Mobile Phone use Amongst Students in a University in Malaysia: Its Correlates and Relationship to Psychological Health

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Abstract

The study explored the extent of mobile phone use amongst students of Universiti Putra Malaysia. Additionally, the study determined personal and family factors related to the mobile phone use and, the relationship between problem mobile phone use and psychological health of the students. The multi-stage cluster sampling was employed to identify the students (N=386) who completed a self-administered questionnaire. The students were found to spend on average 6 hours daily and USD18.70 monthly on their mobiles. Text message was the most used feature and peers were the most frequently contacted person. Older students used more voice calls while females text message more frequently. Male and younger students were more interested with other features (MMS and GPRS) of the mobiles. Students from higher income families spent more time and money on their mobile phone. Additional analyses showed that students with lower self-esteem and spent more time on the phone were more likely to be problem phone users. Adolescents who spend more time on their mobile phone were also more vulnerable to psychological disturbances. There is a need to further uncover underlying factors that influence students' mobile phone behavior, and the consequences of intense mobile phone use on their psychological well-being.

Keywords: Mobile phone use pattern, problem mobile phone use, psychological health, college student, self-esteem

1. Introduction

The mobile phone is viewed as an important communication tool and has become an integral part of the Malaysian society. Malaysians are increasingly using the mobile phone rather than the fixed line telephone as a way to keep in touch with their family, friends, colleagues and business associates. The mobile phone first appeared in Malaysia in 1998 and was mainly used by professionals. The first generation of the mobile phone was built with basic features such as voice call. Today, mobile phones are equipped with other features that allow further communication and entertainment such as the Short

Message Service (SMS), MP3 (MPEG-1 Audio Layer 3) player, games, internet and videos. These additional features attracted people across all walks of life including the younger generations, and consequently led to the increase in the number of mobile phone users in Malaysia.

A survey conducted in the year 2008 by the Malaysian Communication and Multimedia Commission (MCMC), revealed that Malaysia ranked second in ASEAN in term of the number of mobile phone users. Malaysia recorded a total of 26 thousands users during that year. More than half (56.4%) of the users were males and the rest (43.6%) were females. The survey further revealed that the main users of the mobile phone were those ranging in age from 20 to 49 years. While pre-teens and students below 19 years old make up 20.9% and the elderly consists of 12.3%. Thus, it seems that young adults are significant mobile phone users in Malaysia. In a study (Abdullah, 2004), Malaysian youths claimed that owning a mobile phone is an essential part of their life. This is not surprising as the younger generations are *digital native*s (i.e., individuals born in the technological era) and will naturally be easily attracted to any technological gadgets. The younger generations furthermore, took the mobile phone not just as a tool for communication but, also as a way to express themselves (Ito and Okabe, 2004) and, more importantly to look *hip* and *cool* (Ling, 2001). This is in contrary to older generations or also known as *digital immigrants* (i.e., individuals born before the technological era), who used the mobile phone mostly for their social or business purposes (Bianchi & Phillips, 2005).

To date, little is known on the extent of mobile phone use amongst the younger generations in Malaysia, including its correlates and consequences on their psychological well-being. Therefore, it is of interest to the present study to explore the mobile phone usage of the younger generations in Malaysia. The accessible population for the present study is students of Universiti Putra of Malaysia. The following research questions are addressed in this study:

1) What is the extent of mobile phone use (patterns & problem) of the students?
2) What personal (i.e., age, sex, & self-esteem) and family (i.e., parents' age, education & family income) factors significantly correlate to mobile phone use (patterns & problem) of the students?
3) What is the relationship between the problem mobile phone use and the level of the psychological health of the students?

Information obtained from the present study will provide a baseline understanding on the mobile computing behavior of young adults particularly those in higher educational institutions in Malaysia. The present study will reveal information on the patterns and levels of usage on mobile phones amongst university students as well as their related factors. Additionally, the study will provide an understanding on the extent to which problematic mobile phone usage is related to the psychological health of the university students.

