



Unwillingness-to-communicate and college students' motives in SMS mobile messaging [☆]

Louis Leung ^{*}

School of Journalism and Communication, The Chinese University of Hong Kong, Shatin NT, Hong Kong

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Abstract

Results from a random sample of 532 college students show that students who made the heaviest use of SMS (Short Message Service) were motivated by its convenience, its low cost, and its utility for coordinating events. People who were socially anxious and were unwilling-to-communicate face-to-face and were put off by the confusing acronyms used in mobile messaging appeared to be those who spent less time, and not more, using SMS despite the fact that SMS could help overcome student's shyness about bringing up difficult topics with friends. In broad terms, SMS is a social technology and has become a popular communication utility for college students.

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1. Introduction

Short Message Service, or SMS, is a text-messaging cell phone technology that has made a hit with teenagers and business people in Europe and Asia and is gaining a foothold in the United States (Holloway and Valentine, 2003; Sutherland and Thompson, 2001). The growing proliferation of cell phones means that just about all mobile phone customers have access to the hardware and software they need to send and receive SMS text messages. Some believe that SMS may develop into a major form of interpersonal mediated communication, just as e-mail has replaced many phone uses. However, no one is predicting that SMS messaging will become as big as e-mail. In fact, SMS is a form of instant messaging (IM), using such programs as ICQ (I Seek You), AOL Instant Messenger (AIM), Yahoo! Messenger, and MSN Messenger, that allows the sending and receiving of brief text messages of up to 160 alphanumeric characters in length to any suitable GSM

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^{*} Tel.: +852 2609 7703; fax: +852 2603 5007.

E-mail address: louisleung@cuhk.edu.hk

phone. With the launch of mobile IM services by some IM operators in cooperation with mobile phone operators, SMS is now “cross-platform”—meaning that SMS supports not only mobile phone addresses but also e-mail addresses. Messages can be sent and received instantly in SMS form through a mobile phone, a fixed line phone, and over the Internet. Less intrusive than a mobile phone call and more immediate than e-mail, use of SMS is growing far more quickly than e-mail. In addition to messaging simple text strings between capable mobile phones, some mobile networks also enable multimedia message service (MMS), which may include richer messages such as combinations of text, voice, animated graphics, photos, video clips, music, and so on.

The most common application of SMS is the exchange of messages between friends. SMS can be more than just a consumer tool. Some businesses around the world are also finding ways to benefit from the technology. For example, financial institutions such as HSBC Bank and Deutsche Bank AG offer customers regular updates on their account balances, send their clients stock quotes, and message customers if unusual activity is detected on their accounts as part of the check on lost or stolen cards. Other business applications of SMS include tracking information on people and packages, providing flight-status updates, and even voting during a TV program. Schools can use SMS to alert parents if their kids skip class. Governments allow it to be used by citizens to cast their votes in local elections. Hospitals and clinics use SMS to remind patients of upcoming appointments and to schedule future ones.

This study focuses on the motivations and pattern of use of SMS text messaging among college students and examines potential factors, such as the gratifications sought, the limitations or shortcomings of SMS, and one personality variable—unwillingness-to-communicate in interpersonal communication—that could influence the level of use.

1.1. Text-messaging culture in Hong Kong and China

Hong Kong is a leader in the adoption of media, both new and old, and is a major telecommunications hub in the Asia-Pacific region (Karp, 1994). In fact, the International Telecommunications Union (ITU) report “Internet in a Mobile Generation,” released in September 2002, ranked Hong Kong as the No. 1 economy in the world in terms of performance in mobile and Internet technologies. According to figures released in September 2005 by the Office of the Telecommunications Authority (OFTA, 2005) in Hong Kong, the penetration rate of the mobile phone had risen to 120%¹ of a population of 6.8 million people, and this is one of the highest in the world. In March 2004, over 77 million SMS messages were sent and over 145 million received in Hong Kong. The number of “received” SMS messages exceeded that of “sent” messages because SMS messages can be sent to multiple receivers. This represents an 83% and a 51% increase in sent and received SMS messages respectively, as compared with the figures for September 2003 (OFTA, 2004).

Despite the wide variety of applications for SMS, the most common use of all has to be for interpersonal communication in the text-messaging culture in Hong Kong, especially by teenagers and students. Social connection and communication have always been of fundamental importance to college students (Leung, 2001). What is new is that another media option is now available to this “instant messenger (IM) generation,” whose ownership of mobile phones has reached over 90% (Lenhart et al., 2001) in the US and over 100% in Hong Kong (OFTA, 2005). Younger teens have more time to kill and are satisfied with a lower depth of interaction. Seen as the trendsetters of future consumer technology use, combined with their substantial spending power, the young are a focus of media attention and market research (Tappscott, 1998; Sutherland and Thompson, 2001).

