Role of social anxiety on high engagement and addictive behavior in the context of social networking sites

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Abstract

Purpose – The purpose of this paper is to tackle the problem of technology addiction by investigating the differences between the antecedences of addictive (problematic technology usage) and high-engagement behavior (non-problematic technology usage). The case of social networking site usage (SNS, e.g. Facebook, Instagram or Twitter) is taken as the case out of the reason of prevalent user population.

Design/methodology/approach – It is revealed that people tend to use SNS not only for building a relationship, but also for communicating. In other words, there are inner needs of adopting the SNS technology. However, no clear definitions can be followed for determining the problematic SNS usage, addictive behavior and the high-engagement behavior. Therefore, this study adopts the notion of uses and gratification theory (U&G theory) for investigating the SNS usage behavior. Also, the social anxiety is also first introduced to integrate into the research for an empirical study.

Findings – Results reveal that gratification sought and relationship maintenance are associated with the addictive behavior, whereas the relationship maintenance is significantly related to high-engagement behavior.

Research limitations/implications – First, the selected data represents a sample of SNW users in the Asian Pacific region and mainly from the group of young college users. Therefore, caution must be taken when generalizing the findings to other SNW users or groups. Second, the time aspect related to social media dependence may need to be considered in future studies. Third, the authors found marginal support for the

influence of intentions of high engagement¸ and future studies may consider applying other theories that could better explain these types of behavior.

Practical implications – The results of this study provide strong evidence that inner anxiety perceived by users should not be neglected while tackling the problematic internet use due to SNW addiction because it can strengthen the force for depending on SNW for seeking social support. Apart from the value of perceived enjoyment as asserted in previous studies, this study opens up a new opportunity to tackle SNW dependence.

Social implications – The key implication of this research is that the impact of the mental health of users on SNW problematic should not be overlooked . The higher the level of anxiety perceived, the more likely is the SNW dependence. Therefore, the online behavior depending on psychological health should be addressed because it may be a critical point for assisting users to adopt SNW wisely.

Originality/value – This study confirms that social anxiety people experience in real (offline) life has impacts on online behavior of SNS usage (online). It suggests that the difference between users as the perceived level of social anxiety can trigger different levels of SNS usage. Second, U&G theory is proven valid in understanding SNS addiction. Third, relationship maintenance through the use of SNS reveals its dissimilar effects on SNS addiction and high engagement.

Keywords Social networking site, Social anxiety, Internet addiction, Uses and gratification theory, High engagement, Relationship maintenance

Paper type Research paper

1. Introduction
As the use of social networking sites (SNS) (e.g. Facebook, Instagram or Twitter) is prevalent among the big percentage of populations around the globe, studies about SNS use has been referred to as one of the top research topics (Andreassen *et al.*, 2017; Błachnio *et al.*, 2016; Öncü, 2015; Kwon *et al.*, 2014; Zhu and Bao, 2018). At the same time, studies also point out that the pervasive access to social media exerts negative effects on both individuals and the society as the whole (Wang *et al.*, 2011). In this study, we aim at probing the problem of the problematic internet use (PIU) due to SNS addiction as denoted by Turel and Serenko (2012). SNS addiction is a type of technology addiction, which is a pathological problematic state (Turel and Serenko, 2012, p. 514) and is an addictive consumption trait of SNS (Kang *et al.*, 2013). Technology addiction (Turel and Serenko, 2012; Turel, 2015) has been studied in cases of internet addiction (Armstrong *et al.*, 2000; Charlton *et al.*, 2013, Chak and Leung, 2004; Chou and Hsiao, 2000; Douglas *et al.*, 2008; Griffiths *et al.*, 2016; Yellowlees and Marks, 2007), online game addiction (Charlton and Danforth, 2007; Skoric *et al.*, 2009; Xu *et al.*, 2012; Wittek *et al.*, 2016). Drawing from these, we define SNS addiction as the user's maladaptive psychological state of dependency on the SNS use, which is manifested through an obsessive pattern of SNS use behavior that take place at the expense of other important activities and infringe normal matters users ought to deal with. As SNS is used for information communication, it consumes time to maintain personal wall for posting information, interacting with others such as replying messages, replying comments and so on. If the time spent on SNS results in shifting other works that should be done, this continuous pattern of SNS is referred to as the pathological SNS use (Turel and Serenko, 2012).

