ISSN Application No. 21778

Journal of Mobile Communication and Networking

Volume No. 13

Issue No. 2

May - August 2025

ENRICHED PUBLICATIONS PVT.LTD

JE - 18,Gupta Colony, Khirki Extn,
Malviya Nagar, New Delhi - 110017.
E- Mail: info@enrichedpublication.com
Phone :- +91-8877340707

ISSN Application No. 21778

Journal of Mobile Communication and Networking

Aims and Scope

Journal of Mobile Communication and Networking welcomes the original research papers, review papers, experimental investigations,surveys and notes in all areas relating to software engineering and its applications. The following list of sample - topics is by no means to be understood as restricting contributions to the topics mentioned.

ISSN Application No. 21778

Journal of Mobile Communication and Networking

ISSN Application No. 21778

Journal of Mobile Communication and Networking

(Volume No. 13, Issue No. 2, May - August 2025)

Contents

ISSN Application No. 21778

What influences our recall of the use of social media and smartphones? An exploratory study based on a sample of Chinese iPhone users

Gefei Li*
Graduate School of International Culture and Communication Studies, Waseda University, 169-8050, 1-104 Totsukamachi, Shinjuku-ku, Tokyo, Japan
E. Qinyu
College of Communication and Art Design, University of Shanghai for Science and Technology, 200090, Zhuoyue Bldg 1-5 F, No.334, Jungong Road, Shanghai, China
Jialong Li
Graduate School of Science and Engineering, Waseda University, 169-8050, 1-104 Totsukamachi, Shinjuku-ku, Tokyo, Japan
Xia Li
School of History and Culture of Science, Shanghai Jiaotong University, 200240, No. 800, Dongchuan Road, Shanghai, China

A B S T R A C T

Self-estimation of technology use is commonly applied in examining people's daily behaviour on social media. However, there has been criticism that retrospective self-estimation of social media use is inaccurate. This study investigates possible factors that might influence the recalling accuracy of social media and smartphone use. By comparing self-report data of social media and overall smartphone use with screen time data from a sample of Chinese iPhone users, we find that the estimated usage is only moderately correlated with the actual usage. The longer time spent on social media or smartphones, the more inaccurate the self-report data would be. Several psychological factors are evidenced to be correlated with the inaccuracy of recall: loneliness is positively correlated with the discrepancies between estimated and actual use of social media. Respondents who report a higher level of loneliness are more likely to overestimate their social media use. Life satisfaction is negatively associated with the discrepancies between estimated and reported actual use of both social media and smartphones. Respondents who report a higher level of life satisfaction are less likely to underreport their overall smartphone use.

Keywords: recalling accuracy; self-report measurement; digital technology; smartphone; social media.

1 Introduction

It is difficult to imagine life without social media in today's world. To a considerable extent, social media is changing the way people communicate, forming our new habits, and reconstructing our daily routine. One significant change seen in the last decade is that fewer people are accessing social media via computers, with an increasing number of users now exclusively on mobile devices. According to a global digital annual report (Kemp, 2019), in January 2019, 3.26 billion people were using social media on mobile devices, with the growth of 297 million new users representing a year-on-year increase more

than 10%. Mobile phones now account for 48% of the time people spend on the internet, while this number in 2014 was only 26%. Apparently, people are spending a longer time on social media and their smartphones. Especially with the spread of the COVID-19 pandemic when many countries imposed lockdowns amidst the crisis, and offline physical interactions had become limited, social media played an increasingly important role in connecting people with the outside world.

To better understand social media's growing impact on our lives, there have been a growing number of studies concerning the interaction between users and digital technology in recent years. Serving as a proxy for the intensity of use, time spent on social media is a frequently used construct in social science and psychology. Previous research regarding the effect of social media use on users' physical and psychological well-being relied heavily on retrospective self-reports of social media use. However, it has long been argued that recall bias exists, and the retrospective data is not always as accurate and reliable as expected (Araujo et al., 2017; Scharkow, 2016; Sewall et al., 2020). Many factors may influence the accuracy of recall, which cast some doubts on retrospective recall methods as valid measures of social media use.

Recently, many scholars have been trying to understand why users fail to remember faithfully their use of digital technology and figure out what factors may influence recall accuracy. For example, Boase and Ling (2013) compared respondents' self-reports of mobile phones with the server log data. They found that the criterion validity of self-report data was relatively low, and there was a gender difference in recalling the use of mobile phones. Araujo et al. (2017) also conducted research comparing respondents' self-reported internet use with automatic tracking data. They reported that the intensity of internet use was associated with the misestimation of internet use. Sewall et al.'s (2020) study comparing participants' self-reports with iPhone screen time data found that psychological well-being factors (i.e., depression, loneliness, and life satisfaction) were also correlated with recall bias. Despite the diversity in the research context and testing variables, findings in previous studies constantly suggest that studying self-assessments of time can provide insights into improving the accuracy and validity of media use measurements.

Thus far, much research in this area has been conducted in Western societies (Ohme et al., 2021; Rosenthal et al., 2021). We consider it is necessary to reproduce the experiment in the Chinese context for the following two reasons. First, Western and Eastern countries are diametrically different in key cultural dimensions such as individualism/collectivism and high/low context, which may have a great influence in terms of social media use and motivation (Kim et al., 2011). For example, social media researchers have noted that new media technologies are sometimes used for activities regarded as 'guilty pleasure', which appeals to one's desire for immediate pleasure rather than long-term benefits. Such types of social media use are correlated with users' feelings of guilt (Panek, 2014). Indeed, in the emotion and cross-cultural literatures, cultural differences play an important role in shame and guilt (Wong and Tsai, 2007). Previous empirical findings suggest that in US contexts, experiencing guilt leads to reparative action (Leith and Baumeister, 1998), yet this model has not been verified in the

Chinese context. Therefore, in our case, we plan to examine whether the experience of guilt would affect people's recall of digital technology use. Second, according to a market report by Statista (2017), China is the country where people used the most iPhones. Yet, the daily use of social media are unique in Mainland China. Due to the Great Firewall, popular websites such as Facebook, Twitter, Instagram, and YouTube are blocked. People instead turn to WeChat and Weibo for social communication needs. This raises a worthwhile question about whether previous findings can be applied to the Chinese context.

The current research represents a twofold effort. First, from a methodological point of view, we use the screen time feature on the iPhone to measure users' social media activities. By comparing the application-traced data with the retrospective recall of social media and smartphone use, this study aims to explore possible factors that may predict retrospective bias in reporting the use of digital technology in the interest of improving the accuracy in data collection. Second, this paper seeks to understand respondents' recalling behaviour about digital technology use among a Chinese sample. By March 2020, there are more than 890 million mobile internet users in China (CNNIC, 2020). In the past decade, we have witnessed an increasing number of studies focusing on the digital technology use of this huge entity. However, research on retrospective recalling behaviour of the Chinese mobile internet users remains scarce. Hence, the findings of present study would extend this research field by providing empirical evidence on recall bias of social media use in Eastern societies.

2 Literature review

2.1 Self-report measures vs. screen time measures in social media research

Social scientists rely heavily on the self-report measures to capture and analyse the user's mobile communication activities. However, reporting on one's daily behaviour is not an easy cognitive task, and it has long been criticised that self-report measure lacks accuracy. Boase and Ling (2013) compared self-report mobile phone use (i.e., voice calling and SMS messaging) to mobile server log data among a nationally representative sample in Norway and found that the self-report data correlated only moderately with the server log data. Similarly, Scharkow (2016) conducted a study examining the accuracy of self-reported internet use. He also found that self-report measures were rarely accurate and their convergent validity with client log files was weak. Araujo et al.'s (2017) study compared the user's self-reported and actual internet use, and again confirmed the low accuracy of self-report measures.

Traditional self-report measures commonly quantify the use of social media and mobile devices in three dimensions: frequency of use (Hatchel et al., 2018), duration of use (Valenzuela et al., 2009; Valkenburg and Peter, 2007), and intensity of emotional connection with specific platforms (Chai et al., 2019). To respond to the frequency measures, normally, respondents are required to recall their activities in a certain period time (e.g., 'less than once a week', 'one to six times a week', 'several times

a day', etc.). Duration questions often involve the use of multiple-choice questions to which respondents answer the estimated amount of time that they spend on specific platforms or devices in a single day (e.g., '0–30 minutes a day', '1–2 hours a day', etc.). Sometimes time diaries are also used in data collection (Giunchiglia et al., 2018), which require respondents to report how they allocated their time during the day in detail. As for the third type of measure, Likert-scales are used to assess respondents' emotional connection with specific devices or platforms.

Considering the format of those self-report questions mentioned above, it is very challenging for the researchers to obtain accurate information about respondents' actual usage behaviour in research. Given that, many attempts have been made to improve data accuracy, including improving survey design strategies and providing an anchor that facilitates respondents' estimation during the survey (Araujo et al., 2017). These strategies, to some extent, increase the accuracy of recall.

The use of objective measures is always considered as more reliable than selfreported measures. The Screen Time function on the iOS system has been introduced in previous studies to track people's device usage in a more accurate way (Sewall et al., 2020). Screen time was first announced as a new feature of Apple's iOS12 software in 2018. With screen time, users can access real-time reports about how much time they spend on their iPhone, iPad, or iPod touch. It gives users detailed reports about how their devices are used, how much time they spend with single apps and predefined categories of apps (e.g., social networking, productivity, entertainment, etc.) and how many notifications they receive (Apple Inc., 2020). There are similar functions available for Android mobile devices. For example, the Digital Wellbeing application launched by Google enables users to get a daily view of their digital habits. However, there are two reasons that prevent us from applying Android users' screen time data in this study. First, as mentioned earlier, when the iPhone screen time function assort users' digital behaviour into several categories (i.e., social networking, productivity, entertainment), the Digital Wellbeing function only record the time users spend on each application. Therefore, it would be difficult to get the whole picture of users' overall usage of the device and may also affect the consistency of the research design. Second, the iPhone screen time is a built-in feature of mobile operating systems, yet Android users have to manually install such digital habits tracing applications on their devices. Considering the Google Play, on which digital wellbeing is available, is blocked in mainland China, it would be challenging to recruit a decent number of Android users who happen to have digital wellbeing or other similar applications on their smartphones. As such, this study plans to apply the objective measure of social media and smartphone use indicated by screen time reports on the iPhone. By comparing self-reports with application-tracked data, this paper seeks to examine the accuracy of retrospective self-reports of time use and to determine factors that may result in recall biases.

2.2 Retrospective biases in self-reports of time spent on social media

According to Boase and Ling (2013), there are three main reasons to question the validity of self-

reports of time use: conceptual validity, cognitive burden, and social desirability. Conceptual validity refers to the extent to which researchers measure the concepts that they intend to measure. It would become a problem if, for example, researchers focus on social media and smartphone activity in a single day because it is unclear whether the activity occurring on that day is representative enough. A common solution is encouraging respondents to report their activities that are actually representative of more general levels. Therefore, in addition to time spent on smartphones and social media yesterday, which is a frequently used measurement of digital technology usage, we also introduced measurements of last week's smartphone activities and instructed respondents to report their screen time reports last week in this study.

Schwarz and Oyserman (2001) explained the cognitive burden that may lead to recall failure in the following three perspectives. First and foremost, memory fades over time, even when the event is relatively essential and distinctive. Second, when asking respondents about frequent behaviour, they are unlikely to have detailed representations of numerous individual episodes of that behaviour. Given that using smartphones and social media has now become a frequently repeated activity that is integrated into our everyday lives, it is difficult to recall the amount of time spent on mobile devices accurately. The longer the time spent on that behaviour, the more difficult the recall might be. Third, autobiographical knowledge is stored in a hierarchical network with specific events (e.g., mundane routine of every life) at the lowest hierarchy level. Searching for events that are stored in low-level hierarchy in memory might be time-consuming, and the outcome is likely to be haphazard. Most trivial events, like picking up smartphones and using social media seem insignificant, which might not be thoroughly searched through the hierarchical network of autobiographical memory when answering the questionnaire survey. From the preceding theoretical discussion, it is thus hypothesised that:

H1a Self-reports of overall social media use are inaccurate. Respondents with higher amounts of actual overall social media usage are more likely to demonstrate significant discrepancies between estimated and actual use.

H1b Self-reports of overall smartphone use are inaccurate. Respondents with higher amounts of actual overall smartphone usage are more likely to demonstrate significant discrepancies between estimated and actual use.

Social desirability is another common source of bias affecting the validity of self-reports. It is defined as "a tendency to deny socially undesirable traits and to claim socially desirable ones, and the tendency to say things which place the speaker in a favourable light" [Nederhof, (1985), p.264]. When answering the survey, respondents might hesitate to report their answers candidly and deliberately 'edit' their answers for the consideration of self-presentation by providing socially desirable responses to threatening questions (Schwarz and Oyserman, 2001). As overuse of social media is often linked with Internet addiction and self-control problems, therefore, in our case, asking about how much time the respondents spend on the social media yesterday and last week in research may turn out to be threatening for some of them.

Earlier research found that the overuse of leisure media during unstructured time may create a sense of 'guilty pleasure' (Panek, 2014). On the one hand, using leisure media gives users tangible short-term gratification. On the other hand, eschewing present tasks in favour of immediate pleasure because of deficits in self-control also gives rise to a feeling of guilt. Guilt indicates that the individual is aware that they have lost control (LaRoseand Eastin, 2002). Said differently, when spending a long time on social media, the individual may struggle with an emotional push-and-pull battle between media temptation and self-control. Following this line, it is reasonable to assume that those who feel guilty about spending a long time on social media may be prone to edit their answers when estimating their use of these applications in order to present a more socially desirable trait of themselves. In other words, respondents who have a higher level of guilt about social media use may be more likely to misestimate their usage. To test this assumption, the following hypotheses are suggested:

H2a Respondents' sense of guilt is positively associated with amounts of actual social media use.

H2b The stronger guilt respondents report, the larger the discrepancies between their estimated and actual social media use.

2.3 Psychological well-being factors affecting the accuracy of self-reports

From a psychological perspective, there are also possible factors that may affect the accuracy of self-report. Specifically, Sewall et al.'s (2020) study suggests that the respondent's loneliness and life satisfaction is associated with the amount of inaccuracy in estimated social media and overall smartphone use. Loneliness is defined as "the unpleasant experience that occurs when a person's network of social relations is deficient in some important way" [Perlman and Peplau, (1993), p.31]. Consulting from previous literature, we concluded that loneliness may influence people's cognitive ability to accurately estimate time spent on technology for the following three reasons. First, it has been determined that lonely individuals are more likely to use online social media to compensate for the lack of offline relationships (Skues et al., 2012). When people with a higher level of loneliness are prone to use more social media as compensation, recalling the use of social media may become even more challenging, as a result, the estimation of time spent on social media and smartphones may be less accurate. Second, many studies indicate that mood is related to our awareness of the passage of time, and negative emotional stimuli are likely to induce arousal effects and influence our time judgments (Droit-Volet, 2013; Gil and Droit-Volet, 2012). Third, a previous study has found that general belongingness has significant effect on social information processing. Considering that belonging is a primary goal of all human beings, when belongingness needs are unmet, greater processing of social information in the environment ensues. As a result, the recall of social events may be biased by the extent of social information processing that allows for belongingness needs to be fulfilled (Gardner et al., 2000). Thus, it is reasonable to infer that when people have a higher level of loneliness, they may be more likely to misestimate the time they spend on their phones and social media. Based on this analysis,

we put forward the following hypothesis:

H3a Respondents who report a higher level of loneliness are more likely to demonstrate significant discrepancies between their estimated and actual use of social media.