Findings from this study may be useful to various parties for example, university students, parents, educators, researchers, and policy-makers. University students will understand the way they use the mobile phone behavior and the ramifications of its inappropriate use. Parents and those with interest in young people will find that the information from this study enhanced their understanding and ability to provide guidance that encourages positive mobile computing activities. Government and policy makers may find that information from the present study is useful in their planning of procedures and programs for young technology users. The findings may substantiate the need for any legislative and societal controls for governing the use of mobile phone among youngsters. On the other hand, the study may shed light on the importance of appropriate use of technology and providing guidance particularly to the technology savvy youth towards reaping the advantage of the technology for their positive development.

2. Previous Research
2.1. Patterns of Mobile Phone Use

Ling (2001) in his study found that young adult men spent more time on the mobile telephones compared to adolescent girls. The men reported to begin spending more time in their late adolescence and peaks in the mid 20's. Their high level of use extends into their early 30's after which their length of usage drops. In his additional analyses, Ling noted that women had quite different patterns of mobile phone use. Although women also begin to spend more time on their mobile phones during their late adolescence, their length of use is lower than the men. Furthermore, as they enter adulthood their length of usage steadily declines as they prefer more face to face interactions compared to their male counterparts.

Researchers found that young mobile phone users tend to demonstrate appropriate monthly expenditure. School-going mobile phone users in Europe spent approximately 25 Euro a month on their mobile phone (Clonen, 2002). Another study revealed that a large proportion (66%) of Australian adolescents preferred to use the mobile phone pre-paid system (Australian Psychological Society, 2004). This system allows adolescents and their parents to monitor and control the mobile phone cost. Furthermore, more than half (57%) of adolescents claimed that they were very careful in spending money on their mobiles. However, a small number (38%) of them reported that they tend to overspend on their mobile phones due to peer expectation of receiving a reply SMS (Short Message Service) from them. A considerable proportion (13%) of adolescents even had to buy additional credit without their parents knowing and 8% borrowed money from their parents to pay their bills.

Mobile phones are equipped with various features that enable communication and entertainment for its young users. Previous study found that the most popular feature used among young users were text messaging (Nurvitadi, 2003; Lie, 2004; Madell & Muncer, 2004; Ling, 2001; Eldrige & Grinter, 2001). Adolescents preferred text messaging because the service was quick, cheap and convenient (Grinter & Eldrige, 2001). Eldrige and Grinter (2001) predicted that teenagers use text messaging to arrange time to chat, adjust arrangements already made and chat or gossip. Teenagers also used text messaging to coordinate with both friends and family. Lie (2004) found that the patterns of text messaging among adolescents peaks significantly between the ages of 16 and 24. Nurvitadhi (2003) in her study of mobile phone usage of adolescents in Japan and USA found that a large proportion (69.53%) of Japanese adolescents preferred using the text messaging service while American adolescents (35.5%) favored the game features of the mobile phone. Japanese adolescents (40.21%) were also found to use more of MP3 (MPEG-1 Audio Layer 3) features of mobile phones as compared to other features. Ling (2001) in his study on female adolescents and young adult men found that female adolescents sent more text messages compared to adult men. Ling further noted that there is a transition periods in patterns of mobile phone use among adolescents. Text messaging was found to be gradually replaced by voice calling when the adolescents were in their early 20's.

Supporting Ling's findings, Lie (2004) found that there is a certain pattern in mobile voice telephony among young adults. Men were seen to use their mobile phone more compared to women. They additionally make more business oriented calls since they are more often in managerial positions. On the other hand, women used the fixed line telephony more than men do to maintain their social network and other social co-ordination task. Women choose the fixed line telephony to socialize because it is more cost effective compared to mobile phones. Similar findings were seen in a study investigating patterns of mobile phone use amongst secondary-school students (Madell & Muncer, 2004). Out of a total of 1340 students, a majority (91.9%) used their mobile phones to make calls, texting messages (89.4%) and receiving phone calls (80%). The findings seem to indicate slightly higher preference for conventional call features than the SMS system among younger sample. However, one of the limitations of the study was that the sample was not randomly selected, thus lack ecological validity and generalizability.

