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Study on Relationship Among University Students' Life Stress, Smart Mobile Phone Addiction, and Life Satisfaction

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Abstract This study aims to analyze the relationships among the types of life stress, smart mobile phone addiction, and life satisfaction of university students in Taiwan. The subjects were 332 university students in northern Taiwan, including 64.8% males and 35.2% females. The research tools were the scale of university students' daily life stress, scale of smart mobile phone addiction, and scale of university students' life satisfaction. The data were analyzed with descriptive statistics, product–moment correlation analysis, and multiple regression analysis. The results suggested that (1) university students' love-affair stress and academic stress positively influence smart mobile phone addiction; (2) their stress of interpersonal relationship, stress of self-career, family life stress, and time management and issues significantly influence their life satisfaction. Finally, based on the findings, suggestions are proposed for teachers, university students, and future research.

Keywords Life stress · Smart mobile phone addiction · Life satisfaction

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Introduction

Most studies discussing the factors of smart mobile phone addiction have found that smart mobile phone addiction is related to many psychological and behavioral problems. For instance, smart mobile phone addicts are more sensitive to interpersonal relationships, they cannot communicate directly with others, they complain about the physical problems, and they suffer from insomnia, social disability, negative self-concept, low self-esteem, anxiety, depression, timidity, etc. (Bianchi and Phillips 2005; Ezoe et al. 2009; Igarashi et al. 2008; Jenaro et al. 2007). However, these studies only explain smart mobile phone addicts' individual diathesis factors, while neglecting the possible effects of environmental factors, such as life stress on smart mobile phone addiction. This study attempts to analyze the influence of life stress on smart mobile phone addiction. Moreover, in order to recognize the possible effects of different types of stress on university students' smart mobile phone addiction, this study aims to analyze the influence of various kinds of life stress on smart mobile phone addiction.

On the other hand, if the addiction is for the pleasure or release from unhappiness, it can serve as another direction for therapy. Recognizing the addicts' satisfaction with the dimensions of well-being can develop a feasible therapy, and also offer customized goals and plans of therapy (Miller and Miller 2009). Life satisfaction is considered as positively related to self-esteem, positive parent–child relationship, academic capability, and adaption (Dew and Huebner 1994; Huebner 2004; Leung and Leung 1992), and is negatively associated with anxiety, depression, internalized and externalized problems, and substance abuse (Gullone and Cummins 1999; McKnight et al. 2002; Zullig et al. 2001). Thus, life satisfaction is an important indicator of the teenagers' positive adaption in life. Substance

addicts expect better and normal lives, which is an important reason behind a tendency to end the addiction and seek assistance (Laudet et al. 2009). With individual background, personality traits, family environment, and social culture, there can be a negative relationship with individual life satisfaction (Rudolf and Watts 2002). However, does this relationship exist in smart mobile phone addiction? This issue will be explored by this study to serve as the reference of life guidance for university students. In addition, since females tend to highly rely on smart mobile phones (Billieux et al. 2008) (Walsh et al. 2011), in order to recognize the relationship among life stress, smart mobile phone addiction, and life satisfaction, this study attempts to control university students' background variables by statistical methods, and probe into the relationships among the related variables in order to explore the effects of various types of life stress and smart mobile phone addiction on life satisfaction.

The purposes of this study are as follows: (1) to analyze the relationship between university students' types of life stress and smart mobile phone addiction; and (2) to explore the relationship among university students' types of life stress, smart mobile phone addiction, and life satisfaction. In order to accomplish these purposes, by a scale of university students' daily life stress, a scale of smart mobile phone addiction, and a scale of university students' life satisfaction, the researcher attempts to determine the relationship between university students' types of life stress and smart mobile phone addiction, and proposes effective methods to deal with smart mobile phone addiction. Second, the researcher evaluates the relationship among university students' life stress, smart mobile phone addiction, and life satisfaction to effectively recognize the effects of university students' perceived life stress and smart mobile phone addiction on daily life. Finally, according to analytic results, this study proposes suggestions for university students' lives, teachers' guidance, and future research.

