STUDY OF DEPRESSION, ANXIETY, AND SOCIAL MEDIA ADDICTION AMONG UNDERGRADUATE STUDENTS

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ABSTRACT

This paper studies the connection between social media addiction and mental disorder from the existing investigation among undergraduate students. A comprehensive document search was conducted by using six electronic databases, including PubMed, Scopus, ScienceDirect, Web of Science, JSTOR, ProQuest Education to identify articles published before November 21st, 2019. All collected papers focused on studying social media addiction and psychosis. Two reviewers individualistically evaluated the quality of the study by using the Joanna Briggs Institute's approach. Five articles were filtered out through the screening process and included in the review. The high prevalence of social addiction among college students (9.7% ~ 41%) has been clarified. The association between social media addiction and mental disorders is positive for student health. This article contributes to raising awareness and finding solutions to these risk problems. The study also confirms the connection between online shopping addiction and eating disorders among social addicts. We also discuss the causes and harms of social media addiction.

Keywords: Social Media Addiction, Mental Disorder, Undergraduate Student, Prisma Chart, Systematic Analysis.

JEL. Classification: I1 Health, I12 Health Behavior, I23 Higher Education.

INTRODUCTION

Social media addiction (or problematic social media use) classified into DSM V is a proposed form of psychological or behavioural dependence on social media platforms (Casale & Banchi, 2020). Meanwhile, mental disorders (or mental illnesses) are conditions that affect your thinking, feeling, mood, and behaviour (Medlineplus, 2020). It is hard for physicians to diagnose the disease if the addict does not report his or her problem. In previous studies on social media addiction, most studies focused on social media addiction used questionnaires/surveys to assess this behavioural addiction without a clinical diagnosis. Young people and students considered to be most vulnerable to problematic internet use (Ioannidis et al., 2018; Kuss et al., 2013; Kuss & Lopez-Fernandez, 2016). A study in India showed that the rate of social media addiction was 36.9% of 1389 social media users who were Pre-University college students (Ramesh et al., 2018).

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Furthermore, the problem of social media use in children and young people are often allied with mental disorders symptoms, for example, anxiety and depression (Hoge et al., 2017). In the US, approximately 25% of college students surveyed showed signs of depression when using Facebook (Moreno et al., 2011). A survey in 2013 from American Psychological Association found that psychological problems are increasing among college students with the ratio, such as anxiety (41.6%), depression (36.4%), and relationship problems (35.8%) (American psychological association, 2013).

When individuals practice their time appropriately for social media, it gives users a good consequence. In some situations, social media can help improve mood and boost health promotion (Hoge et al., 2017). During the time the whole world was fighting the coronavirus, social media's strength contributes to a significant part of Vietnam's successful anti-COVID-19 epidemic (La et al., 2020). When diagnosing Facebook addiction symptoms, clinicians can consider a person's relationship with parents or peers (Badenes-Ribera et al., 2019). The reason is that antidepressants do not help much improve patients with anxiety and depression (Kelly et al., 2012). In contrast, social media also increases the negative aspects of youth activities because of their popularity in the activities of people today. The more time people spend on social media, the more likely they are to suffer from depression (Lin et al., 2016; Boers et al., 2019). Fear of missing out can reduce the happiness of young people (Fabris et al., 2020).

Previous studies have inspected the association between social media addiction and mental disorders. First of all, one article in 2014 shows the association between SNS and mental health issues: depressive symptoms, changes in self-esteem, and Internet addiction (Pantic, 2014). Another article also concluded that Facebook use is associated with six results: addiction, anxiety, depression, body image, alcohol use, and other problems (Frost & Rickwood, 2017). Problematic social media use among young Americans largely explains the connection between social media use and depressive symptoms (Shensa et al., 2017). A meta-analysis of random effects has confirmed a positive correlation between problematic Facebook use and psychological distress (Marino et al., 2018). Another meta-analysis also confirmed the relation between Facebook's application and the depressive symptoms but on a small scale (Yoon et al., 2019). Finally, there is a link between social media use and mental health issues (Keles et al., 2020). However, the studies mentioned above do not focus on a specific age group, so the difference between this article and previous assessments is that this study only focuses on college students.

In the age of information technology and the internet boom today, social media addiction is very vulnerable, specifically for young people. This article chooses to analyze social media addiction studies of college students aged 18-24. The first reason is those college students expected to have better future incomes than young people working in the industry after completing high school (Jerrim, 2015). The second reason is that the degree of social media addiction is increasing among young men and women (Aparicio-Martínez et al., 2020). A study in the US found that social media use is associated with an increase in depression (Lin et al., 2016).