H3b Respondents who report a higher level of loneliness are more likely to demonstrate significant discrepancies between their estimated and actual use of smartphones.

Life satisfaction is another commonly adopted measure of subjective well-being. It refers to "a global assessment of a person's quality of life according to his chosen criteria" [Shin and Johnson, (1978), p.478]. Sewall et al. (2020) find that life satisfaction significantly predicts the retrospective self-report bias, and higher levels of life satisfaction are associated with greater inaccuracies in estimated social media use. In line with this finding, we hypothesised that:

H4a Respondents who report a higher level of life satisfaction are more likely to demonstrate significant discrepancies between their estimated and actual use of social media.

H4b Respondents who report a higher level of life satisfaction are more likely to demonstrate significant discrepancies between their estimated and actual use of smartphones.

3 Methods

3.1 Procedure

To test these hypotheses, a web-based survey was conducted between June 4th and June 11th of 2020. All respondents were recruited from the 51Diaocha online panel (the Chinese equivalent of Qualtrics), a professional online survey company managing national samples of Chinese Internet users. Numerous consumer-behaviour-related questionnaire surveys have been conducted on this platform (Carroll et al., 2019). Ethics approval for this study was obtained from the ethics committee of the host university. Before the survey, all participants were informed that only information regarding time spent on their smartphones and social media would be required. Considering privacy and personal data protection, no screenshot of the screen time was required. Informed consent was obtained from all participants.

Participants should meet the following three requirements: iPhone users over 18 years old, smartphone software had been updated to iOS13 or later, Mandarin speakers. The scales were originally developed in English and then translated to Chinese by the author. A back translation was performed by another translator who was not involved in the original translation and had no prior knowledge of the objectives to ensure that the translated version was accurate and valid.

3.2 Participants

In total, 327 respondents completed the questionnaire. We excluded 12 respondents who reported higher yesterday social media use than yesterday's overall smartphone use, yielding a final sample of 315 respondents. The demographic characteristics of the sample are as follows: 48.3% (n = 152) of the

participants are female and 51.7% (n = 163) are male; 14.9% (n = 47) of the participants are students and 57.5% (n = 181) are employed; 92.1% (n = 290) of the participants hold a college degree or above. The age of the participants ranges from 18 to 56 years (M = 28.4, SD = 4.825).

3.3 Measures

3.3.1 Estimate usage

The estimated usage included two dimensions to measure the intensity of both smartphone and social media use. The first is designed to estimate how much time people spent on smartphones yesterday and last week. Yesterday usage was measured with the following items: "Before consulting screen time, please estimate the total amount of time you spent on your smartphone yesterday", and "Before consulting screen time, please estimate the total amount of time you spent on social media on your smartphone yesterday." Participants were instructed to fill in blank fields corresponding to the number of hours and number of minutes. Last week usage was also measured with two fill-in-the-blank questions: "Before consulting screen time, please estimate the total amount of time you spent on your smartphone last week", and "Before consulting screen time, please estimate the total amount of time you spent on social media on your smartphone last week." Participants were instructed to enter a response in blank fields corresponding to the number of hours and number of minutes.

3.3.2 Actual usage

Correspondingly, the actual usage measures were also divided into two parts: yesterday usage and last week usage for overall smartphone use and social media use. The social media use can be found from the social networking category on the screen time report by default. In addition to the well-known social networking apps (e.g., Facebook, Instagram,Twitter, LINE, etc.), we also inspected what kind of Chinese social media apps were categorised as Social Networking on the screen time before conducting the survey. The following popular apps are identified as social networking: WeChat (the Chinese equivalent of WhatsAPP), Weibo (the Chinese equivalent of Twitter), QQ (the Chinese equivalent of LINE), Zhihu (a question-and-answer website), Tieba (the Chinese equivalent of Tumblr), and Lofter (a blog site). Respondents were asked to report their use of smartphones and social media at the end of the questionnaire survey by checking on the screen time report on their iPhones. Pictorial instructions about how to read the screen time report were provided.

3.3.3 Discrepancies

To examine the extent of misestimation, we created additional variables describing the difference

between estimated self-report data and screen time data by recording the absolute value of the estimated usage and actual usage. These variables were termed as discrepancy. Consulting from previous literature (Araujo et al., 2017), we subtracted the actual usage from the respondents' self-estimated usage and extracted the absolute value (i.e., discrepancymeasure = |self-estimatedmeasure – actual usagemeasure|) to assess the bias of estimation. In total, there were four discrepancy variables: the discrepancy of yesterday's phone use; the discrepancy of yesterday's social media use; the discrepancy of last week's phone use; and the discrepancy of last week's social media use.

3.3.4 Loneliness

Participants responded to six items (ULS-6) from the UCLA loneliness scale, Version 3 (Russell, 1996) scored on a four-point Likert scale (1 = Never to 4 = Often), with higher scores indicating higher levels of loneliness. The ULS-6 showed good construct validity and good internal consistency with an alpha = 0.809 in this study.

3.3.5 Life satisfaction

The satisfaction with life scale (Diener et al., 1985) is a widely used measure of subjective well-being. It assesses an individual's cognitive judgement of his/her life as a whole. Items were scored on a scale of 1 (not at all true of me) to 5 (extremely true of me), with higher scores indicating higher well-being levels. This index showed excellent reliability (alpha = 0.840) in this study.

3.3.6 Guilt

Consulting from previous literature (Panek, 2014), we designed a three-item scale to assess guilt. Participants were asked to rate how well the following three statements can be used to describe their own situations (from 1 = not at all true of me to 5 = extremely true of me): "I often feel guilty about the amount of time I spend on social media"; "I often feel guilty about the amount of time I spend on my phone"; "I often feel guilty about having engaged in certain activities on social media." These questions measured guilt associated with the amount of social media consumption and smartphone use. Higher scores indicate stronger guilt about social media use. Overall, the scale had good construct validity and good internal consistency with an alpha = 0.872.

4 Results

The survey data analyses were implemented by applying the SPSS version 20.0. Descriptive statistics for the estimated and application-tracked smartphone and social media usage are presented in Table 1.

According to the yesterday measures, participants spent an average of 8.15 hours (SD = 3.13) on their phones, of which 4.14 hours (SD = 2.13) were spent on social media. As for the last week measures, it shows that the average time spent on smartphones in one week was 54.86 hours (SD = 20.79), with 29.78 hours (SD = 15.41) on the social media.

Table 1 Summary statistics for primary measures (N = 315)

	Number of items	*Mean*	*Median*	*SD*
Estimate yesterday use (hours)				
Phone		7.94	7.72	3.02
Social media		4.31	3.83	2.20
Actual yesterday use (hours)				
Phone		8.15	7.81	3.13
Social media		4.14	3.55	2.13
Estimate last week use (hours)				
Phone		52.57	50	20.65
Social media		29.45	26	15.71
Actual last week use (hours)				
Phone		54.74	51.42	20.77
Social media		29.99	29.05	15.39
Loneliness	6	12.05	12	3.80
Life satisfaction	5	15.97	16	4.19
Guilt	3	7.90	8	2.82

According to Table 1, respondents tended to underestimate their yesterday's overall phone use, last week's overall phone use, last week's social media use, but overestimate their yesterday's social media use. Paired-sample t-tests were conducted for the estimated measures and application-tracked measures.

Paired-sample t-tests were conducted to test whether the discrepancies were statistically significant or not. To better control for the influence of outliers, we performed logarithmic transformations on the time-related variables. As shown in Table 2, the mean of the estimated yesterday's social media use was significantly higher than the mean of the actual yesterday's social media use ($p < 0.05$). This result indicated that respondents tended to overestimate the time they spent on social media yesterday. In terms of last week's overall phone use, the estimated measure's mean was significantly lower than the application-tracked measure ($p < 0.01$). Namely, respondents were prone to underestimate the overall time they had spent on their phones last week. Meanwhile, Table 2 also shows that the discrepancy of yesterday's phone use and that of last week's social media measures were not statistically significant.

Table 2 Paired-sample t-tests comparing estimated and actual usage (N = 315)

	Estimated		*Actual*		μ_{M1-M2}	*df*	*t*	*p*
	M_1	SD_1	M_2	SD_2				
Yesterday phone use	0.867	0.172	0.878	0.176	–0.010	314	–1.534	0.126
Yesterday SM use	0.580	0.225	0.554	0.246	0.025	314	2.439	0.015**
Last week phone use	1.685	0.182	1.707	0.174	–0.021	314	–2.710	0.007**
Last week SM use	1.407	0.240	1.413	0.245	–0.005	314	-0.435	0.664

Notes: 1. SM = social media; 2. All variables are log-transformed.
*$p < 0.05$. **$p < 0.01$.

Pearson correlations were then performed to assess the relationships among the primary variables. Loneliness, life satisfaction, and guilt were standardised to avoid the differences in the ranges of initial features from causing biases. The results of this analysis are presented in Table 3.

As shown in Table 3, the correlations between the yesterday estimate questions and the application-tracked measures were 0.766, $p < 0.01$, for overall phone use, and 0.692, $p < 00.01$, for social media use. The correlations between the last week's estimate questions and the application-tracked measures were 0.695, $p < 0.01$, for overall phone use, and 0.621, $p < 0.01$, for social media use. In sum, correlating estimate measures to the Screen Time data indicated that the retrospective recall of time spent on smartphones and social media was only moderately similar to the tracking data.

The discrepancy of yesterday's overall phone use was positively correlated with actual yesterday overall phone use ($r = 0.115$, $p < 0.05$). In the same vein, yesterday's social media use discrepancy was positively correlated with actual yesterday social media use ($r = 0.141$, $p < 0.05$). As for last week usage, it was also found that the discrepancy of last week overall phone use was positively correlated with actual last week overall phone use ($r = 0.140$, $p < 0.05$), while the discrepancy of last week social media use was positively correlated with actual last week social media use ($r = 0.169$, $p < 0.01$). Said differently, the longer time spent on smartphones and social media, the less likely the estimated usage would be accurate. Therefore, H1a and H1b are supported.

Guilt was positively correlated with actual yesterday social media use ($r = 0.157$, $p < 0.01$) and actual last week social media use ($r = 0.129$, $p < 0.05$), whereas no statistically significant correlations were found between guilt and estimated use of social media. Namely, being aware of the actual time that has spent on social media might give respondents a sense of guilt, and the longer the time spent, the stronger the feelings of guilt would be. Therefore, H2a is supported. However, the correlations between guilt and discrepancy variables were weak and not statistically significant. Hence, H2b is rejected.

Table 3 Zero correlations among social media and smartphone use variables and well-being variables (N = 315)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Estimate yesterday phone use	1														
2	Estimate yesterday SM use	0.647**	1													
3	Estimate last week phone use	0.782**	0.516**	1												
4	Estimate last week SM use	0.555**	0.756**	0.674**	1											
5	Actual yesterday phone use	0.766**	0.516**	0.613**	0.449**	1										
6	Actual yesterday SM use	0.482**	0.692**	0.358**	0.573**	0.545**	1									
7	Actual last week phone use	0.577**	0.384**	0.695**	0.500**	0.645**	0.387**	1								
8	Actual last week SM use	0.392**	0.507**	0.390**	0.621**	0.390**	0.674**	0.591**	1							
9	Discrepancy of yesterday phone use	0.049	0.126*	–0.038	0.052	0.115*	0.108	0.064	0.052	1						
10	Discrepancy of yesterday SM use	0.128*	0.278**	0.085	0.179**	0.174**	0.141*	0.150**	0.087	0.590**	1					
11	Discrepancy of last week phone use	0.098	0.061	0.038	0.034	0.139*	0.037	0.140*	0.051	0.480**	0.422**	1				
12	Discrepancy of last week SM use	0.103	0.153**	0.082	0.160**	0.151**	0.116*	0.130*	0.169**	0.303**	0.330**	0.477**	1			
13	Loneliness	0.100	0.127*	0.100	0.100	0.051	0.007	0.120*	0.044	0.079	0.158**	0.096	0.133*	1		
14	Life satisfaction	–0.023	–0.054	0.019	0.002	–0.080	–0.017	–0.074	0.000	–0.138*	–0.135*	–0.150**	–0.111*	–0.305**	1	
15	Guilt	0.028	0.072	–0.011	0.023	0.023	0.157**	0.001	0.129*	–0.012	0.092	0.001	0.004	0.380**	–0.044	1

Notes: 1. SM = social media; 2. Time measures are log-transformed; 3. Loneliness, life satisfaction, and guilt scales are standardised.
*$p < 0.05$. **$p < 0.01$.

Table 4 Regression analysis of over-reporting and under-reporting of social media and overall smartphone use

	Social media use				*Overall phone use*			
	Yesterday		*Last week*		*Yesterday*		*Last week*	
	Under report	*Over report*	*Under report*	*Over report*	*Under report*	*Over report*	*Under report*	*Over report*
Actual use	1.343**	0.034	1.799**	−0.300	1.044**	−0.380	1.693**	−0.866*
Loneliness	0.003	0.126**	−0.029	0.164*	−0.046	0.045	−0.009	0.109
Life satisfaction	−0.007	−0.056	−0.061	−0.060	−0.092*	0.016	−0.166**	0.087
Guilt	0.048	−0.016	0.007	−0.117	−0.002	−0.014	−0.018	−0.006
Constant	−1.646**	1.603	−3.748**	3.328**	−1.104	2.662**	−3.679**	5.557**
R^2	0.301	0.087	0.236	0.097	0.124	0.019	0.176	0.104
Adjusted R^2	0.279	0.061	0.219	0.068	0.099	−0.015	0.161	0.067
N	133	146	185	129	149	120	213	101

Notes: 1. Actual use means yesterday's and last week's actual use of social media and smartphones indicated by screen time report, respectively; 2. All time variables are log-transformed; 3. Loneliness, life satisfaction, and guilt scores are standardised.
*$p < 0.05$. **$p < 0.01$.

Loneliness turned out to be positively correlated with estimated yesterday social media use ($r = 0.127$, $p < 0.05$) and actual last week overall smartphone use ($r = 0.120$, $p < 0.05$). Loneliness was also positively associated with discrepancy of yesterday social media use ($r = 0.158$, $p < 0.01$) and discrepancy of last week social media use ($r = 0.133$, $p < 0.05$). In other words, respondents who reported a higher level of loneliness would estimate their social media use less accurately. On this account, H3a and H3b are supported.