Literature Review

Life Stress and Smart Mobile Phone Addiction

According to past research, there is a positive correlation between stress and failure in adaption (Cooper and Payne 1991; Lazarus 1999), as people cannot deal with the abrupt or long-term stressful situations, such as diseases, life changing events, and compelling demands. Due to such experiences, individuals can enter into psychological and physical crises (Dohrenwend 1998). Stress is a concrete factor of substance addiction, and the recurrence of an addiction (Sinha 2008). Moreover, young people might reflect social behavior by their addiction (Orford 2001);

hence, there is a universal correlation between stress and various kinds of addictions (Lam et al. 2009). However, according to research on internet addiction, which is a technology addiction, as is smart mobile phone addiction, when individuals experience internal and external stress, there can be internet addiction in order to be distracted from stress, or it can be the response to the stress. Young (2007) suggested that internet addicts' impulsive behavior can be treated as a measure to reduce emotional stress and future behavior. In other words, internet addiction becomes an approach to release daily pain and tension, as supported by empirical studies. Internet addiction is a behavior experienced by individuals under internal stress. Therefore, internet addiction will appear with many potential risk factors, such as alcoholism, dissatisfaction with family, and current stressful events (Lam et al. 2009). Likewise, according to the research of Beranuy et al. (2009), there is a significant correlation between internet use and psychological distress.

In addition, some studies have treated impulsive use of a mobile phone as a kind of technostress (Brod 1984), and abuse of a smart mobile phone as an addiction of behavior and technology (Billieux et al. 2008, 2007). Therefore, smart mobile phone users can avoid negative emotions and experiences of daily pain and tension through smart mobile phone addiction. This study thus assumes that there is positive correlation between smart mobile phone addiction and the perceived stress.

Smart Mobile Phone Addiction and Life Satisfaction

Substance addicts and life satisfaction are significantly related, for instance, alcoholics and drug users have lower degrees of psychological happiness (Visser and Routledge 2007). However, increased individual life satisfaction will reduce the recurrence of substance use disorder (Laudet et al. 2009). There can be a significant relationship between internet addiction and life satisfaction. Regarding internet use, new life technology can change the individuals' self-concept and life satisfaction (Green et al. 2005); thus, if individuals are able to effectively manage time, and create social networks for communication and increased social support, it will lower stress and result in self-verification (Robinson et al. 2000; Haythornthwaite and Wellman 2002). In other words, internet use can be related to the enhancement of life satisfaction and the avoidance of loneliness. Some studies have suggested that spending time on line creates isolation and will not enhance social process or guarantee psychological health; thus, increased online time is related to a reduction in life satisfaction and increased loneliness (Sproull and Kiesler 1986; Stepanikova et al. 2010). The differences in research findings can be the users' life problems caused by internet use. Apparently, internet addicts cannot increase social support through the

internet, but they may gain a sense of satisfaction by interacting with others through internet addiction in order to escape from reality. Therefore, some studies have suggested that there can be a negative correlation between addiction to online games and life satisfaction (Ko et al. 2005). However, does smart mobile phone addiction show the same relationship?

Many studies have found that intimate and supportive social relationships will avoid stress, increase happiness, and reduce sadness (House et al. 1988; Johnson 1991), which perspectives can be expanded to determine how the use of smart mobile phones influences psychological happiness. Social relationships influence the capability of smart mobile phone users, and there can be positive or negative relationships between smart mobile phone use and psychological happiness, which will depend on the effect of smart mobile phone use on social processes of psychological health. For instance, smart mobile phone use not only increases the communication frequency of young people, but also enhances interpersonal relationships (Igarashi et al. 2005; Matsuda 2000). If smart mobile phone use can help individuals deal with social activities more effectively, and engage in their daily jobs, psychological happiness will be enhanced with the increased use of smart mobile phones.