Furthermore, while the COVID-19 pandemic is still complicated over the world, governments recommend that people should stay home and only socialize when necessary. Hence, people have favourable conditions to spend more time on social media. Founded on data from Statista conducted in March 2020, the percentage of longer spending on social media (e.g., Facebook, Instagram, Twitter, etc.) in the world is 44%, China is 50%, the United States is 32%, and Singapore is 39% (Statista, 2020). Therefore, this study aimed to systematically examine the prevalence of social media addiction among college students and assess the association between

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social media addiction and mental disorders for undergraduate students. The next sections of this paper are data and methodology, content analysis, results discussion, implications, and conclusion.

DATA AND METHODOLOGY

Data

The way to collect the data from this paper was from PRISMA's guidelines, the Preferred Reporting Items for Systematic Reviews and Meta-analyses (Moher et al., 2009). The advantage of this method is to summarize and analyze previous studies' details related to the research objectives. The Prisma statement assists the authors to improve systematic assessments. The authors need to examine 27 listed items (see appendix A) and develop a four-phase diagram to process and refine relevant research papers (Moher et al., 2009).

Search Strategy

Six databases were systematically searched, including ProQuest Education (1986-2019), PubMed (2011-2019), Scopus (2011-2019), ScienceDirect (2009-2020), Web of Science (2009-2019), and JSTOR (1981-2016). The date to collect the database is November 21st, 2019. The listed search keywords are made based on instructions from the PICO framed research question (N.Y.U. libraries, 2020; Schardt et al., 2007). In this paper, the authors narrow to population and outcome. The population was college students or university students, while the outcome was the association between social media addiction and mental disorder. The search terms have been used to search for the research, and the authors use synonyms of the keywords. Undergraduate students contain college students or university students, and social media addiction comprises social networking addiction or Facebook addiction or Instagram addiction or Twitter addiction. Mental disorders consist of mental disorders or intellectual disorders or psychological disorders. The first process of finding documents in this article is on the PubMed website, see appendix B for details. Each element was searched in turn on PubMed advanced search. The keyword sequences in PubMed was identified in the search toolbar as ((((College students OR university students))) AND ((Social networking addiction OR Facebook addiction OR Instagram addiction OR Twitter addiction))) AND ((mental disorder OR intellectual disorder OR psychological disorder)). After that, the search technique for the next database was performed with the same procedure for other data. The paper was checking the related studies during the 1981-2020 period. As a result, 1100 articles have been compiled and screened as the information in the PRISMA flow chart, Figure 1.

Study Selection Criteria

The inclusion and exclusion criteria were used to screen articles that matched the research objectives of this study. First, quantitative non-interventional study designs (cross-sectional studies, cohort study, case-control study) and studies published in English were included. Besides, studies published in peer review journals were also comprised. But studies with non-peer reviewed journals, proceeding letters, editorials, conference abstracts, literature review, systematic review, and experimental design were excluded. Second, the participants that were undergraduate students aged 18-24 were encompassed. Graduate students or high school students were omitted. Third, the outcome of interest was the association between social media addiction and mental disorders such as depression or anxiety. Social media addiction has counted in social networking addiction or

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Facebook addiction or Instagram addiction or Twitter addiction or WeChat addiction; mental disorders have identified as depression or anxiety. Two reviewers independently reviewed all papers based on the titles and abstracts of the studies identified in the literature search and selected eligible documents for full-text review (Tuan, Ferry). The third reviewer consulted when needed (Kuan-Han).