Cell phone users worldwide send more than a billion text messages a day from one mobile phone to another (Wireless SMS, 2002, April, May). In Western Europe alone, 186 billion messages were sent in 2002, according to consulting firm Frost & Sullivan. Although text messaging is still in its infancy in the United States, it has become a primary means of communication in China. As of August 2003, there were 244 million mobile phone subscribers, making China the largest mobile communications market in the world (Yan, 2003). Data from

¹ Cellular phones penetration in Hong Kong, at 120% (because some users have 2 SIM cards), is one of the highest in the world (among Sweden, Finland, and Norway).

China Telecom also show that Chinese mobile phone users sent 220 billion text messages in 2003, or an average of 7000 every second. This is more than the rest of the world combined. According to the Mobile Youth 2002 report released by the Wireless World Forum, China has the fastest growing market for SMS, followed by North America (“China’s SMS”, 2002, August 8). Over one billion SMS text messages are sent every month. In Hong Kong, SMS traffic to mainland China multiplies during holiday seasons. On New Year’s Eve in 2001, Beijing Mobile expanded their SMS capacity to 5 times more than usual, to handle the million SMS messages sent in the final hour of the year (China’s SMS New Year, 2002, Feb. 26). China’s SMS market is predicted to expand to 500 million users by 2007, each of them sending 6 messages per day (China Gears Up, 2002, July 17).

With greater access to technology than any previous generation, today’s youth are coming of age in parallel with the rapid growth and global adoption of mobile phones and other wireless devices (Holloway and Valentine, 2003; Leung and Wei, 1999; Leung, 2001, 2003; Livingstone, 2002; Sutherland and Thompson, 2001; Wartella et al., 2000). IM, such as SMS and ICQ, may also help young people to overcome their shyness about bringing up difficult topics with friends and facilitate online flirting. Things may be said through SMS that are difficult to say in face-to-face communication or even on the telephone when the correspondent’s voice can be heard. SMS permits direct, immediate, casual mediated contact. However, little research has been conducted on SMS use and its impact on interpersonal mediated communication, especially among teenagers and college students.

2. Theoretical frameworks

2.1. *Uses and gratifications paradigm*

Research into the use and gratification tradition has examined the gratifications associated with the use of television, VCRs, telephones, personal computers, the Internet, and electronic mail, among others (Dimmick et al., 1994; Dobos, 1992; Katz et al., 1973; Levy, 1987; Lichtenstein and Rosenfeld, 1984; Lin, 1998; Lometti et al., 1977; O’Keefe and Sulanowski, 1995; Papacharissi and Rubin, 2000; Peled and Katz, 1974; Perse and Dunn, 1998; Rubin, 1979, 1981, 1983, 1984). Other studies in gratifications or benefits of computer-mediated technologies such as electronic bulletin board (James et al., 1995), on-line electronic message system (Blackman, 1990), political computer bulletin board (Garramone et al., 1986), cellular phones (Leung and Wei, 2000), the pagers (Leung and Wei, 1999), and ICQ (Leung, 2001) suggested broad motivations which included information exchange, conversation and socializing, information viewing, entertainment, information and education, escape and diversion, reassurance, fashion and status, and communication medium appeal. Recent studies have also emphasized personality traits and predict media use (Finn, 1997), gratifications from overall media use (Vincent and Basil, 1997), the identification of social and psychological characteristics that influence the use of media (Finn and Corr, 1988; Perse and Rubin, 1990; Rubin, 1993), and on Net-generation attributes and gratification-obtained on Internet use (Leung, 2003).

These studies are derived from the uses and gratifications perspective, which asserts that social psychological motivations may cause people to turn to mass media for companion and other gratifications. As early as 1974, Rosengren suggested that certain basic needs interact with personal characteristics and the social environment of the individual would produce different motives and gratification behaviors that can come from using the media or other activities. Palmgreen and Rayburn (1979) argued that the primary task facing media research was to integrate the roles played by gratifications and other factors into a general theory of media consumption. The use and gratification approach assumes the active participation of the audience in media selection and use. The concept of an active audience implies (1) utility, the uses people have for communication, (2) intentionality, or prior motivation that directs communication behavior, and (3) selectivity, or prior interest and desires that affect communication choices and content (Blumler and Katz, 1974; Palmgreen et al., 1985). The general theoretical conclusion of many use and gratification studies is that the gratifications sought motivate the use of a particular medium in an audience. In this respect, the audience is often attempting to satisfy certain psychological needs such as surveillance, information-seeking, entertainment, personal identity or companionship (Dimmick et al., 1994; Lin, 1998; Rubin, 1981, 1983). Maslow (1970) described these psychological needs as cognitive and emotional in nature. As such, the