In addition, although smart mobile phones are mostly used for communication, interaction through smart mobile phones is not the same as face-to-face social interaction, as the former will eventually lower the individuals' psychological health, and smart mobile phone addiction is the best example. In fact, smart mobile phone addicts are more sensitive to interpersonal relationships and may have difficulty in direct communication with others (Ezoe et al. 2009). Moreover, smart mobile phone addicts have a negative self-concept, low self-esteem, and they tend to be shy (Bianchi and Phillips 2005; Ezoe et al. 2009; Igarashi et al. 2008). There is a significant correlation between unhealthy life factors and abuse of smart mobile phones (Ezoe et al. 2009; Koivusilta et al. 2003, 2005). The main reason is the impulsive use of smart mobile phones influencing young people's daily lives and emotions (Kamibeppu and Sugiura 2005). Based on the above, normal use of smart mobile phones can help moderate interpersonal relationships, execute jobs, and improve life satisfaction. However, smart mobile phone addicts' life satisfaction can be reduced due to personality traits and psychological factors. Thus, this study assumes that there is correlation between smart mobile phone addiction and life satisfaction.

Life Stress and Life Satisfaction

Pavot and Diener (1993) suggested that the measurement of satisfaction is based on a comparison between individual criteria and life environment, and such evaluation will influence emotional and responsive strategies (Diener 1994; Lazarus 1991). The change of overall life satisfaction might result in changes of the teenagers' responsive strategies. For instance, individual lower life satisfaction can be caused by various risky behaviors related to health (such as the abuse of tobacco, alcohol, and drugs). On the contrary, adventurous behavior can change a person's life satisfaction. According to research, there is a negative correlation between perceived negative stress and life satisfaction; however, there is a positive correlation between perceived positive stress and life satisfaction (Abolghasemi and Varaniyab 2010). Many studies have found that when university students perceive higher stress, their life satisfaction would be lower (Chang 1998). Likewise, some studies have shown that stress can significantly predict life satisfaction (Barnes and Lightsey 2005; Hamarat et al. 2001). Thus, there is a significant correlation between life stress and life satisfaction.

Method

Participants

This study treated university students as pretest subjects, and conducted questionnaire surveys in different schools. After obtaining due consents from the schools, the researcher invited the students to complete the questionnaires. A total of 250 pretest questionnaires to test the reliability and validity of the scales used in this study were distributed, and 238 valid samples were retrieved, including 107 males (45.0%) and 131 females (55.0%). The duration of questionnaire survey was about 15 min. A total of 350 questionnaires were distributed, and after retrieving the questionnaires, invalid samples, including those with blank and neutral responses, were eliminated. There were 332 valid samples, including 187 from Aletheia University (56.3%) and 145 from the Taipei College of Maritime Technology (43.7%). Regarding gender distribution, there are 215 males (64.8%) and 117 females (35.2%). There are 91 freshmen (27.4%), 71 sophomores (21.4%), 78 juniors (23.5%), and 92 seniors (27.7%). Their ages are mostly in the range of 18–22 years, which matches the condition of this study to treat university students as the subjects.

Measures

Smart Mobile Phone Addiction Scale (MPAS)

This study adopted the "smart mobile phone addiction scale," which contains 11 items, developed by Hong et al. (2012) as the tool. The scoring is based on a Likert's 6-point scale (1 = "strongly disagree" to 6 = "strongly

agree"). According to this scale, three psychological characteristics of smart mobile phone addiction can be analyzed: (1) academic problems and effects (three items); (2) time management and problems (five items); and (3) substitute satisfaction (three items). Examples of the items are as follows: "since I spend too much time using a smart mobile phone, my academic study or grades are influenced"; "when you use a smart mobile phone, you have the intention to 'use it more for a few minutes'"; "before my must-do activities, I will check my smart mobile phone to see if there is a missed call or message." Cronbach's α of the subscales are 0.83, 0.91, and.73. Cronbach's α of internal consistency of all items is 0.90; thus, the reliability of this scale is good.

