



RESEARCH ARTICLE

Impact of Social Media on Undergraduate Mental Health in Malaysia

Ting Tin Tin¹, Ong Jing Hong², Chong Jing Hui³, Chew Jia Shen⁴, Tan Yi Jian⁵, Wan Nor Al-Ashekin Wan Husin⁶, Ali Aitizaz⁷, Lee Kuok Tiung^{8*}, Sunday A. Afolalu⁹, Umar Farooq Khattak¹⁰

^{1,6,10} Faculty of Data Science and Information Technology, INTI International University, Nilai 71800, Malaysia

²⁻⁵ Faculty of Computing and Information Technology, Tunku Abdul Rahman University of Management and Technology, Kuala Lumpur, Malaysia

⁷ School of technology, Asia Pacific University, Malaysia

⁸ Faculty of Social Science and Humanities, 88400 Kota Kinabalu, Universiti Malaysia Sabah, Malaysia

⁹ Department of Mechanical and Mechatronics Engineering, Afe Babalola University, Ado-Ekiti, Nigeria

⁹ Department of Mechanical Engineering Science, University of Johannesburg, South Africa

¹⁰ School of IT, Uinar International University, Malaysia

ARTICLE INFO

Received: Oct 14, 2024

Accepted: Jan 10, 2025

Keywords

Impact

Social Media

Mental Health

Cyberbullying

Students

TARUMT

ABSTRACT

The widespread use of social media platforms among undergraduate students in Malaysia has raised concerns about its impact on mental health. Social networks expose students to a variety of potential risks, such as cyberbullying and privacy concerns. This study addresses the pressing issue of whether the use of social networks influences the mental well-being of undergraduates. The objective is to identify the specific effects of platforms such as YouTube, Facebook, Instagram, and TikTok on student mental health. Using a questionnaire-based methodology, we collected a study sample of 182 respondents from students studying at TARUMT to investigate the correlation between the use of social media and mental health issues, including stress, anxiety, depression, and bipolar disorder. In particular, while some platforms show less pronounced effects, others exacerbate mental health problems among students. This study contributes to understanding the factors that influence mental health issues among university students and emphasizes the need for targeted interventions to mitigate potential harm, thus motivating further research in this area.

***Corresponding Author:**

tintin.ting@newinti.edu.my

INTRODUCTION

The 21st century has witnessed exponential growth of online social networking sites (SNS), with Facebook emerging as the most important platform in terms of the number of users (Kumari et al., 2020). Facebook plays a variety of roles in society, including as a communication tool, a source of information, and a social connector (Montag et al.). However, this ubiquitous presence has also improved. However, this ubiquitous presence has also raised concerns about its mental health effects, especially among college students.

Numerous studies have highlighted the detrimental effects of excessive use of Facebook on the mental health of college students. Nazzal et al. (2022) found that long-term Facebook use increased

the risk of depression, anxiety, and stress disorders in this population. The design encourages constant connection and comparison with others, which can lead to feelings of inadequacy, loneliness, and low self-esteem (Smith, 2023). Socially anxious college students may prefer online communication on Facebook to face-to-face interactions, leading to increased time spent on the platform (Chabrol et al., 2017).

Furthermore, the impact of Facebook on sleep patterns and academic performance cannot be ignored. Studies have shown that excessive use of social media, including Facebook, is associated with sleep disruption and sleep deprivation, which can further exacerbate mental health problems (Alonzo et al., 2021). Al-Menayes (2015) also noted that the addictive nature of Facebook can interfere with academic performance, as students can prioritize engaging in social media over studying or fulfilling academic responsibilities. Despite these negative effects, several studies have also highlighted the potential benefits of Facebook use on the mental health of college students. Billah et al. (2023) argue that Facebook can serve as a mechanism for students to cope with stress, anxiety, depression, and loneliness by providing a sense of social support and connection. This duality of Facebook highlights the complexity of its impact and emphasizes the need for further research, particularly with the Malaysian undergraduate student population.

Transitioning to Instagram, the platform has rapidly gained popularity among young people, with over 59% of users aged between 18 and 29 years (Ponnusamy et al., 2020, cited in Alhabash and Ma, 2017). However, the relationship between Instagram use and college students' mental health is complex. Research has shown that Instagram addiction is associated with high levels of depression and anxiety (D'Souza & Hemamalini, 2018). Social comparison is a common behavior on Instagram and is associated with feelings of inadequacy and low self-esteem, especially in individuals with lower levels of mental health (Ponnusamy et al., 2020b). Additionally, Instagram addiction has been linked to issues of colorism, compounding its impact on mental health (Sharma et al., 2022). Despite these negative associations, Instagram also offers some benefits for mental health; Naslund et al. (2020) found that Instagram can provide a platform for self-expression and self-disclosure, which can lead to increased self-esteem and social connection among young people. However, it is not yet clear to what extent these positive aspects have a negative impact on mental health and further research is necessary, particularly with undergraduate students in Malaysia.

The YouTube platform has become a cornerstone of online video consumption, with over 2.1 billion users and 1 billion hours of video consumption per day by 2020 (Statista, 2020). YouTube's popularity amongst adolescents and young adults has made it an important platform for understanding its impact on mental health. Santini et al. (2015) noted that while many college and university students view social media, including YouTube, as a means of social support, it can also have a detrimental effect on mental health, especially for those with already elevated levels of anxiety and depression. Research has shown that YouTube use is strongly associated with depression, anxiety, and stress among college students (Iwamoto & Chun, 2020). However, certain YouTube content can also have a positive impact on mental health; Balcombe & De Leo (2023) argue that YouTube is a valuable platform for information sharing and mental health support, providing a range of content that can improve mental health. Furthermore, internet-based peer support on platforms such as YouTube can be effective in promoting behavior change and improving health (Choi et al., 2021). Despite these findings, there are still gaps in our understanding of how specific types of content on YouTube can positively or negatively impact mental health. Further research is necessary to identify protective factors and potential mechanisms at play in this dynamic, with a particular focus on the university student population in Malaysia.

Finally, there is growing concern about the impact of TikTok on the mental health of college students. TikTok's unique short-form video format has made it popular among millennial and Gen Z users, raising concerns about social media addiction (Smith & Short, 2022). Research has shown that TikTok users frequently make social comparisons, resulting in feelings of self-depreciation and anxiety (Grogon, S. 2012). Additionally, TikTok's addictive nature and potential misinformation can

further exacerbate mental health issues among college students (Villa-Ruiz et al., 2020; Fan, 2023; Jafarov et al., 2024).