behavior of media gratification seeking is regarded as goal-directed and utility-driven (Blumler, 1979; Katz et al., 1974). This utilitarian view of media use can be conceptually applicable to people's motives associated with the use of SMS text messaging. Despite so little research has been conducted on gratifications of SMS use, much of what we know regarding motives for the use of SMS has been drawn from the experience of teenage users. These presumably use SMS to exchange gossip and rumors, talk about their personal lives, do something when they are bored, find ways to connect and hang out, and chat about anything or nothing in particular. Unlike previous studied technologies, SMS is different because it is a form of instant messaging systems, omnipresent, inconspicuous, and text-based. One goal of this study is to explore a wide range of motivations in SMS use which users can identify as unique. As a result, the following research question is asked:

RQ1: What are the gratifications students associate with SMS use?

As suggested earlier that gratification is an important variable in mass communication and consumer research, this study expects perceived gratifications sought from SMS increase with SMS use. Thus, the following hypothesis was proposed:

H₁: The more gratifications students sought from SMS use, the more one would use SMS.

2.2. Shortcomings in SMS text messaging

SMS has many advantages. For example, the recipient does not have to be present to receive a message. It is quick, ubiquitous, inexpensive, unobtrusive, and eliminates the risk of getting stuck in a long conversation. However, it also has its shortcomings. The major weakness of SMS is that messages are generally limited to 160 characters per message. Paradoxically, it is this very limitation of text messaging that has contributed to its huge and growing appeal in the youth market, resulting in a comprehensive and ingenious sub-language of abbreviations and characters based on pictograms like the “:)” representing a happy face. Very often there is willful misspelling and an encyclopedia of acronyms, e.g. BIG = big evil grin, POS = parent over shoulder, RUOK = Are you OK? CUL8R = See you later, YTLKIN2ME = You talking to me? and in Taiwan, 520 = “I love you” and 881 would mean “bye-bye”. These are accused of being a cause of confusion and misunderstanding about the intended meaning in the text messages. Furthermore, the keypad on the handset is difficult to use to enter English or Chinese characters, and this discourages older users.

SMS and MMS are at a fairly early stage of diffusion. SMS use is still largely concentrated in the “text generation” consisting of teenagers and students. SMS users may feel pressure to respond immediately to questions from others once it becomes known that they are able to access messages, whether through SMS via their mobile phone or through ICQ via the Internet. Consequently, less time and patience is spent on preparing an answer to an instant message. IM-ing has many of the characteristics of e-mail but lowers the psychological costs of communication still further as it is extremely casual and easy to use. But in many ways it is also more demanding (Katz and Rice, 2002). As the latest in a string of technological inventions that conspire to demand ever faster responses at any hour of the day, SMS quickens the pace and broadens the volume of communication for many of its users. To an even greater extent than pagers, cell phones or e-mails, it provides the ability to broadcast an almost constant online presence, particularly with the spread of broadband Internet connections that enable users to be permanently connected. Instant messaging, using either SMS or ICQ, often leads to a disjointed rhythm in conversations, where one person is typing a message about one subject at the same time as the other person is still answering a previous message on a different subject. Since it could be expected that these shortcomings may have a significant impact on the usage pattern of SMS, we ask the following research question:

RQ₂: What are the common perceptions of the shortcomings of SMS text messaging?

H₂: The more shortcomings of SMS students perceived from SMS use, the less one would use SMS.

In addition to the gratifications and the shortcomings of SMS as the two most important factors influencing the level of SMS use, we feel that one personality construct could also be taken into consideration, namely—an individual's unwillingness-to-communicate.