Scale of University Students' Daily Life Stress

The researcher interviewed university students to determine their life stress events of the past. In addition, by open-ended questions, 33 psychology students were invited to share their life stress events during the past year. Based on the scale of life stress, as developed by Lee and Chen (2004) and Renner and Mackin (1998), this study generalized 25 items. The scoring is based on a Likert's 5-point scale (0 = "not disturbing at all" to 4 = "highly disturbing"). A higher total score indicates that daily life of the university student is more disturbing, and vice versa. By factor analysis and correlation analysis, this study conducted validity analysis. Eigenvalue >1 and scree testing were the criteria to select the factors. Varimax was used for orthogonal rotation. After deleting the items with factor loadings of <0.4 and with double loading (Tabachnick and Fidell 2007), this study obtained KMO 0.89; Bartleet Test of Sphericity χ^2 (231) = 4557.05 ($p < .001$); and five factors, which are named "stress of interpersonal relationship" (5 items) that explains 16.23% variance, "family life stress" (five items) that explains 15.92% variance, "academic stress" (five items) that explains 14.29% variance, "love-affair stress" (four items) that explains 14.09% variance, and "stress of self-career" (three items) that explains 10.31% variance. There are totally 22 items, which can explain 70.84% variance. Cronbach's α values of the subscales of "scale of university students' daily life stress" are 0.91, 0.87, 0.83, 0.89, and.83, respectively. Internal consistency Cronbach's α of all items is 0.92; thus, the reliability and validity of this scale is good.

Scale of University Students' Life Satisfaction

This scale is based on the scale of university students' life satisfaction, as developed by Li et al. (2009), in order to probe into university students' life satisfaction. The scale includes 6 items and the purpose is to measure university

students' studies, leisure lives, interpersonal relationships, family, intimate relationships, and overall life satisfaction. The scoring is based on a Likert's 6-point scale (1 = "strongly disagree" to 6 = "strongly agree"). A high score indicates that the student is more satisfied with his/her daily life, and vice versa. Cronbach's α of internal consistency of all items is 0.89; thus, the reliability of this scale is good.

Data Analysis

In order to probe into the correlation among university students' perceived life stress, smart mobile phone addiction, and life satisfaction, this study designed a scale to measure university students' daily life stress, and obtained the types of perceived daily life stress to explore the relationship between types of life stress and smart mobile phone addiction. It further discusses the correlation among life stress, smart mobile phone addiction, and life satisfaction. First, descriptive statistics were used to analyze university students' perceived life stress, smart mobile phone addiction, and life satisfaction. Second, product–moment correlation analysis was conducted to explore the correlation among the subscales of university students' perceived daily life stress, smart mobile phone addiction, and life satisfaction. Finally, in order to determine if university students' smart mobile phone addiction would be influenced by the types of university students' perceived daily life stress, this study conducted multiple regression analysis to determine the predictabilty of the types of university students' perceived daily life stress on smart mobile phone addiction. Therefore, university students' gender and grade level were treated as control variables. The predictors included stress of interpersonal relationship, family life stress, academic stress, love-affair stress, and stress of self-career. The dependent variable was smart mobile phone addiction for multiple regression analysis. In addition, in order to determine if university students' life satisfaction would be influenced by types of university students' perceived life stress and smart mobile phone addiction, multiple regression analysis was conducted to determine the predictability of the types of university students' perceived daily life stress, and smart mobile phone addiction on life satisfaction. Therefore, this study treated university students' gender and grade level as control variables, with predictors including types of daily life stress (stress of interpersonal relationship, family life stress, academic stress, love-affair stress, and stress of self-career), and characteristics of smart mobile phone addiction (time management and problems, academic problems and effects, and substitute satisfaction). The dependent variable was life satisfaction for multiple regression analysis.