In general cases, computer use is encouraged, and it provides benefits when not occurring in tandem with other types of addiction-driven behavior. Not all levels of use, habitual or not, lead to pathological problems. High-engagement behavior refers to the behavior of users who spend considerable time on their overall IS use but no core addiction symptoms, e.g., conflict or withdrawal, emerge. This non-pathological behavior is defined as situations in which SNW use does not lead to negative consequences for the individual (Orford, 1985). This notion has been successfully applied in cases of online games (Charlton and Danforth, 2007), and it is also applicable in the case of SNW use. Previous studies mainly apply the notion of high engagement in the cases of online game playing (Deleuze *et al.*, 2018), game-based learning (Hamari *et al.*, 2016), the consensus of SNS high engagement no yet reach. In this study, we define high engagement with SNWs as

continued use by users, adopting SNW use for maintaining relationships/bonding with others, that does not result in symptoms of conflict or the inability to withdraw.

Although studies investigate the potential factors in influencing addictive behavior, researchers also look at the possible solutions. Anxiety, self-esteem and shyness are revealed relevant to internet addictive behavior out of concern of personal trait. And pursuing real-life day-to-day activities or need for relationship could be one control strategy in facing the problem of internet addiction (Douglas *et al.*, 2008). For SNS addiction, habit is revealed to be relevant to SNS addiction (Turel and Serenko, 2012; Turel, 2015; Wang *et al.*, 2015), whereas perceived enjoyment is revealed to be related to the high-engagement behavior (Turel and Serenko, 2012). The IS habit is known to represent automatic mechanism that drive individual's online behavior (Kang *et al.*, 2013) and the hedonic value mainly is referred to as one kind of the emotion of information technology (IT) use (Beaudry and Pinsonneault, 2010). However, the effects of SNW gratification and relationship building, based on uses and gratification (U&G) theory, are overlooked in the current state of research. U&G theory posits that people use media to satisfy their needs and desires, and it has also been applied to study the selection and use of media, as well as the sender's information, i.e., user-generated content and interactivity with others (Child *et al.*, 2012, p. 1860). Although relationship maintenance is revealed to be salient in SNW use (Hollenbaugh and Ferris, 2014; Krasnova *et al.*, 2010; Zhou, 2016), we experimentally test these notions in relationship to SNW addiction and high engagement. We believe that this study can bridge the gap between SNW use behavior and SNW problematic behavior and possibly find a solution.

In this paper, we claim that both online and offline users' behavior should be taken into account when investigating SNW use behavior, in the sense of not only fulfilling the needs for relationship bonding, but also the social cognition of comparison. The motivation for relationship bonding or relationship bridging is revealed as the antecedents for enhancing continuous SNW use (Lee, 2013). When taking SNW into account as a communication mechanism for people who want to bond or bridge relationships, SNW gratification based upon U&G theory is appropriate to apply. Characterizing users' offline behavior, on the one hand, users adopt SNW for communication with people to facilitate relationship maintenance; users are also influenced by anxiety, as social cognitive theory (Bandura, 1977, 1986) notes that people tend to compare themselves with others in the same network. This aspect is neglected in the literature, but, in fact, SNW provokes a challenge that users experience in comparison with their perceptions of the relative happiness or sadness of others in a social-capital perspective (Lee, 2013). In other words, social anxiety in the sense of uncertainty about other SNW users' perceptions of levels of engagement with SNW, behavior such as clicking the bottom of a post to "LIKE," updating a personal wall, replying to messages and proactively posting greetings on other users' SNW walls on special occasions such as someone's birthday may manifest as a heightened desire to learn more about what similar "others" experience. The role played by social anxiety has previously been demonstrated in the relationship between online communication and online self-disclosure among adolescents (Wang *et al.*, 2011; Müller *et al.*, 2016). Therefore, this study combines the perspectives of U&G and social cognition in one study and empirically examines their validity among SNW users.

In the followings, theoretical background and research model are addressed. Research methodology is expressed in Section 3. Results and discussions are depicted in Section 4. Implications for research and practices are given in the end of this paper.