The mobile phone was design to allow communication between family members and peers. Research has shown that adolescents frequently contacted their family followed by friends. The ability

to easily contact parents and vice versa is very important for adolescents (Australian Psychological Society, 2004), as it makes them feel safe and always connected to significant people in their life. Furthermore, it is extremely helpful during emergencies. According to Wale and Gillard (1994) the mobile phone in general helps build family relationship by maintaining open communication and substituting for human contact. Via the mobile phone adolescents and their families would communicate without much difficulty at any time and place. Both adolescents and their families could be in constant contact. Besides family members, adolescents have reported using their mobile phones to regularly contact their peers to chat, gossip and share stories with each other. Thus, the mobile phone also provides an avenue to improve and maintain their social relationships (Australian Psychological Society, 2004). Therefore the study substantiated that mobile phone could enhance relationships between adolescents and their family and friends.

2.1. Correlates of Mobile Phone Use

Various factors have been proven to be significantly related to the patterns of mobile phone use. Past researchers have focused on the relationships of personal factors such as sex, age, and self-esteem with mobile phone use. To date little is known on the extent of the relationships between familial factors such as parents' age, education, and family income and mobile phone use patterns and problem among the younger generations. Thus the following review of literature focuses mainly on the relationships of personal factors and young people mobile phone computing behavior.

Past research has shown that male users are more attracted to the technical application and features of the mobile phone such as games and MP3 player while females use the mobile phone as a socializing tool (Ling, 2001; Bianchi & Phillips, 2005). Adolescent girls do tend to develop the skills required to maintain their social networks as they attain their adult position in society. Bianchi and Philips (2005) in their study found that females use the mobile phone for social reasons while males called more people on a regular basis. Bianchi and Philips assumed that males used their phones frequently for business purposes and not for socializing. However, Bianchi and Philips did not find any significant relationship between gender and the patterns of mobile phone (i.e SMS usage and time spent). Bianchi and Philips concluded that gender did not predict overall use of the mobile phone. They claimed that the mobile phone was a gender neutral device and both gender seemed to have embrace mobile phone technology equally.

Researchers studied the connection between age and mobile phone patterns of adolescents. Bianchi and Phillips (2005) found that age played a role in determining the total time spent on the mobile phone during the week. Older respondents were found to use the mobile phone more for business purposes while younger students used it to socialize. According to Bianchi and Phillips, this may be because the sample of the study contained older and working respondents thus, explaining the reason behind the patterns of mobile phone for this study sample. Further findings from their study revealed that younger users were more addicted to the mobile phone as indicated by high scores on the Mobile Phone Problem Use Scale. Ito and Okabe (2004) found similar findings. Japanese adolescents were preoccupied with their mobile phone because they had flexible time, energy and mobility compared to older users. Adolescents used the mobile phone for emotional and social communications specifically in building and sustaining relationship with friends (Ling & Yittri, 2002). Furthermore, adolescents viewed the mobile phone as an impressive and liberating personal tool that allowed them to have a better social position in life.

Researchers have also shown interest in studying adolescents' level of self-esteem and its influence with mobile phone usage. Individual with high self esteem are assumed to use less of the mobile phone for communication compared to those with low self esteem. Low self-esteem users were assumed to use the mobile phone for reassurance and not mainly for social purposes. However, Bianchi and Phillips (2005) found that low self-esteem did not contribute to the overall use of mobile phone. Nevertheless, it did predict problem mobile phone use.

2.2. Problem Mobile Phone Use and Psychological Health

Although the mobile phone has brought many benefits in its users' life, intense use of this communication device may cause harm to user's health including his or her psychological well being. Studies from different countries such as Thailand (Kawsaki et al, 2006), Korea (Jee Hyun, Doo-Heum, Seung-Ho & Jaehak, 2008), Norway (Ling, 2005) have found that students who are preoccupied with their mobile phone tend to experience psychological disturbances. Jee Hyun et al. (2008) in their recent study involving 595 Korean students found that excessive use of the hand phone causes students to have depression, higher interpersonal anxiety, and lower self-esteem.