Despite these concerns, TikTok also offers avenues for early intervention and raising awareness of mental health among college students. Provides educational content as well as opportunities for creative expression and community support, highlighting its potential as a platform for positive mental health practices (Gajo et al., 2022; Regasa, 2023). However, more research is needed to fully understand and address the impact of TikTok on the mental health of university students, especially Malaysian students.

In conclusion, while social media platforms such as Facebook, Instagram, YouTube and TikTok offer potential benefits in terms of social connection and support, their overuse poses significant risks to the mental health of college students. The complex relationship between social media use and mental health highlights the need for targeted interventions and further research, especially for the Malaysian university student population. Understanding these dynamics is critical to promoting positive mental health among today's students (Ting et al., 2024; Yi et al., 2022).

1.1 Problem Statement

Social media has become a major part of students' lives in an increasingly digitized world, posing both opportunities and problems for their mental health. Social media exposes students to a variety of potential risks, such as cyberbullying, privacy concerns, and exposure to unrealistic or idealized portrayals, although it can also give them a sense of community, support, and self-expression (Hasan, 2023; Jam et al., 2018).

According to Schønning et al (2020), policy and regulatory gaps may also arise from a lack of knowledge on how social media affects mental health. Governments and oversight organizations may forget to put user protection policies into place or hold social media companies responsible for actions that exacerbate mental health problems.

The findings of this research could motivate other researchers to investigate factors that contribute to mental health problems among university students. This research offers evidence-based insights, it can inform policymakers to devise regulations promoting healthier social media use among undergraduates, thereby mitigating adverse mental health outcomes. Ultimately, these contributions can help balance the benefits of social media with the need to protect and improve mental health among Malaysia's undergraduate population.

2.0 LITERATURE REVIEW

Facebook's Impact on Undergraduate Mental Health

The 21st century has witnessed the rise of online social networking sites (SNS) (Yamin, 2019), with Facebook emerging as the foremost platform in terms of user numbers (Kumari et al., 2020 cited in Boudreaux, 2022, p.1). This ubiquitous platform serves diverse purposes within society (Montag et al., 2019).

A study by Nazzal et al. (2022) found that excessive use of Facebook among undergraduate students has a significant impact on their mental health, particularly increasing the risk of depression, anxiety, and stress. Furthermore, depression and anxiety are the key impacts of Facebook adoption, there is a study that found that Facebook plays a significant role in diagnosing bipolar disorder (do Nascimento et al., 2016). In fact, a study has shown that prolonged exposure to social media platforms such as Facebook can exacerbate feelings of loneliness and self-esteem, contributing to poor mental well-being (Smith, 2023). Socially anxious university students prefer online communication rather than face-to-face interactions, therefore, they spend more time on Facebook to communicate with others (Chabrol et al., 2017; Jam et al., 2019). Furthermore, other findings indicate that sleep disruption and deprivation are associated with excessive use of social networks and negative mental health outcomes (Alonzo et al., 2021). Similarly, Al-Menayes (2015) concludes that the addictive nature of social networks, such as Facebook, can interfere with academic performance. However,

according to Billah et al. (2023), the use of Facebook can also serve as a coping mechanism for stress, anxiety, depression, and loneliness among students, providing a sense of social support and social connection.

However, research on the impact of Facebook on mental health is extensive, yet there is a lack of detailed analysis on how the duration and timing of Facebook use influence mental health among Malaysian undergraduates. Most studies do not differentiate between short-term versus long-term effects of Facebook engagement, nor do they consider the time of day when usage occurs, which could be crucial in understanding its psychological impacts. In general, while Facebook offers potential benefits in terms of social connection, its excessive use poses significant risks to the mental well-being of Malaysian undergraduates, highlighting the need for targeted interventions and further research in this area.

Instagram's Impact on Undergraduate Mental Health

Over the past two decades, internet addiction has become a popular topic for researchers in the field of behavioral addictions (Kircaburun & Griffiths, 2018). Instagram is among the rapidly expanding social networks, particularly favored by young adults, with more than 59% of its users falling between the ages of 18 and 29 (Ponnusamy et al., 2020 cited in Alhabash & Ma, 2017, Omnicore, 2019).

To begin with, let us explore the relationship between Instagram and mental health. Based on the study by D'Souza & Hemamalini (2018), Instagram addiction was found to crucially impact high levels of depression and anxiety among undergraduate students. Moreover, an analysis found that of the 196 Instagram posts, 70.4% are shared by individuals suffering from bipolar disorder (Patel et al., 2023). Furthermore, a study has shown that addiction to social media platforms such as Instagram can lead to heightened feelings of social comparison and exacerbate colorism issues (Sharma et al., 2022). A finding by Ponnusamy et al. (2020b), indicated that individuals with lower levels of psychological well-being may be prone to experiencing addiction to Instagram as they endeavor to fulfill their social needs. On the contrary, numerous advantages of social media were mentioned in a study of 43 studies involving young people, including better self-esteem and opportunities for self-disclosure (Naslund et al., 2020).

However, despite numerous studies and research on the relationship between Instagram use and mental health among undergraduate students, there is still a lack of research that qualitatively explores how and why Instagram impacts mental health wellbeing. Gaining insight into the qualitative aspects can offer a deeper understanding of how Instagram influences mental well-being. Therefore, it is expected that further research will delve into studying Malaysian undergraduate students to refine understanding in this domain.

YouTube Impact on Undergraduate Mental Health

In 2020, YouTube boasted a staggering user base exceeding 2.1 billion, with daily video consumption surpassing one billion hours, while content creators contributed over 500 hours of video every minute (Statista, 2020 cited by Osman et al., 2022). YouTube stands as the second most popular global website and serves as a common choice for hosting content by both traditional media and other social media outlets (Alexa Inc., 2019 cited in Osman et al., 2022). YouTube and Twitter are prominent social media platforms favored by adolescents and young adults, given their widespread popularity (Maina, 2016 cited in Khasawneh et al., 2020).

Many college and university students perceive social networks as a means of social support; however, it can negatively impact their mental well-being, particularly among those already experiencing elevated levels of anxiety and depression (Santini et al., 2015). For example, a study involving 90 hospitalized adolescents with a background of non-suicidal self-injury (NSSI) revealed that most participants had encountered NSSI through conventional or online social media platforms prior to engaging in self-harming acts (Zhu et al., 2016 cited in Khasawneh et al., 2020). It has been observed that there exists a correlation between YouTube use and the mental health of undergraduates, as

indicated by the statement: "YouTube use had a significant relationship with depression, anxiety, and stress" (Iwamoto & Chun, 2020). However, it is important to acknowledge that certain YouTube content can positively impact the mental well-being of undergraduates. In fact, YouTube serves as an invaluable platform not only for information sharing, but also for offering mental health support (Balcombe & De Leo, 2023). Furthermore, researchers have explored how internet-based peer support on platforms such as community forums and YouTube, where people share personal experiences and provide emotional support, can effectively foster behavior change and improve health outcomes (Choi et al., 2021).