2. Theoretical background and research model
In order to test the roles of social anxiety and relationship maintenance on SNS addiction (pathological) and high-engagement (non-pathological) behavior (Kuss and Lopez-Fernandez, 2016), user self-motivations triggered by the media use in terms of U&G theory is involved in the research model. Also, we claim that relationship maintenance as

bonding and bridging is important to consider at while focusing on the SNS use (Lee, 2013). Users adopt SNS for communication with people in order to facilitate relationship maintenance; at the same time, SNS users also can be influenced by anxiety as the social cognitive theory (Bandura, 1977, 1986), which points out that people tend to compare themselves with others in the same network. We claim that this regard is neglected in the literature, but in fact SNS provokes a challenge that users experience comparison with respect to happiness or sadness of others in the social-capital perspective (Lee, 2013). In other words, social anxiety refers to the uncertainty of other SNS users' perceptions about the engagement of SNS, and it may manifest a heightened desire to learn more about what similar others experience. The role played by social anxiety has been proven valid in the relationship of online communication and online self-disclosure among adolescents (Wang *et al.*, 2011). Drawing from this, this study claims that it should be logical to combine the perspective of U&G and social cognition in one study and empirically examines its validity among SNS users. The research model is presented in Figure 1.

2.1 Social anxiety and self-disclosure intentions
2.1.1 Social anxiety. Anxiety refers to a general tendency to experience a heightened stress response when confronted with typical problems or challenges of human social life (Festinger, 1954; Spielberger, 1966). For IT use, anxiety has been referred to as one of the sources of individual influences that have impacts on the use of information technology in the light of the theory of social cognition (Bandura, 1977, 1986). Anxiety also been defined as a heightened feeling of stress when confronted with problems or challenges (Thatcher and Perrewe, 2002, p. 383; Ostovar *et al.*, 2016), and it is useful to understand how individual differences influence the use of IT technology and computer self-efficacy (Compeau *et al.*, 1999).

In SNS use behavior, anxiety is referred to as one of the attachment styles that people build up via SNS use based on attachment theory (Lee, 2013). Attachment theory first depicts the relationship as that between infants and their main caregivers (Bowlby, 1969, 1973, 1980). If the infant keeps receiving interactions from the caretakers, he/she may form a secure attachment style, which is a mental model and which can result in picturing themselves as worthy of care and others are available, trustworthy and not rejecting them. The important thing is that the mental model developed during early childhood can result in less positive subsequent behavior. Sharing conceptual overlap with the study of the context underlying attachment styles in adulthood, anxiety is denoted as an important dimension (Lee, 2013, p. 1500). Anxiety in/about the broader social life could link attachment styles to the use of SNW for bonding and bridging social capital. This notion coincides with a study (Beaudry and Pinsonneault, 2010) that links anxiety during the use of IT to seeking social support. Another study postulates a notion of social anxiety based on a social compensation perspective (Wang *et al.*, 2011). They assert that adolescents with high social anxiety would prefer to disclose themselves through online communication (Lee and Staphinski, 2012).
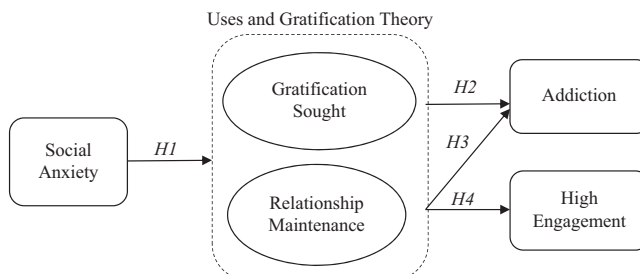

Figure 1.
Research model

As the social cognitive theory (Bandura, 1977, 1986) illustrates that people tend to compare themselves with others in the same network and the social anxiety can strengthen the force. In this study, we define the social anxiety as people who encounter the level of uncertainty in offline life. Due to the social anxiety, it may manifest a heightened desire to learn more about what similar people experience. By adopting the use SNS, people seek social support from the same network out of the concerns of social cognition. This point has also been agreed by the study of internet addiction (Song *et al.*, 2004) and mobile text messaging addiction (Sultan, 2014). Therefore, the following hypothesis is proposed:

H1. Social anxiety is positively associated with SNS gratification sought and relationship maintenance.