In an earlier study, Van den Bulck (2003) reported that addictive mobile phone usage could cause disturbance in students' sleeping pattern. Students tend to get engaged in text messaging and feel anxious when not receiving replies from their friends even during the night when they are supposed to be sleeping (Kamibeppu and Sugiura, 2005). This addictive behavior tends to cause students to stay up late at night and thus disrupting their daily routine. Several studies have shown that addictive behavior and lack of sleep is detrimental to one's psychological health and functioning (Fredriksen, Rhodes, Reddy & Way, 2004; Moore, Kirchner, Drotar, Johnson, Rosen, Ancoli-Israel & Redline, 2009; Roberts, Roberts, & Chen 2001).

3. Methodology
3.1. Participants and Sampling

Participants for the present study were selected using a multi-stage cluster sampling technique. In the first stage, a total of five out of 17 residential colleges were randomly identified. In the second stage, a male and a female's blocks were identified from the selected colleges. Out of the four floors from each block, a floor was randomly selected. All students residing in the selected floor were then invited to participate in the study. From the total of 500 hundred self-administered questionnaires distributed, 388 were returned. However, two of the questionnaires were unusable, consequently 386 students comprising 209 males and 177 females were included this study. Within the confidence interval level of .95, a power of 95%, an alpha of .05 and effect size of at least .02, the sample size is considered large enough for making inference to the study population.

The mean age of the study participants were 20.87 years old (sd. = 1.611) and spanned from 18 to 32 years. Given that the accessible population for the study comprised mostly Malay students, it was expected that the selected participants to be mostly Malays (78.2%). The rest were Chinese (13.5%), Indians (3.6%), and others (4.7%). The students were mostly undertaking a Bachelor degree program (86.8%); the remaining (13.2%) were enrolled in a Diploma or an associate degree programs. Nearly all (91.1%) of the students were taking between 14 and 19 of credit hours of courses during the semester in which the study was conducted; with an average of 17 credit hours of courses. On average the students were found to be in their third semester of study.

The students were found to come from families that are quite diverse in terms of demographic characteristics. The average income earned by their families was over RM20,000 (USD1=RM3.80), but 27% of their sample families lived below the poverty line (RM8,000). The mean age for their mothers and fathers is 48.75 (Sd. = 5.77) and 52.02 (Sd. = 8.01), respectively. Mothers (mean = 8.89 years) seemed to attain lower levels of education compared to fathers (mean = 10.14 years).

3.2. Measures

3.2.1. The Rosenberg Self-Esteem Scale (RSE)

The respondent's judgment of his or her self-worth was measured using the Rosenberg Self-Esteem Scale (Rosenberg, 1965). The scale comprises 10-items (5 positive and 5 negative), and in this study it was rated on a four-point Likert scale (1=strongly disagree, 4=strongly agree). A sample of items on this scale is included below.

1) On the whole, I am satisfied with myself.
2) At times I think I am no good at all.
3) I feel that I have a number of good qualities.

Reverse-coding was done on all negative items so that higher scores would indicate higher self-esteem. The total possible score on this scale ranged from 10 to 40. The reliability assessment for this scale in the present study sample was found to be at 0.75.

3.2.2. The Mobile Phone Use Survey (MPS)

Problematic mobile phone use of the students was measured using the Mobile Phone Use Survey developed by Bianchi and Phillips (2005). The survey consisted of 27 questions that asked on issues regarding tolerance, withdrawal, craving, escaping other problems and negative life consequences in the areas of social, familial, work and financial difficulties (Bianchi & Phillips, 2005). Issues on a person's loss of control over their amount of mobile phone usage and time spent on mobile phone-related activities were also included in the survey. The scale used in this survey was a simple Likert-type ranging from 1 (not true at all) to 10 (extremely true). Higher scores on the scale would indicate higher problem mobile phone use. The Cronbach's alpha for this scale was calculated to be at 0.91. Sample items for the scale are included below:
1) I felt lost without my mobile phone.
2) I find it difficult to switch off my mobile phone.
3) I can never spend enough time on my mobile phone.