Although many studies have investigated YouTube's influence on student mental health, there remains a gap in our understanding of how specific types of content on the platform can either positively or negatively impact well-being. More research is necessary to identify protective factors and the underlying mechanisms at play in this dynamic. In summary, while YouTube and social media offer support, they also pose risks to student mental health. However, more research is needed on how specific YouTube content affects well-being, essential to promote positive mental health practices among students today.

Impact of TikTok on Undergraduate Mental Health

Short videos, particularly those under 60 seconds, have surged in popularity due to their ease of sharing on social media and compatibility with mobile devices (Du et al., 2020). TikTok has played an important role in this trend, quickly gaining popularity among consumers of all ages, particularly millennials in China (Jung & Zhou, 2019). However, the platform's unique features, such as the ability to record moments and create short films, have raised concerns about social media addiction (Smith & Short, 2022), an area that has been more extensively studied in relation to Facebook and Instagram.

The impact of TikTok on undergraduate mental health, particularly with regard to stress and anxiety, is a growing concern, with research indicating that undergraduates often engage in social comparisons on the platform, leading to self-disaffection and anxiety (Gregon, 2012). Higher levels of online social comparison, especially appearance-specific comparisons, have been linked to depressive symptoms and an increased risk of disordered eating and body image concerns in this demographic (Fardouly et al., 2018; Carter, 2016). Furthermore, excessive TikTok usage has been associated with elevated stress levels among undergraduates (Ismail, 2022). Concerns also arise regarding misinformation due to the format of short videos, potentially impacting viewers' understanding of various subjects (Villa-Ruiz et al., 2020, Fan, 2023). However, TikTok offers avenues for early intervention and increased mental health awareness among undergraduates, as well as educational content and opportunities for creative expression and community support. Users must exercise caution and moderation to avoid the negative effects of excessive use, and further research is needed to fully understand and address TikTok's impact on undergraduate mental health (Gajo et al. 2022; Regasa, 2023).

Despite its widespread use, there has been limited comprehensive study on TikTok's precise effects on mental health, especially among undergraduates. Compared to other platforms, there are relatively few studies examining TikTok's impact. In conclusion, there is growing concern over TikTok's impact on mental health, particularly stress and anxiety. While it provides educational and entertaining content, issues such as cyberbullying and social comparison persist. More research is needed to fully understand these effects and develop strategies for healthier use of social media. Table 1 concludes previous studies with detailed variables involved in the research.

Table 1. Covariates of undergraduate mental health based on previous studies

Covariate	Detail Variables	Previous Studies
Depression	Mental Health; Facebook Use; University students Internet; Facebook; Behavior	Nazzal et al. (2022) do Nascimento et al. (2016) Billah et al. (2023)

	mental health; coping strategies; social support; resiliency; students Instagram Addiction; Depression; College Students social media; instagram; mental health social media ; mental health ; risks Instagram use; Depression; Mental health disorder social media; depression; higher education depression; Youtube; social media; Youth mental health; social media; cyberbullying mental health; social media; cyberbullying Social media use; Tiktok; students	D'Souza & Hemamalini (2018) Sharma et al. (2022) Naslund et al. (2020) Adeyanju et al. (2021) Iwamoto & Chun. (2020) Gaus et al. (2021) Fardouly et al. (2018) Carter (2016) Gorgon (2012)
Anxiety	Mental Health; Facebook Use; University students Internet; Facebook; Behavior Social Media; Internet; Borderline Personality Disorder mental health; coping strategies; social support; resiliency; students Instagram Addiction; Depression; College Students Youtube; Youtuber; social anxiety social media; mental health; risks Mental health; short video; education; students Tiktok; mental health mental health; social media; cyberbullying	Nazzal et al. (2022) do Nascimento et al. (2016) Chabrol et al. (2017) Billah et al. (2023) D'Souza & Hemamalini (2018) de Bérail et al. (2019) Naslund et al. (2020) Fan (2023) Ismail (2022) Fardouly et al. (2018) Carter (2016)
Stress	Mental Health; Facebook Use; University students mental health; coping strategies; social support; resiliency; students Mental Health problem; TikTok application; college students Mental Health; short video; education; students Tiktok; mental health	Nazzal et al. (2022) Billah et al. (2023) Gajo et al. (2022) Fan (2023) Ismail (2022)
Bipolar Disorder	Internet; Facebook; Behavior social media use; bipolar disorder Bipolar disorder	do Nascimento et al. (2016) Patel et al. (2023) Iwamoto & Chun (2020)

Based on the study conducted in the previous sections, this study constructed a conceptual framework as shown in Figure 1.

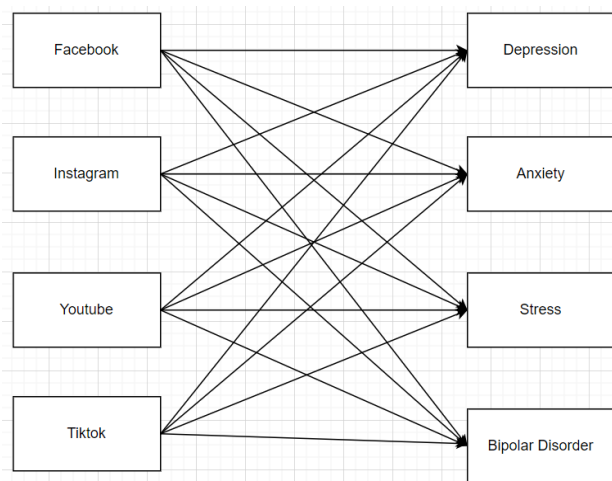


Figure 1. Conceptual Framework

3.0 RESEARCH METHODOLOGY

Over the course of 26 days, a survey was conducted on undergraduate students at Tunku Abdul Rahman University of Management and Technology's (TAR UMT) in the Wilayah Persekutuan Kuala Lumpur, Malaysia. We utilized the Google form, which included multiple questions for data collection purposes. We then asked TARUMT undergraduate students who were willing to complete the Google form by distributing the survey form link or QR code through WhatsApp, Facebook, Instagram, and email address. A total of 121 undergraduates participated in the survey.