Life satisfaction was negatively correlated with all the discrepancy variables, which means when respondents have a higher level of life satisfaction, the estimation of social media and overall smartphone use would be more accurate. Accordingly, H4a and H4b are rejected.

We also conducted a multivariate analysis to explore potential factors associated with under- and over-reporting that occurred when respondents estimated their use of social media and smartphones. We used a dichotomous variable to indicate under- and overreporting that occurred when respondents reported their use that was differed from the actual use indicated by the screen time data. The results of this analysis are presented in Table 4.

This multivariate analysis shows that only a few factors were significantly associated with under- and over-reporting. Actual use measures are significantly and positively associated with all the underreport variables. The longer time spent on social media and smartphones, the more likely respondents will underreport their use.

Loneliness is only positively associated with over-report of yesterday's social media use ($p < 0.01$) and over-report of last week's social media use ($p < 0.05$). Said differently, respondents who reported a higher level of loneliness tended to over-report their social media use. Life satisfaction is significantly and negatively correlated with underreport of yesterday's overall phone use ($p < 0.05$) and underreport of last week's overall phone use ($p < 0.01$), which indicated that respondents who reported a higher level of life satisfaction were less likely to underreport their overall phone use. Guilt did not significantly predict under-/over-report of social media nor overall smartphone use, which was in line with the Pearson correlation analysis.

5 Discussion

The present research aims to examine the accuracy of self-reported social media measures and smartphone use and explore possible factors that may affect recall bias. Comparing self-reported data with application-tracked data recorded by Screen Time on iPhone, there are four major findings.

First and foremost, our analysis shows that estimates of social media and smartphone use are inaccurate, and only moderate associations between retrospective estimates and reported actual use are examined, with Pearson correlations ranging from $r = 0.621$ to $r = 0.766$. This finding is in line with earlier studies (Araujo et al., 2017, Sewall et al., 2020; Scharkow, 2016), indicating that retrospective estimates of use are not always reliable in media use studies. In fact, previous studies concerning the

correlations between digital technology use and subjective well-being using retrospective self-report measurements should be understood as perceived use, rather than actual use.

Second, it is determined that actual use of social media and smartphones strongly predicts the discrepancy between estimated and reported actual use. The longer time people spent on social media and smartphones, the more likely that they will underestimate their use. One possible explanation is that frequency illusions occur at some stages of cognitive processing. It has been demonstrated that people tend to underestimate frequent events and overestimate rare events (Fiedler and Armbruster, 1994). Given that social media and smartphones are so frequently used in everyday lives, the respondent's temporal judgment on time spent on the smartphone and social media may be influenced, and such influence may increase as the use time increases.

Third, two psychological well-being variables, loneliness and life satisfaction, are significantly correlated with misestimation of the use of social media and smartphones. On the one hand, respondents with a higher level of loneliness became less accurate in recalling their social media use for yesterday and last week. The multivariate analysis demonstrates that a higher level of loneliness is associated with an overestimation on their yesterday's and last week's social media use. There are several possible explanations for these findings. First, Pearson correlation analysis suggest that loneliness is positively correlated with estimated yesterday social media use. Said otherwise, respondents who report a higher level of loneliness are more likely to believe that they spent a longer time on social media yesterday. Individuals place different values on their daily behaviour, and those who report a higher level of loneliness may weigh social media use more important than other activities given that using social media helps to ease the feelings of loneliness. When estimating the intensity of social media use, their judgments might be distorted. As a result, these respondents are likely to overestimate their social media use. Second, some scholars suggested that our emotions alter our sense of time, and time can be distorted to appear shorter or longer than it really is (Droit-Volet and Meck, 2007). At the present stage of research, we conjecture that loneliness, as an unpleasant emotional valence, might alter our sense of time, and consequently, respondents who report a higher level of loneliness may recall their social media use less accurately. On the other hand, life satisfaction is significantly and negatively correlated with discrepancy variables, which means that those who report a higher level of life satisfaction will have fewer discrepancies in estimating their use of social media and smartphones. According to the multivariate analysis, it is noticed that when respondents report a higher level of life satisfaction, they are less likely to underreport their yesterday's and last week's overall phone use.

These findings are somewhat in conflict with Sewall et al.'s (2020) study, in which the researchers find that higher levels of loneliness are associated with more significant inaccuracies in estimated overall phone use, but not estimated social media use; whereas higher levels of life satisfaction are associated with greater inaccuracies in estimated social media use, but not overall use. Also, higher levels of respondent depression are associated with greater inaccuracies in estimated overall use and

estimated social media use. There are a few possible explanations. On the one hand, existing literature has shown that depressed individuals are likely to have different feelings regarding time passage (Droit-Volet, 2013). Given that we did not include depression in our model, the findings might be different. On the other hand, in that previous work, although the actual weekly overall phone use and social media use were reported according to the screen time data, the calculation method of screen time was different at that time: the screen time feature tracked the duration of time that specific applications were used or the overall phone use over the past seven days. When we conducted our study, Screen Time data over the past seven days was no longer available. Instead, the new calculation method reports screen time week by week from Sunday to Saturday. In most cases (if respondents did not happen to answer the questionnaire on Sunday), the last week's report would be different from the past seven days' report, which may also influence the results.

Last but not least, this study introduces guilt to examine whether using social media would generate a feeling of guilt and whether the guilty feeling would drive respondents to edit their answer to the survey for the sake of social desirability. Pearson correlation analysis shows no significant association between the estimated use of social media and the sense of guilt, and the correlation between discrepancies variables and guilt is not significant neither. Nevertheless, both yesterday's and last week's actual use of social media are positively correlated with the sense of guilt, and the correlation between yesterday's social media use and guilt ($r = 0.157$) is slightly stronger than the one with last week's social media use ($r = 0.129$). That is to say, being aware of spending great effort and extended time on social media may be accompanied by a sense of guilt. The longer the time is, the stronger the feeling would be. However, such a feeling of guilt does not have long term effects on people's well-being, given that the association between guilt and life satisfaction was not significant. Also, we did not found any statistically significant correlation between recall discrepancies and guilt, which means guilt is not the reason for the respondents to edit their answers during the survey. Nevertheless, in Panek's (2014) study regarding guilty pleasure media use and time management, it is suggested that users are aware of the overuse of leisure media because of deficits in self-control, and the level of self-control is a more accurate predictor of the amount of social media use. Future studies can address self-control as another possible factor in explaining the retrospective bias of social media and smartphone use.

In sum, our exploratory study links a few behavioural and psychological traits to under- and over-reporting of social media and smartphone use. However, these factors do not explain a large amount of variance in the models, which suggests that additional mechanisms may be at work when recalling the use of social media and smartphones. It is still unclear how other factors, such as personality traits and self-control, may be associated with the accuracy of the retrospective estimates of social media and smartphone use. This is a fruitful topic for future research.

This study has several limitations. First, the share across devices function is now available on screen time, which means that user can enable this function on any device signed to the same iCloud account to report the combined screen time, so the actual reported time spent on social media and smartphone may

be the combined time, rather than time spent merely on the phone. It is worth applying screening questions before the questionnaire survey to ensure that the share across devices function is turned off, and the Screen Time only reports smartphone use.

Another limitation is that there might be potential differences between online penal informants and the general population. In this study, we only recruited iPhone users and discussed their digital technology use and recalling behaviour. We cannot verify whether the results of this study among a specific group can be applied to the general population. Given that there are similar functions on the Android system recording users' daily behaviour on smartphones, future work is clearly needed to include other smartphone systems to represent the population better.

The third limitation of this study is that our study was conducted exclusively with a limited number of Chinese users. Findings in this study could have been further strengthened by including more representative samples in other cultural settings.

Finally, the actual use measurements in this study still rely on respondent's self-report of screen time. It is doubtful whether every individual respondent reported their actual use precisely as what was shown in the screen time report. One way to address this issue in future research is to require respondents to upload a screenshot of their Screen Time reports.

6 Conclusions

This research again finds that the traditionally used self-report measure of digital technology use is not accurate. The longer people using smartphones and social media, the more inaccurate that self-report would be. From a psychological perspective, loneliness and life satisfaction are important factors that might influence the accuracy of recall: respondents with a higher level of life satisfaction might have a more accurate recall of overall smartphone use. In comparison, those who reported a higher level of loneliness were prone to have more considerable discrepancies in recalling social media use.

Screen time, as a function designed to curb users' smartphone dependency, aims to help users regain control or at least make them aware of the amount of time they are spending on their devices. From a researcher's perspective, the Screen Time data improves the accuracy of measure and fends off unwanted under-reporting of usage. Overall, using more standard and accurate data about people's daily behaviour on smartphones and social media would be precious for future research efforts relating to the impacts of digital technology use. This study suggests the importance of applying a standard time perception approach to time-use studies since the common practice in social media behaviour of measuring time-based on subjective feeling about it is somewhat challenged. With the fruitful information available on the screen time report (i.e., time duration, pickups, most used applications, and notifications), in the future, it is worth applying this novel research strategy to communication studies, cognitive psychology, and neuropsychology.

References

Apple Inc. (2020) Use Screen Time on your iPhone, iPad, or iPod Touch [online] https://support.apple.com/en-us/HT208982 (accessed 19 October 2020).

Araujo, T., Wonneberger, A., Neijens, P. and de Vreese, C. (2017) 'How much time do you spend online? Understanding and improving the accuracy of self-reported measures of internet use', Communication Methods and Measures, Vol. 11, No. 3, pp.173–190, https://doi.org/10.1080/19312458.2017.1317337.

Boase, J. and Ling, R. (2013) 'Measuring mobile phone use: self-report versus log data', Journal of Computer-Mediated Communication, Vol. 18, No. 4, pp.508–519, https://doi.org/10.1111/jcc4.12021.

Carroll, G.R., Feng, M., He, Y., O'Connor, K. and Wang, L. (2019) 'Authenticity and institutional context: individual preferences in China', Journal of International Consumer Marketing, Vol. 31, No. 5, pp.429–446, https://doi.org/10.1080/08961530.2019.1590281.

Chai, H., Niu, G., Lian, S., Chu, X., Liu, S., & Sun, X. (2019) Why social network site use fails to promote well-being? The roles of social overload and fear of missing out. Computers in Human Behaviour, [Online] 100, 85-92. Available from: https://doi.org/10.1016/j.chb.2019.05.005.

CNNIC (2020) The 45th Statistical Report on Internet Development in China [online] http://cnnic.com.cn/IDR/ReportDownloads/202008/P020200827549953874912.pdf (accessed 19 October 2020).

Diener, E., Emmons, R.A., Larsen, R.J. and Griffin, S. (1985) 'The satisfaction with life scale', Journal of Personality Assessment, Vol. 49, No. 1, pp.71–75.

Droit-Volet, S. (2013) 'Time perception, emotions and mood disorders', Journal of Physiology-Paris, Vol. 107, No. 4, pp.255–264, https://doi.org/10.1016/j.jphysparis.2013. 03.005.

Droit-Volet, S. and Meck, W.H. (2007) 'How emotions colour our perception of time', Trends in Cognitive Sciences, Vol. 11, No. 12, pp.504–513, https://doi.org/10.1016/j.tics.2007.09.008.

Fiedler, K. and Armbruster, T. (1994) 'Two halfs may be more than one whole: category-split effects on frequency illusions', Journal of Personality and Social Psychology, Vol. 66, No. 4, pp.633–645.

Gardner, W.L., Pickett, C.L. and Brewer, M.B. (2000) 'Social exclusion and selective memory: how the need to belong influences memory for social events', Personality & Social Psychology Bulletin, Vol. 26, No. 4, pp.486–496.

Gil, S. and Droit-Volet, S. (2012) 'Emotional time distortions: the fundamental role of arousal', Cognition & Emotion, Vol. 26, No. 5, pp.847–862, https://doi.org/10.1080/02699931. 2011.625401.

Giunchiglia, F., Zeni, M., Gobbi, E., Bignotti, E. and Bison, I. (2018) 'Mobile social media usage and academic performance', Computers in Human Behavior, Vol. 82, pp.177–185, https://doi.org/10.1016/j.chb.2017.12.041.

Hatchel, T., Negriff, S. and Subrahmanyam, K. (2018) 'The relation between media multitasking, intensity of use, and well-being in a sample of ethnically diverse emerging adults', Computers in

Human Behaviour, Vol. 81, pp.115–123, https://doi.org/10.1016/j.chb.2017.12.012.

Kemp, S. (2019) 'Digital trends 2019: every single stat you need to know about the internet' [online] https://thenextweb.com/contributors/2019/01/30/digital-trends-2019-every-single-statyou-need-to-know-about-the-internet/ (accessed 19 October 2020).

Kim, Y., Sohn, D. and Choi, S.M. (2011) 'Cultural difference in motivations for using social network sites: a comparative study of American and Korean college students', Computers in Human Behaviour, Vol. 27, No. 1, pp.365–372, https://doi.org/10.1016/j.chb.2010.08.015.

LaRose, R. and Eastin, M.S. (2002) 'Is online buying out of control? Electronic commerce and consumer self-regulation', Journal of Broadcasting & Electronic Media, Vol. 46, No. 4, pp.549–564, https://doi.org/10.1207/s15506878jobem4604_4.

Leith, K.P. and Baumeister, R.F. (1998) 'Empathy, shame, guilt, and narratives of interpersonal conflicts: guilt-prone people are better at perspective taking', Journal of Personality, Vol. 66, No. 1, pp.1–37.

Nederhof, A.J. (1985) 'Methods of coping with social desirability bias: a review', European Journal of Social Psychology, Vol. 15, No. 3, pp.263–280.

Ohme, J. et al. (2021) 'Mobile data donations: assessing self-report accuracy and sample biases with the iOS screen time function', Mobile Media & Communication, Vol. 9, No. 2, pp.293–313.

Panek, E. (2014) 'Left to their own devices: college students' 'guilty pleasure' media use and time management', Communication Research, Vol. 41, No. 4, pp.561–577, https://doi.org/10.1177/0093650213499657.

Perlman, D. and Peplau, L.A. (1993) 'Toward a social psychology of loneliness', in Duck, S. and Gilmour, R. (Eds.): Personal Relationships: Personal Relationships in Disorder, pp.31–56, Academic Press, London.

Rosenthal, S.R. et al. (2021) 'Association between mobile phone screen time and depressive symptoms among college students: a threshold effect', Human Behavior and Emerging Technologies, Vol. 3, No. 3, pp.432–440.

Russell, D.W. (1996) 'UCLA loneliness scale (version 3): reliability, validity, and factor structure', Journal of Personality Assessment, Vol. 66, No. 1, pp.20–40.