Results

Descriptive Statistics

Table 1 shows descriptive statistics of the variables in this study. First, regarding university students' life stress, as seen from the table, academic stress is the most significant (M = 2.77), followed by stress of self-career (M = 2.56), stress of interpersonal relationship (M = 2.00), family life stress (M = 1.79), and love-affair stress (M = 1.66). Regarding their smart mobile phone addiction, the score of their substitute satisfaction is the highest (M = 2.46), followed by time management and problems (M = 2.01), and academic problems and effects (M = 1.68). According to Hong et al. (2012), the score of university students' academic problems and effects is the highest (M = 3.54), followed by substitute satisfaction (M = 3.21), and time management and problems (M = 1.20). Only the average score of time management and problems is higher in this study. However, Hong et al. treated female university students as the samples, and suggested that gender difference requires further studies. This study analyzes the normal distribution test of variables, and finds that the Coefficients of Skewness of the variables are less than 2. The following data analysis is based on this aspect.

Correlation Analysis

This section will probe into the relationship among university students' perceived life stress, smart mobile phone addiction, and life satisfaction. The results are as shown in Table 2. Stress of interpersonal relationship, family life stress, academic stress, love-affair stress, and stress of self-career are positively related to time management and problems, academic problems and effects, and substitute satisfaction of smart mobile phone addiction. On the contrary, stress of interpersonal relationship, family life stress, academic stress, love-affair stress, and stress of self-career are negatively related to life satisfaction. Noticeably, time management and problems, academic problems and effects, and substitute satisfaction of smart mobile phone addiction are not significantly related to life satisfaction.

Table 1 Descriptive statistics

Variables	M	SD	Mean of each item	Min.	Max.	Skew
Stress of interpersonal relationship (5 items)	9.985	4.471	1.997	5	25	1.012
Family life stress (5 items)	8.943	4.001	1.789	5	25	1.446
Academic stress (5 items)	13.865	4.273	2.773	5	25	0.145
Love-affair stress (4 items)	6.631	3.137	1.658	4	20	1.306
Stress of self-career (3 items)	7.672	3.283	2.557	3	15	0.274
Time management and problems (5 items)	10.060	4.786	2.012	5	30	0.885
Academic problems and effects (3 items)	5.033	2.903	1.678	3	18	1.589
Substitute satisfaction (3 items)	7.365	3.425	2.455	3	18	0.588
Life satisfaction (6 items)	24.461	6.261	4.077	6	36	−0.262

Table 2 Correlation analysis

	1	2	3	4	5	6	7	8	9
1. Stress of interpersonal relationship	1								
2. Family life stress	0.528***	1							
3. Academic stress	0.407***	0.308***	1						
4. Love-affair stress	0.492***	0.501***	0.216***	1					
5. Stress of self-career	0.443***	0.432***	0.427***	0.309***	1				
6. Time management and problems	0.176***	0.239***	0.172**	0.359***	0.159**	1			
7. Academic problems and effects	0.147**	0.217***	0.193***	0.354***	0.188***	0.713**	1		
8. Substitute satisfaction	0.176***	0.221***	0.210***	0.319***	0.145**	0.624***	0.559***	1	
9. Life satisfaction	−0.405***	−0.363***	−0.221***	−0.203***	−0.332***	0.010	−0.044	−0.083	1

$**p < .01$; $***p < .001$

Multiple Stepwise Regression Analysis

Smart Mobile Phone Addiction is Dependent Variable

This study conducted multiple regression analysis to probe into the effect of university students' life stress on smart mobile phone addiction after controlling for background variables. In other words, this study treated university students' background variables (gender and grade level), and perceived life stress (stress of interpersonal relationship, family life stress, academic stress, love-affair stress, and stress of self-career) as predictors, and smart mobile phone addiction as the dependent variable, to determine the life stress that explains the most variances of smart mobile phone addiction. First, this study attempted to determine if there is multicollinearity in regression analysis, and found that the maximum variance inflation factor (VIF) is 1.74, and the minimum tolerance value is 0.61; thus, there is no multicollinearity.