The survey uses a questionnaire format on Google Forms to assess social media use and self-reported mental well-being using validated scales. These include scales from Ting et al. (2023), Tandoc et al. (2015), Islam et al. (2021), Pate et al. (2023), Moldt et al. (2022), Caballo et al. (2012), Jones et al. (2013), and Hirschfeld. (2002). Table 2 shows the questionnaire item that was used to obtain the data.

Table 2. Questionnaire item details and resources

Questionnaire Item	Options	Scale	Resource
Section A: Social Media Usage Q1. What is your favorite social media platform?	Facebook Instagram Youtube TikTok	First Choice Second choice Third choice Fourth choice	Sohane et al., 2023
Q2. What is the average time you spend on social media every day?		None <1 hours 1-2 hours >2 hours	
Q3. How often do you find yourself using social media without a specific purpose?		Almost never Almost always	
Q4. I use social media to shop online. Q5. I use social media to watch movies/shows. Q3. I use social media to listen to music. Q4. I use social media to play online games. Q5. I use social media to watch video clips about celebrities. Q6. I use social media to download music/video. Q7. I use social media to post photos/update my status. Q8. I use social media to communicate with teachers/classmates (for educational purposes). Q9. I use social media to read important announcements from colleges and/or industries. Q10. I use social media to submit an article (e.g., blog). Q11. I use social media to get the latest news. Q12. I use social media to watch humorous/funny video clips. Q13. I use social media to discuss assignment(s)		Almost Usually not Occasionally Usually Almost always	Ting et al., 2023

<p>Section B: Depression Q15. Trouble concentrating on things Q16. You thought your life had been a failure Q17. You felt that people disliked you Q18. Often like to crying Q19. People were unfriendly Q20. Trouble falling or staying asleep, or sleeping too much Q21. You was bothered by things that usually don't bother you Q22. Little interest or pleasure in doing things Q23. Feeling tired or having little energy Q24. Poor appetite or overeating Q25. Thoughts that you would be better off dead or of hurting yourself in some way</p>		Almost never Almost always	Tandoc et al., 2015 Islam et al., 2021
<p>Section C: Stress Q26. You feel you were inadequate Q27. You feel like thing kept piling up Q28. You feel like you were carrying a heavy load Q29. You feel like you were rushed Q30. You feel that the odds were against you Q31. You feel you are in hurry Q32. You feel like nothing was going right Q33. You feel like there was no escape Q34. You feel that too many demands are being made on you Q35. You are light-hearted Q36. You have too many things to do Q37. You feel under pressure from deadlines</p>		Almost never Almost always	Pate et al., 2023 Moldt et al., 2022
<p>Section D: Anxiety Q38. You feel nervous, anxious, or on edge Q39. You feel not being able to stop or control worrying Q40. You feel like worrying too much about different things Q41. You feel trouble in relaxing Q42. You feel afraid as if something awful might happen Q43. You become easily annoyed or irritable Q44. You feel refusing when asked to do something don't like doing Q45. You feel watched by people of the opposite sex Q46. You feel nervous about speaking in class Q47. You feel anxiety when talking to people don't know at school Q48. You making a mistake in front of other people Q49. You attending a social event where only know one person</p>		Almost never Almost always	Caballo et al., 2012
<p>Section E: Bipolar Disorder Q50. You have little control over my mood Q51. You are unhappy with the person you has become</p>		Almost never Almost always	Jones et al., 2013;

Q52. You feel like in control of the things that happen in your life Q53. You are productive in the things in life you have engage in Q54. You play a central role in maintaining your own well being Q55. You depend on others to maintain your own well being Q56. You struggle to make sense of the experiences you have had Q57. You think differently about some of your experiences now compared when they first occurred Q58. You avoid taking on challenges in life that matter to you Q59. You are more self-confident than usual Q60. You had much more energy than usual			Hirschfeld, 2002
---	--	--	------------------

In our research, our objective is to examine the links between social media use (Facebook, Instagram, YouTube, TikTok) and mental health issues (depression, stress, anxiety, bipolar disorder) using SPSS for statistical analysis. Employing the Pearson correlation coefficient in a bivariate approach allows us to assess the strength and direction of the relationships between social media platforms and specific mental health conditions. By applying Pearson's correlation, we will be able to quantify how strongly the use of each social media platform is associated with each mental health issue, providing insights into the potential impact of social media on mental health.

4.0 RESULTS AND DISCUSSIONS

Based on Table 3, the research involved administering a questionnaire to assess various psychological constructs, including the use of social media, depression, stress, anxiety, and bipolar disorder. The reliability of the questionnaire was evaluated using Cronbach's alpha coefficient, a measure of internal consistency between items.

Table 3. Reliability level of questionnaire items

Questionnaire items sections	Cronbach's alpha based on standardized items	Number of items
Social Media Usage	0.938	53
Depression	0.900	11
Stress	0.896	12
Anxiety	0.811	12
Bipolar Disorder	0.758	11
Total	0.951	99

The questionnaire encompassed a total of 99 items in all constructs. Within the Social Media Usage section, participants responded to 53 standardized items aimed at gauging their engagement with social media platforms. The analysis revealed a high level of internal consistency, with a Cronbach alpha coefficient of 0.938, indicating robust reliability in measuring social media usage. For depression, the questionnaire consisted of 11 items that addressed symptoms associated with the condition. Reliability analysis yielded a Cronbach's alpha coefficient of 0.900, suggesting strong internal consistency among depression-related items. Similarly, the Stress section consisted of 12 items designed to assess stress-related experiences. The internal consistency among these elements was found to be high, with a Cronbach alpha coefficient of 0.896. Anxiety symptoms were evaluated using a set of 12 items. Reliability analysis indicated good internal consistency among anxiety-related constructs, with a Cronbach alpha coefficient of 0.811. Lastly, participants responded to 11 items

aimed at assessing symptoms associated with bipolar disorder. The internal consistency of the bipolar disorder scale was moderate, with a Cronbach alpha coefficient of 0.758. Table 4 shows 182 demographic data for the respondents: age, gender, and Ethnicity. The data show that most of the respondents' age is between 21-25, which is 62.1 percent.

Table 4. Demographic information of the participants

Characteristic	Frequency	Percentage
Age		
<18	3	1.6
>25	17	9.3
18-20	49	26.9
21-25	113	62.1
Gender		
Female	52	28.6
Male	130	71.4
Ethnicity		
Bisaya	1	0.5
Chinese	160	87.9
Indians	12	6.6
Malays	9	4.9
Total	182	100

Based on the results in Table 5, the direct relationship between Facebook use and mental health ($r_{\text{depression}}=0.246^{**}$, $r_{\text{anxiety}}=0.282^{**}$, $r_{\text{stress}}=0.292^{**}$ and $r_{\text{bipolar disorder}}=0.296^{**}$) is significantly positive ($\text{sig} < 0.001$). Therefore, H1-4 are accepted. This result is consistent with (citations).