2.3. *Unwillingness-to-communicate*

Burgoon (1976) defined unwillingness-to-communicate as “a chronic tendency to avoid and/or devalue oral communication and to view the communication situation as relatively unrewarding” (p. 60). Past research has associated the unwillingness-to-communicate construct with anomia, alienation, introversion, low self-esteem, and high communication apprehension (Burgoon, 1976). To measure unwillingness-to-communicate, Burgoon (1976) created a two-dimension scale: (a) approach-avoidance, which identifies “the degree to which individuals feel anxiety and fears about interpersonal encounters and are inclined to actively participate in them or not” (p. 63), and (b) reward, which reflects “the degree to which people perceive that friends and family don't seek them out for conversation and opinions, and that interactions with others are manipulative and untruthful” (Burgoon and Hale, 1983, p. 240). Unwillingness-to-communicate has been used to explain mass media use (e.g., Armstrong and Rubin, 1989) and Internet use (e.g., Papacharissi, 2002; Papacharissi and Rubin, 2000). For example, in radio research conducted by Armstrong and Rubin (1989), it was found that, as compared with non-callers, talk radio callers were less willing-to-communicate in face-to-face interaction and perceived face-to-face communication to be less rewarding. In the same way as for the talk-radio callers, SMS might serve as an alternative to more traditional channels for those who find face-to-face communication unattractive. Moreover, Papacharissi and Rubin (2000) indicated that Internet users who were socially anxious and avoided face-to-face interaction, chose the Internet as a functional alternative channel to satisfy their need for interpersonal communication. In addition, it was also found that UC-Reward had a positive correlation with information seeking and a negative correlation with interpersonal utility. This suggests that those who felt valued in their interpersonal environment considered the Internet to be primarily an informational tool, whereas those who felt less valued in their face-to-face interaction turned to the Internet as an alternative communication tool. Recently Ma and Leung (2005) investigated ICQ usage pattern and focused on the effects of unwillingness-to-communicate and media perception of the Internet on self-disclosure in ICQ conversation in terms of control of depth, honesty, positive-negative, and amount. They found that people who are more willing to participate in real life communication tend to disclose more intimately, positively, and to a greater extent about themselves in ICQ; whereas, people who find real life communication un-rewarding would tend to be more dishonest, negative, less desirable, and less open in disclosing their opinions and beliefs.

In light of the physical characteristics and technological capabilities of sending messages using SMS via a mobile phone, SMS is a novelty that appeals to a wide range of users. It is particularly appealing, perhaps, to people who are more apprehensive about face-to-face communication and find real life communication with family and friends less rewarding because they may feel more confident when using SMS for interpersonal encounters. Although communication apprehension can also be treated as a motive or a gratification sought, as a mediated interpersonal communication technology, SMS mobile text messaging can be studied profitably within a theoretical framework grounded in the unwillingness-to-communicate paradigm.

This study focuses on the effects of gratifications-sought, unwillingness-to-communicate, and the shortcomings of SMS text messaging on the pattern of use of SMS among college students. These factors should help to explain the students' motives for using SMS and help to predict the level of use. Therefore, two additional hypotheses and two research questions are asked:

H₃: SMS users will be more apprehensive in communication than non-users.

H₄: Level of SMS use will be positively related to UCS-AA and UCS-R.

RQ₃: What are the differences between SMS users and non-users with respect to the shortcomings of SMS text messaging and demographics?

RQ₄: To what extent can the gratifications of SMS use, an unwillingness-to-communicate, the shortcomings of SMS text messaging, and demographics predict patterns of SMS use?

3. Method

3.1. *Sample and sampling procedure*

Questionnaires were administered during classes, with the permission of the instructors, to a multi-stage stratified random sample of classes² at a large size university in Hong Kong in 2003. In the first stage, departments were randomly selected from a stratified list of 47 small (less than 100 students), medium (100–300 students), and large (more than 300 students) departments and programs in seven colleges. The stratification accounted for 42 small, 4 medium, and 1 large departments. To ensure a proportionate stratified sample from these 47 departments, one large, two medium, and 12 small departments were randomly selected. The second stage was to select classes from a stratified list of large (over 100 students), medium (31–99 students), and small (30 or fewer students) classes from the 15 randomly selected departments. As there were more medium sized classes in the university, 8 large, 26 medium, and 13 small sized classes were randomly selected to ensure a fair reflection of the distribution of the student population.

As participation in this research was entirely voluntary, alternate classes of similar size were used when an instructor refused to cooperate. The final sample consisted of 532 students, of whom 353 were users of SMS (66.4%) and 179 were non-users (33.6%). The completion rate was 88.2%.³

The reasons given for not using the SMS included: “my mobile phone does not have the service” (80%); “no need or no interest” (69.2%); “don’t want to pay for it” (57.8%); “don’t know how to use SMS” (43.8%); “difficult to understand” (37.5%); “don’t have time for it” (32.1%); “limited message length” (23.3%); and “too complicated” (20.6%).

College students were chosen as the target sample in the study because access to mobile phones and the likelihood of them using SMS was high. The participants ranged in age from 18 to 25 ($M = 20.2$, $SD = 1.14$), and the majority were female (66.2%). The largest group of respondents was first year undergraduate students (35.2%), followed by second year (33.9%), third year (24.1%), fourth year (5.5%), and post-graduate students (1.3%). The mean monthly household income was between US\$1282 and US\$2564, with 54.2% living at home and 45.4% living in dormitories on campus. These figures closely resembled the actual distribution of the university population.

