social acceptance, lower life satisfaction, societal comparisons and jealousy and other factors are important contributors to increased use of social platforms, which ultimately has an adverse influence on mental situation.

6. Conclusion

In the digital age, technology plays a crucial role in our day-to-day lives, having its own positive and negative influence. Considering the fact that for some individuals they could reflect a perverted reality, social networking channels nevertheless serve as spaces where individuals are able to share themselves about a comprehensive investigation of the influencing role of social platforms on human mental situations. The outcome of the research indicates that adolescents in particular among all other age groups are more likely to have emotional issues including depression, worry, and other issues. More severe mental health symptoms are associated with prolonged use of social media.

7. Recommendation

Self-esteem and mental health may be promoted by giving students the knowledge and resources they need to use social media responsibly in learning institutes. The most important recommendation that comes from this research as we advance into the technological era is to establish discussions within these social media platforms for the purpose of promoting community health. Moreover, from a medical and public health standpoint, social media activity has to be carefully evaluated.

References

- [1] Appel, H., Gerlach, A. L., & Crusius, J. (2016). The interplay between Facebook use, social comparison, envy, and depression. *Current opinion in psychology*, 9, 44-49.
- [2] Asibong, U., Okafor, C. J., Asibong, I., Ayi, E., Omoronyia, O., & Owoidoho, U. (2020). Psychological distress and social media usage: A survey among undergraduates of a university in Calabar, Nigeria. *Nigerian Postgraduate Medical Journal*, 27(2), 115-121.
- [3] Beyari, H. (2023). The Relationship between Social Media and the Increase in Mental Health Problems. *International Journal of Environmental Research and Public Health*, 20(3), 2383.
- [4] Blomfield Neira, C. J., & Barber, B. L. (2014). Social networking site use: Linked to adolescents' social self-concept, self-esteem, and depressed mood. *Australian Journal of Psychology*, 66(1), 56-64.
- [5] Coyne, S. M., Rogers, A. A., Zurcher, J. D., Stockdale, L., & Booth, M. (2020). Does time spent using social media impact mental health?: An eight year longitudinal study. *Computers in human behaviour*, 104, 106160.
- [6] Frison, E., & Eggermont, S. (2016). Exploring the relationships between different types of facebook use, perceived online social support, and adolescents' depressed mood. *Social Science Computer Review*, 34(2), 153-171.
- [7] Giordano, A. L., Lundeen, L. A., Wester, K. L., Lee, J., Vickers, S., Schmit, M. K., & Kim, I. K. (2022). Nonsuicidal self-injury on instagram: examining hashtag trends. *International Journal for the Advancement of Counselling*, 1-16.
- [8] Giumetti, G. W., & Kowalski, R. M. (2022). Cyberbullying via social media and well-being. *Current Opinion in Psychology*, 45, 101314.
- [9] Hanprathet, N., Manwong, M., Khumsri, J., Yingyuen, R., & Phanasathit, M. (2015). Facebook addiction and its relationship with mental health among Thai high school students. *Journal of the Medical Association of Thailand*, 98, S81-S90
- [10] Hull, M. (2022) Anxiety Disorders Facts and Statistics. Available online: <https://www.therecoveryvillage.com/mental-health/anxiety/anxiety-disorder-statistics/>.
- [11] Karim, F., Oyewande, A. A., Abdalla, L. F., Ehsanullah, R. C., & Khan, S. (2020). Social media use and its connection to mental health: a systematic review. *Cureus*, 12(6).
- [12] Keles, B., McCrae, N., & Grealish, A. (2020). A systematic review: the influence of social media on depression, anxiety and psychological distress in adolescents. *International journal of adolescence and youth*, 25(1), 79-93.
- [13] Kemp. S. (2022). DIGITAL 2022: GLOBAL OVERVIEW REPORT. Available at: <https://datareportal.com/reports/digital-2022-global-overview-report>
- [14] Koehler, S. N., & Parrell, B. R. (2020). THE IMPACT OF SOCIAL MEDIA ON MENTAL HEALTH: A MIXED-METHODS RESEARCH OF SERVICE PROVIDERS AWARENESS.
- [15] Lee, M. H. L., Kaur, M., Shaker, V., Yee, A., Sham, R., & Siau, C. S. (2023). Cyberbullying, social media addiction and associations with depression, anxiety, and stress among medical students in Malaysia. *International journal of environmental research and public health*, 20(4), 3136.
- [16] Lopes, L. S., Valentini, J. P., Monteiro, T. H., Costacurta, M. C. D. F., Soares, L. O. N., Telfar-Barnard, L., & Nunes, P. V. (2022). Problematic social media use and its relationship with depression or anxiety: a systematic review. *Cyberpsychology, Behavior, and Social Networking*, 25(11), 691-702.
- [17] Meier, A., & Reinecke, L. (2021). Computer-mediated communication, social media, and mental health: A conceptual and empirical meta-review. *Communication Research*, 48(8), 1182-1209.
- [18] Moreton, L., & Greenfield, S. (2022). University students' views on the impact of Instagram on mental wellbeing: a qualitative study. *BMC psychology*, 10(1), 1-10.
- [19] Nazari, A., Hosseinnia, M., Torkian, S., & Garmaroudi, G. (2023). Social media and mental health in students: a cross-sectional study during the Covid-19 pandemic. *BMC psychiatry*, 23(1), 1-11.
- [20] Nesi, J., & Prinstein, M. J. (2015). Using social media for social comparison and feedback-seeking: Gender and popularity moderate associations with depressive symptoms. *Journal of abnormal child psychology*, 43, 1427-1438.
- [21] Rahardjo, W., & Mulyani, I. (2020). Instagram addiction in teenagers: The role of type D personality,