3.2.3. The General Health Questionnaire (GHQ)

The psychological health of the students was measured using the General Health Questionnaire (GHQ) (Goldberg, 1978). The GHQ, originally developed by Goldberg is designed to identify two main classes of problems: inability to carry out one's normal 'healthy' functions, and the appearance of new phenomena of a distressing nature. It focuses on breaks in normal functioning rather than on life-long traits; therefore, it only covers disorders or patterns of adjustment associated with distress. In this research, the short version of the GHQ with 12 items was used. Scoring for the scale is in the form of a simple Likert: 0, 1, 2 and 3. High scores on the GHQ indicated that the students experience psychological distress and the subsequent maladjustment, which undermine well-being. Goldberg reported test-retest reliability coefficients on three groups ranging from .51 to .91, and split-half reliability of .95. In the present study, the GHQ scored an overall alpha reliability of 0.70. Sample of items are as follows:

In the past six weeks have you ……
1) Been able to concentrate on whatever you are doing?
2) Lost much sleep over worry?
3) Felt constantly under strain?

3.3. Data Analyses

Data from the present study were gathered and analyzed using the Statistical Package of the Social Sciences. Descriptive statistics were used to determine the distributional characteristics of each of the study variables. Inferential statistics (Pearson Correlations and Multiple Regression analysis) were additionally used to determine the extent of associations between the independent variables [personal characteristics (age, sex and self-esteem) and family characteristics (parents' age, years of education and family income), mobile phone use variables (patterns and problem) and psychological health. A chance probability level of less than .05 was set to reject the null hypotheses.

4. Results

4.1. Patterns of Mobile Phone Use

Table 1 presents the summary patterns of mobile phone use of the students. The mean monthly expenditure of mobile phone amongst the students was USD16. In a day, the students' average duration of mobile phone use was 353.36 minutes (Sd. = 447.45) or 5.89 hours. The results indicated that students spent moderately in terms of time and money on their mobile phones. The feature of the mobile phone often used by students was text messaging or SMS. The study found more than half (57.3%) of the students preferred to use the SMS compared to making calls (34.7%). Nearly all (97.7%) of the students stated that they text message every day. Information on the frequency of mobile phone use also showed that the average number of SMS sent in a day was 72. The mean time used in sending and receiving SMS daily was 246.44 minutes (or 4.11 hours)(Sd. = 360.98).

Voice call was the second feature popularly used by the students. The study found that the mean number of calls made by the students were roughly 5. The average time spent making calls in a day was 47.69 minutes. The findings tend to suggest that students relied on SMS as their main mode of communication as compared to the conventional voice calls. Additionally, data obtained showed that the total number of people called per day according to almost a majority (74.1%) of the students was about six. Friends (31.9%) seemed to be most frequently contacted person compared to parents [mothers (23.3%); fathers (27.5%)].

Table 1: Patterns of Mobile Phone Use of Students (N=386)

Variable	n (%)	Mean	Sd.
Monthly Expenditure (n=383)		RM56.14	RM62.94
Time Spent (min)			
Duration of use per day (min) (n=385)		353.36	447.45
Sending and receiving SMS per day (minutes) (n=386)		246.44	360.98
Duration of Calls per day (minutes) (n=383)		47.69	122.58
Features often used			
SMS	221 (57.3)		
Calls	134 (34.7)		
Games	124 (32.1)		
Frequency of Use*			
SMS Feature (n=386)		72.09	22.72
Calls per day (n=386)		4.87	6.50
Frequency of Text Message (n=386)			
Every day	377 (97.7)		
Once a week	8 (2.1)		
Once a month	1 (.3)		
Frequently Contacted Individuals			
Friends (n=386)	123 (31.9)		
Mother (n=386)	90 (23.3)		
Father (n=375)	103 (27.5)		

Note: USD1=RM3.80, Sd = Standard deviation, *Frequency of used was measured using ratio scale.