2.2 U&G theory and self-disclosure intentions
2.2.1 SNS gratifications sought and the relationship maintenance. U&G theory has been employed to understand people's motivations behind specific internet applications, such as in the cases of blogging (Child *et al.*, 2012, p. 1860) and internet use (Chou and Hsiao, 2000). The U&G has also been demonstrated to be valid in explaining the motives of Facebook users toward fulfilling their needs for information seeking, entertainment and maintaining or developing new friendships (Hollenbaugh and Ferris, 2014; Krasnova *et al.*, 2010).

Because the problematic pattern of SNS use is to use the SNS excessively and compulsively, the characteristics of SNS of lots of interactive features that provide a good opportunity for examining individuals' problematic use. Studies reveal that internet gratifications (Song *et al.*, 2004) and gratifications sought from SNS (Chen and Kim, 2013) are associated with the problematic use of internet and SNS.

Drawing from these studies, the gratification of relationship building sought from SNW is captured within these "continued use" intentions. Bonding social capital and bridging social capital have both been recognized as the two attachment styles of individuals utilizing SNW (Lee, 2013). Benefits of these two types of social capitals can be emotional supports, ample resources, expanding existing social networks by invitations with others, etc. This notion also been echoed by the study conducted by Krasnova *et al.* (2010) by applying the method of focus group. We define SNS gratifications sought of social support as a root for motivating users to actively engage in utilizing the SNS to alleviate the uncertainty of social life, whereas the relationship maintenance is viewed as the approaches adopted by users to bond (with old friends) and bridge (with new friends) the relationship via SNS. Therefore, the following hypotheses are proposed:

H2. SNS gratification sought is positively associated with SNS addiction.

H3. Relationship maintenance is negatively associated with SNS addiction.

H4. Relationship maintenance is positively associated with SNS high engagement.

3. Research methodology
3.1 Participants and procedure
A pilot study was conducted to refine the wording and the meaning of the questionnaire to eliminate ambiguity and lack of clarity. The results obtained from the pilot study were used to remove the ambiguity and lack of clarity in the wordings or the meanings of the questionnaire. To capture a diverse sample of SNS users, we selected Facebook as the case as it is referred to as the most popular SNS platform, and similar studies have used the same platform (Steinfield *et al.*, 2008; Sheldon *et al.*, 2011). Two approaches for the formal questionnaire distribution were employed. First, with the consent of the management of the information systems department in a large southern university in Taiwan, a random sample was drawn

from the list of all students enrolled in both undergraduate and post-graduate courses. Second, other participants were recruited through an announcement on the Facebook pages of various members of the research team. The duration of data collection was about six weeks.

Followed by the suggestions made by researchers to avoid the common method bias (CMV) which might occur in the survey-based research (Lindell and Whitney, 2001), a number of methods were applied in this study to minimize the problem. We designed a number of reversed questions, included irrelevant questions about the domain of the study and used multiple Likert scales in the questionnaire. Similar methods have applied in relevant studies (Maier *et al.*, 2015; Turel *et al.*, 2011). We believe the risk of CMV can be greatly reduced by applying this method and the clear denotations can be presented. Furthermore, in order to motivate participation, a randomly awarded prize of US$20 was offered. This study was performed from May to August 2013. The participants of our empirical study comprised online ($n = 150$) and face-to-face ($n = 132$) respondents. After the deletion of the incomplete questionnaires, the valid samples were 254: online ($n = 150$) and face-to-face ($n = 104$). The *t*-test was applied in testing the differences between the two sets of collected samples; no significant difference was revealed between these two sets of data. Therefore, it is reasonable to combine these two sets of samples into one for further examination.

The demographic information of the collected samples reveals that the majority of the respondents were male (54.8 percent), aged between 20 and 25 years (54.8 percent), education background included college graduates or undergraduate (62.2 percent). The frequency of SNS use mainly was about 1–3 h per day (44.1 percent), and the frequency to post over the SNS was on weekly basis (41 percent). Among all subjects, about 66.5 percent ($n = 169$) were college students who were enrolled in the campus and had higher intentions to participate in this study. Similar studies were also proven valid (Fuller *et al.*, 2016; Min *et al.*, 2016).