Scharkow, M. (2016) 'The accuracy of self-reported internet use – a validation study using client log data', Communication Methods and Measures, Vol. 10, No. 1, pp.13–27, https://doi.org/10.1080/19312458.2015.1118446.

Schwarz, N. and Oyserman, D. (2001) 'Asking questions about behaviour: cognition, communication, and questionnaire construction', The American Journal of Evaluation, Vol. 22, No. 2, pp.127–160.

Sewall, C.J., Bear, T.M., Merranko, J. and Rosen, D. (2020) 'How psychosocial well-being and usage amount predict inaccuracies in retrospective estimates of digital technology use', Mobile Media & Communication, https://doi.org/10.1177/2050157920902830.

Shin, D.C. and Johnson, D.M. (1978) 'Avowed happiness as an overall assessment of the quality of

life', Social Indicators Research, Vol. 5, Nos. 1–4, pp.475–492.

Skues, J.L., Williams, B. and Wise, L. (2012) 'The effects of personality traits, self-esteem, loneliness, and narcissism on Facebook use among university students', Computers in Human Behaviour, Vol. 28, No. 6, pp.2414–2419, https://doi.org/10.1016/j.chb.2012.07.012.

Statista (2017) 'iPhones in use worldwide', Statista [online] https://www.statista.com/statistics/755625/iphones-in-use-in-us-china-and-rest-of-the-world/ (accessed 9 October 2021).

Valenzuela, S., Park, N. and Kee, K. (2009) 'Is there social capital in a social network site? Facebook use and college students' life satisfaction, trust, and participation', Journal of Computer-Mediated Communication, Vol. 14, No. 4, pp.875–901, https://doi.org/10.1111/j.1083-6101.2009.01474.x.

Valkenburg, P. and Peter, J. (2007) 'Online communication and adolescent well-being: testing the stimulation versus the displacement hypothesis', Journal of Computer-Mediated Communication, Vol. 12, No. 4, pp.1169–1182, https://doi.org/10.1111/j.1083-6101.2007. 00368.x.

Wong, Y. and Tsai, J. (2007) 'Cultural models of shame and guilt', in Tracy, J., Robins, R., Tangney, J. and Campos, J. (Eds.): The Self-conscious Emotions: Theory and Research, 1st ed., pp.209–223, Guilford Publications, New York.

ISSN Application No. 21778

Need factors and preoccupation among mobile social media users

Ming-Han Chiang
Department of Applied Cosmetology,
National Tainan Junior College of Nursing,
No. 78, Sec. 2, Minzu Rd., Winzu Rd.,
West Central Dist., Tainan City 700007, Taiwan
Li-Ling Liu*
Department of Business Administration,
CTBC Business School,
No. 600, Sec. 3, Taijiang Blvd., Annan District,
Tainan 709, Taiwan

ABSTRACT

Social networking sites provide mobile applications to induce users to rely on and use them. Social media apps (SMAs) create, amplify, strengthen, disseminate, and consume social signals from peers and the general public. These signals are prolonging deep engagement and participation. SMAs take advantage of user needs (for belonging, self-actualisation, enjoyment, self-identity, and self-esteem), which results in the excessive use of SMAs, which then causes cognitive preoccupation. A total of 1,551 questionnaires indicated that belonging needs positively affect the excessive social use of SMAs. Self-actualisation and enjoyment needs positively affect the excessive hedonic use of SMAs. Self-identity and self-esteem needs positively affect the excessive cognitive use of SMAs. Excessive use (social, hedonic, and cognitive use) of SMAs positively affects cognitive preoccupation. SMAs must ensure the enjoyment and social needs of users. Regarding the balance between benefits and social responsibilities, SMA operators should provide healthy apps without causing conflicts in SMA users.

Keywords: needs factors; excessive use of social media apps; preoccupation; linear predictive control model; social media apps; SMAs.

1 Introduction

Mobile phones are now indispensable. Mobile phones can be used to receive and send e-mails, make audio and video calls, allow interactions on social network apps, run games, and enable sharing and viewing picture and videos. Social networking sites (SNSs) provide many mobile applications (e.g., Line, Facebook [FB], Twitter, and Instagram) to induce dependence and use (Saade and Bahli, 2005).

According to Statista statistics, the world's most popular SNSs or social media apps (SMAs) are WhatsApp, FB Messenger, and WeChat (Chatbot Trends, 2020). The monthly users of FB now number over 2.5 billion. The number of monthly FB users in the Asia-Pacific region accounts for 42% of global users, and the number of users in Taiwan accounts for 83% of its total population (Chatbot Trends, 2020). In Taiwan, the number of Line users is the largest and has reached 21 million,

accounting for 90% of the population (Yi, 2020).

Social media differ from other media in the creating and consuming of social signals from peers and the masses. It amplifies, strengthens, and disseminates these signals. The signals are also changing our behaviour, for example lengthened engagement (Van der Heijden, 2004; Business Weekly, 2021). Excessive use and compulsive checking behaviour adversely affect the psychological and life outcomes and overall well-being of individuals, for example through technological addiction, the collection of a large amount of personal information, the implantation of false information, and internet fraud (Ho, 2021). A key component of problematic internet use is cognitive preoccupation (Tokunaga, 2012). Cognitive preoccupation entails obsessive thinking patterns that involve the use of technology. It is a psychological disruption usually related to some aspect of internet or technology use (Caplan, 2010; Haagsma et al., 2013).

Researchers have identified factors related to excessive SNS use and psychological problems. Most studies on SNSs have focused on the darker side of SNS use (Das et al., 2020; Ho and Ito, 2019; Cao and Yu, 2019; Cao et al., 2018). Some researchers have suggested socio-psychological factors such as belonging needs, self-esteem, self-identity, attitude (Ho et al., 2017), loneliness, stress, social anxiety (Ndasauka et al., 2016), enjoyment perception, social liquidity, demographics, habit, (Kwon et al., 2016), need for social interaction, need for achievement, need for escapism, and social anxiety (Kardefelt-Winther, 2014) to explain why users spend excessive time on SNSs or gaming apps.

Motivation theory can inform our understanding of behaviour and motivation. Motivation may be divided into extrinsic or intrinsic motivation (Shee and Peltier, 2020). In intrinsic motivation, people act purely because they like the action or express self-encouragement and self-interest in the activity or process (Oh and Syn, 2015).Intrinsic motivation theory is always the antecedent in consumer attitudes or behaviour (Shee and Peltier, 2020; Watchravesringkan et al., 2010).

Studies of SNSs have focused on the darker side of SNS use. The present study hypothesised that motivation theory and intrinsic motivation theory could clearly explain the behaviour of and motivational factors related to SNS users. Accordingly, the study applied these theories as a basis to establish a model for explaining how needs motivate excessive SMA use to induce cognitive preoccupation through intrinsic motivation.

2 Literature review and hypothesis

Needs factors researchers have suggested that belonging needs (Ghatak and Singh, 2019; Wu and Li, 2020; Ho et al., 2017), self-esteem needs (Ghatak and Singh, 2019; Wu and Li, 2020; Ho et al., 2017), self-actualisation needs (Ghatak and Singh, 2019; Wu and Li, 2020), self-identity needs (Wu, 2019), and enjoyment needs (Hou and Shiau, 2020) are the key constructs in SMA use. Belonging needs include recognition, close ties, sympathy, and affection for others (Ghatak and Singh, 2019) and are involved in the emotional enhancement for maintaining the connectedness of SMA users (Wu and Li,

2020). Self-esteem needs include SMA user needs for recognition and care from society (Wu and Li, 2020). Self-actualisation needs describe development needs and reflect the personalised level in meeting users' personalised design needs (Ghatak and Singh, 2019). Self-identity is constructed by oneself and others to define and regard someone in social life (Jenkins, 2008). The needs of self-identity are an essential factor affecting privacy behaviour in SNSs (Wu, 2019). Enjoyment refers to an interactive process evoking pleasure, happiness, or interest (Hu and Tsai, 2009). Enjoyment needs are related to entertainment and arousal (Nishimura and King, 2007).

Excessive use of SMA excessive use of an SMA means that the use is longer than the planned time, or that an excessive amount of time or energy is spent on the platform (Caplan and High, 2006; Tandon et al., 2021). Cao and Yu (2019) applied user gratifications theory and suggested that excessive social media use comprises three constructs (excessive social use, excessive hedonic use, and excessive cognitive use). Alhashem et al. (2021) suggested that many personal benefits are derived from an online community, including hedonic factors of fun and enjoyment, cognitive benefits from problem solving and learning, and extra-personal and personal benefits generating from the use of social value. In this study, I adopted the approaches of Cao and Yu (2019) and Alhashem et al. (2021) to define three constructs of the excessive use of social media. Excessive social use refers to spending too much time strengthening contacts with others; excessive hedonic use refers to enjoyment, pleasure and emotional experiences derived from excessive use of an SMA; excessive cognitive use means that the user spends too much time and energy seeking information and knowledge by learning and problem solving.

Cognitive preoccupation cognitive preoccupation is a key component or symptom of problematic use of the internet (Tokunaga, 2012). Cognitive preoccupation refers to obsessive thinking modes that involve using a technology, and it is a psychological disruption in which a person is fixed on some aspect of technology or the internet (Caplan, 2010; Haagsma et al., 2013). For a person with such a preoccupation, the internet or technology becomes an inevitable medium. When the preoccupied person is not using the internet or technology, the preoccupation persists with obsessive thoughts, anxiety, or discomfort (Shapira et al., 2000). Therefore, researchers have suggested that cognitive preoccupation exacerbates internet or SNS use and negative outcomes, especially for problematic use of the internet involving both cognitive preoccupation and behavioural modes (Shapira et al., 2000; Tokunaga, 2012; Zheng and Lee, 2016). Haagsma et al. (2013) reported that cognitive preoccupation with the internet may explain the problematic use of online gaming. Cao et al. (2018) suggested cognitive-emotional preoccupation and cognitive-behavioural control to explain the excessive use of mobile SNSs and negative outcomes.

This study reviewed the literature and examined the relationships among the excessive SMA use, cognitive preoccupation, and needs factors (belonging, self-actualisation, enjoyment, self-identity, and self-esteem).

2.1 Hypotheses

Our research model comprised the following groups of items: belonging needs, self-actualisation, enjoyment, self-identity, and self-esteem; excessive SMA use, excessive hedonic SMA use, and excessive cognitive SMA use; and cognitive preoccupation.

Belonging needs are at the third level in Maslow's hierarchy of needs. Belonging needs are attachment needs and close ones' love in life (Ghatak and Singh, 2019). They are social needs or love and belonging needs. A sense of belonging comes from the need for emotion and empathy in life. At present, people throughout the world keep in touch with family and friends through social media. Social media users are constantly updating their status. The number of people entering into relationships by joining social media is increasing (Quan-Haase and Young, 2010; Ghatak and Singh, 2019).

Social networking platforms are free from time and space constraints and provide individuals with an opportunity to maintain relationships with peers, friends, and family. Users also have the opportunity to freely express their ideas and obtain the approval of others (Ho et al., 2017). The need to belong is an intrinsic motivation; people want to naturally form and maintain long-lasting, meaningful, and positive interpersonal relationships (Baumeister and Leary, 1995). People with a high sense of belonging feel isolated and lonely when they cannot connect with their social network (family, friends, and peers). At this time, the use of social platforms becomes the main response substitute (Ledbetter et al., 2011). Again, intrinsic motivation refers to feelings of interest and satisfaction with an activity or process without external rewards or motivations (Ryan and Deci, 2000). With intrinsic motivation, high belonging-need individuals spend considerable time strengthening contact with others.

H1 Belonging needs positively affect the excessive social use of SMAs.

Self-actualisation embodies the individual's development towards satisfying the highest needs. Self-actualisation needs describe 'development needs' (Ghatak and Singh, 2019). An example is an individual enthused to take a specific course obtains successful outcomes, with their efforts fully appreciated (Ghatak and Singh, 2019). Self-actualisation is an efficient affective factor in intrinsic motivation (Deci, 1976). Self-actualisation is also an overall factor of intrinsic motivation (Epstein et al., 2013).

Social media use can result in self-actualisation or a higher level of happiness (Chou and Lim 2010). Happiness has two elements: hedonia and eudaimonia. Eudaimonia can be produced by pursuing the use or developing the best side of oneself (Huta and Ryan, 2010). Further, eudaimonia moves to self-fulfilment, which is equal to self-actualisation. Self-actualisation is related to 'more ultimate' experiences. Eudaimonic activities also lead to hedonic enjoyment (Waterman et al., 2008). Social media provide a niche market where talented people share experience and knowledge and gain understanding (Ghatak and Singh, 2019). For self-actualisation, social media users would be happy and excited to engage in SMA use to increase their knowledge and self-development. This study applies intrinsic motivation theory to propose that with self-actualisation needs, individuals spend

considerable time seeking enjoyable, pleasurable, and emotional experiences, resulting in the excessive use of an SMA.

H2 Self-actualisation needs positively affect the excessive hedonic use of SMAs.

Enjoyment refers to the feeling that an interactive process is interesting and causes pleasure or happiness (Hu and Tsai, 2009). Here, individuals engage in activities for the pursuit of happiness, but not for external rewards. Therefore, enjoyment is considered intrinsic motivation (Hu and Tsai, 2009). Enjoyment needs are related to the feeling of being awakened and entertained (Nishimura and King, 2007).

Enjoyment needs are the key reasons people use social media (Hou and Shiau, 2020). Social media site operators supply add-on applications, social games, or psychological tests that let users have fun and interact with others on the platform (Hsiao et al., 2016). Therefore, enjoyment needs prompt users to stay active on social media for long periods. On the basis of intrinsic motivation theory, this study proposes that the processes of an SMA providing the enjoyment needs of users result in users spending considerable time seeking enjoyable, pleasurable, and emotional experiences and resulting in the excessive use of an SMA.

H3 Enjoyment needs positively affect the excessive hedonic use of SMAs.

The need for self-identification represents how individuals need to understand themselves clearly (Schlenker, 1980) and includes an essential level of engaging in a behaviour for self-concept (Stryker, 1987). Social science has recognised that social interaction helps form self-identity (Jenkins, 2008; Mead, 1967). The 'person' implies the existence of others through an intersubjective entity. Individuals express self-identity and find self-understanding through circulation and negotiation (Floridi, 2011). Intrinsic motivation, in the form of feelings of personal expressiveness, was suggested as defining one dimension of identity (Waterman, 2004). Intrinsic motivation and self-identity are related (Werff et al., 2013).