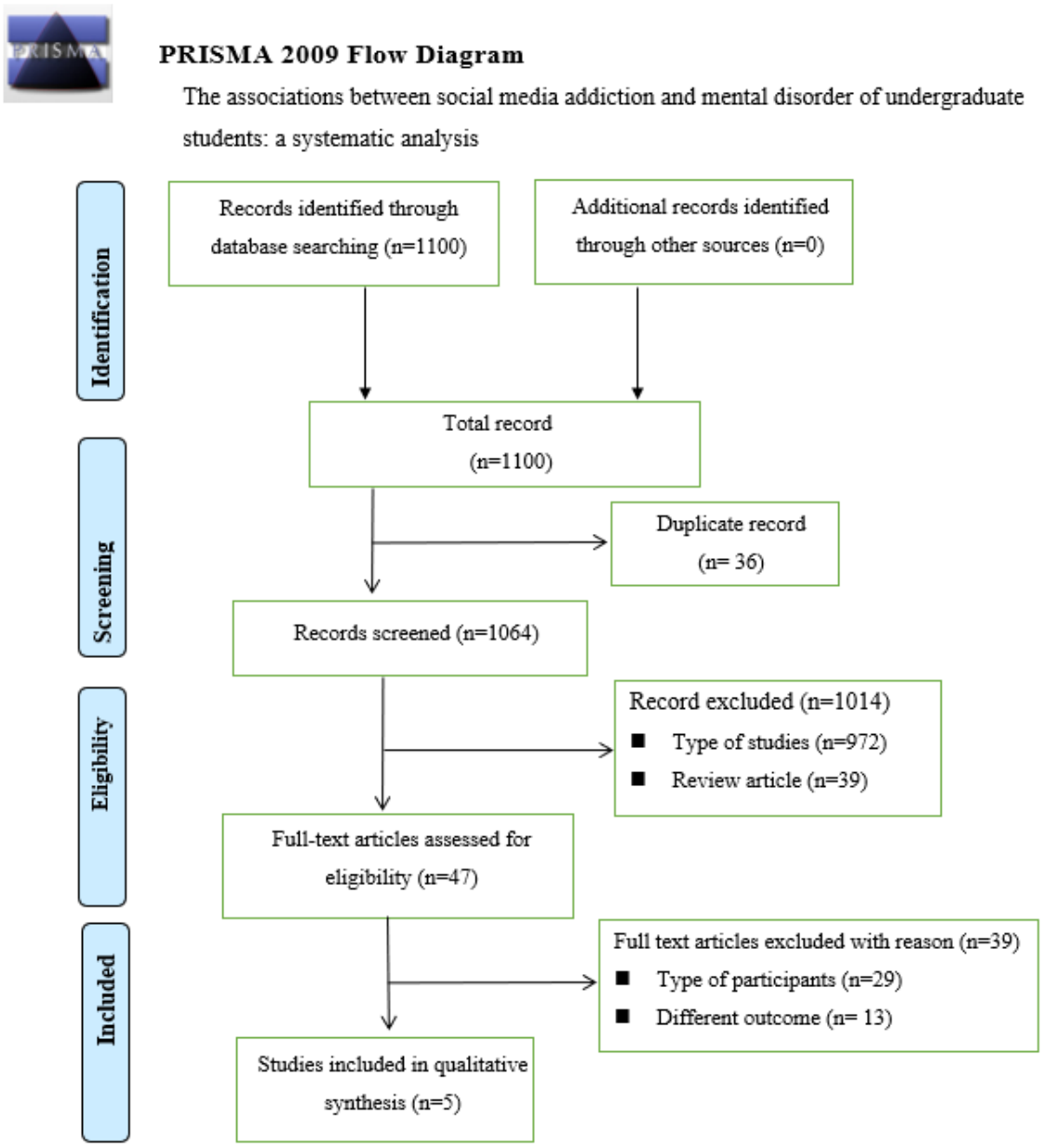

FIGURE 1

PRISMA FLOW CHART

Data Extraction and Synthesis

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A reviewer (Tuan) extracted the information and cross-checked with a second independent reviewer (Ferry) for each chose to study: publication year, country of research, study design, sample size, gender, age, exposure measurement for social networking addiction, outcome measurement for mental disorder and findings for the association and SNS addiction. The extracted data were recorded in Excel 2016 spreadsheet. Any differences were resolved through discussion between two reviewers and with the participation of a third reviewer (Kuan-Han).

Quality Assessment

The critical evaluation checklist established by the Joanna Briggs Institute (JBI) and collaborators was used to evaluate each study's quality, including the type of study design (The Joanna Briggs Institute, 2017). JBI's critical assessment checklist has eight questions for cross-sectional research. Each answer item on the list was scored as 1 for "yes" and 0 for "no, not clear, or not applicable." Reviewers have to discuss any disagreement to get the final decisions.

Statistical Analysis

Data were analyzed with SPSS 25.0 software (I.B.M. Corp, Armonk, NY). The Kappa statistics and percentage agreement were calculated to evaluate the agreement between the two reviewers on research choice and quality assessment, with a kappa value of 0.8 or higher indicating as a great deal (Giannantonio, 2008).

CONTENT ANALYSIS AND RESULTS

Study Selection

A total of 1100 articles are collected through six databases. After removing duplicate articles and refining articles based on inclusion and exclusion criteria, five articles met the final analysis selection. The process of screening the articles was in Table 2. The consensus between the two independent reviewers for this research choice is excellent for both title and abstract (Kappa = 0.865, percentage agreement = 99.1%) and full text (Kappa = 0.86, percentage agreement = 93%). The quality of the selected article presented in Table 2. Consensus of 2 reviewers for assessment of quality was excellent (Kappa = 0.8 percentage agreement = 94%).