Table 5. Pearson correlation of IV and DV

Independent Variable	Dependent variable	Sig(2-tailed)	Pearson's Correlation (r)
Facebook	Depression	<0.001	0.246**
	Anxiety		0.282**
	Stress		0.292**
	Bipolar Disorder		0.296**
Instagram	Depression	0.131	0.112
	Anxiety	0.045	0.149*
	Stress	0.060	0.140
	Bipolar Disorder	0.187	0.098
Youtube	Depression	<0.001	0.295**
	Anxiety	0.008	0.197**
	Stress	0.002	0.225**
	Bipolar Disorder	0.005	0.208**
Tiktok	Depression	<0.001	0.330**
	Anxiety	0.032	0.159**
	Stress	0.064	0.138
	Bipolar Disorder	0.009	0.194**

Note: **Correlation is significant at the 0.01 level (2-tailed).

Based on the results in Table 5, the direct relationship between Youtube use and mental health ($r_{\text{depression}}=0.295^{**}$, $r_{\text{anxiety}}=0.197^{**}$, $r_{\text{stress}}=0.225^{**}$, $r_{\text{bipolar disorder}}=0.208^{**}$) is significantly positive (sig is

< 0.001 , 0.008 , 0.002 , 0.005). Therefore, H9-H12 are accepted. Based on the results in Table 5, the direct relationship between Tiktok use and mental health ($r_{\text{depression}}=0.330^{**}$, $r_{\text{anxiety}}=0.159^{**}$, $r_{\text{bipolar disorder}}=0.194^{**}$) is significantly positive (sig is < 0.001, 0.032, 0.009). However, Tiktok use and mental health ($r_{\text{stress}} = 0.138^{**}$) are significantly negative (sig is 0.064). Therefore, H13, H14, H16 are accepted, but H15 is falling support. Based on the results in Table 5, the direct relationship between Instagram use and mental health ($r_{\text{depression}}=0.112$, $r_{\text{stress}}=0.140$ and $r_{\text{bipolar disorder}}=0.098$) is significantly negative (sig is 0.131, 0.060, 0.187). But Instagram use and mental health ($r_{\text{anxiety}} = 0.149^{**}$) are significantly positive (sig is 0.045). Therefore, H5,H7,H8 are in a falling support but H6 is accepted.

DISCUSSION

The research hypotheses related to Facebook usage H1, H2, H3, and H4 were formulated based on the existing literature suggesting potential associations between social media participation and mental health outcomes. Hypothesis H1 posited a positive correlation between Facebook use and depression, reflecting the premise that excessive exposure to social media, particularly platforms like Facebook, may contribute to depressive symptoms due to factors such as social comparison and cyberbullying. The link between cyberbullying and depression has become stronger, and girls and older adolescents are more vulnerable to experiencing depression afterward (Hu et al., 2021). Similarly, hypothesis H2 anticipated a positive correlation between Facebook use and anxiety, considering the role of social media in amplifying feelings of stress and apprehension through constant connectivity and exposure to curated lifestyles. Hypothesis H3 predicted a positive correlation between Facebook use and stress, aligning with research suggesting that prolonged engagement with social media platforms may lead to elevated stress levels due to information overload and digital overload. Lastly, hypothesis H4 proposed a positive correlation between Facebook use and bipolar disorder, acknowledging the potential impact of social media on mood regulation and emotional stability among individuals with bipolar disorder. Facebook may affect undergraduate mental health because undergraduate students diagnosed with major depressive disorders have been observed to dedicate an excessive amount of their leisure time to the use of computers (Zaffar et al., 2015). Additionally, the pattern was comparable to personality disorders, where the primary predictor of each disorder predominantly revolved around factors related to Facebook usage, except for paranoid personality disorder (Rosen et al., 2013).

Hypotheses on Instagram usage H5, H6, H7, and H8 were formulated based on the unique characteristics of the platform and its perceived influence on mental health outcomes. Hypothesis H5 anticipated a non-significant correlation between Instagram use and depression, considering the platform's emphasis on visual content. Our study did not find a significant relationship between Instagram use and depression or stress, contrary to some existing literature. Possible factors contributing to this discrepancy include variations in study samples and measurement methods. Hypothesis H6 posited a positive correlation between Instagram use and anxiety, recognizing the role of image-focused platforms in exacerbating anxiety symptoms through comparison and self-presentation concerns. Our research demonstrates that social comparison, prevalent on Instagram, is a precursor to increased anxiety. Instagram induces anxiety among college students by promoting a culture of comparison and exposure to idealized images, both linked to increased social anxiety. Furthermore, exposure to idealized images contributes to negative emotions and overall poor psychological well-being, further amplifying anxiety levels among undergraduates (Jiang & Ngien, 2020). Hypothesis H7 predicted a non-significant correlation between Instagram use and stress, acknowledging the mixed findings in existing literature regarding the platform's impact on stress levels. Hypothesis H8 proposed a non-significant correlation between Instagram use and bipolar disorder, considering the limited research exploring the relationship between Instagram engagement and mood disorders. Initially, there may appear to be no direct link between Instagram use and bipolar disorder, especially considering activities such as listening to music and reading announcements. However, after a deeper analysis based on our Table 6, it becomes evident that these activities may be associated with bipolar disorder. This unexpected finding suggests the need for

more research into the impact of social media use on mental health, particularly focusing on activities like listening to music and reading important announcements from colleges.

Table 6. Questionnaire cause bipolar disorder

Social media	Questionnaire	Pearson's Correlation (r)
Instagram	I use social media to listen to music.	0.004
	I use social media to read important announcements from colleges/industries.	0.005

The investigation of hypotheses concerning YouTube usage H9, H10, H11, and H12 was guided by the platform's prevalence and its potential influence on mental health outcomes. Hypothesis H9 anticipated a positive correlation between YouTube use and depression, recognizing the role as a source of entertainment and information that can contribute to feelings of isolation and inadequacy among users. Hypothesis H10 posited a positive correlation between YouTube use and anxiety, considering the platform's ability to evoke stress and apprehension through exposure to alarming or sensationalized content. Hypothesis H11 predicted a positive correlation between YouTube use and stress, acknowledging the potential for prolonged screen time and content consumption to exacerbate stress levels among users. Lastly, hypothesis H12 proposed a positive correlation between YouTube use and bipolar disorder, recognizing the need to explore the impact on mood regulation and emotional well-being among people with bipolar disorder. The findings of this study support social comparison, suggesting that individuals on platforms like YouTube tend to compare themselves with others (Iwamoto & Chun, 2020). Our participants showed that they often place emotional importance on how others are on these platforms. This comparison process can lead to feelings of inadequacy and anxiety as individuals try to meet perceived standards set by others on YouTube. Based on the previous finding, excessive use of social media correlates with mental health issues such as emotional distress and poor performance, underscoring its negative impact on well-being (Lozano Blasco et al., 2020).