Social media provide numerous opportunities to satisfy self-identity needs. Social media can help individuals through user names, displaying personal interests, avatars. Through social relationships, as well, users define themselves. Feedback and gathering information from social media represent one type of self-identity. Hence, individuals can know themselves by contemplating elements that can be used to define their self-identity and learning about others' perceptions (Min and Kim, 2015). When self-presented identities are confirmed in social interactions, people feel understood and satisfied (Goffman, 1967). Online community platforms supply the knowledge sharing process and opportunities for verification and identity expression (Ma and Agarwal, 2007). FB is a place to establish and share identities through exhibitionism and gossip (Bumgarner, 2007). Twitter users always self-censor tweets to maintain their self-image (Marwick and Boyd, 2011). These social media characteristics may foster SMA dependence habits because users believe that strong membership with the online community is part of their identity and thus exhibit a high degree of satisfaction in participating (Aladwani, 2014; Zhang et al., 2011). Therefore, this study proposes that individuals with

high self-identity needs will seek information and knowledge by problem solving and learning, leading to excessive use of SMAs.

H4 Self-identity needs positively affect the excessive cognitive use of SMAs.

Self-esteem needs are second from the top of Maslow's hierarchy and represent the need for recognition. Esteem comes from the heart. Compliments and positive feedback from those around one bring positive feelings and, in turn, increase self-esteem (Ghatak and Singh, 2019). The intrinsic motivator would be characterised by 'a sense of achievement that boosts self-esteem'. Hence, self-esteem is a main measure of intrinsic motivation (Vos et al., 2020).

Social media (e.g., FB, Instagram, and Line) provide instant gratification to raise morale and bring positive emotions. Social media induce confidence by providing a sense of self-identity and freedom (Muqaddas et al., 2017). Hence, social media use can amplify esteem effectively (Nyagh et al., 2015). A study revealed that individuals with high self-esteem or confidence used social media excessively for social enhancement (Kapidzic, 2013). This study proposes that individuals with self-esteem needs spend considerable time seeking information and knowledge by problem solving and learning, resulting in excessive use of SMAs.

H5 Self-esteem needs positively affect the excessive cognitive use of SMAs.

Social media allows one to keep in touch with people anytime and anywhere. In social support theory, individuals seek or provide support that is embedded in social networks through social relationships (Maier et al., 2015).

Individuals receive more messages from virtual friends on social media when the number of deep social relationships on social networks increases. To retain a large social network and to ensure the feelings of belonging and support, individuals must frequently check their social media to resonate as quickly as possible (Cao et al., 2016). As social media use increases, social networks become larger. According to the law of reciprocity in social relations, individuals may have more interaction and social support (Yang and Lin, 2017). Again, cognitive preoccupation represents compulsive thinking patterns involving technology use (Haagsma et al., 2013).

Excessive social use in this study refers to the frequent social use of an SMA, which triggers maladaptive cognition. In the cognitive-behavioural model (Davis, 2001), maladaptive cognition is considered a sufficient cause of problematic internet use symptoms. Maladaptive cognition includes distorted thoughts, thought processes, and cognitive focus (Caplan, 2010). Cognitive preoccupation, distorted thoughts, and the processes of thought can be classified as maladaptive cognitions (Caplan, 2010). Therefore, this study proposes that the excessive social use of an SMA induces cognitive preoccupation.

H6 Excessive social use of an SMA positively affects cognitive preoccupation.

Hedonic social media use represents the use of the technology for entertainment and fun (Ali-Hassan et al., 2015). Social media use can satisfy fantasy, sensory, or emotive aspects of hedonic gratification (Shivinder and Raj, 2020). The virtual self-consistency of consumers induces self-expression value

perception and social media consumption hedonic value, and ultimately motivates the use of social media (Khaldi, 2014).

Excessive use of mobile social networks generates cognitive and emotional preoccupation behaviour. Even if the behaviour is problematic, this use contributes to the occurrence of such behaviour (Zheng and Lee, 2016). Individuals may gradually form clusters in long-term memory and exhibit a tendency of behaviour related to responses from social media stimuli. The associative clusters between internal and external stimuli (e.g., social media notifications) can prompt a strong impulse for responding to cognitive and/or emotional emergencies (Turel and Qahri-Sarenmi, 2016). Therefore, this study proposes that the excessive hedonic use of an SMA induces cognitive preoccupation.

H7 Excess hedonic use of an SMA positively affects cognitive preoccupation.

The cognitive use of social media refers to creating and sharing content and accessing content derived from others. It also includes sharing bits and pieces of life such as opinions, ratings, and videos (Ali-Hassan et al., 2015). The theory of use and gratification suggests that media choice and specific content to meet specific needs are purely at the discretion of users, and users have the right to make their own choices.

Active users can evaluate media appropriate to their cognitive needs (Bae, 2018; Billings et al., 2017). Knowledge and information access and comprehension are related to cognitive needs (Al-Ghamdi and Carlin, 2005; Leung, 2009; Stefanone et al., 2019). Cognitive preoccupation behaviour is at the core of impulsive behaviour. Impulsive behaviour, in turn, actively enhances the motivation to participate in which the state of motivation is irresistible (Collins and Lapp, 1992). Therefore, this study proposes that the excessive cognitive use of an SMA induce cognitive preoccupation.

H8 Excessive cognitive use of an SMA positively affects cognitive preoccupation.

3 Methodology

3.1 Survey design

This study employed convenience sampling to recruit responds from October 2020 to February 2021. The sample was expanded through the use of snowball sampling, with participants recruited from the acquaintances of EMBA students and graduates of CTBC Business School. Thus, the sample comprised adults in Taiwan who were aged older than 18 years and responded to an online questionnaire. The preface of the questionnaire stated that its purpose was purely academic, that there were no correct or incorrect answers that the survey was anonymous, and they were guaranteed confidentiality. Respondents were asked to consent before beginning the questionnaire. In all, 3,000 were invited to participate, and, at the data collection deadline, 1,551 questionnaires had been returned, with an effective recovery rate of 51.7%. To minimise the impact of common method variance (CMV), three methods were used in the questionnaire design.

First, to prevent respondents from falling into a model related to Likert or the semantic difference scale, open-ended dummy questions were interspersed throughout the questionnaire. Second, the anchor point of the scale varies by structure. Third, some items were reverse-coded.

The data was tested for CMV by using Harman's single-factor test. If CMV is a serious problem, a single factor will emerge from the factor analysis, or a general factor will explain most of the covariance in the standard variable (Podsakoff and Organ, 1986). Factor analysis was performed with all items, and nine factors with eigenvalues greater than 1 were extracted. In addition, no obvious general factor was observed in the unrotated factor structure, and factor 1 accounted for less than 20% of the variance. Therefore, the post hoc test indicated that CMV was not a serious problem.

3.2 Methods

First, the characteristics of the respondents were analysed using descriptive analysis. Second, the direct and indirect relationships between need factors (belonging, self-esteem, self-actualisation, self-identity and enjoyment), excessive use of SMAs (excessive social, hedonic, and cognitive use of SMAs), and cognitive preoccupation were assessed. AMOS 25 was used to perform confirmatory factor analysis (CFA) and structural equation modelling (SEM) of the scale to solve problems related to dimensionality and convergent and discriminant validity (Anderson and Gerbing, 1988). SPSS 17.0 was used to determine Cronbach's α and to perform Pearson product-moment correlation analysis to determine internal consistency and discriminant validity. Third, the relationships among all variables were clarified using correlation analysis. Finally, a nested model approach was employed using SEM to examine models (Niehoff and Moorman, 1993). The paths from need factors to cognitive preoccupation were estimated through this approach. AMOS 25 was employed for path analysis measuring the hypothesised relationships.

3.3 Measurement

Control variables. Many control variables were included in the analysis because prior studies have reported that these variables significantly influenced excessive social media use (Cao and Yu, 2019). In our analysis, gender was coded as follows: 0 = female and 1 = male. Age was defined as the number of years since birth. Moreover, total time of SMA use (in hours) per day was coded as follows: 1 = < 3 hours per day, 2 = 3–6 hours per day, 3 = 6–9 hours per day, and 4 = > 9 hours per day. The SMA opening frequency per day was coded as follows: 1 = < 20 times, 2 = 21–40 times per day, and 3 > 40 times per day.

The independent variable of this study was need factors (belonging, self-esteem, self-actualisation, self-identity, and enjoyment); intermediator variables were excessive social use, hedonic use, and cognitive use of an SMA; and the dependent variable was cognitive preoccupation. All items were

measured using a five-point Likert scale ranging from 'strongly disagree' to 'strongly agree'.

Belonging needs the scale used to evaluate attachment needs and close ones' love in life consisted of seven items from the study of Leary et al. (2013). A higher score represents a higher need for belonging. An example item was 'I do not like being alone' ($\alpha = 0.882$).

Self-esteem needs the study used four items from the inventory developed by Patchin and Hinduja (2010) to measure self-esteem. An example was 'I think I have a lot of good qualities' ($\alpha = 0.891$).

Self-actualisation needs the scale measured the level of agreement. An example item was 'I am happy to share my feelings and emotions on SMAs' ($\alpha = 0.948$). The measures were adapted from the study of Ghatak and Singh (2019). There was three items to create a comprehensive index. A higher score indicates a higher need for self-realisation.

Self-identity needs this study used three items from the inventory developed by Callero (1985) to measure self-identity needs. One example was 'SMAs have become part of my life' ($\alpha = 0.866$).

Enjoyment needs Enjoyment needs were measured using three items developed and amended by Hu and Tsai (2009). One item was 'SMAs are fun' ($\alpha = 0.943$).

Excessive social use of SMAs Excessive social use of SMAs was assessed using four items developed and amended by Ali-Hassan et al. (2015) and Caplan and High (2006). An example was 'I spend a lot of time using SMAs to create new interpersonal/group relationships' ($\alpha = 0.929$).

Excessive hedonic use of SMA Excessive hedonic use of SMAs was measured using three items developed and amended by Ali-Hassan et al. (2015) and Caplan and High (2006). One example was 'I spend a lot of time using SMAs to relax' ($\alpha = 0.933$).

Excessive cognitive use of SMA Excessive cognitive use of SMAs was assessed using four items developed and amended by Ali-Hassan et al. (2015) and Caplan and High (2006). One example item was 'I spend a lot of time using SMAs to share information with my friends' ($\alpha = 0.922$).

Cognitive preoccupation the cognitive preoccupation scale contained eight items adapted from Collins and Lapp (1992) and Turel and Qahri-Saremi (2016). One example was 'I find that I cannot stop using SMAs' ($\alpha = 0.952$).

4 Data analysis and results

4.1 Sample characteristics

Table 1 demonstrated the respondent characteristics; 52.2% of the respondents were men, 48.6% were between the ages of 41 and 60 years; 25.9% worked in the service industry; 24.9% used Line, WeChat, and FB; 47.8% used SMAs 3–6 hours per day; 44.7% used an SMA fewer than 20 times a day, and 44.2% used an SMA 21–40 times per day.

Table 1 Characteristics of the respondents (N = 1,551)

	Frequency	*Percentage*
Gender		
Male	810	52.2
Female	741	47.8
Age (Years)		
Under 20	133	8.6
21–40	557	35.9
41–60	754	48.6
Above 60	107	6.9

Table 1 Characteristics of the respondents (N = 1,551) (continued)

	Frequency	*Percentage*
Industry		
High-tech	399	25.7
Service	401	25.9
Financial	30	1.9
Military/public/teaching	261	16.8
Freelance	154	9.9
Housekeeping	59	3.8
Student	233	15.0
Others	14	.9
Common use type of SMA		
Line	262	16.9
LineandWechat	91	5.9
LineandIG	115	7.4
LineandFB	386	24.9
LineandWechatandFB	151	9.7
LineandFBandIG	383	24.7
LineandWechatandIG	16	1.0
LineandWechatandFBandIG	147	9.5
The total time of using SMA per day		
Under three hours	460	29.7
3–6 hours	742	47.8
6–9 hours	174	11.2
Above nine hours	175	11.3
The times of using SMA per day		
Under 20 times	525	33.8
21–40 times	685	44.2
Above 41 times	341	22.0
The times of responding SMA per day		
Under 20 times	693	44.7
21–40 times	544	35.1
Above 41 times	314	20.2

4.2 Measurement model

This study used CFA to measure the problems of dimensionality and convergent and discriminant

validity. Due to low standardised loadings ($p < 0.05$) or non-significant t values, some items were excluded. Items are deleted for scale purification or when similar patterns are observed in other empirical studies (Netemeyer et al., 2004). Table 2 indicates that the standardised loadings (ranging from 0.704 to 0.971) and all t values (14.303 to 27.011) were significant (e.g., CFI = 0.901, RMR = 0.045, TFI = 0.900, RMSEA = 0.060). The standardised loadings of all 37 items were greater than 0.70. The magnitude of the loadings and its significant t value provided evidence of the validity of convergence. The composite reliability scores were between 0.866 and 0.948 (all > 0.7). The average variance value extracted exceeded 0.5 (Anderson and Gerbing, 1988).

Table 2 Scale items, reliabilities, and confirmatory factor analysis results

Scale items	*Standardised loadings*	*t*	*Alpha*
Belong needs			0.882
I want others to need me	0.714	24.635	
I do not like being alone	0.741	24.067	
I need to have a strong sense of belonging	0.792	22.594	
When I do not join other people's plans, it makes me feel very troubled	0.784	22.894	
I feel hurt when others do not accept me	0.834	20.743	
Self-actualisation needs			0.948
I will be happy to share and update everything that happens in my life in SMA	0.915	21.833	
I will be happy to share my feelings and emotional state on SMA	0.971	17.679	
I am happy to share and update my activity process and bits and pieces in SMA	0.914	20.463	
Enjoyment needs			0.943
SMA bring me fun	0.899	23.719	
SMA makes me very happy	0.960	15.936	
SMA makes me cheerful	0.914	22.814	
Self-esteem needs			0.891
Overall, I am very satisfied with myself	0.809	23.091	
I think I have a lot of good qualities	0.872	23.647	
I do many things better than most people	0.835	14.343	
I think I am a person worthy of being a good friend	0.776	23.677	
Self-identity needs			0.866
If I am forced to give up using SMA, I will feel at a loss	0.858	19.113	
For me, being a SMA user means more than just using SMA0	0.781	23.055	
SMA have become part of my life	0.846	19.986	
Excessive social use of SMA			0.929
I spend a lot of time using SMA to create new interpersonal/group relationships	0.884	22.156	
I spend a lot of time using SMA to meet people I would never meet	0.916	19.476	
I spend a lot of time using SMA to maintain close social relationships	0.867	23.033	
I spend a lot of time using SMA to meet people who share my hobbies	0.844	23.941	

Table 2 Scale items, reliabilities, and confirmatory factor analysis results (continued)

Scale items	*Standardised loadings*	*t*	*Alpha*
Excessive hedonic use of SMA			0.933
I spend a lot of time using SMA to make me feel rested	0.898	20.723	
I spend a lot of time using SMA to give me a chance to breathe during work	0.918	18.632	
I spend a lot of time using SMA to get me entertained	0.909	19.620	
Excessive cognitive use of SMA			0.922
I spend a lot of time using SMA to share information with my friends	0.0850	23.296	
I spend a lot of time using SMA to post and create information with friends	0.897	20.579	
I spend a lot of time using SMA to create and post information for my work	0.857	23.031	
I spend a lot of time using SMA to learn about friends' posting information	0.859	22.932	
Cognitive preoccupation			0.952
I found that I cannot stop using SMA	0.763	26.449	
I find it difficult to distract my desire to use SMA	0.784	26.249	
I think SMA is interfering with my daily activities	0.704	27.011	
If I cannot use SMA, I will feel very disappointed	0.923	22.093	
When I canot use SMA, I would miss extremely SMA	0.913	22.812	
When I am frustrated, I would be eager to use SMA	0.903	23.413	
When I am lonely, I would be eager to use SMA	0.893	23.911	
If I cannot use SMA, I would feel nervous	0.873	24.619	

In addition, the study used a series of pairwise CFAs to evaluate discriminant validity. First, a two-dimensional model was fit to each pair of research structures, and the items representing each factor were converted into a single-factor solution. For a two-factor model, various fitting statistics produce better results. The results strongly indicated that each set of items represented a potential structure, providing evidence of discriminative validity (Anderson and Gerbing, 1988). Internal consistency analysis was performed by calculating the α coefficient for each construct. According to Table 2, all alpha values were greater than Nunnally's (1978) recommended benchmark of 0.70.