Study Characteristics

The characteristics and results of the studies, including the association between social media addiction and psychosis, are presented in Table 1. All included papers were written in English and published since 2014 to 2019 and places of the study included China, Singapore, and the US (Hormes et al., 2014; Tang & Koh, 2017; Montag et al., 2018; Liu & Ma, 2019; Xie & Karan, 2019). All research methods in these studies are cross-sectional (Hormes et al., 2014; Liu & Ma, 2019; Montag et al., 2018; Tang & Koh, 2017; Xie & Karan, 2019)

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TABLE 1
SUMMARY OF INCLUDED STUDIES

No	Author, year	Country	Study design (cohort, cross-sectional, case control)	Sample size	Gender	Exposure measurement for social networking addiction	Outcome measurement for mental disorder	Findings	
								Association	Prevalence of SNS addiction
1	Montag et al., 2018	China	Cross sectional	61	34.4% female; 65.6% male	WeChat addiction scores	Self-report questionnaires: trait anxiety and depressive symptoms;	Higher tendencies towards WeChat addiction were associated with smaller gray matter volumes of the subgenual anterior cingulate cortex, a key region for monitoring and regulatory control in neural networks underlying addictive behaviors. Moreover, a higher frequency of the paying function was associated with smaller nucleus acumen's volumes. Findings were robust after controlling for levels of anxiety and depression.	25 (41%)
2	Liu & Ma, 2019	China	Cross sectional	463	74,3% female, 25,7% male	Chinese Social Media Addiction Scale.	The Experience in Close Relationships Scale, the Difficulties in Emotion Regulation Scale	Attachment anxiety positively predicted SNS addiction and that emotion regulation mediated this link. These findings suggest that individuals' affective regulation capability should be a target of future interventions and treatments	78 (16.8%)

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3	Tang et al., 2018	Singapore	Cross sectional	1110	62.5% females, 37.5% males	A modified version of the 6-item Bergen Facebook Addiction Scale (BFAS) was used to measure SNS addiction.	Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013)	The comorbidity rates of SNS addiction and affective disorder were 21% for depression, 27.7% for anxiety, and 26.1% for mania. In general, females as compared to males reported higher comorbidity rates of SNS addiction and affective disorder.	328 (29.5%)
4	Hormes et al., 2014	USA	Cross sectional survey study	253	62.8% female, male 37,2%	Young Internet Addiction Test	Acceptance and Action Questionnaire-II, White Bear Suppression Inventory and Difficulties in Emotion Regulation	Disordered online social networking use was present in 9.7% [n = 23; 95% confidence interval (5.9, 13.4)] of the sample surveyed, and significantly and positively associated with scores on the Young Internet Addiction Test ($P < 0.001$), greater difficulties with emotion regulation ($P = 0.003$) and problem drinking ($P = 0.03$).	23 (9.7%)
5	Xie et al., 2019	USA	Cross sectional and linier regression	526	59% Female, 41% male	Bergen Facebook Addiction Scale	State-Trait Anxiety Inventory (STAI; Spielberger, 2010); the six-item Short-Form State Anxiety Scale (Marteau & Bekker, 1992)	Trait anxiety, Facebook intensity, and broadcasting behavior on Facebook positively predict Facebook addiction and state anxiety. Moreover, gender interacts with trait anxiety, so that the gender difference in Facebook addiction is significant only when trait anxiety is low.	N/A

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TABLE 2
METHODOLOGICAL QUALITY OF INCLUDED STUDIES

Joanna Briggs Institute checklists	Hormes et al., 2014	Liu & Ma, 2019	Montag et al., 2018	Tang et al., 2018	Xie, et al., 2019
Cross-sectional studies					
Were the criteria for inclusion in the sample clearly defined?	1	1	1	1	1
Were the study subjects and the setting described in detail?	1	1	1	1	1
Was the exposure measured in a valid and reliable way?	1	1	1	1	1
Were objective, standard criteria used for measurement of the condition?	1	1	1	1	1
Were confounding factors identified?	1	1	1	1	1
Were strategies to deal with confounding factors stated?	1	1	1	1	1
Were the outcomes measured in a valid and reliable way?	1	1	1	1	1
Was appropriate statistical analysis used?	1	1	1	1	1

Participants' Characteristics

Five articles are selected out of 47 full-text articles assessed for eligibility. Besides, the authors only choose undergraduate students, who aged from 18 to 24. The respondents were from the US, China, and Singapore. The sample size was from 61 to 1,110 respondents, while the number of females was higher than males, except for one study from Montag et al. (2018).