3.2. *Measures*

3.2.1. *Gratifications of SMS use*

Initially, items used in previous studies on the gratifications of the telephone, such as sociability, instrumentality, reassurance, entertainment, acquisition, and time management, were included in the survey questionnaire (Dimmick et al., 1994; O’Keefe and Sulanowski, 1995; and LaRose and Dordick, 1993). Additional gratification items were included which related to the use of mobile phones, pagers, and the ICQ, such as mobility, immediacy, affection, relaxation, and fashion/status (Leung, 2002; Leung and Wei, 1999, 2000). In this study it is assumed that these motives would also apply to the use of SMS. However, as a text-messaging technology, the SMS may involve other motives in addition to those gratification dimensions defined previously. Therefore, this study seeks to first identify those gratifications that are uniquely associated with this technology. To do this, a focus group was created to gather and to refine gratification items directly related to SMS usage. A total of 27 statements that reflected the different categories of reasons for using SMS were tested. The final questionnaire consisted of gratification statements as primary motives for engaging in this form of mediated interpersonal communication, ranging from escape, affection, convenience, entertainment, fashion, inclusion, sociability, coordinating events to relaxation. A 5-point Likert scale was used, with “1” meaning “strongly disagree” and “5” meaning “strongly agree” to rate each of the reasons presented for using

² Only all classes offered by the university have equal chances to be selected but not every student. This means that students, who are absent on the day of the survey or students not taking any classes but a directed or independent study, may have been excluded.

³ The 88.2% completion rate was calculated by dividing the total number of questionnaires completed by the total number of questionnaires distributed on the day of the survey to those students present in class in all the 37 classes. Students did not return the questionnaire and left class early were considered the refusals. The refusals were also included in the calculation.

SMS. Twenty of the items survived the pre-testing carried out with a convenient sample of 96 students. Items that were found to be repetitive or ambiguous were eliminated.

3.2.2. *Unwillingness-to-communicate*

A 20-item Unwillingness-to-Communicate Scale (Burgoon, 1976) was used in this study. It included the dimensions of Approach-Avoidance (UCS-AA) and Reward (UCS-R), each containing 10 items. Low UCS-AA scores meant that the respondents were anxious or fearful about interpersonal encounters, whereas low UC-Reward scores implied that the respondent found interpersonal communication to be less rewarding, less valued, and that they were less sought out for conversation and opinions by their friends and family. To be consistent, a 5-point Likert scale was adopted throughout the study with 5 = strongly agree and 1 = strongly disagree. Reliabilities for the UCS-AA dimension was 0.82, whereas the Cronbach's alpha for the UC-Reward dimension was 0.74.

3.2.3. *Shortcomings in SMS text messaging*

To assess the perceptions of both users and non-users on the shortcomings of SMS text messaging, participants in the gratifications focus group were also asked to provide information on the aspects of the technology that they disliked. A total of nine items that were commonly agreed to give rise to problems in the use of text messaging using SMS were identified. They included the following: "using different acronyms for the same word is difficult to understand"; "it is annoying when getting an SMS message if you don't know what the acronyms stand for"; "non-obvious long phrases are confusing when shortened"; "acronyms in SMS that already have other meanings might cause confusion"; "it is difficult to determine the intent from the SMS message"; and "it is hard to figure out if an SMS message is a joke or is serious." A 5-point Likert scale was used with 1 = strongly disagree and 5 = strongly agree.

3.2.4. *Demographics*

The demographic characteristics of the students that were measured were their age, gender, classification, monthly household income, and whether they lived at home or in dormitories on the campus.

4. Findings

4.1. *Gratifications of SMS use*

Principal component factor analysis was run to determine the potential groupings of the 20 gratifications items of SMS use. Varimax rotation was used to better account for expected correlations among potential factors. Six factors emerged with eigenvalues greater than 1.0, explaining 75.44% of the total variance (see Table 1).

The first factor was "entertainment". This consisted of four items reflecting how SMS can be used as a communication channel for students to seek enjoyment and stimulation and have fun. The mean scores for these items were the third highest, suggesting that entertainment was a strong motive for using SMS. This factor had an eigenvalue of 6.12 and explained 30.6% of the total variance. The reliability of these four items as indicated by the Cronbach's alpha was high at .92. "Affection" was the second factor (eigenvalue = 2.81, 14.04% of the total variance). It included four items that characterized SMS as a channel for expressing appreciation, showing care for the feelings of another person, giving encouragement, and sending goodnight messages to loved ones (the Cronbach's alpha was .92). These items had the highest mean scores, indicating that showing affection was an important motivation for student use of SMS. "Fashion" was the third factor (eigenvalue = 2.21, 11.07% of the total variance). It consisted of three items that illustrated how messaging using SMS was considered fashionable and stylish, and was expected by their student peers. However, the mean scores of the three items underlying this factor were the lowest, although the Cronbach's alpha remained high at .94. "Escape" was the fourth factor (eigenvalue = 1.70, 8.5% of the total variance). It included three items that achieved relatively low mean scores and a Cronbach's alpha at .82. These items suggested that students sent/received SMS messages when they "wanted to get away from what they were doing," "wanted to put off something they should be doing," and "wanted to play tricks on others." The fifth factor, "convenience and low cost" (eigenvalue = 1.19, 5.92% of the total variance), contained three items demonstrating that the SMS was used widely