It also reveals that the collected samples can be representative as the majority of SNS regular to heavy users (high-engaged users) in terms of the frequency use and information needs out of the social and relationship concerns. The demographic information of the selected data is shown in Table I.

3.2 Measurements
Questions measuring each construct in this study were adapted from earlier studies. Participants completed the survey by answering on the mix of seven-point Likert scale (1 = "strongly disagree" to 7 = "strongly agree") and five-point Likert scale (1 = "strongly disagree" to 5 = "strongly agree"). The complete list of questionnaire items and their original sources are reported in Table II. Some items (GSS3, RE1, HE2 and HE3) were

Measure	Items	Freq.	Percent	Measure	Items	Freq.	Percent
Gender	Male	139	54.8	Gender	Female	115	45.2
Age	< 20	70	27.6	Education	High school or less	26	10.2
	20–25	139	54.8		College/Undergraduate	158	62.2
	26–35	42	16.5		Graduate/Post-graduate	70	27.6
	36–45	3	1.1				
SNS usage frequency (hours per day)	< 1	111	43.7	Frequency in posting over the SNS	Daily	47	18.5
	1–3	112	44.1		Weekly	104	41
	3–4	7	2.8		Monthly	38	15
	4 or longer	24	9.4		Infrequent	65	25.5

Note: $n = 254$

Table I.
Demographic information of participants

Construct	Item	Likert scale	Source
Social anxiety	ANX1: I tend to feel anxious when the time I think of the possibility of unfortunate matters that may happen in life ANX2: I remind myself to be careful for revealing out what are my thoughts over the Facebook ANX3: I try to make my life busier in order to lower the anxiety to think of unfortunate things in life ANX4: I cannot control but think of bad matters that may never happened in life	Seven-points Likert scale	Liu and Kuo (2007) and Wang *et al.* (2011)
Gratification sought	To what extend do you use Facebook for? GSS1: to find romantic relationship GSS2: to find someone who are cool GSS3: to find someone who I can meet up in real life[a] GSS4: to improve my social networking status	Five-points Likert scale	Hollenbaugh and Ferris (2014) and Krasnova *et al.* (2010)
Relationship maintenance	To what extend you conduct to bridge or bond the relationship with others via the Facebook? RE1: exchange messages or information with others[a] RE2: keep contact with acquaintances RE3: leave messages over others' personal wall RE4: send private messages to people	Seven-points Likert scale	Hollenbaugh and Ferris (2014), Krasnova *et al.* (2010) and Lee (2013)
Addiction	ADD1: I would forget to deal with the major matters while utilizing social networking sites (SNS) as Facebook ADD2: I have troubles of my social life due to the usage of SNS as Facebook, e.g., have arguments or misunderstandings with others ADD3: I shift other works that I supposed to do in lower priority due to the usage of SNS as Facebook ADD4: If I am unable to use the Facebook, I will feel emotional or easy to lose my temper ADD5: I have tried to reduce the period of time in spending on SNS usage but there is no success	Seven-points Likert scale	Charlton and Danforth (2007) and Turel and Serenko (2012)
High engagement	HE1: I feel it is ok if I cannot use Facebook HE2: I feel pleasure when I use the Facebook (reversed question)[a] HE3: I will feel better if I can reduce the time spent on the Facebook[a] HE4: it is not important for me as the matter of Facebook usage	Seven-points Likert scale	Charlton and Danforth (2007) and Turel and Serenko (2012)

Note: [a]Items were dropped from the final analysis after measurement model analysis

Table II.
Summary of measurement scales

dropped due to the examination of the validity and good-of-fit indicators as addressed in the followings. In total, 17 items were included for the final data analyses.

3.3 Data analysis
To test the model, partial least squares (PLS) method that is a structural equation modeling approach is used. PLS allows researchers to integrate measurement and structural models (Anderson and Gerbing, 1988). The measurement model examines hypothesized links between indicators and latent constructs, whereas the structural model estimates hypothesized paths between independent (exogenous) and dependent (endogenous) latent construct. Results are presented as follows.