4.2. Correlates of Patterns of Mobile Phone Use

Correlational analyses were computed to explore what personal and family factors were related to the patterns of mobile phone use amongst students of the study. Results of the analyses are as shown in Table 2. Students' age (r = .18, p ≤ 0.01) and mothers' age (r = .14, p ≤ 0.01) were found to be significantly correlated with business calls. It seemed that older students made more business calls compared to social calls and other features. Similarly, students with older mothers tend to receive more business calls from the students. This finding may be due to chance and does not signify the extent of the relationship between mothers' age and business calls.

Results also showed that sex was significantly (r= -.21, p ≤ 0.00) related to SMS feature of the mobile phone. The negative relationship indicated that girls tend to use text messaging more compared to boys. In terms of other features [MMS (Multimedia Messaging Service) and GPRS (General Packet Radio Service)], significant relationships were found with age (r = -.12, p ≤ 0.05), sex (r = .11, p ≤ 0.05) and fathers' age (r = -.14, p ≤ 0.01). The data seemed to indicate that boys and younger students were keener on using and exploring features such as MMS and GPRS. In addition, students who have younger fathers appeared to be more responsive towards the use of various features available through the mobile phone technology.

Table 2: Correlates of Patterns of Mobile Phone Use

Variables	Sub-dimension of Patterns of Use					
	Number of Social Calls r(p)	Number of Business Calls r(p)	Number of SMS r(p)	Number of Other Features r(p)	Duration of Use r(p)	Monthly expenditure r(p)
Personal Characteristics						
Age	.05(.31)	.18(.00)**	-.06(.24)	-.12(.02)*	-.02(.02)	.05(.36)
Sex	.08(.13)	.02(.67)	-21(.00)**	.11(.04)*	-.09(.07)	-.01(.80)
Self-esteem	.03(.53)	.04(.47)	.07(.15)	-.02(.68)	-.02(.68)	.10(.05)*
Family Characteristics						
Mothers' Age	.03(.61)	.14(.01)**	.01(.84)	-.09(.07)	-.08(.10)	-.05(.35)
Fathers' Age	.05(.37)	.09(.10)	-.03(.62)	-.14(.01)**	-.02(.77)	-.04(.50)
MEdu (Years)	-.01(.79)	.02(.74)	.09(.07)	.09(.10)	.11(.04)*	.12(.02)*
FEdu (Years)	-.02(61)	.01(.84)	.13(.01)*	.07(.18)	.03(.52)	.11(.04)*
Family Income	-.02(-.02)	-.07(.16)	.00(.97)	.02(.72)	.11(.03)*	.10(.05)*

Note: * p ≤ 0.05 level (2-tailed); ** p ≤ 0.01 (2-tailed); MEdu=Mother's education, FEdu=Father's education. Sex was dummy coded: 0=female, 1=male.

Findings from the study indicated that family income was highly correlated with duration of mobile phone use (r = .11, p ≤ .05) and monthly expenditure (r = .10, p ≤ .05). Surprisingly, additional analysis showed that duration of use was not significantly related (r = .07, p ≤ .15) to the amount of money the students spent on the phone per month. Both mothers' (r =.12, p ≤ .02) and fathers' (r =.11, p ≤ .04) education were positively related to the monthly phone expenditure of the students. The study also showed that self-esteem (r = .10, p ≤ .05) had significant relationship with monthly expenditure. Hence, consistent with expectation the findings tend to suggest that students coming from higher socio-economic status homes have higher inclination to spend longer time and money on the phone.

4.3. Correlates of Problem Mobile Phone Use

Table 3 illustrates the results on the correlates of problem mobile phone use. Only one of the three personal variables i.e., self-esteem (r = -.18, p ≤ 0.01) was found to show significant relationships to problem mobile phone use. The finding is consistent with expectation; lower self-esteem students will be more prone to become problematic phone user compared to students with higher levels of self-esteem. In general the students rated themselves as having high level of self-esteem. Results of descriptive analysis showed that the students scored on average 29.90 (Sd. = 4.04). Their adjusted mean score on the scale was calculated to be at 2.99 out of 4 which was above the mid-point value of 2.00.