Table 1
Factor analysis of gratifications of SMS use

I use SMS...	Mean	SD	Factors					
			1	2	3	4	5	6
<i>Entertainment</i>								
1. Because it is entertaining	3.03	1.14	.90					
2. Because it is fun	3.08	1.19	.86					
3. Because it is stimulating	2.94	1.14	.86					
4. Because I enjoy it	3.03	1.15	.77					
<i>Affection</i>								
5. To let others know I care about their feelings	3.59	1.21		.89				
6. To thank them	3.59	1.12		.87				
7. To show others encouragement	3.72	1.09		.86				
8. To send goodnight messages to love ones	2.75	1.36		.54				
<i>Fashion</i>								
9. To look stylish	2.04	1.07			.90			
10. To look fashionable	2.05	1.09			.89			
11. To not look old-fashion	2.02	1.07			.88			
<i>Escape</i>								
12. To put off something I should be doing	2.43	1.02				.83		
13. To get away from what I am doing	2.40	1.08				.82		
14. Because I can play tricks on others	2.26	1.14				.74		
<i>Convenient and low cost</i>								
15. Because it is quick	3.24	1.16					.86	
16. Because it is easy to use and convenient	3.29	1.09					.84	
17. Because it is cheaper and I can control cost	3.05	1.19					.70	
<i>Coordination</i>								
18. To arrange a time to phone each other	2.59	1.08						.85
19. To coordinate and clarify how and when to communicate	2.84	.98						.76
20. To coordinate a time to instant message each other	2.77	1.01						.66
Eigenvalue			6.12	2.81	2.21	1.70	1.19	1.06
Percent of variance explained			30.60	14.04	11.07	8.50	5.92	5.30
Cronbach's alpha			.92	.83	.94	.82	.75	.71

Scale: 1 = strongly disagree and 5 = strongly agree. $N = 352$ (total variance: 75.44%).

by students because “it is quick,” “it is easy to use and convenient,” and “it is cheap and they could control cost” (the Cronbach's alpha was .75). The item mean scores were relatively high, indicating that convenience and low cost were important motivations for students to use SMS. “Coordination” was the last factor (eigenvalue = 1.06, 5.3% of the total variance). The responses showed that students used SMS to arrange a time to phone each other, to coordinate and clarify how and when they would communicate, and to coordinate a time to instant message each other (the Cronbach's alpha was .72).

On the whole, this study found that many students were motivated to use SMS by such instrumental reasons as convenience/low cost, entertainment, coordination, and fashion. Others used SMS for intrinsic motives such as affection and escape. However, hypothesis H_1 , posited that the more gratifications one sought from SMS use, the more one would use SMS, was only partially supported. This is because level of SMS use was significantly linked only to gratifications such as convenient ($r = .26, p < .001$) and low cost and coordination ($r = .13, p < .05$), but not entertainment, affection, fashion, and escape.

4.2. Shortcomings in SMS text messaging

To assess the common perceptions of the shortcomings of SMS text messaging, principal components factor analysis yielded two factors with an eigenvalue greater than 1.0, explaining 76.31% of the variance (see Table 2).

Table 2
Factor analysis of shortcomings in text messaging

Perceptions of SMS text messaging	Mean	SD	Factors	
			1	2
<i>Confusing acronyms</i>				
1. Different acronyms for the same word difficult to understand	3.04	1.03	.88	
2. Annoying when you don't know what the acronyms stand for	3.16	1.12	.82	
3. Non-obvious long phrases when shortened are confusing	3.13	.97	.81	
4. Acronyms in SMS already have other meanings might cause confusion	3.03	.95	.76	.38
<i>Intention difficult to understand</i>				
5. Difficult to determine the intent from the SMS message	2.91	.98		.89
6. Hard to figure out SMS message a joke or serious	2.93	1.03		.87
Eigenvalue			3.51	1.07
Variance explained (%)			58.44	17.87
Cronbach's alpha			.87	.78

Scale: 1 = strongly disagree and 5 = strongly agree; $N = 352$ (total variance: 76.31).