3.3.1 Preliminary assessment. The initial assessment aims at probing the problem of CMV. This risk was mitigated in the survey design phase by employing approaches as negatively worded itemed and multiple measurement scale types. However, the risk may still exist in the form of self-reported questionnaire. Therefore, potential CMV risks were assessed by the applying following methods as recommended in the literature (Podsakoff *et al.*, 2003). Based on the literature, suggestions of applying the mixture measurement approach as the

seven-point-scale and five-point Likert scales in our study were taken for asserting higher validity of the results. In the first, Harman's single factor test was conducted. An exploratory principal components analysis was applied with no rotation to all multi-item scales. It reveals that it explains only 26.26 percent of the variance (Podsakoff *et al.*, 2003). As the value is not greater than 0.50 and each factor explains roughly equal variance, the data do not indicate evidence of common method bias. Second, followed by the notion proposed by Lindell and Whitney's (2001) test that uses a theoretically unrelated constructs (terms as a marker_SC variable: marker_social cohesion), which is used to adjust the correlations among the principal constructs (Pavlou *et al.*, 2007). High correlations among the study's principle constructs and social cohesion would indicate common method bias as the construct of social cohesion should be weakly linked to the study's principle constructs. The correlation matrix (Table III) is outputted. Results reveal that there are no correlations in values more than 0.9 been detected and the values are ranged from 0.31 to −0.15. Overall, the results presented above suggest that CMV is unlikely to have a major influence in this study.

3.3.2 Measurement model. Confirmatory factor analysis was used to assess the convergent validity and discriminant validity of the construct. Convergent validity was ensured as the theoretically related scales were highly correlated. Three criteria of convergent validity were recommended for a composite reliability (CR) of 0.7 or above, an average variance extracted of more than 0.50 and item loadings higher than 0.70 (Fornell and Larcker's, 1981; Hair, 2009). As shown in Table IV, results reveal the construct CR (ranging from 0.85 to 0.95) and average variance extracted (ranging from 0.59 to 0.87) (Barclay *et al.*, 1995; Chin, 1998) and the item loadings are higher than 0.70. All of these measures meet the required levels.

In order to evaluate discriminant value that indicates the extents to which the construct of concern is low in correlation with other constructs. Results of validity are demonstrated when the square root of each construct's AVE is greater than the correlation between that construct and all other constructs (Fornell and Larcker's, 1981). As shown in Table V, the square root of AVE exceeds the correlations between each construct and the other constructs, justifying adequate discriminant and convergent validity.

Furthermore, drawing from the studies (Tenenhaust *et al.*, 2005; Wetzels *et al.*, 2009), the value of the goodness-of-fit (GoF) indices is calculated. The GoF value is 0.31 ($>$ GoF$_{medium}$ value of 0.25) (Wetzels *et al.*, 2009, p. 187), showing that the model is at acceptable level of validation:

$$GoF = \sqrt{0.673 \times 0.142} = 0.31.$$

3.3.3 Structural model. A bootstrapping procedure was used to generate *t*-statistics and standard errors (Chin, 1998). According to Barclay *et al.* (1995), the R^2 indicates the amount of variance explained by the model. To evaluate the research model, R^2 values were calculated for SNS gratification sought of social support, SNS addiction and SNS high engagement. The significance of the individual paths is shown in Figure 2.

H1 (social anxiety to SNS gratification sought of social support) ($\beta = 0.247$), *H2* (SNS gratification sought of social support to SNS addiction) ($\beta = 0.473$) and *H3*

	ADD	ANX	HE	GSS	RE	Marker_SC
ADD	1.00					
ANX	0.42	1.00				
HE	−0.01	0.14	1.00			
GSS	0.45	0.25	0.04	1.00		
RE	−0.39	−0.04	0.17	0.05	1.00	
Marker_SC	−0.16	−0.15	−0.16	0.08	0.31	1.00

Table III.
Assessment of common method bias-correlation matrix

	ADD	ANX	Factor loading HE	GSS	RE	CR	AVE
Addiction (ADD)						0.91	0.67
ADD1	0.76						
ADD2	0.77						
ADD3	0.88						
ADD4	0.85						
ADD5	0.82						
Social anxiety (ANX)						0.85	0.59
ANX1		0.77					
ANX2		0.74					
ANX3		0.84					
ANX4		0.71					
High engagement (HE)						0.85	0.74
HE1			0.92				
HE4			0.80				
SNW gratification sought of social support (GSS)						0.89	0.50
GSS1				0.76			
GSS2				0.75			
GSS4				0.79			
Relationship maintenance (RE)						0.95	0.87
RE2					0.93		
RE3					0.95		
RE4					0.92		