Prevalence and Measures of Social Media Addiction

Prevalence of social media addiction

The figures in Table 1 display that the prevalence of SNS addiction in Asia countries like Singapore and China is greater than that of the US The high percentage of college students addicted to social networking sites in Asia countries once again confirmed the validity of previous studies. The figure is consistent with earlier studies that the prevalence of social media addiction among Asian students than other continents (Kuss & Griffiths, 2011; Andreassen et al., 2012; Tang & Koh, 2017; Tang et al., 2018). In two studies in China, one identified 78 of the 463 students surveyed were reported as social media addicts or 16.8% (Liu & Ma, 2019); Another study, 21 out of 61 students addicted to WeChat social networking (or 41%) were announced (Montag et al., 2018). A study in Singapore declared 328 out of 1110 (29.5%) of the students surveyed identified

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Facebook addiction (Tang & Koh, 2017). In two studies in the US, one study found that 23 out of 253 surveyed students (9.7%) addicted to social networks (Hormes et al., 2014); Another study did not specify the prevalence of social media Facebook (Xie & Karan, 2019).

Measures of social media addiction

Previous studies have used numerous approaches to measure social media addiction. First of all, the young internet addiction test encompasses 20 items for measuring symptoms associated with excessive internet use, assessing salience and anticipation of use, unreasonable use, and lack of control overuse and neglect of work and social life (Hormes et al., 2014). Difficulties in Emotion Regulation Scale (DERS) comprises 36 items that are separated into six self-report measure of increasing in emotion regulation (Hormes et al., 2014). Additionally, SNS addiction could coincide with food addiction and shopping addiction (Tang & Koh, 2017). SNS addicts are meeting the pressure to access the sites frequently due to the fear of missing out and keeping up with demands on relationship maintenance, constant social comparison with others, relationship turbulence with the public nature of conflict on the SNS, and frequent violation of privacy (Kuss et al., 2013; Fox & Moreland, 2015; Tang & Koh, 2017).

Moreover, social networking addiction can be anticipated based on the low gray matter volumes in the ventral (subgenual) anterior cingulate volume (Montag et al., 2018). The nucleus accumbens could estimate frequent usage (Montag et al., 2018). Furthermore, updating status and sharing photos and videos predicts Facebook addiction actively, but wall activities such as "liking" or commenting are not related to Facebook addiction (Xie & Karan, 2019). Finally, Facebook addiction can be predicted based on two characteristics, such as gender and anxiety (Xie & Karan, 2019). For more specific, among the low level of trait anxiety, women had a higher level of Facebook addiction than men (Xie & Karan, 2019). A high level of character anxiety can lead to stress when users disconnected from SNS (Xie & Karan, 2019).

Measures of mental disorder

There were various outcome measures used for mental disorders in the selected studies. The first measure is DERS (Hormes et al., 2014) that was a 36-item, six-factor self-report measure of difficulties, assessing (1) awareness of emotional responses; (2) lack of clarity of emotional responses; (3) non-acceptance of emotional responses; (4) limited access to emotion regulation strategies perceived as useful; (5) difficulties controlling impulses when experiencing negative emotions; and (6) difficulties engaging in goal-directed behaviours when experiencing negative emotion. The second measure is ECR-SV (Liu & Ma, 2019), including a twelve-item test for evaluating adult attachment. The scale comprised of two six-item subscales: anxiety and avoidance. Each item rated on a 7-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree. Another measure of depression, anxiety, and mania were DSM-5 (Tang & Koh, 2017). They were scoring at least 5 of the nine items on the depression scale during the same two-week period for classifying depression. Scoring 3 (or more) of the six symptoms on the anxiety scale was to sort anxiety. Scoring 3 (or more) of the seven traits in the mania scale has classified mania. The six-item Short-Form State Anxiety Scale (Xie & Karan, 2019) was used to measure state anxiety. Finally, the authors (Montag et al., 2018) aimed to characterize the addictive potential of communication applications based on their measure for the brain.

The Association between Social Media Addiction and Mental Disorder

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The use of online social networking sites has caused many emotional regulatory issues such as more experiential avoidance, lack of acceptance of emotional responses, limited access to emotion regulation strategies, poor impulse control, and clever engaging in goal-directed behaviours (Hormes et al., 2014). People with a higher level of trait anxiety are more likely to feel anxious when separated from SNS, and gender difference does not exist with a high level of trait anxiety (Xie & Karan, 2019). People who use Facebook more intensively are more addicted to Facebook and report the senior level of state anxiety without Facebook (Xie & Karan, 2019). Besides, emotional disorders partly mediated in the relationship between stress and social media addiction (Liu & Ma, 2019). Attached anxiety has recognized as a predictor of SNS addiction, but there is no relationship between avoidance attachment and SNS addiction (Liu & Ma, 2019). Higher levels of self-reported addiction symptoms and more frequent practice (of the paying service) were related to lower gray matter volumes in the ventral (subgenual) anterior cingulate and the nucleus accumbens (Montag et al., 2018). In addition to this, structural alterations in the frontostriatal-limbic circuitry characterize a common denominator across different categories of digital addiction, including Internet Communication Disorder (Montag et al., 2018).