According to the equation of smart mobile phone addiction shown in Table 3, the effects of gender and grade level on smart mobile phone addiction are insignificant. Overall explanatory power is only 0.04%. This study included the types of life stress in E.(2), and found that the overall explanatory power becomes 19.5%. After controlling for university students' gender and grade level, love-affair stress and academic stress can significantly predict smart mobile phone addiction, which shows that love-affair stress and academic stress positively influence smart mobile phone addiction. Stress of interpersonal relationship, family life stress, and stress of self-career are not significantly related to smart mobile phone addiction. Noticeably, in Eq. (2), after including the types of life stress, the prediction of gender on smart mobile phone addiction is significant. It shows that females' scores of smart mobile phone

Table 3 Multiple regression model of smart mobile phone addiction

Predictors	Smart mobile phone addiction 1		Smart mobile phone addiction 2	
	B (β)	t	B (β)	t
Gender	2.059 (0.101)	1.833	2.409 (0.119)	2.353*
Grade level	0.010 (0.005)	0.098	0.007 (0.004)	0.078
Academic stress			0.033 (0.145)	2.535*
Stress of interpersonal relationship			−0.22 (−0.101)	−1.544
Love-affair stress			1.148 (0.371)	6.111***
Stress of self-career			0.054 (0.018)	0.301
Family life stress			0.198 (0.081)	1.270

*$p < .05$; ***$p < .001$

addiction are higher than males; however, grade level does not significantly influence smart mobile phone addiction.

Life Satisfaction is the Dependent Variable

This study conducted multiple regression analysis to probe into the effects of university students' life stress and smart mobile phone addiction on life satisfaction, after controlling for background variables. In other words, this study treated university students' background variables (gender and grade level), perceived life stress (stress of interpersonal relationship, family life stress, academic stress, love-affair stress, and stress of self-career), and smart mobile phone addiction (time management and problems, academic problems and effects, and substitute satisfaction) as predictors and life satisfaction as the dependent variable, in order to determine the predictors that explain the most variances of life satisfaction. First, this study attempted to determine if there is multicollinearity in regression analysis, and found that maximum variance inflation factor is 2.45, and minimum tolerance value is 0.41; thus, there is no multicollinearity.

According to Eq. (1) in Table 4, the effects of gender and grade level on life satisfaction are insignificant, and its overall explanatory power is 0.01%. This study included the subscales of life stress in Eq. (2), and found that overall explanatory power becomes 21.6%. Thus, after controlling for university students' gender and grade level, stress of interpersonal relationship, stress of self-career, and family life stress can significantly predict life satisfaction. Moreover, normalized regression coefficients of the three variables on life satisfaction are negative. Thus, stress of interpersonal relationship, stress of self-career, and family life stress negatively influence life satisfaction. Academic stress and love-affair stress are not significantly related to life satisfaction. Finally, this study included the subscales of smart mobile phone addiction in Eq. (3), and found that the overall explanatory power is 23.3%. Thus, after controlling for university students' gender and grade level, stress of interpersonal relationship, stress of self-career, and family life stress of Eq. (2) can significantly predict life satisfaction. In addition, time management and problems of smart mobile phone addiction significantly influence life satisfaction.

Discussion

This study is an important primary research; it provides the evidences of possible universal correlation between different types of life stress and smart mobile phone addiction, and probes into the possible effects of university students' life stress and smart mobile phone addiction on life satisfaction. By exploring the influences of university students'