The composite score of each construct was calculated by averaging the scores of the items representing the construct. In Table 3, the range of correlation coefficients among all constructs was from 0.004 (gender and enjoyment) to 0.817 (excessive social and cognitive use of SMAs). None of the correlation coefficients were equal to or higher than 0.90 (Tabachnick and Fidell, 1996), providing further evidence for discriminant validity. The composite score means and standard deviations are also provided in Table 3.

Age and cognitive preoccupation were significantly negatively correlated ($r = –0.110$, $p < 0.01$). Hours of SMA use per day, number of SMA uses per day, number of SMA responses per day, belonging need, self-actualisation need, enjoyment need, self-esteem need, self-identity need, and excessive social, hedonic, and cognitive use of SMAs were significantly positively correlated with cognitive

preoccupation (r = 0.194, 0.318, 0.247, 0.676, 0.514, 0.559, 0.203, 0.662, 0.745, 0.722, and 0.750, respectively; $p < 0.01$).

Table 3 Correlation of all variables ($N = 1551$)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Age	1													
2	Gender	0.076*	1												
3	Total using hours	−0.254**	−0.261**	1											
4	Opening times	−0.145**	−0.116**	0.489**	1										
5	Responding times	−0.104*	−0.020	0.334**	0.673**	1									
6	Belong	−0.271**	−0.042	0.250**	0.316**	0.272**	1								
7	Self–actualisation	−0.100*	−0.011	0.278**	0.261**	0.213**	0.569**	1							
8	Enjoyment	−0.124**	−0.004	0.261**	0.214**	0.189**	0.577**	0.734**	1						
9	Self–esteem	0.117**	0.036	0.013	0.219**	0.211**	0.255**	0.464**	0.424**	1					
10	Self–identity	−0.205**	−0.117**	0.348**	0.377**	0.318**	0.689**	0.708**	0.673**	0.338**	1				
11	Social use	−0.193**	−0.019	0.263**	0.359**	0.281**	0.664**	0.554**	0.594**	0.243**	0.586**	1			
12	Hedonic use	−0.253**	−0.020	0.323**	0.312**	0.226**	0.620**	0.656**	0.713**	0.233**	0.646**	0.792**	1		
13	Cognitive use	−0.132**	−0.075	0.248**	0.325**	0.247**	0.661**	0.557**	0.596**	0.251**	0.566**	0.817**	0.791**	1	
14	Preoccupation	−0.110**	−0.058	0.194**	0.318**	0.247**	0.676**	0.514**	0.559**	0.203**	0.662**	0.745**	0.722**	0.750**	1

Note: *$p < 0.05$; **$p < 0.01$.

AMOS 25 for path analysis was used to test the hypothesised relationships. Table 4 presents the model fit statistics. Collectively, they demonstrated that the research model favourably fit the data: $\chi 2$ = 22,968.621; degrees of freedom = 703; p = 0.000; CFI = 0.907; NFI = 0.911; GFI = 0.907; and AGFI = 0.904.

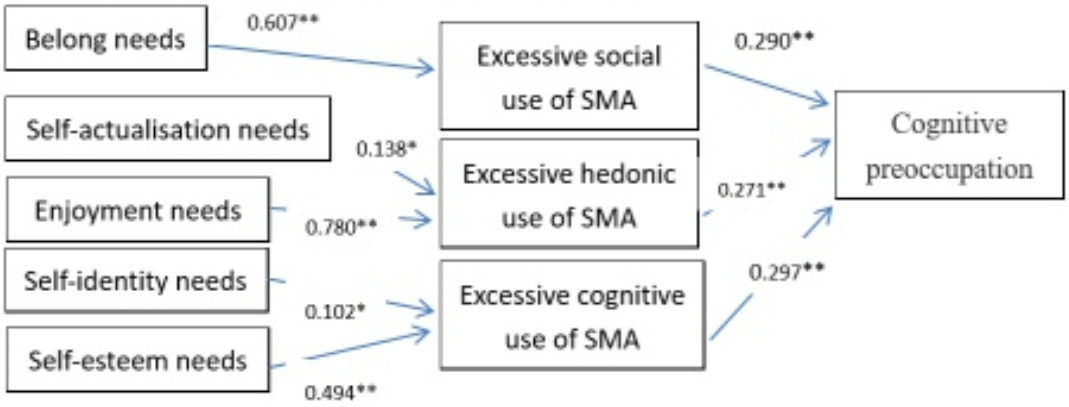
Table 4 Model test results

Control variables and hypothesised relationships	*Standardised parameter estimates*	*t-values*	*Accepted/ rejected*
Impact on cognitive Preoccupation			
Control variable			
Age	–0.058*	–2.327	N/A
Gender	–0.015	–0.597	N/A
Total using SMA hours per day	0.032	1.121	N/A
Opening SMA times per day	0.250**	7.129	N/A
Responding SMA times per day	0.062	1.898	N/A
Belong needs → excessive social use of SMA	0.607**	29.918	Accepted
Self-actualisation needs → excessive hedonic use of SMA	0.138**	2.855	Accepted
Enjoyment needs → excessive hedonic use of SMA	0.780**	16.329	Accepted
Self-identity needs → excessive cognitive use of SMA	0.102**	2.691	Accepted
Self-esteem needs → excessive cognitive use of SMA	0.494**	20.116	Accepted
Excessive social use of SMA → cognitive preoccupation	0.290**	9.812	Accepted
Excessive hedonic use of SMA → cognitive preoccupation	0.271**	9.481	Accepted
Excessive cognitive use of SMA → cognitive preoccupation	0.297**	10.058	Accepted
R^2 =			
Fit statistics			
X^2 = 22,968.621, df = 703, p = 0.000			
CFI = 0.907			
NFI = 0.911			
GFI = 0.907			
AGFI = 0.904			
Root mean square error of approximation (RMSEA) = 0.060			
Root mean square residual (RMR) = 0.045			

Notes: CFI, comparative fit index; NFI, normed fit index; GFI, goodness-of-fit index;
AGFI, adjusted GFI; RMR, root-mean-square residual.
*p < 0.05; **p < 0.01.

The path analysis results supported the eight hypotheses proposed in the study (Figure 1). H1 states that belonging needs positively affect the excessive social use of SMAs (β = 0.607, p < 0.05). H2 is that self-actualisation needs positively affect the excessive hedonic use of SMAs (β = 0.138, p < 0.05). H3 is that enjoyment needs positively affect the excessive hedonic use of SMAs (β = 0.780, p < 0.05). H4 states that self-identity needs positively affect the excessive cognitive use of SMAs (β = 0.102, p < 0.05). H5 posits that self-esteem needs positively affect the excessive cognitive use of SMAs (β = 0.494, p < 0.05). H6 states that excessive social use of SMAs positively affects cognitive preoccupation (β = 0.290, p < 0.05). H7 states that excessive hedonic use of SMAs positively affects cognitive preoccupation (β = 0.271, p < 0.05). Finally, H8 states that excessive cognitive use of SMAs positively affects cognitive preoccupation (β = 0.297, p < 0.05).

Figure 1 Hypothesised model (see online version for colours)



Note: *$p < 0.05$; **$p < 0.01$.

5 Discussion and conclusions

This study contributed to clarifying the framework for and relationships among need factors (belonging needs, actualisation needs, enjoyment needs, self-esteem needs, and self-identity needs), excessive use of SMAs (social use, hedonic use, cognitive use), and cognitive preoccupation. The findings indicate that belonging needs positively affect the excessive social use of SMAs (H1), self-actualisation needs positively affect the excessive hedonic use of SMAs (H2), enjoyment needs positively affect the excessive hedonic use of SMAs (H3), self-identity needs positively affect the excessive cognitive use of SMAs (H4), self-esteem needs positively affect the excessive cognitive use of SMAs (H5), excessive social use of SMAs positively affect cognitive preoccupation (H6), excessive hedonic use of SMAs positively affect cognitive preoccupation (H7), and excessive

cognitive use of SMAs positively affect cognitive preoccupation (H8). The findings also indicate that younger SMA users and those who use apps more frequently have higher cognitive preoccupation

This study argued that and empirical results confirmed that need factors (belonging, self-actualisation, enjoyment, self-esteem, self-identity) positively affect the excessive use of SMAs, and that excessive use of SMAs (social use, hedonic use, and cognitive use) positively affect cognitive preoccupation.

First, belonging needs positively affect the excessive social use of SMAs. Belonging and love are indispensable needs. An SMA is a readily available communication platform. For meeting intrinsic needs, an SMA is necessary to circulate information and maintain social relationships. The argument of this study is consistent with that of Roberts and David (2020), who suggested that belonging needs are an innate driving force that determines most behaviour (social media intensity and social connection). Second, self-actualisation needs positively affect the excessive hedonic use of SMAs. Self-actualisation needs are the highest needs and the robust factor of intrinsic motivation. Participating in knowledge and self-development activities through social media makes SMA users happy and enables their self-realisation. Eudaimonic activities and feelings also lead to hedonic enjoyment. This argument is consistent with that of Han (2012), who reported that the amount of information perceived on an SNS and the self-actualisation of users through sharing information with others on the site have a significant positive effect on the users' perceived usefulness of and perceived pleasure provided by the SNS.

Third, enjoyment needs positively affect the excessive hedonic use of SMAs. Among the five need factors, these needs had the strongest positive impact on the excessive use of SMAs. SMA users interact with other users and have fun with additional applications, social games, or psychological testing platforms provided by platforms. The feeling of being engaged and entertained can fulfil enjoyment needs. With SMA operators constantly creating new and interesting app types and with crowd interaction, enjoyment needs inevitably became the most prominent factor affecting the excessive use of SMAs, especially hedonic use. The argument of this study is consistent with those of Tamborini et al. (2011) and Gökhan and Ece (2021). Tamborini et al. (2011) concluded that media value should meet non-hedonic and hedonic needs (arousal and affect) to define media enjoyment. Gökhan and Ece (2021) suggested that the role of hedonic use included application aesthetics, perceived enjoyment, and the practical benefits of consumer behaviour in application market development satisfaction and application continuity willingness.

Fourth, self-identity needs positively affect the excessive cognitive use of SMAs. Self-identity represents the basic elements of engaging in a behaviour to achieve a personal self-concept. Individuals find self-understanding and express and establish self-identity through social interaction with others and through the process of continuous circulation and negotiation. SMA platforms (Line, FB, Instagram, and WeChat) supply processes for and opportunities to share, express, gossip, and verify, through which users maintain their self-image and identity. Self-identity needs can be met by the many

opportunities of social media. This argument is consistent with that of Karahanna et al. (2018).

The current study proposed a need-availability-feature view of social media use, which assumes that the psychological needs of individuals motivate them to use SMAs to meet these needs. Fifth, then, self-esteem needs positively affect the excessive cognitive use of SMAs. The generation of and increase in self-esteem result from compliments and positive feedback from those around one, which provide positive recognition. SMA users use social media for real-time satisfaction through real-time interaction, increasing morale and confidence and fostering positive emotions. Therefore, to satisfy self-esteem needs, users with high self-esteem use SMAs. This is consistent with Cao's (2006) suggestion that in social cognitive theory, consumer value and behaviour are changed through the interaction of media use and cognition (self-esteem).

Regarding social use, SMAs can conveniently connect users with friends, family, acquaintances, and colleagues. To maintain a social network for support and a sense of social belonging, individuals must check their SMA frequently and resonate as quickly as possible. Hedonic use of an SMA satisfies either fantasy, sensory, or emotive aspects of hedonic gratification (through the use of the technology for fun and entertainment). Cognitive use of SMAs involves encountering and evaluating media to select content and media that meet cognitive needs such as knowledge, information acquisition, and comprehension. Three types of excessive SMA use can induce maladaptive cognitions. Problematic internet use symptoms include cognitive preoccupation. This argument of this study is consistent with the findings of Carlson et al. (2016), who observed that social media use in the workplace may promote both productive behaviour (task-orientation and relationship building) and non-productive behaviour (deviance) at work.

Other findings of this study revealed that younger SMA users had higher levels of cognitive preoccupation, and the number of SMA uses day affected the cognitive preoccupation of SMA users. Younger SMA users have enough time to attend what they need, especially their belonging, self-actualisation, enjoyment, self-esteem, and self-identity needs. Satisfying many types of needs leads to excessive SMA use, which then induces preoccupation. This is consistent with the findings of Salmela-aro et al. (2017). They reported that students' use of social digital technologies (computer, internet, mobile, and social media) may lead to compulsive and addictive behaviour patterns. Concluding that the daily use of SMAs will affect cognitive preoccupation is reasonable; loading an SMA and paying attention to it will gradually become a habit and, unknowingly, an addiction. Wang et al. (2015) concluded that the development of psychological dependence on social media is explained by the theory of rational addiction, that is, dependence initially develops from habit.

6 Managerial implications

This study confirmed that need factors (belonging, self-actualisation, enjoyment, self-esteem, and self-identity) have a significant impact on the excessive use (social, hedonic, and cognitive) of SMAs.

Excessive use affects cognitive preoccupation; excessive use of SMAs induces cognitive preoccupation. Mobile phones are extremely convenient, and SMAs are increasingly mutating to attract people. SMA operators must pay attention to the needs of consumers when updating or innovating their platform. In particular, the study found that among the need factors that affect the excessive use of SMAs, enjoyment needs exert the greatest impact (on hedonic use), followed by social needs (on their social use). The effect of self-esteem needs (on the cognitive use of SMAs) is the third-largest; self-actualisation needs have the fourth-largest effect (on the hedonic use of SMAs), and the fifth-largest effect is that of self-identity needs (on the cognitive use of SMAs). The results suggest that when updating or innovating apps, SMA operators must focus on enjoyment needs first, followed by social needs. Hence a 'gamification' approach may be considered by SMA providers during the initial development of the apps. Next, SMA operators must note that excessive social, hedonic, and cognitive use; younger age; and frequent SMA use are significant factors affecting cognitive preoccupation. Achieving a balance between benefits and social responsibilities such that SMAs can be used in a healthy and reasonable manner without causing conflicts with family, work, friends, and at the physiological level is a topic that SMA operators must consider carefully.