Table IV.
Results of reliability and convergent validity testing

				Correlation of constructs and average variance extracted				
Construct	Mean	SD	Composite reliability	(1)	(2)	(3)	(4)	(5)
ADD[b]	4.34	1.57	0.91	0.82[a]				
ANX[b]	3.68	1.50	0.85	0.42	0.82[a]			
HE[b]	4.08	1.49	0.85	−0.04	0.11	0.86[a]		
GSS[b]	3.28	1.01	0.89	0.46	0.25	0.03	0.77[a]	
RE[b]	3.93	3.83	0.95	−0.39	−0.05	0.17	0.04	0.93[a]

Table V.
Descriptive statistics and discriminate validity

Notes: [a]The square root of AVE. For adequate discriminant validity, the diagonal elements should be greater than corresponding off-diagonal elements; [b]abbreviations for constructs are: ADD, addiction; ANX, social anxiety; HE, high engagement; GSS, gratification sought; RE, relationship maintenance
Source: Author calculations using SPSS and SmartPLS

(relationship maintenance to SNS addiction) ($\beta = -0.410$) exhibited a *p*-value of less than 0.001, indicating a significant positive effect between the constructs. *H4* (relationship maintenance to SNS high engagement) ($\beta = 0.175$) exhibited a *p*-value of less than 0.05. Discussions and explanations with respect to the literature review and the results are given in the next section.

4. Discussion and implications
4.1 Summary of results
The goal of this study is to investigate PIU in the context of SNW, SNW addiction, and their possible antecedences. Our results support the idea that both user's offline and online behavior should be taken into account in understanding SNW addiction. The results of this study show that user offline behavior and social anxiety ($\beta = 0.247$, $p < 0.001$) are associated

Uses and Gratification Theory
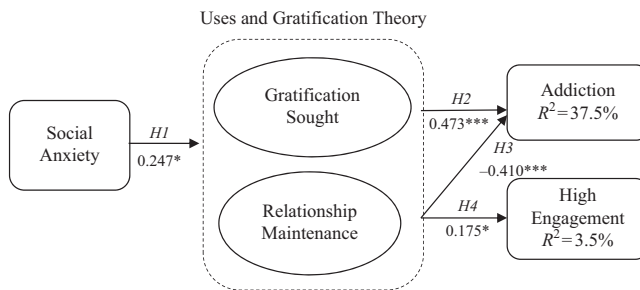
Notes: *p<0.05; ***p<0.001
Source: Author calculations using SmartPLS

with SNW gratification seeking social support, and this SNW gratification seeking is, in turn, associated with SNW addiction ($\beta = 0.473$, $p < 0.001$). Another user behavior, relationship maintenance, is negatively associated with SNW addiction ($\beta = -0.410$, $p < 0.001$), whereas it is positively associated with high SNW engagement ($\beta = 0.175$, $p < 0.05$). Furthermore, behavior around relationship maintenance can be negatively associated with SNW addiction. The explanatory power of the model is 37.5 percent (R^2 value = 0.375). Furthermore, relationship maintenance is positively associated with high SNW engagement (R^2 value = 0.035). The results reveal a set of interesting findings.

First, the results show that social anxiety is important factor of PIU and that as people experience higher levels of uncertainty in real (offline) life, this uncertainty also impacts their online behavior around SNW use (online). This finding suggests that differences in the perceived levels of social anxiety in users could trigger different levels of SNW use adoption. This coincides with propositions made by researchers (Beaudry and Pinsonneault, 2010; Lee, 2013; Wang *et al.*, 2011) based on theories of social cognition as they are addressed. People tend to compare themselves with others in the same network. Our study also successfully extends the notion of social anxiety and proves its link with SNW use through gratification seeking behavior. This finding highlights the effect of social anxiety on the continued user behavior. It suggests that these differences in users are dominant in explaining their SNW use behavior.

Second, U&G theory has proven to be valid for understanding SNW addiction. As the gratification seeking underlying SNW affects users' motivations around SNW use (Song *et al.*, 2004), the gratification sought from social support has highlighted and demonstrated an early need to prevent SNW addiction. This finding suggests that seeking social support through the SNW is an imperative factor in dominating PIU. This pointed career search extends our understanding of the intrinsic motivations of addiction behavior as perceived enjoyment and is the only factor agreed upon by researchers in this domain (Turel *et al.*, 2012; Wang *et al.*, 2015).