The hypotheses regarding TikTok usage H13, H14, H15, and H16 were formulated considering the platform's rapid rise in popularity and its potential implications for mental health. Hypothesis H13 anticipated a positive correlation between TikTok use and depression, recognizing the immersive and addictive nature that can contribute to feelings of emptiness and dissatisfaction among users. Hypothesis H14 posited a positive correlation between TikTok use and anxiety, acknowledging the platform's ability to induce stress and anxiety through constant scrolling and exposure to curated content. Hypothesis H15 predicted a non-significant correlation between TikTok use and stress, considering the potential for excessive engagement with short-form videos. TikTok does not seem to cause stress among undergraduates. TikTok serves as an enjoyable platform for discussing diverse topics with humor, possibly offering stress relief instead of adding to it (Jiotsa et al., 2021). Lastly, hypothesis H16 proposed a positive correlation between TikTok use and bipolar disorder, recognizing the need to explore the impact on mood instability and emotional regulation among individuals with bipolar disorder. Based on our research, TikTok's platform may contribute to mental health issues such as depression, anxiety, and bipolar disorder, as users are exposed to criticism and negative feedback. This is supported by the prevalence of depression and anxiety among adolescents and young adults, often discussed in popular social media content among youth (Samuel et al., 2024).

5.0 CONCLUSION

This study explored the relationship between social media use and mental health issues among undergraduates in Malaysia, focusing on platforms such as Facebook, Instagram, YouTube and TikTok. The findings indicate a significant positive correlation between the use of these platforms and various mental health challenges, including depression, anxiety, stress, and bipolar disorder. In particular, excessive use of Facebook and TikTok showed strong associations with higher levels of depression and anxiety. YouTube, while also associated with negative mental health outcomes, provided some benefits related to information and support for mental health, demonstrating a complex interaction between content type and user impact.

The study had several issues that might have limited how far the results could be applied. Because the sample was limited to undergraduates from a single university, it might not accurately reflect the range of experiences between Malaysian undergraduates. Furthermore, the use of self-reported data raises the possibility of bias because individuals may have over- or underreported their use of social media or their state of mental health. The cross-sectional methodology makes it more difficult to determine a causal relationship between social media use and results related to mental health.

To gain a deeper understanding of the causal links between social media consumption and mental health over time, future research should take into account longitudinal approaches. The results would be more generalizable if the demographic scope was expanded to include additional universities and a more varied pool of participants. It would also be helpful to investigate the effects of particular types of social media content, as this could offer a more in-depth understanding of the ways in which various interactions impact mental health. Lastly, tests and implementations of interventions aimed at reducing the negative effects of social media on mental health could provide the research findings real-world applicability.

REFERENCES

- Adeyanju, G. C., Solfa, R. P., Tran, T. L., Wohlfarth, S., Büttner, J., Osobajo, O. A., & Otitoju, A. (2021). Behavioural symptoms of mental health disorder such as depression among young people using Instagram: a systematic review. *Translational Medicine Communications*, 6(1). <https://doi.org/10.1186/s41231-021-00092-3>
- Al-Menayes, J. J. (2015). Social Media Use, Engagement and Addiction as Predictors of Academic Performance. *International Journal of Psychological Studies*, 7(4), 86. <https://doi.org/10.5539/ijps.v7n4p86>
- Alonzo, R., Hussain, J., Stranges, S., & Anderson, K. K. (2021). Interplay between social media use, sleep quality, and mental health in youth: A systematic review. In *Sleep Medicine Reviews* (Vol. 56). W.B. Saunders Ltd. <https://doi.org/10.1016/j.smrv.2020.101414>
- Balcombe, L., & De Leo, D. (2023). The Impact of YouTube on Loneliness and Mental Health. *Informatics*, 10(2). <https://doi.org/10.3390/informatics10020039>
- Billah, M., Rutherford, S., Akhter, S., & Tanjeela, M. (2023). Exploring mental health challenges and coping strategies in university students during the COVID-19 pandemic: A case study in Dhaka city, Bangladesh. *Frontiers in Public Health*, 11. <https://doi.org/10.3389/fpubh.2023.1152366>
- Caballo, V. E., Salazar, I. C., Irurtia, M. J., Arias, B., Hofmann, S. G., & ciso-a Research Team. (2012). The multidimensional nature and multicultural validity of a new measure of social anxiety: The Social Anxiety Questionnaire for Adults. *Behavior therapy*, 43(2), 313-328. <https://doi.org/10.1016/j.beth.2011.07.001>
- Carter, B., Rees, P., Hale, L., Bhattacharjee, D., & Paradkar, M. S. (2016). Association between portable screen-based media device access or use and sleep outcomes: a systematic review and meta-analysis. *JAMA pediatrics*, 170(12), 1202-1208. <https://doi.org/10.1503%2Fcmaj.190434>
- Chabrol, H., Laconi, S., Delfour, M., & Moreau, A. (2017). Contributions of psychopathological and interpersonal variables to problematic facebook use in adolescents and young adults. *International Journal of High Risk Behaviors and Addiction*, 6(1). <https://doi.org/10.5812/ijhrba.32773>