The first factor was “*confusing acronyms*”. This consisted of four items reflecting how users and non-users of SMS agreed that there was difficulty in understanding “different acronyms for the same phrase” and “shortened phrases from non-obvious long phrases,” and found that it was annoying when they did not know what the acronyms stood for. This factor had an eigenvalue of 3.51 and explained 58.44% of the total variance. The reliability of these four items as indicated by the Cronbach's alpha was high at .87 and the item mean scores were also high. “*Intention difficult to understand*” was the second factor (eigenvalue = 1.07, 17.87% of the total variance). It included two items, namely, that users and non-users of SMS found it hard to determine the intent of a message, and difficult to figure out whether the message was a joke or was a serious message. How-

Table 3
Discriminant analysis of SMS users with unwillingness-to-communicate, shortcomings in text messaging, and demographics predictors^a
($N = 532$)

Predictors	Structure coefficients
<i>Unwillingness-to-communicate</i>	
Approach-Avoidance (UCS-AA)	-.31***
Reward (UCS-R)	-.03
<i>Shortcomings in SMS text messaging</i>	
Confusing acronyms	.81***
Intention difficult to understand	.44***
<i>Demographics</i>	
Gender (male = 1)	.30***
Age	.00
Classification	.05
Household income	.30***
Residence (dormitory = 1)	.01
Eigenvalue	.10
Canonical correlation	.31
Degree of freedom	7
Wilks' lambda	.91
Significance	$p < .001$
Group centroids	
SMS user	-.23
SMS non-users	.46
Cases correctly classified	62.3%

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

^a SMS users were dummy coded with user = 1, else = 0.

ever, the item mean scores for the two items underlying this factor were low and the Cronbach's alpha was moderately high at .78. In sum, this study found that both users and non-users of SMS clearly perceived that there were significant shortcomings in SMS text messaging.

H₂ predicted that the more shortcomings of SMS students perceived from SMS use, the less one would use SMS. Correlation results showed partial support as only confusing acronyms was significantly associated with level of SMS use ($r = -.13, p < .05$).

4.3. Differences between SMS users and non-users

H₃ hypothesized that SMS users will be more apprehensive in communication than non-users and the third research question asked if there were differences between SMS users and non-users with respect to the shortcomings of SMS text messaging and their demographic characteristics. Discriminant analysis was run using these three aspects as predictors. Table 3 shows that SMS student users were more likely to be male with a high family household income and were well aware of the shortcomings inherent in SMS text messaging, such as the confusing acronyms and the unclear message intention. When compared to non-users, SMS users were more socially anxious or felt less valued in face-to-face communication but not significantly linked to UCS-R. Therefore, H₃ received partial support. The function correctly classified 62.3% of the cases.

4.4. Predicting SMS usage pattern

The messages students sent via SMS were mostly personal or job related (76.6%), 72.1% on relationships/romance, 64.7% on family, 60% on school, and 50% were not related to anything in particular. The circumstances that led students to use SMS to communicate include: when they need to coordinate something (74.7%), a habit (65.8%), when they are bored (62.8%), when they receive an SMS message (61.9%), and when

Table 4
Regression analysis of SMS usage using gratifications, unwillingness-to-communicate, shortcomings in text messaging, and demographics as predictors

Predictors	Level of SMS use	Persons SMS were sent to		Locations where SMS was used	
		Immediate family	Boyfriends or girlfriends	Buses, cars and trains	Malls, restaurants and street
<i>Gratifications</i>	β	β	β	β	β
Entertainment		.16**			.12*
Affection			.18**	.25***	.16**
Fashion		.23***			.15**
Escape					
Convenient and low cost	.25***		.21***	.12*	.15**
Coordination	.16**				.12*
<i>Unwillingness-to-communicate</i>					
Approach-Avoidance (UCS-AA)	.12*		.15**	.17**	
Reward (UCS-R)					
<i>Shortcomings in SMS text messaging</i>					
Confusing acronyms	-.14**				
Intention difficult to understand					
<i>Demographics</i>					
Gender (male = 1)		-.16**			-.11*
Age					
Classification		-.11*	.12*	.10*	
Household income	.11*				
Residence (dormitory = 1)					
Final adjusted R ² (%)	.12	.11	.11	.12	.12

Notes: Figures are standardized beta coefficients. *N* ranged from 334 to 353.

$p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

they have nothing else to do (55%). Furthermore, as shown in [Table 4](#), regression analysis shows that heavy users of SMS, motivated by its convenience/low cost ($\beta = .25, p < .001$) and its ability to help coordinate events ($\beta = .16, p < .01$), were those who were less afraid of social contact and were willing to get involved in real life communication ($\beta = .12, p < .05$). Thus, H_4 was not supported. In contrast, light users tended to be influenced by the shortcomings of confusing acronyms in SMS messaging ($\beta = -.14, p < .01$), had a low household income ($\beta = .11, p < .05$), and were among those who were socially anxious and felt less valued in face-to-face communication. These five variables accounted for 12% of the total variance.