The study found significant correlations amongst mothers' age (r = -.11, p ≤ 0.01) and fathers' age (r = -.12, p ≤ 0.05) and problem mobile phone use. These findings tend to suggest that students with younger parents were inclined to get hook on their phone.

At the bivariate level, three aspects of the patterns of mobile phone use were significantly related to the problem mobile phone use scores of the students (number of social

Table 3: Correlates of Problem Mobile Phone Use Score

Variable	r	P
Personal Characteristics		
Age	-.05	.30
Sex	-.01	.90
Self-esteem	-.18**	.00
Family Characteristics		
Mothers' Age	-.11**	.04
Fathers' Age	-.12*	.02
Mothers' Years of Education	.03	.54
Fathers' Years of Education	.02	.77
Family Income	.07	.19
Patterns of Mobile Phone Use		
Number of Social Calls	.20**	.00
Number of Business Calls	.07	.19
Number of SMS	.06	.23
Number of Other Features	.14**	.01
Duration of Use	.13*	.01
Monthly expenditure	.09	.01

Note: * $p < 0.05$ level (2-tailed); ** $p < 0.01$ (2-tailed). Sex was dummy coded: 0=female, 1=male

calls, r=.20, $p \leq 0.01$; number of other features, r=.14, $p \leq 0.01$; duration of use, r=.13, $p \leq 0.05$). The findings revealed that students, who spent more time on the phone, made more social calls and frequently utilized features such as MMS and GPRS were more likely to be problematic mobile phone users.

Additional analyses were conducted to determine which of the personal and family characteristics as well as the patterns of mobile phone use would be predictive of the problem mobile phone use of the students. Results of the multiple regression analyses using the force-entry procedure are as shown in Table 4. Out of all the fourteen variables only self-esteem and number of social calls emerge as unique predictors of the problem mobile phone use. The regression model was significant (F=2.671, $p \leq .001$). The predictor variables accounted for 10% of the variance in the mobile phone use scale. Students who made more social calls appeared to score higher on the problem mobile phone use scale. This finding is perhaps consistent with expectations; students who spent more time socializing on the phone would be heavy phone users.

4.4. Problem of Mobile Phone Use and Psychological Health

The study found that the mean score of the students on the Problem Mobile Phone Use scale was 97.65 (Sd. = 36.65). Based on their adjusted mean of 3.63 out of a possible 9, the students seemed to score low on the problem mobile phone use scale. Higher scores would indicate an

Table 4:   Predictors of Problematic Mobile Phone Use (PMPU)

	PMPU Inventory Standardized betas
Personal Characteristics	
Age	-.02
Sex	-.01
Self-Esteem	.15*
Family Characteristics	
Mothers' Age	-.05
Fathers' Age	-.09
Mothers' Years of Education	-.03
Fathers' Years of Education	.01
Family Income	.06
Mobile Phone Use	
Social Calls	.17**
Business Calls	.04
SMS Feature	.02
Other Features	.06
Duration of use	.08
Money Spent	.06
	R^2 = .10 F= 2.671***

Note: * $p < .05$, ** $p < .01$,*** $p < .001$. Sex was dummy coded: 0=female, 1=male

addiction and loss of control on usage of the mobile phones. Results from the present study suggested that the students do not exhibit problem behavior in using their mobile phones.

Analysis on the GHQ-12 scale showed that students had an average score of 32.36 with a standard deviation of 4.55. Their adjusted mean on the scale was 2.30 out of 4, indicating that the students have a somewhat moderate level of psychological health.

Correlational analysis computed revealed that problematic phone use score was significantly (r = 0.14, p ≤ 0.01) related to psychological health. This finding tends to suggest that the more problematic the students were regarding their phone use, the more they would be psychologically disturbed. This may be due to their uncontrollable and unhealthy use of their mobile phones.