7 Limitation and further research

This study had methodological limitations. First, the findings are limited by the cross-sectional design. Second, the study used a self-report scale to measure need factors, excessive use of SMAs, and cognitive preoccupation, which may introduce bias. Third, the sample included only Taiwanese SMA Users; SMA users in other countries were not sampled.

Age and frequency of SMA use significantly affect cognitive preoccupation. Whether these two factors have a moderating effect on the relationship between need factors and cognitive preoccupation is a question worthy of discussion.

Regarding methodology, two approaches to data collection and analysis exist: qualitative and quantitative. A quantitative method (questionnaire) was used to test the hypotheses of this study. Therefore, sampling is not complete. In-depth interviews should be conducted to obtain richer findings.

Acknowledgements

This manuscript was edited by Wallace Academic Editing.

References

Aladwani, A.M. (2014) 'Gravitating towards Facebook (GoToFB): what it is? And how can it be measured?', Computers in Human Behavior, Vol. 33, p.270e278, http://dx.doi.org/10.1016/

j.chb.2014.01.005.

Al-Ghamdi, M.A. and Carlin, D.B. (2005) Saudi Arabian Television (First Channel) Touristic Programs: Uses and Gratifications and Perceptions of the Programs' Effect by Saudi Tourists Who Spend Their Summer Vacations Domestically, University of KS, Ann Arbor [online] http://search.proquest.com/docview/304990762?accountid=10612 (accessed April 2020).

Alhashem, M., Moraes, C. and Szmigin, I.T. (2021) 'Use and social value in peer-to-peer prosumption communities', European Journal of Marketing, Vol. 55, No. 1, pp.193–218, https://doi.org/10.1108/EJM-03-2019-0235.

Ali-Hassan, H., Nevo, D. and Wade, M. (2015) 'Linking dimensions of social media use to job performance: the role of social capital', The Journal of Strategic Information Systems, Vol. 24, No. 2, pp.65–89, https://doi.org/10.1016/j.jsis.2015.03.001.

Anderson, J.C. and Gerbing, D.W. (1988) 'Structural equation modeling in practice: a review and recommended two-step approach', Psychology Bulletin, Vol. 103, pp.411–423, https://doi.org/10.1037/0033-2909.103.3.411.

Bae, M. (2018) 'Understanding the effect of the discrepancy between sought and obtained gratification on social networking site users' satisfaction and continuance intention', Computers in Human Behavior, Vol. 79, pp.137–153, DOI: 10.1016/J.CHB.2017.10.026.

Baumeister, R.F. and Leary, M.R. (1995) 'The need to belong: desire for interpersonal attachments as a fundamental human motivation', Psychological Bulletin, Vol.117, p.497e529, http://dx.doi.org/10.1037/0033-2909.117.3.497.

Billings, A.C., Qiao, F., Conlin, L. and Nie, T. (2017) 'Permanently desiring the temporary? Snapchat, social media, and the shifting motivations of sports fans', Communication and Sport, Vol. 5, No. 1, pp.10–26, DOI: 10.1177/2167479515588760.

Bumgarner, B.A. (2007) 'You have been poked: exploring the uses and gratifications of Facebook among emerging adults', First Monday, Vol. 12, p.11 [online] http://firstmonday.org/ojs/index.php/fm/article/viewArticle/2026/1897 (accessed May 2020).

Business Weekly (2021) The Community Effect You Non-Notice Stimulates you to Vote and Donate, Vol. 1745, April 22.

Callero, P.L. (1985) 'Role-identity salience', Social Psychology Quarterly, Vol.48, pp.203–215, https://doi.org/10.2307/3033681.

Cao, X. and Yu, L. (2019) 'Exploring the influence of excessive social media use at work: a three-dimension usage perspective', International Journal of Information Management, Vol. 46, pp.83–92, https://doi.org/10.1016/j.ijinfomgt.2018.11.019.

Cao, Q.D.X. (2006) 'The impact of American media exposure and self-esteem on Chinese urban adolescent purchasing involvement', Journal of Family and Economic Issues, Vol. 27, No. 4, pp.664–674, DOI: 10.1007/s10834-006-9038-3.

Cao, X., Guo, X., Vogel, D. and Zhang, X. (2016) 'Employing the influence of social media on

employee work performance', Internet Research, Vol. 26, No. 2, pp.529–545, https://doi.org/10.1108/IntR-11-2014-0299.

Cao, X., Masood, A.B., Luqman, A.B. and Ali, A. (2018) 'Excessive use of mobile social networking sites and poor academic performance: antecedents and consequences from stressor-strain outcome perspective', Computers in Human Behavior, Vol. 85, pp.163–174, https://doi.org/10.1016/j.chb.2018.03.023.

Caplan, S.E. (2010) 'Theory and measurement of generalized problematic internet use: a two-step approach', Computers in Human Behavior, Vol. 26, No. 5, pp.1089–1097, https://doi.org/10.1016/j.chb.2010.03.012.

Caplan, S.E. and High, A.C. (2006) 'Beyond excessive use: the interaction between cognitive and behavioral symptoms of problematic Internet use', Communication Research Reports, Vol. 23, No. 4, pp.265–271, https://doi.org/10.1080/08824090600962516.

Carlson, J.R., Zivnuska, S., Harris, R.B., Harris, K.J. and Carlson, D.S. (2016) 'Social media use in the workplace: a study of dual effects', Journal of Organizational and End User Computing, Vol. 28, No. 1, p.15. DOI: 10.4018/JOEUC.2016010102.

Chatbot Trends (2020) In the Era of Big Information, Which One Should you Choose for Line, Messenger, or Telegram? April 30 [online] https://goskyai.com/tw/Blog/chatbot trends/linemessengertelegramchatbot/ (accessed May 2020).

Chou, A.Y. and Lim, B.B.L. (2010) 'A framework for measuring happiness in online social networks', Issues in Information Systems, Vol. 11, No. 1, pp.198–203, https://doi.org/ 10.48009/1_iis_2010_198-203.

Collins, R.L. and Lapp, W.M. (1992) 'The temptation and restraint inventory for measuring drinking restraint', Addiction, Vol. 87, No. 4, pp.625–633, https://doi.org/10.1111/j.1360-0443.1992.tb01964.x.

Das, S.R., Mahmud, I., Ahmed, S., J-Ho, S.C. and Andalib, T.W. (2020) 'Fun or frustration: modelling discontinuance intention of social media users', International Journal of Electronic Commerce Studies, Vol. 11, No. 2, pp. 107-117. DOI: 10.7903/ijecs.1823.

Davis, R.A. (2001) 'A cognitive-behavioral model of pathological internet use', Computers in Human Behavior, Vol. 17, No, 2, pp.187–195, https://doi.org/10.1016/S0747-5632(00)00041-8.

Deci, E.L. (1976) 'The hidden costs of reward', Organizational Dynamics, Vol. 4. No. 3, p.6, https://doi.org/10.1016/0090-2616(76)90036-X.

Epstein, R.H., Clinton, M.S., Gabrovska, K. and Petrenko, O. (2013) 'Changes in motivation during an MBA program: gender makes a difference from first-year to graduation', Academy of Educational Leadership Journal, Vol. 17, No. 2, pp.103–120 [online] https://login.autorpa.lib.nccu.edu.tw/login?url=https://www.proquest.com/scholarly journals/changes-motivation-during-mba-program-gender/docview/1368620523/se 2?accountid=10067 (accessed May 2020).

Floridi, L. (2011) 'The informational nature of personal identity', Minds and Machines, Vol. 21, No. 4,

pp.549–566, DOI: 10.1007/s11023-011-9259-6.

Ghatak, S. and Singh, S. (2019) 'Examining Maslow's hierarchy need theory in the social media adoption', FIIB Business Review, Vol. 8, No. 4, pp.292–302, https://doi.org/10.1177/2319714519882830.

Goffman, E. (1967) Interaction Ritual: Essays on Face-to-Face Interaction, Aldine, Oxford, UK.

Gökhan, A. and Ece, A (2021) 'Hedonic and utilitarian benefits as determinants of the application continuance intention in location-based applications: the mediating role of satisfaction', Multimedia Tools and Applications, Vol. 80, No. 5, pp.7103–7124, DOI: 10.1007/s11042-020-10094-2.

Haagsma, M.C., Caplan, S.E., Peters, O. and Pieterse, M.E. (2013) 'A cognitive-behavioral model of problematic online gaming in adolescents aged 12-22 years', Computers in Human Behavior, Vol. 29, No. 1, pp.202–209, DOI: 10.1016/j.chb.2012.08.006.

Han, B. (2012) An Investigation of Factors Influencing the User's Social Network Site Continuance Intention, University of North Texas, ProQuest Dissertations Publishing, p.3573835 [online] https://digital.library.unt.edu/ark:/67531/metadc177209/ (accessed June–July 2020).

Ho, H. and Ito, K. (2019) 'Consumption-oriented engagement in social network sites: undesirable influence on personal well-being', European Journal of Marketing, Vol. 53, No. 7, pp.1355–1377, DOI: 10.1108/EJM-11-2017-0809. Ho, S.S., Lwin, M.W. and Lee, E.W.J. (2017) 'Till logout do us part? Comparison of factors predicting excessive social network sites use and addiction between Singaporean adolescents and adults', Computers in Human Behavior, Vol. 75, pp.632–642, https://doi.org/ 10.1016/j.chb.2017.06.002.

Ho, Z.Z. (2021) 'When we use the product for free, it becomes a product', Union News, March 26, p.A12, Public Opinion Forum.

Hou, A.C.Y. and Shiau, W.L. (2020) 'Understanding Facebook to Instagram migration: a push-pull migration model perspective', Information Technology and People, Vol. 33, No. 1, pp.272–295, https://doi.org/10.26710/jbsee.v6i2.947.

Hsiao, C.H., Chang, J.J. and Tang, K.Y. (2016) 'Exploring the influential factors in continuance usage of mobile social apps: satisfaction, habit, and customer value perspectives', Telematics and Information, Vol. 33, No. 2, pp.342–355, https://doi.org/10.1016/j.tele.2015.08.014.

Hu, A.W.L. and Tsai, W.M.H. (2009) 'An empirical study of an enjoyment-based response hierarchy model of watching MDTV on the move', Journal of Consumer Marketing, Vol. 26, No. 2, pp.66–77, DOI: 10.1108/07363760910940438.

Huta, V. and Ryan, R.M. (2010) 'Pursuing pleasure or virtue: the differential and overlapping well-being benefits of hedonic and eudaimonia motives', Journal of Happiness Studies, Vol. 11, No. 6, pp.735–762, https://doi.org/10.1007/s10902-009-9171-4.

Jenkins, R. (2008) Social Identity, 3rd ed., Routledge, London.

Kapidzic, S. (2013) 'Narcissism as a predictor of motivations behand Facebook profile picture selection', Cyberpsychology, Behavior and Social Networking, Vol. 16, pp.14–19, http://dx.doi.

org/10.1089/cyber.2012.0143.

Karahanna, E., Xu, S., Xu, Y. and Zhang, N. (2018) 'The needs-affordances-features perspective for the use of social media', MIS Quarterly, Vol. 42, No. 3, p.737, https://doi.org/10.25300/MISQ/2018/11492.

Kardefelt-Winther, D. (2014) 'Problematizing excessive online gaming and its psychological predictors', Computers in Human Behavior, Vol. 31, pp.118–122, https://doi.org/10.1016/j.chb.2013.10.017.

Khaldi, A. (2014) 'The effect of virtual self congruency on consumer's involvement in social media and the motivation to consume social media', Journal of Business Studies Quarterly, Vol. 6, No. 1, pp.184–190 [online] https://www.proquest.com/docview/1566312939/abstract/A09516524A304947PQ/1?accountid=10067 (accessed February 2021).

Kwon, H.E., So, H., Han, S.P. and Oh, W. (2016) 'Excessive dependence on mobile social apps: a rational addiction perspective', Information System Research, Vol. 27, No. 4, pp.919–939, DOI: 10.1287/isre.2016.0658.

Leary, M.R., Kelly, K.M., Cottrell, C.A. and Schreindorfer, L.S. (2013) 'Construct validity of the need to belong scale: mapping the nomological network', Journal of Personality Assessment, Vol. 95, pp.610–624, http://dx.doi.og/10.1080/00223891.2013.819511.

Ledbetter, A.M., Mazer, J.P., DeGroot, J.M., Meyer, K.R., Mao, Y. and Swafford, B (2011) 'Attitudes toward online social connection and self-disclosure as predictors of Facebook communication and relational closeness', Communication Research, Vol. 38, p.27e53, http://dx.doi.org/10.1177/0093650210365537.

Leung, L. (2009) 'User-generated content on the internet: an examination of gratifications, civic engagement and psychological empowerment', New Media and Society, Vol. 11, No. 8, pp.1327–1347, DOI: 10.1177/1461444809341264.

Ma, M. and Agarwal, R. (2007) 'Through a glass darkly: Information technology design, identity verification, and knowledge contribution in online communities', Information Systems Research, Vol. 18, No. 1, pp.42–67. DOI: 10.1287/isre.1070.0113.

Maier, C., Laumer, S., Eckhardt, A. and Weitzel, T. (2015) 'Giving too much social support: social overload on social networking sites', European Journal of Information Systems, Vol. 24, No. 5, pp.447–464, https://doi.org/10.1057/ejis.2014.3.

Marwick, A.E. and Boyd, D (2011) 'I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience', New Media and Society, Vol. 13, No. 1, pp.114–133, https://doi.org/10.1177/1461444810365313.

Mead, G.H. (1967) Mind, Self, and Society: From the Standpoint of a Social Behaviorist, University of Chicago Press, Chicago.

Min, J. and Kim, B. (2015) 'How are people enticed to disclose personal information despite privacy concerns in social network sites? The calculus between benefit and cost', Journal of the Association for

Information Science and Technology, Vol. 66, No. 4, pp.839–857, https://doi.org/10.1002/asi.23206.

Muqaddas, J., Sanobia, A.S. and Nawaz, A. (2017) 'Social media on self-esteem', European Scientific Journal, Vol. 13, No. 23, pp.329–341, DOI: 10.19044/esj.2017.v13n23p329.