- Choi, B., Kim, H., & Huh-Yoo, J. (2021). Seeking mental health support among college students in video-based social media: content and statistical analysis of YouTube videos. *JMIR formative research*, 5(11), e31944. <https://doi.org/10.2196/31944>
- D'Souza, L., & Hemamalini, M. J. (2018). Instagram addiction and depression among college students. *The International Journal of Indian Psychology*, 6(4), 96-102. <https://doi.org/10.25215/0604.091>
- de Bérail, P., Guillon, M., & Bungener, C. (2019). The relations between YouTube addiction, social anxiety and parasocial relationships with YouTubers: A moderated-mediation model based on a cognitive-behavioral framework. *Computers in Human Behavior*, 99(April), 190-204. <https://doi.org/10.1016/j.chb.2019.05.007>
- do Nascimento, J. P. R., Borges Costa, L., & Meneses, R. L. (2016). Is There Any Difference between Bipolar and Non-bipolar Individuals in the Use of Facebook? *Bipolar Disorder: Open Access*, 2(1). <https://doi.org/10.4172/2472-1077.1000104>
- Fan, R. (2022, November). The Impact of TikTok short videos on anxiety level of juveniles in Shenzhen China. In *2022 International Conference on Science Education and Art Appreciation (SEAA 2022)* (pp. 535-542). Atlantis Press. <https://doi.org/10.32388/EPFG06>
- Fardouly, J., Willburger, B. K., & Vartanian, L. R. (2018). Instagram use and young women's body image concerns and self-objectification: Testing mediational pathways. *New media & society*, 20(4), 1380-1395. <https://doi.org/10.3390%2Fijerph18062880>
- Gajo, A. G. E., Gaisen, E. M. P., Franz Von King, R. L., Edaño, L. B., & Calixtro Jr, V. L. (2023). Sustaining students' mental health through the use of tiktok application. *Indonesian Journal of Community and Special Needs Education*, 3(1), 11-20. <http://dx.doi.org/10.17509/ijcsne.v3i1.43729>
- Gaus, Q., Jolliff, A., & Moreno, M. A. (2021). A content analysis of YouTube depression personal account videos and their comments. *Computers in human behavior reports*, 3, 100050. <https://doi.org/10.1016/j.chbr.2020.100050>
- Grogan, S. (2021). *Body image: Understanding body dissatisfaction in men, women and children*. Routledge. <https://doi.org/10.4324/9781315681528>
- Hasan, M. I. (2023). *The Impact of Social Media on Mental Health and Well-Being on Students*. <https://www.researchgate.net/publication/375635347>
- Hirschfeld, R. M. (2002). The Mood Disorder Questionnaire: a simple, patient-rated screening instrument for bipolar disorder. *Primary care companion to the Journal of Clinical Psychiatry*, 4(1), 9. <https://doi.org/10.4088/pcc.v04n0104>
- Hu, Y., Bai, Y., Pan, Y., & Li, S. (2021). Cyberbullying victimization and depression among adolescents: A meta-analysis. *Psychiatry research*, 305, 114198. <https://doi.org/10.1016/j.psychres.2021.114198>
- Islam, M. R., Tushar, M. I., Jannath, S., Moona, A. A., Akter, S., & Islam, S. M. A. (2021). Data set concerning the use of social networking sites and mental health problems among the young generation in Bangladesh. *Data in Brief*, 39, 107593. <https://doi.org/10.1016/j.dib.2021.107593>
- Ismail, N. S., Rustham, A. T. P., & Ibrahim, A. (2022, February). The Relationship Between the Intensity of Using Tik Tok social media and Stress Level Among Teenagers in Makassar City During the Pandemic. In *Interdisciplinary Conference of Psychology, Health, and Social Science (ICPHS 2021)* (pp. 265-268). Atlantis Press. <https://doi.org/10.2991/assehr.k.220203.039>
- Iwamoto, D., & Chun, H. (2020). The emotional impact of social media in higher education. *International Journal of Higher Education*, 9(2), 239-247. <https://doi.org/10.5430/ijhe.v9n2p239>
- Jafarov, S. (2024). Internationalisation and Cultural Aspects of Online Learning, Training, and Research. *Pakistan Journal of Life and Social Sciences*, 22(2), 6437-6452.
- Jam, F. A. (2019). CRYPTO CURRENCY—A NEW PHENOMENON IN MONETARY CIRCULATION. *Central Asian Journal of Social Sciences and Humanities*, 4(1), 39-46.

- Jam, F. A., Singh, S. K. G., Ng, B., & Aziz, N. (2018). The interactive effect of uncertainty avoidance cultural values and leadership styles on open service innovation: A look at Malaysian healthcare sector. *International Journal of Business and Administrative Studies*, 4(5), 208-223.
- Jiang, S., & Ngien, A. (2020). The effects of Instagram use, social comparison, and self-esteem on social anxiety: A survey study in Singapore. *Social Media+ Society*, 6(2), 2056305120912488. <https://doi.org/10.1177/2056305120912488>
- Jiotsa, B., Naccache, B., Duval, M., Rocher, B., & Grall-Bronnec, M. (2021). Social media use and body image disorders: Association between frequency of comparing one's own physical appearance to that of people being followed on social media and body dissatisfaction and drive for thinness. *International Journal of Environmental Research and Public Health*, 18(6), 1-14. <https://doi.org/10.3390/ijerph18062880>
- Jones, S., Mulligan, L. D., Higginson, S., Dunn, G., & Morrison, A. P. (2013). The bipolar recovery questionnaire: Psychometric properties of a quantitative measure of recovery experiences in bipolar disorder. *Journal of Affective Disorders*, 147(1-3), 34-43. <https://doi.org/10.1016/j.jad.2012.10.003>
- Khasawneh, A., Madathil, K. C., Dixon, E., Wiśniewski, P., Zinzow, H., & Roth, R. (2020). Examining the self-harm and suicide contagion effects of the blue whale challenge on YouTube and Twitter: Qualitative study. *JMIR Mental Health*, 7(6). <https://doi.org/10.2196/15973>
- Kircaburun, K., & Griffiths, M. D. (2018). Instagram addiction and the Big Five of personality: The mediating role of self-liking. *Journal of Behavioral Addictions*, 7(1), 158-170. <https://doi.org/10.1556/2006.7.2018.15>
- Kumari, S. (2020). Effects of Social Isolation on Mental Health. *International Journal of Scientific Research and Engineering Development*, 4(6), 1085-1093.
- Lozano Blasco, R., Latorre Cosculluela, C., & Quílez Robres, A. (2020). Social network addiction and its impact on anxiety level among university students. *Sustainability*, 12(13), 5397. <https://doi.org/10.3390/su12135397>
- Moldt, J. A., Festl-Wietek, T., Mamlouk, A. M., & Herrmann-Werner, A. (2022). Assessing medical students' perceived stress levels by comparing a chatbot-based approach to the Perceived Stress Questionnaire (PSQ20) in a mixed-methods study. *Digital Health*, 8, 20552076221139092. <https://doi.org/10.1177/20552076221139092>
- Montag, C., Lachmann, B., Herrlich, M., & Zweig, K. (2019). Addictive features of social media/messenger platforms and freemium games against the background of psychological and economic theories. *International journal of environmental research and public health*, 16(14), 2612. <https://doi.org/10.3390/ijerph16142612>
- Naslund, J. A., Bondre, A., Torous, J., & Aschbrenner, K. A. (2020). Social media and mental health: benefits, risks, and opportunities for research and practice. *Journal of technology in behavioral science*, 5, 245-257. <https://doi.org/10.1007/s41347-020-00134-x>/Published
- Nazzal, Z., Rabee, H., Ba'ar, M., & Berte, D. (2022). Virtually alone: excessive Facebook use and mental health risk in Palestine, a cross sectional study. *Palestinian Medical and Pharmaceutical Journal*, 6(1), 53-62. <https://doi.org/10.59049/2790-0231.1041>
- Osman, W., Mohamed, F., Elhassan, M., & Shoufan, A. (2022). Is YouTube a reliable source of health-related information? A systematic review. *BMC Medical Education*, 22(1), 382. <https://doi.org/10.1186/s12909-022-03446-z>
- Pate, A. N., Reed, B. N., Cain, J., & Schlesselman, L. (2023). Improving and expanding research on burnout and stress in the academy. *American Journal of Pharmaceutical Education*, 87(1), ajpe8907. <https://doi.org/10.5688/ajpe8907>
- Patel, P., Nagare, M., Randhawa, J., Ali, A., & Olivieri, L. (2023). Bipolar Disorder in Social Media: An Examination of Instagram's Role in Disseminating Accurate Information. *Cureus*, 15(9). <https://doi.org/10.7759/cureus.46296>
- Ponnusamy, S., Iranmanesh, M., Foroughi, B., & Hyun, S. S. (2020). Drivers and outcomes of Instagram Addiction: Psychological well-being as moderator. *Computers in Human Behavior*, 107. <https://doi.org/10.1016/j.chb.2020.106294>