5. Discussion

The university students focused in the present study was found to use their mobile phone reasonably and appropriately. They demonstrated reasonable amount of time and money spent on their mobile phone. The most used feature of the mobile phone was SMS followed by voice calls. This finding is consistent with earlier studies (Nurvitadi, 2003; Lie, 2004; Madell & Muncer, 2004; Ling, 2001; Eldrige & Grinter, 2001). The most plausible explanations for these findings are that SMS feature is cheaper compared to conventional voice calls, and as students they have limited financial resources; thus making SMS the best mode of communication for them.

The age of the students also played a factor in determining patterns of using the mobile phone. Younger students were found to be more inclined to use the additional features of the mobile phone such as, MMS and GPRS, while older users preferred to use the conventional voice calls. Females used more of the SMS feature while boys were more interested with other technological features of the mobile. These findings are consistent with previous study reported by Ling (2001) in which males and younger mobile users were more fascinated by new technology.

Being young students in the present study are still trying to find their own identity and eager to maintain, establish and expand their social network, thus, it was not surprising to find that students frequently contacted their friends more compared to their parents. Although young students are prone to be emotionally unstable during their transaction to adulthood, the students in this study were

generally found to have high level of self-esteem, non-problematic mobile phone users and moderately psychologically healthy.

Although overall the students were not intense mobile phone users, the study found that at the bivariate level those who had lower levels of self-esteem and younger parents tended to use the mobile phone more often than others. Students with lower self-esteem tend to have a desire to seek self-reassurance, therefore are more likely to use their mobile phone more (Bianchi & Phillips, 2005). Students whose parents are younger may have no problem in using the technology compared to older parents, thus they frequently contacted their children. As a result, the parents' behavior triggered the students to constantly check on their mobile phones and turn them into heavy users of the mobile phone.

Findings from the present study also showed that students who spent more time on their mobile phones including making social calls and used other features such as MMS and GPRS may more likely become intense mobile phone users. The amount of time spent on the mobile phone and fascination with the features of the mobile phone would make some students easily more attracted and addicted to the mobile phone. Thus, these act as precipitating factors for problematic mobile phone behavior. Further analyses showed that when other variables included in the study were statistically controlled, self-esteem and the number of social calls were predictive of problem mobile phone use. These findings are expected since it is possible that students with lower self-esteem would be more comfortable to confront a mobile phone than a real person. As indicated earlier, lower self-esteem students probably use the mobile phone as a prop for self-confidence (Bianchi & Phillips, 2005). Compared to other students, these students are more likely to spend more time on the phone and such actions may possibly propel them towards problematic mobile phone behavior.

Data from the study suggested that students who demonstrate problematic mobile phone behavior would also experience psychological problems. This finding tend to suggests that addiction or degree of attachment towards the mobile phone would cause students to experience symptoms such as anxiety, depression or even lack of sleep, which would interfere with their overall psychological functioning. This study concurs with other studies on the negative impact of addictive behavior and inadequate sleep on one's psychological health (Fredriksen et al., 2004; Moore et al., 2009; Roberts et al., 2001).

6. Conclusion

Mobile phone use has been hugely accepted by Malaysian especially amongst students. Born in the technological era, students were found to adapt well to the mobile phone. Data obtained from the present study provided baseline information regarding the patterns and problems of mobile phone usage, and psychological health of university students. Personal and familial factors were found to somewhat influence the university students' behavior in using mobile phones. Although overall the students in the study portrayed a good mobile phone computing behavior, factors that may contribute to or trigger the intensity of their mobile phone usage is worth noting.

The present study is not without its limitation. The findings are very specific and could only be generalized to population with the same characteristics. Furthermore, the questionnaires were self-administered; thus the reliability and validity of the information obtained depended solely on the honesty of the respondents in responding to the questionnaire. Despite the limitations, the current study should provide the impetus for new investigations to refine the understanding of mobile phone use amongst university students. Further research could investigate other underlying factors that exist within the ecosystems of the students that could shape their mobile phone behaviors. In addition, the consequences of intense mobile phone use could be further explored in terms of degree of psychological symptoms experienced by users of the mobile telephone.

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