- self-esteem, and fear of missing out. *Psikohumaniora: Jurnal penelitian psikologi*, 5(1), 29-44.
- [22] Rahman, N. I. A., Ismail, S., Seman, T.N.V.A.T., Rosli, N. F. A. B., Jusoh, S. A. B. M., Dali, W. P. E. W., ... & Haque, M. (2013). Stress among preclinical medical students of University Sultan Zainal Abidin. *Journal of applied pharmaceutical science*, 3(11), 076-081.
- [23] Riehm, K. E., Feder, K. A., Tormohlen, K. N., Crum, R. M., Young, A. S., Green, K. M., ... & Mojtabai, R. (2019). Associations between time spent using social media and internalising and externalising problems among US youth. *JAMA psychiatry*, 76(12), 1266-1273.
- [24] Robb M. B. (2019). *The New Normal: Parents, Teens, Screens, and Sleep in the United States*. Common Sense Media: San Francisco, CA; Available at :<https://www.commonsensemedia.org/sites/default/files/uploads/research/2019-new-normal-parents-teens-screens-and-sleepunited-states.pdf>
- [25] Ryani, M. A., Alshahrani, A., Khmees, R. A., & Gosadi, I. M. (2023). Assessment of the Association Between Use of WhatsApp for Work-Related Purposes and Levels of Depression, Anxiety, and Stress Among Healthcare Workers from Jazan, Saudi Arabia. *Psychology Research and Behavior Management*, 713-725.
- [26] Schodt, K. B., Quiroz, S. I., Wheeler, B., Hall, D. L., & Silva, Y. N. (2021). Cyberbullying and mental health in adults: The moderating role of social media use and gender. *Frontiers in psychiatry*, 12, 674298.
- [27] Searing, L. (2022) Depression Affects about 280 Million People Worldwide. Available online:<https://www.washingtonpost.com/health/2022/02/27/depression-worldwide/>.
- [28] Todorov, G. (2023). Frightening Social Media Statistics and Mental Health Statistics. Available in: <https://thrivemyway.com/social-media-stats/>
- [29] Ulvi, O., Karamehic-Muratovic, A., Baghbanzadeh, M., Bashir, A., Smith, J., & Haque, U. (2022). Social media use and mental health: A global analysis. *Epidemiologia*, 3(1), 11-25.
- [30] Viner, R. M., Gireesh, A., Stiglic, N., Hudson, L. D., Goddings, A. L., Ward, J. L., & Nicholls, D. E. (2019). Roles of cyberbullying, sleep, and physical activity in mediating the effects of social media use on mental health and wellbeing among young people in England: a secondary analysis of longitudinal data. *The Lancet Child & Adolescent Health*, 3(10), 685-696.
- [31] WHO (2022). World Health Organization. *Mental Health*; World Health Organization: Geneva, Switzerland, 2022.