Table 4 Multiple regression model of life satisfaction

Predictors	Life satisfaction 1		Life satisfaction 2		Life satisfaction 3	
	B (β)	T	B (β)	t	B (β)	t
Gender	0.403 (0.031)	0.554	0.369 (0.028)	0.568	0.193 (0.015)	0.296
Grade level	−0.010 (−0.008)	−0.153	−0.020 (−0.017)	−0.334	−0.025 (−0.02)	−0.405
Academic stress			−0.003 (−0.002)	−0.037	−0.005 (−0.003)	−0.058
Stress of interpersonal relationship			−0.385 (−0.275)	−4.246***	−0.378 (−0.27)	−4.166***
Love-affair stress			0.149 (0.075)	1.248	0.097 (0.049)	0.772
Stress of self-career			−0.29 (−0.152)	−2.559*	−0.292 (−0.153)	−2.588**
Family life stress			−0.293 (−0.188)	−2.966**	−0.306 (−0.196)	−3.103**
Time management and problems					0.250 (0.191)	2.497*
Academic problems and effects					0.085 (−0.04)	−0.546
Substitute satisfaction					−0.153 (−0.084)	−1.296

*$p < .05$; **$p < .01$; ***$p < .001$

different kinds of life stress on smart mobile phone addiction, this study suggests prevention of mental illness for teenagers and the meaning of clinical management. The findings provide an understanding of the risk factors of university students' smart mobile phone addiction. In addition, prediction of university students' life stress and smart mobile phone addiction on life satisfaction can serve as a reference to the effects of university students' types of life stress and smart mobile phone addiction on their lives. This study found a significantly positive correlation between university students' life stress and smart mobile phone addiction. However, noticeably, according to literature review, there is a significant relationship between smart mobile phone addiction and life satisfaction; however, this finding does not support the hypothesis.

Stress is the risk factor of addiction behavior and addiction recurrence; moreover, psychological distress can be the complication of addiction and is a factor of recurrence after completion of therapy (Lam et al. 2009; Sinha 2008). Addiction behavior, which reflects life stress, can be due to the experiences of substance addiction or internet addiction. The findings of this study reveal that university students can treat abuse of smart mobile phones as a measure to reduce pain and tension in life. In other words, when university students encounter different kinds of life stress, they might respond to the situation by smart mobile phone addiction, even though the measure is inadequate. Regarding the types of life stress, prediction of love-affair stress on smart mobile phone addiction is more significant, with academic stress being the second. In intimate relationships, emotional stress and learning stress are the most significant stress sources of university students (Murphy and Archer 1996). Moreover, teenagers may continue involvement in such activities, as it will positively enhance their friendships in social groups, and the use of a smart mobile phone can fulfill these functions (Cassidy 2006). Thus, in order

to deal with the emotional stress in intimate relationships, and enhance the said relationship, university students can possibly abuse smart mobile phones. Specifically, university students' perceived love-affair stress is mainly from the following situation. When teachers and family members disagree with their relationships with the opposite sex, they might encounter arguments or break up; this distance from other classmates and friends can increase the emotional burden and have negative effect on studies. Thus, they will try to maintain the intimate relationship with the opposite sex by calls or messages through smart mobile phones. The purpose of the use of smart mobile phones matches sociability, as suggested by Wei (2008), and is a motive to maintain friendly relationships, as indicated by Hong et al. (2012). There can be correlation between the motive to use smart mobile phones and smart mobile phone addiction; however, evidence for this will rely on future research.

In addition, this study found that university students' academic stress is higher than other kinds of life stress, which is consistent with previous studies. In Asian society, academic stress is the most significant in university students' life stress (Huan et al. 2006; Wang and Pan 2006). When university students encounter high academic stress and adopt inferior response strategies, it will result in negative behaviors and lowered academic achievement (Rafidah et al. 2009). According to the findings of this study, learning stress can be a possible risk factor of university students' smart mobile phone addiction. Currently, in Taiwan, the prevalence of smart mobile phones for university students is high. When the students perceive a high degree of academic stress, the games and online functions of smart mobile phones can serve as stress release and entertainment tool (Hong et al. 2012a, b; Wei 2008), in order to avoid negative emotions and experiences caused by pain and tension in daily lives. The substitution might be found by university students' online use of smart mobile

phones and game playing in class. It is suggested that the teachers cannot trigger the students' learning motives or students experience high academic stress. Smart mobile phone addiction is simply their manifest behavior to escape from heavy academic stress. Thus, while teaching, teachers should avoid neglecting the students' use of smart mobile phones, and they should actively understand and intervene in their behavior and recognize their purposes. The smart mobile phone addiction students' motive to use, the negative effects of smart mobile phone addiction on their academic achievement, and the degree of effect will rely on future studies.