Selected articles confirmed the association between social media addiction and mental disorder. One report confirmed SNS addiction predictions through attachment anxiety (Liu & Ma, 2019), and another article anticipated addiction to Facebook through trait anxiety, Facebook intensity, and broadcasting behaviour (Xie & Karan, 2019). In statistical analysis, among the students addicted to social networks, the proportion of food addiction is 3%, and shopping addiction is 5% (Tang & Koh, 2017). Moreover, 9.7% of social media addicts had a positive relationship with the young internet addiction test scores, difficulty regulating emotions, and problematic drinking (Hormes et al., 2014).

FINDINGS AND IMPLICATIONS

The Findings

This study summarizes articles related to social media addiction and mental disorders among college students systematically. To do so, a total of five articles have been compiled and analyzed. The objectives of the study was to clarify that (1) The high prevalence of social addiction among college students (9.7% ~ 41%) has been stated; (2) confirms positive relationship between social media addiction and mental disorders by reviewing previous studies.

Theoretical Contributions

The paper contributes to the theory of mental disorders and social media addiction by taking some effective preventive measures to understand the community better and our findings are consistent with (Fusar-Poli et al., 2019). Our paper contributes to theories of online customer behaviour, social media marketing (Chen & Lin, 2019; Vanhala et al., 2020), and contributes to the theory of customers' need for uniqueness (Abosag et al., 2019) by determining the impact of mental health and behavioural addiction of consumers on emotions, cognitions, entertainment, online attitudes and purchase intentions in the online shopping behaviour models. Furthermore, the paper has the potential to influence public relations implemented by any organization through social media (Namisango & Kang, 2019). It also stimulates the idea that managers build an organizational culture through social media (Ravasi & Schultz, 2006) in the context of

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globalization and multicultural exchanges (Chu et al., 2020). Lastly, the paper also improves the understanding of companies operating in the tourism sector to effectively launch tourism marketing campaigns by considerate customer psychology and visitor activity on social media (Zeng & Gerritsen, 2014).

The Practical Implications

Facebook is a useful tool to meet the lives of modern society because it supports Maslow's needs-based hierarchy (Houghton et al., 2020). It meets the needs of Maslow's scale, such as safety, belonging, self-esteem, social connection (Houghton et al., 2020). Although Facebook has been criticized for its data and privacy policies, users continue to use the social network due to the satisfaction of Facebook on life (Houghton et al., 2020). It is used to get rid of problems or manage loneliness (Menon et al., 2014). Therefore, the most popular global social network today is Facebook among many social networks worldwide (Clement, 2020). However, to lessen stress and anxiety from graphic imagery and worrisome messages, individuals should control the amount of time on the internet, particularly during the COVID-19 pandemic outbreak (Amsalem et al., 2020).

Academics and practitioners could apply our approach to study many aspects related to social media behaviour. For example, the method can flexibly apply to the connection between the exchange rate and the economy (Batai et al., 2017) and the relationship between capital structure and profitability (Chang et al., 2019). Furthermore, it also assists analyzing online consumer behavior (Raphaeli et al., 2017), new fashion trends from generation Y in e-commerce (Ladhari et al., 2019), social media marketing in the Small and Medium Enterprises (Chatterjee & Kumar Kar, 2020). Meanwhile, extensions could include applying our approach to study education (Hau et al., 2019; 2020), agriculture (Moslehpour et al., 2018), transportation (Thipwong et al., 2020a), tourism (Thipwong et al., 2020b), and environment (Tran et al., 2019). Extensions could include many other exciting issues, and readers may refer to (Chang et al., 2017) for more information.

The Cause And Severity Of The Association Between Social Media Addiction And Mental Disorder

The causes

Four causes of social media overuse may be listed as follows (1) The increase in depression symptoms have occurred in tandem with the rise of smartphones since 2007 (Twenge et al., 2017). (2) Young people, especially Generation Z, spend less time connecting with friends, but they spend more time connecting digital content. They quickly lose focus at work or study because they spend a lot of time watching others' lives in an age of information explosion. (3) Another theory of an increase in depression is low self-esteem when they feel negative on SNS comparing to those who are more beautiful, thinner, more famous, and wealthier (Primack et al., 2017). Thus, social media users might become less emotionally satisfied, making them feel socially isolated (Primack et al., 2017). (4) Studying pressure and increasing homework load may be the cause of mental problems for students (Twenge et al., 2017), thereby promoting the matching of social media addiction and psychiatric disorders.