Third, relationship maintenance through the use of SNW reveals its dissimilar effects on SNW addiction and high engagement. Based on U&G theory, people use SNW for communication out of the concern for how to bridge and maintain relationships with new and old friends. This notion was found to be applicable in SNW continuous intentions based on attachment and social capital theories (Lee, 2013; Krasnova *et al.*, 2010). This finding aligns with previous studies, but it stresses additionally the effects of relationship maintenance on lessening SNW addiction (Douglas *et al.*, 2008). In addition, our study invites further exploration around the topic of high engagement because the results show minimum explanatory power.

4.2 Theoretical implications

Given the limited research to date in the area of SNW addiction, this study seeks a possible solution to understand the relevant cognitive domains based on U&G and social

cognition theories. Our tests provide three major contributions: extending the understanding of SNW addiction; identifying social anxiety and the associated gratification sought from social support as determinants of SNW addiction; and revealing the dissimilar effects of adopting SNW for relationship maintenance in SNW addiction and high engagement.

Specifically, this study argues that both online and offline behavior based on U&G and social cognition theories should be integrated in understanding SNW addiction. This point is proven to be valid in this study and could lead to more studies, possibly probing the problem of PIU. As people use SNW in different fashions and out of different intrinsic concerns, their excessive use can be managed by offering proper solutions.

Additionally, we advance the current research on SNW addiction and call for the measurement of high engagement in SNWs. As internet technology expands ubiquitously, everyone needs to learn how to live with it wisely. SNW can be perfectly applied in maintaining relationships with people through sending/forwarding/replying messages; however, human relationship building still requires other efforts, such as face-to-face meetings and physical contact. As it is unavoidable not to use SNW in different instances, high SNW engagement behavior should be further addressed and examined.

Finally, this study bridges the gap by integrating studies of users' continued uses behavior and PIU in one study. We empirically test the link between social anxiety as perceived offline and gratification seeking and relationship maintenance via SNW use and SNW addiction/high engagement. We aimed to provide a more holistic solution in tackling the unsolved PIU problem.

4.3 Practical implications

The results of this study provide strong evidence that inner anxiety perceived by users should not be neglected while tackling the PIU due to SNW addiction because it can strengthen the force for depending on SNW for seeking social support. Apart from the value of perceived enjoyment as asserted in previous studies, this study opens up a new opportunity to tackle SNW dependence.

The key implication of this research is that the impact of the mental health of users on SNW problematic use should not be overlooked. The higher the level of anxiety perceived, the more likely the SNW dependence. Therefore, the online behavior depending on psychological health should be addressed carefully and directly because it may be a critical point for assisting users to adopt SNW wisely.

These results can also help service providers understand the mechanisms of addiction behavior. As features of social media are updated regularly, system administrators should promote positive cognition around systems use rather than emotion oriented or seditious messages revealed on the platform. Furthermore, facilitating the smooth exchange of messages and communications is work in which the SNW staff has taken a strong lead.

4.4 Limitations

This study presents several limitations. First, the selected data represent a sample of SNW users in the Asian Pacific region and mainly from the group of young college users. Therefore, caution must be taken when generalizing our findings to other SNW users or groups. Factors such as cultural differences between users may be considered in future studies (Lowry *et al.*, 2011). Second, the time aspect related to social media dependence may need to be considered in future studies. As our study spent about six weeks collecting the data, future studies should employ a more extended longitudinal design to investigate the time aspect and its impacts on SNW addiction. Third, although U&G theory is applied in our study, we do not consider all possible variables. Issues of information seeking, aesthetic experience, monetary compensation, diversion and personal status can be explored in future

studies (Song *et al.*, 2004). Fourth, structured interviews with SNW users can be conducted to inspire further insight into SNW user behavior. Fifth, we found marginal support for the influence of intentions of high engagement, and future studies may consider applying other theories that could better explain these types of behavior. As there is no consensus of SNS high engagement researched yet in the literature, there should be more studies conducted for asserting the scenario.

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