- Qiyang, Z., & Jung, H. (2019, September). Learning and sharing creative skills with short videos: A case study of user behavior in TikTok and Bilibili. In *Int. Assoc. Soc. Des. Res. Conf* (No. 10, pp. 25-50). <https://doi.org/10.3389%2Ffpsyg.2022.932805>
- Regasa, A., & Ettisa, D. L. (2023). The Impact of TikTok on Students: A Literature Review. *Qeios*. <https://doi.org/10.32388/EPFG06>
- Rosen, L. D., Whaling, K., Rab, S., Carrier, L. M., & Cheever, N. A. (2013). Is Facebook creating “iDisorders”? The link between clinical symptoms of psychiatric disorders and technology use, attitudes and anxiety. *Computers in Human Behavior*, 29(3), 1243–1254. <https://doi.org/10.1016/j.chb.2012.11.012>
- Samuel, L., Kuijpers, K., & Bleakley, A. (2024). TherapyTok for depression and anxiety: a quantitative content analysis of high engagement TikTok videos. *Journal of Adolescent Health*, 74(6), 1184–1190. <https://doi.org/10.1016/j.jadohealth.2024.02.002>
- Santini, Z. I., Koyanagi, A., Tyrovolas, S., Mason, C., & Haro, J. M. (2015). The association between social relationships and depression: A systematic review. *Journal of Affective Disorders*, 175, 53–65. <https://doi.org/10.1016/j.jad.2014.12.049>
- Schønning, V., Aarø, L. E., & Skogen, J. C. (2020). Central themes, core concepts and knowledge gaps concerning social media use, and mental health and well-being among adolescents: a protocol of a scoping review of published literature. *BMJ open*, 10(1), e031105. <https://doi.org/10.1136/bmjopen-2019-031105>
- Sharma, A., Sanghvi, K., & Churi, P. (2022). The impact of Instagram on young Adult’s social comparison, colourism and mental health: Indian perspective. *International Journal of Information Management Data Insights*, 2(1). <https://doi.org/10.1016/j.jjimei.2022.100057>
- Smith, T. (2023). An exploratory analysis of the relationship of problematic Facebook use with loneliness and self-esteem: the mediating roles of extraversion and self-presentation. *Current Psychology*, 42(28), 24410–24424. <https://doi.org/10.1007/s12144-022-03505-0>
- Smith, T., & Short, A. (2022). Needs affordance as a key factor in likelihood of problematic social media use: Validation, latent Profile analysis and comparison of TikTok and Facebook problematic use measures. *Addictive Behaviors*, 129, 107259. <https://doi.org/10.3389/fpsyg.2022.932805>
- Sohane, A., Ghanghoriya, P., & Tiwari, A. (2023). Impact of Use of Social Media on Adolescent’s Mental Health in a Tier 2 City—A Cross-Sectional Study. *International Journal of Recent Surgical and Medical Sciences*, 09(01), 018–022. <https://doi.org/10.1055/s-0042-1743450>
- Tandoc, E. C., Ferrucci, P., & Duffy, M. (2015). Facebook use, envy, and depression among college students: Is facebooking depressing? *Computers in Human Behavior*, 43, 139–146. <https://doi.org/10.1016/j.chb.2014.10.053>
- Ting, T. T., Lee, K. T., Lim, S. M., Lai, C. C., Omar, M. A., Alin, J., & Meri, A. (2023). Assessing the identity of digital technology in education in the age of digital communication. *Online Journal of Communication and Media Technologies*, 13(4). <https://doi.org/10.30935/ojcm/13695>
- Ting, T. T., Lee, S. C., Wee, M. C., & Chaw, J. K. (2024). Romantic relationship patterns, detailed covariates, and impacts on education: A study on young adults in the US using ICPSR dataset. *Global Social Welfare*, 11(2), 151–163. <https://doi.org/10.1007/s40609-022-00254-7>
- Villa-Ruiz, C., Kassamali, B., Mazori, D. R., Min, M., Cobos, G., & LaChance, A. (2021). Overview of TikTok’s most viewed dermatologic content and assessment of its reliability. *Journal of the American Academy of Dermatology*, 85(1), 273–274. http://dx.doi.org/10.2991/978-2-494069-05-3_66
- Yamin, M. (2019). Information technologies of 21st century and their impact on the society. *International Journal of Information Technology (Singapore)*, 11(4), 759–766. <https://doi.org/10.1007/s41870-019-00355-1>
- Yi, A. C. Y., Ying, T. K., Yee, S. J., Chin, W. M., & Tin, T. T. (2022). InPath Forum: A Real-Time Learning Analytics and Performance Ranking Forum System. *IEEE Access*, 10, 128536–128542. <https://doi.org/10.1109/ACCESS.2022.3227430>

Zaffar, M., Mahmood, S., Saleem, M., & Zakaria, E. (2015). Facebook addiction: Relation with depression, anxiety, loneliness and academic performance of Pakistani students. *Science International (Lahore)*, 27(3), 2469-2475.