The severity

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Depression symptoms and suicide rates have increased for young people since 2010, especially dangerous for girls (Twenge et al., 2017). Screen time in using social networking applications might have a more significant impact on the mental health of girls than boys (Twenge et al., 2017). Depressive symptoms and suicidal outcomes from television viewing have decreased since 2010, although television viewing correlated positively with depression symptoms and suicidal outcomes (Twenge et al., 2017). The popularity of the internet, smartphones, social networking sites, though part of modern life, has contributed to the rise of depressive and suicidal symptoms in young people. Therefore, measures to prevent harm, such as depression or suicide among young people, should be discussed and offered to all stakeholders.

Proposed Solutions

As for the solution to social media addiction's problem, on the user's side, everyone adjusts his or her behaviour using social networks or social media. It is highly recommended to change social networking users' time to about 30 minutes per day to improve mental health and well-being (Hunt et al., 2018). Control of social media usage time is primarily the user's responsibility and then the influence of relatives or friends. Therefore, self-awareness of how much time spent on social networks needs to be the best plan to avoid addiction and positively affect users' work. Cognitive-behavioural therapy should consider as an effective intervention in the short-term for behavioural addiction (Stevens et al., 2019). Instead of wasting time on social networking, there are many activities for students to minimize the negative impacts of S.N.S. First, students should increase face-to-face connections with friends with physical activities such as exercise or playing sports, and so on. In strengthening family connection, one option for parents to manage their children's time at home by teaching them to do housework; another choice is sharing the important information from students from watching television, reading books, or newspapers.

From the social media manufacturer and the government's administration, legal documents to support anti-social network addiction or social media need to be discussed and put into implementation laws to protect users. A bill, the Social Media Addiction Reduction Technology (SMART) from US Senator Josh Hawley (Mettler, 2019), is suggested to address social media addiction's negative issues. For the 18-24 age group of college students, parents can still strongly influence these students' consciousness and psychology. Many signs of social network addiction were explained. The children may show signs of social media addiction, such as spending time on social media, fear of losing connection with friends on social media, frequently posting information online, and shopping addiction or eating disorders. When parents see those signs, they should control the social media usage time of their children. Besides, they may coordinate with the legislature by building and updating the laws for those who are social media addiction. Finally, home-school coordination is a crucial factor in regulating student consciousness and behaviour.

CONCLUDING REMARKS

Compared with similar research (Frost & Rickwood, 2017; Keles et al., 2020; Marino et al., 2018; Pantic, 2014; Shensa et al., 2017; Yoon et al., 2019), our findings are consistent with the findings from some existing literature, including (1) Symptoms of depression and anxiety are associated with excessive social media use. (2) People who have a passive lifestyle are at a higher risk of depression. (3) Excessive social media usage time, over three hours, is a significant risk to users' anxiety and depression. (4) Social comparison habits are likely to cause depression and psychological disorders because users often feel lost when others share their good experiences. In

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contrast, the difference between this article and others is to focus on a specific age group (undergraduate students aged 17 to 24), discuss the causes, severity, and proposed solutions to the association among social media addiction, depression, and anxiety.

In contrast, compared with divergent research, some of our findings are contradict with some findings from some existing literature. For example, social media use moderated had positive relationships with job performance, job satisfaction, work engagement, and work-life conflict (Chu, 2020). Internal social media is an effective way to increase employee engagement through the level of perceived transparency of the organization and organizational identification (Men et al., 2020). Besides, individuals can use social media to make appropriate connections to achieve their fundamental goal orientation (Brinkman et al., 2020). Consequently, social media is the driving force behind shopping and positive word-of-mouth commitment for customers (Ryu & Park, 2020).

From this study, the authors recommend that people use social media for no more than three hours a day to avoid the risk of social media addiction. Besides, people with mental disorders, anxiety disorders, stress, depression need to strictly control the time spent using social media and especially restrict the posting or discussion of issues that can cause mental impairment. Furthermore, people in good health should create an excellent social environment, even in cyberspace by offering useful information and do not spread negative comments or discussions on social media. People who are vulnerable to mental illness should be supervised and shared from family, friends, and relatives for negative issues stemming from social media. Moreover, when developing regulations on the use of social networking sites, leaders should make specific provisions towards building a positive communication culture of all members on the digital technology platform. Finally, when treating patients with symptoms of psychosis and depression, psychologists and psychiatrists should pay attention to the appearance of behavioural addiction, including social media addiction.

During the COVID-19 pandemic, it was understandable that students will increase their time spent by using social media at home. However, by doing so, it will increase the potential risk of social network addiction, social anxiety, and depression in the era of digital technology boom today, especially research has found out that there is a positive relationship between social media addiction and mental disorders among college students. A popular measure of social media addiction in recent years is the Bergen Facebook Addiction Scale as used in some research articles. The article also points out the connection between online shopping addiction and eating disorders among social addicts. On the other hand, the authors have listed signs of social media addiction so individuals can control their social network usage. From this fact, this article contributes to raising awareness and finding out solutions to solve the risk problems.