According to analysis on the effect of university students' life stress on smart mobile phone addiction, gender can significantly predict smart mobile phone addiction. It means that the score of female university students' smart mobile phone addiction is higher than that of male university students. When encountering stress, females tend to seek social support (Folkman and Lazarus 1985), they prefer communication by email, and maintain social relationships with others through smart mobile phones (Bianchi and Phillips 2005; Billieux et al. 2007; Boneva et al. 2001; Lemish and Cohen 2005; McKenna et al. 2002; Rees and Noyes 2007). Thus, in high life stress, female university students are more likely to become the high-risk groups of smart mobile phone addiction. When dealing with love-affair stress, they particularly have smart mobile phone addiction. In other words, if female university students fight or break up with male friends in daily lives, the teachers and family members disagree with their relationship with the male, and they become distant from other classmates and friends after having the relationship; thus, they are more likely to maintain the relationship with other friends by the abuse of smart mobile phones in order to obtain social support. Therefore, parents and teachers should pay attention to a sudden increase of the female university students' phone bills, abnormal daily routine, and lowered academic grades. They will be able to understand their friendship, particularly the development of an intimate relationship.

Finally, this study found that university students' stress of interpersonal relationships, family life stress, and stress of self-career will negatively influence life satisfaction. This finding is not only consistent with Abolghasemi and Varaniyab (2010), who suggested that there is a negative correlation between the perceived negative stress and life satisfaction, but also supports the hypothesis of this study. The effects of individuals' life stress on their lives depend on their evaluation of personal responsive capability and the environment. This study found that peer relationships, family environment, and objectives of career are the critical factors in university students' lives. However, surprisingly, there is no significant correlation between smart

mobile phone addiction and life satisfaction, which means that university students' smart mobile phone addiction does not influence their life satisfaction. It does not suggest that university students with high smart mobile phone addiction are not unsatisfied with their lives. The findings of this study might simply show that there is no correlation between smart mobile phone addiction and life satisfaction. However, will university students show their dissatisfaction with lives due to smart mobile phone addiction? According to Herzberg's Two Factor Theory, university students' life satisfaction can be associated with their lives. Nevertheless, university students' dissatisfaction is usually related to life environment (Herzberg 1966). This study probed into university students' satisfaction with life, and did not analyze their dissatisfaction. Future studies can explore the correlation between university students' smart mobile phone addiction and life dissatisfaction.

Finally, multiple regression analysis of university students' life stress and smart mobile phone addiction on life satisfaction found that, after controlling for university students' gender and grade level, and including the types of life stress, a higher score in time management and problems in smart mobile phone addiction indicates higher life satisfaction. However, in correlation analysis, there is no relationship between smart mobile phone addiction and life satisfaction. The main reason is that, time management and problems is influenced by common factors of the types of life stress, which shows a significant correlation with life satisfaction. The explanatory power of prediction is 1.7%, which is insignificant. Future studies should be cautious regarding the explanation of the findings and their application.

When explaining the findings of this study, some limitations should be considered. First, the cross-sectional nature of this study can only provide the findings of correlation, rather than the inference of causal relationships. In addition, smart mobile phone addiction investigated in this study does not reach the clinical level, and can only demonstrate the primary study on the types of university students' smart mobile phone use. Whether psychological distress can directly lead to smart mobile phone addiction will rely on future studies through experiment and longitudinal study. Moreover, the samples of this study were students from only two universities, and the findings may not apply to other samples. Thus, future studies can expand the scope and size of the samples to validate the findings.

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