Ndasauka, Y., Juan, H., Wang, Y., Yang, L., Yang, Z., Ye, Z., Hao, Y., Fallgatter, A.J., Kong, Y. and Zhang, X. (2016) 'Excessive use of Twitter among college students in the UK: validation of the micro blog excessive use scale and relationship to social interaction and loneliness', Computers in Human Behavior, Vol. 55, pp.963–971, http://dx.doi.org/10.1016/j.chb.2015.10.020.

Netemeyer, R.G., Brashear-Alejandro, T. and Boles, J.S (2004) 'A cross-national model of job-related outcomes of work role and family role variables: a retail sales context', Journal of Academic Marketing Science, Vol. 32, pp.49–60, https://doi.org/10.1177/0092070303259128.

Niehoff, B.P. and Moorman, R.H. (1993) 'Justice as a mediator of the relationship between methods of monitoring and organizational citizenship behavior', Academy of Management Journal, Vol. 36, pp.527–556, https://doi.org/10.2307/256591.

Nishimura, S. and King, B.E.M. (2007) 'The use of guidebooks by Japanese overseas tourists: a quantitative approach', Journal of Travel Research, Vol. 45, pp.275–284, https://doi.org/10.1177/0047287506295907.

Nunnally, J.C. (1978) Psychometric Theory, 2nd ed., McGraw-Hill, New York, NY, USA. Nyagh, S., Nyagah, V., Asaatsa, S. and Mwania, M. (2015) 'Social networking sites and their influence on the self-esteem of adolescents in Embucounty, Kenya', Journal of Educational Policy and Entrepreneurial Research, Vol. 2, No. 1, pp.87–92 [online] https://www.iiste.org/ Journals/index.php/JEPER (accessed January–February 2021).

Oh, S. and Syn, S.Y. (2015) 'Motivations for sharing information and social support in social media: a comparative analysis of Facebook, Twitter, Delicious, You Tube, and Flickr', Journal of the Association for Information Science and Technology, Vol. 66, No. 10, pp.2045–2060, DOI: 10.1002/asi.23320.

Patchin, J.W. and Hinduja, S. (2010) 'Cyberbullying and self-esteem', The Journal of School Health, Vol. 80, pp.614–621, http://dx.doi.org/10.1111/j.1746-1561.2010.00548.x.

Podsakoff, P.M. and Organ, D.W. (1986) Self-reports in organizational research: problems and prospects', Journal of Management, Vol. 12, pp.531–544, https://doi.org/10.1177/014920638601200408.

Quan-Haase, A. and Young, A.L. (2010) 'Uses and gratifications of social media: a comparison of Facebook and instant messaging', Bulletin of Science, Technology and Society, Vol. 30, No. 5, pp.350–361, https://doi.org/10.1177/0270467610380009.

Roberts, J.A. and David, M.E. (2020) 'The social media party: fear of missing out (FOMO), social media intensity, connection, and well-being', International Journal of Human – Computer Interaction, Vol. 36, No. 4, pp.386–392, DOI:10.1080/10447318.2019.1646517.

Ryan, R.M. and Deci, E.L. (2000) 'Intrinsic and extrinsic motivations: class definitions and new

directions', Contemporary Educational Psychology, Vol. 25, No. 1, pp.54–67, https://doi.org/10.1006/ceps.1999.1020.

Saade, R. and Bahli, B. (2005) 'The impact of cognitive absorption on perceived usefulness and perceived ease of use in on-line learning: an extension of the technology acceptance model', Information and Management, Vol. 42, No. 2, pp.317–327, DOI: 10.1016/j.im.2003.12.013.

Salmela-aro, K., Upadyaya, K., Hakkarainen, K., Lonka, K. and Alho, K. (2017) 'The dark side of internet use: two longitudinal studies of excessive internet use, depressive symptoms, school burnout and engagement among Finnish early and late adolescents', Journal of Youth and Adolescence, Vol. 46, No. 2, pp.343–357, DOI: 10.1007/s10964-016-0494-2.

Schlenker, B.R. (1980) Impression Management: The Self-Concept, Social Identity, and Interpersonal Relations, Brooks/Cole Publishing Company, Monterey, CA.

Shapira, C.N.A., Goldsmith, T.D., Keck, P.E., Khosla, U.M. and McElroy, S.L (2000) 'Pshchiatric features of individuals with problematic internet sue', Journal of Affective Disorders, Vol. 57, pp.267–272. DOI: 10.1016/s0165-0327(99)00107-x.

Shee, B.A.V. and Peltier, J. (2020) 'Antecedent consumer factors, consequential branding outcomes and measures of online consumer engagement: current research and future directions', Journal of Research in Interactive Marketing, Vol. 14, No. 2, pp.239–268, https://doi.org/10.1108/JRIM-01-2020-0010.

Shivinder, N. and Raj, S. (2020) 'Social media use in academia: towards topology development and investigation of dominant use motive', Journal of Information, Communication and Ethics in Society, Vol. 18, No. 2, pp.255–280, DOI: 10.1108/JICES-08-2019-0093.

Stefanone, M.A., Yue, Z. and Toh, Z. (2019) 'A social cognitive approach to traditional media content and social media use: selfie-related behavior as competitive strategy', New Media and Society, Vol. 21, No. 2, pp.317–335, DOI: 10.1177/1461444818795488.

Stryker, S. (1987) Identity theory: developments and extensions', in Yardley, K. and Honess, T. (Eds.): Self and Identity: Psychosocial Perspectives (89e103), Wiley, New York, USA.

Tabachnick, B.G. and Fidell, L.S. (1996) Using Multivariate Statistics, 3rd ed., Haper Collins College Publishers, New York, NY, USA.

Tamborini, R., Grizzard, M., Bowman, N.D., Reinecke, L. and Lewis, R.J. (2011) 'Media enjoyment as need satisfaction: the contribution of hedonic and nonhedonic needs', Journal of Communication, Vol. 61, No. 6, p.1025, DOI: 10.1111/j.1460-2466.2011.01593.x.

Tandon, A., Dhir, A., Almugren, I., AlNemer, G.N. and Mantymaki, M. (2021) 'Fear of missing out (FoMO) among social media users: a systematic literature review, synthesis and framework for future research', Internet Research, Vol. 31, No. 3, pp.782–821, https://doi.org/10.1108/INTR-11-2019-0455.

Tokunaga, R.S. (2012) 'A unique problem or the manifestation of a preexisting disorder? The mediating role of problematic internet use in the relationships between psychosocial problems and

functional impairment', Communication Research, Vol. 41, No. 4, pp.53–560, https://doi.org/10.1177/0093650212450910.

Turel, O. and Qahri-Saremi, H. (2016) 'Problematic use of social networking sites: antecedents and consequence from a dual-system theory perspective', Journal of Management Information System, Vol. 33, No. 4, pp.1087–1116, https://doi.org/10.1080/07421222.2016.1267529.

Van der Heijden, H. (2004) 'User acceptance of hedonic information systems', MIS Quarterly, Vol. 28, No. 4, pp.695–704, https://doi.org/10.2307/25148660.

Vos, S.D., Ilicic J., Quester P.G. and Crouch, R.C (2020) 'Set yourself free! Exploring help-seeking motives in at-risk gamblers', European Journal of Marketing, Vol. 55, No. 4, pp.1203–1226, https://doi.org/10.1108/EJM-04-2019-0347.

Wang, C., Lee, M.K.O. and Hua, Z. (2015) 'A theory of social media dependence: evidence from microblog users', Decision Support Systems, Vol. 69, pp.40–49, http://dx.doi.org/10.1016/j.dss.2014.11.002.

Watchravesringkan, K., Hodges, N.N. and Kim, Y.H. (2010) 'Exploring consumers' adoption of highly technological fashion products: the role of extrinsic and intrinsic motivational factors', Journal of Fashion Marketing and Management, Vol. 14, No. 2, pp.263–281, DOI: 10.1108/13612021011046101.

Waterman, A.S. (2004) 'Finding someone to be: studies on the role of intrinsic motivation in identity formation', Identity, Vol. 4, No. 3, pp.209–228, DOI: 10.1207/s1532706xid0403_1.

Waterman, A.S., Schwartz, S.J. and Conti, R (2008) 'The implications of two conceptions of happiness (hedonic enjoyment and eudaimonia for the understanding of intrinsic motivation', Journal of Happiness Studies, Vol. 9, No. 1, pp.41–79, DOI: 10.1007/s10902-006-9020-7.

Werff, E.V., Steg, L. and Keizer, K. (2013) 'It is a moral issue: the relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behavior', Global Environmental Change, Vol. 23, No. 5, pp.1258–1265, DOI: 10.1016/j.gloenvcha.2013.07.018.

Wu, H. and Li, G. (2020) 'Innovation and improvement of visual communication design of mobile app based on social network interaction interface design', Multimedia Tools and Applications, Vol. 79, pp.1–16, DOI: 10.1007/s11042-019-7523-6.

Wu, P.F. (2019) 'The privacy paradox in the context of online social networking: a self-identity perspective', Journal of the Association for Information Science and Technology, Vol. 70, No. 3, pp.207–217, https://doi.org/10.1002/asi.24113.

Yang, H.L and Lin, R.X. (2017) 'Determinants of the intention to continue use of SoLoMo services: consumption values and the moderating effects of overloads', Computers in Human Behavior, Vol. 73, pp.583–595, https://doi.org/10.1016/j.chb.2017.04.018.

Yi, G.Y. (2020) 'LINE adjusts its Asian market strategy, Taiwan and Thailand become leading service and roles', Taiwan Business Daily News, November 28, Global Economic [online] https://udn.com/news/story/6811/5049767 (accessed January–February 2021).

Zhang, Y., Tang, L.S.T. and Leung, L. (2011) 'Gratifications, collective self-esteem, online emotional openness, and trait like communication apprehension as predictors of Facebook uses', Cyberpsychology, Behavior, and Social Networking, Vol. 14, pp.733–739, http://dx.doi.org/10.1089/cyber.2010.0042.

Zheng, X. and Lee, M.K.O. (2016) 'Excessive use of mobile social networking sites: negative consequences on individuals', Computers in Human Behavior, Vol. 65, pp.65–76, https://doi.org/10.1016/j.chb.2016.08.011.

Instructions for Authors

Essentials for Publishing in this Journal

1 Submitted articles should not have been previously published or be currently under consideration for publication elsewhere.

2 Conference papers may only be submitted if the paper has been completely re-written (taken to mean more than 50%) and the author has cleared any necessary permission with the copyright owner if it has been previously copyrighted.

3 All our articles are refereed through a double-blind process.

4 All authors must declare they have read and agreed to the content of the submitted article and must sign a declaration correspond to the originality of the article.

Submission Process

All articles for this journal must be submitted using our online submissions system. http://enrichedpub.com/ . Please use the Submit Your Article link in the Author Service area.

-

Manuscript Guidelines

The instructions to authors about the article preparation for publication in the Manuscripts are submitted online, through the e-Ur (Electronic editing) system, developed by **Enriched Publications Pvt. Ltd**. The article should contain the abstract with keywords, introduction, body, conclusion, references and the summary in English language (without heading and subheading enumeration). The article length should not exceed 16 pages of A4 paper format.

Title

The title should be informative. It is in both Journal's and author's best interest to use terms suitable. For indexing and word search. If there are no such terms in the title, the author is strongly advised to add a subtitle. The title should be given in English as well. The titles precede the abstract and the summary in an appropriate language.

Letterhead Title

The letterhead title is given at a top of each page for easier identification of article copies in an Electronic form in particular. It contains the author's surname and first name initial .article title, journal title and collation (year, volume, and issue, first and last page). The journal and article titles can be given in a shortened form.

Author's Name

Full name(s) of author(s) should be used. It is advisable to give the middle initial. Names are given in their original form.

Contact Details

The postal address or the e-mail address of the author (usually of the first one if there are more Authors) is given in the footnote at the bottom of the first page.

Type of Articles

Classification of articles is a duty of the editorial staff and is of special importance. Referees and the members of the editorial staff, or section editors, can propose a category, but the editor-in-chief has the sole responsibility for their classification. Journal articles are classified as follows:

Scientific articles:

1. Original scientific paper (giving the previously unpublished results of the author's own research based on management methods).

2. Survey paper (giving an original, detailed and critical view of a research problem or an area to which the author has made a contribution visible through his self-citation);

3. Short or preliminary communication (original management paper of full format but of a smaller extent or of a preliminary character);

4. Scientific critique or forum (discussion on a particular scientific topic, based exclusively on management argumentation) and commentaries. Exceptionally, in particular areas, a scientific paper in the Journal can be in a form of a monograph or a critical edition of scientific data (historical, archival, lexicographic, bibliographic, data survey, etc.) which were unknown or hardly accessible for scientific research.

Professional articles:

1. Professional paper (contribution offering experience useful for improvement of professional practice but not necessarily based on scientific methods);
2. Informative contribution (editorial, commentary, etc.);
3. Review (of a book, software, case study, scientific event, etc.)

Language

The article should be in English. The grammar and style of the article should be of good quality. The systematized text should be without abbreviations (except standard ones). All measurements must be in SI units. The sequence of formulae is denoted in Arabic numerals in parentheses on the right-hand side.

Abstract and Summary

An abstract is a concise informative presentation of the article content for fast and accurate Evaluation of its relevance. It is both in the Editorial Office's and the author's best interest for an abstract to contain terms often used for indexing and article search. The abstract describes the purpose of the study and the methods, outlines the findings and state the conclusions. A 100- to 250-Word abstract should be placed between the title and the keywords with the body text to follow. Besides an abstract are advised to have a summary in English, at the end of the article, after the Reference list. The summary should be structured and long up to 1/10 of the article length (it is more extensive than the abstract).

Keywords

Keywords are terms or phrases showing adequately the article content for indexing and search purposes. They should be allocated heaving in mind widely accepted international sources (index, dictionary or thesaurus), such as the Web of Science keyword list for science in general. The higher their usage frequency is the better. Up to 10 keywords immediately follow the abstract and the summary, in respective languages.

Acknowledgements

The name and the number of the project or programmed within which the article was realized is given in a separate note at the bottom of the first page together with the name of the institution which financially supported the project or programmed.

Tables and Illustrations

All the captions should be in the original language as well as in English, together with the texts in illustrations if possible. Tables are typed in the same style as the text and are denoted by numerals at the top. Photographs and drawings, placed appropriately in the text, should be clear, precise and suitable for reproduction. Drawings should be created in Word or Corel.

Citation in the Text

Citation in the text must be uniform. When citing references in the text, use the reference number set in square brackets from the Reference list at the end of the article.

Footnotes

Footnotes are given at the bottom of the page with the text they refer to. They can contain less relevant details, additional explanations or used sources (e.g. scientific material, manuals). They cannot replace the cited literature.
The article should be accompanied with a cover letter with the information about the author(s): surname, middle initial, first name, and citizen personal number, rank, title, e-mail address, and affiliation address, home address including municipality, phone number in the office and at home (or a mobile phone number). The cover letter should state the type of the article and tell which illustrations are original and which are not.