The study had some limitations that the outcomes should examine thoughtfully. The primary limitation is the small number of qualified studies being screening from the existing research papers. The paper examined only five articles to study the relationship between social media addiction and mental disorder and focuses mainly on college students. Additionally, there was a high risk of language bias because the authors only reviewed studies published in English and reputable peer-reviewed journals. Other limitations include heterogeneity in study design, methodology, sample size, and outcome measures that could be improved. Finally, including articles studying in advanced and good developing countries with strong economies like the United States, China, and Singapore could improve the results. Future research related to social media addiction could include studying different levels of depression and anxiety. The theoretical framework for social addiction should also be improved. Last, the connection between social

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media addiction and mental disorder should also be examined and be paid attention to the treatment of related pathologies as well as follow-up studies.

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APPENDIX A

Section/topic	#	Checklist item
TITLE		
Title	1	Identify the report as a systematic review, meta-analysis, or both.
ABSTRACT		
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.
INTRODUCTION		
Rationale	3	Describe the rationale for the review in the context of what is already known.
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).
METHODS		
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.

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Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.
RESULTS		
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).
DISCUSSION		
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).

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Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.
FUNDING		
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.

APPENDIX B

The Procedure to Use Keywords in the Search Tools

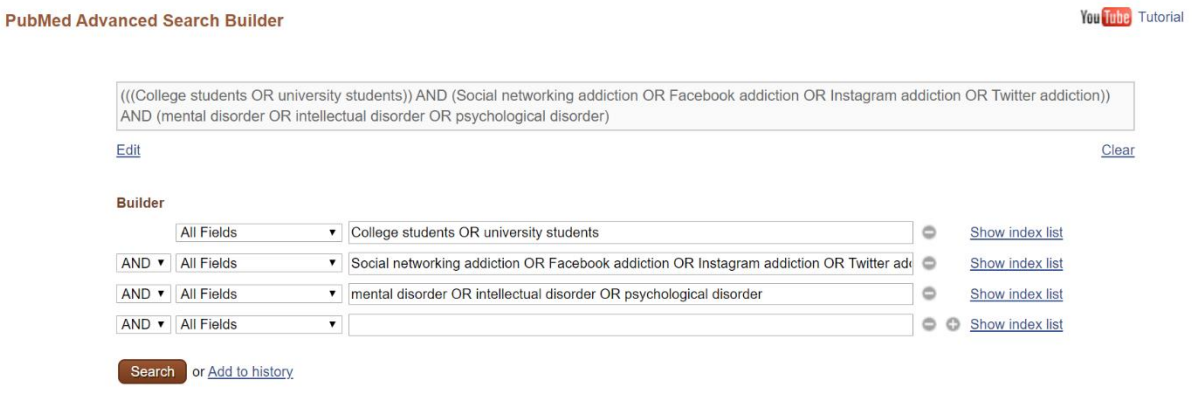
The first process of finding documents in this article is used on the PubMed website. Each element in the order in Table 1 will be searched in turn on PubMed advanced search, then all documents will be aggregated in search engines with AND links. The authors search for related articles in the PubMed advanced search tools step by step as follow:

Step 1: Visit web link https://www.ncbi.nlm.nih.gov/pubmed/advanced

Step 2: Copy each component in Table 1 into the advanced search section. The web page interface will look when performing the same operation seen in Figure 2.

TABLE 1
THE KEYWORDS IN THE SEARCH TOOLS

No	Keywords in the search tools	Criteria
1	College students OR university students	People
2	Social networking addiction OR Facebook addiction OR Instagram addiction OR Twitter addiction	Exposure
3	Mental disorder OR intellectual disorder OR psychological disorder	Outcome
4	All components	



FIGURE

KEYWORD SEQUENCES IN PUBMED ADVANCED SEARCH BUILDER

Citation Information: Nguyen, T. H., Lin, K-H., Rahman, F. F., Ou, J-P., & Wong, W-K. (2020). Study of depression, anxiety, and social media addiction among undergraduate students. Journal of Management Information and Decision Sciences, 23(4), 284-303.

Step 3: Pressing Search button and then the result will appear with the number of articles related to the keyword. PubMed keyword sequences will be identified in the search toolbar as ((((College students OR university students))) AND ((Social networking addiction OR Facebook addiction OR Instagram addiction OR Twitter addiction))) AND ((mental disorder OR intellectual disorder OR psychological disorder)).

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