In addition to the level of SMS use, the persons to whom SMS messages were sent and the locations where SMS was used were also examined. Regression results indicate that sending SMS messages to immediate family members was done for entertainment ($\beta = .16, p < .01$) and fashion ($\beta = .23, p < .001$), whereas affection ($\beta = .18, p < .01$), convenience and low cost ($\beta = .21, p < .001$), and feeling socially anxious or being unwilling to get involved in face-to-face communication ($\beta = .15, p < .01$) were reasons for sending SMS messages to boyfriends or girlfriends. Demographically, students who used SMS to communicate with their immediate family were often female and from a lower classification, while those who sent messages to boyfriends or girlfriends tended to be from a higher class.

Similarly, convenience and low cost ($\beta = .12, p < .01$ for the buses, cars and trains and $\beta = .15, p < .01$ for the malls and streets regression equations) and the ability to use SMS for activity co-ordination ($\beta = .12, p < .05$) were important predictors for those who are on the move. As expected, the heavy use of SMS text messaging during idle times in transit such as on buses, cars, and trains and in malls, restaurants, and streets is strongly linked to entertainment ($\beta = .12, p < .05$), affection ($\beta = .25, p < .001$ for buses, cars, and trains and $\beta = .16, p < .01$ for malls, restaurant, and street), and fashion ($\beta = .15, p < .01$) gratifications, especially for female upper class students, those who are socially anxious, or who are active in the public eye. The variance explained in the four regression equations ranged from 11% to 12%.

5. Conclusions and discussion

5.1. SMS use and unwillingness-to-communicate

The aims of this research were to discover the motives for SMS use by college students and how these motives, together with unwillingness-to-communicate and the shortcomings of SMS, could explain the usage pattern of this widespread form of mobile text messaging. The results show that convenience and low cost, entertainment, coordination, and fashion were strong instrumental motives for SMS use while affection and escape were intrinsic factors. As compared to non-users, student users of SMS tended to be male with a high household income were more socially anxious or felt less valued in face-to-face communication. They were well aware of the shortcomings inherent in SMS text messaging, such as the confusing acronyms and the unclear message intention. The findings of this research suggest that these shortcomings did not inconvenience them nor discourage them from using SMS text messaging, for they are a group that loves technology, has a passionate interest in how technology works, and possesses a keen sense of being innovative and investigative ([Tappscott, 1998](#); [Sutherland and Thompson, 2001](#)). On the other hand, regression analysis shows that students who made heavy use of SMS, motivated by its convenience, low cost, and its ability to help coordinate events, were those who had less fear of, and were more willing to get involved in, real life communication. In contrast, people who were socially anxious, were unwilling-to-communicate face-to-face, and were irritated by the confusing acronyms used, appeared to be those who spent less time, not more, using SMS. This finding is in line with a recent study on ICQ, which indicated that lonely people who were unwilling to reveal themselves in face-to-face communication did not spend more time or use ICQ more often than others ([Leung, 2002](#)). However, this result contradicts some earlier research which found that talk radio callers and Internet users who avoided face-to-face interaction or found it less rewarding, used talk radio and the Internet more for interpersonal communication purposes and chose it as a functional alternative to satisfy their interpersonal needs ([Armstrong and Rubin, 1989](#); [Papacharissi and Rubin, 2000](#)). These diametrically opposed results can be explained by the fact that SMS messaging may have become a popular and common interpersonal communication tool among Hong Kong students despite its shortcomings and the differences in the personalities of the users.

5.2. Motives for SMS use

As expected, convenience and low cost was found to be an important predictor for the level of SMS use, especially by those who are on the move, i.e. during transits in cars, trains, buses, or in malls, restaurants, or in the street, and by those who often text-message with boyfriends or girlfriends. It is certainly true that service charges for SMS and MMS are cheap as compared with voice services. For example, the charges for voice services are from 0.8 to 2.2 US cents *per minute*, but for SMS they are from 2.1 to 3.6 US cents and for MMS from 12 to 14.5 US cents *per message*. Similarly, active SMS users, such as those in China and Taiwan, use the technology to cut down on their relatively expensive mobile phone costs. In fact, a local area phone call in China might cost from 6 to 12 US cents, but SMS costs only about 1.2 US cents *per message*, and so it is comparatively cheaper than a regular voice call. The young peoples' love of new technology has been a significant force in the rise of the mobile phenomenon as a faster and cheaper way to communicate and establish connectivity. For adolescents, mobile messaging began as a way to save on the cost of telephone calls, and from there it evolved into a trend, since there are some things that are easier to write than to say. As market competition increases for SMS, prices may drop even further to attract the critical mass of users.

It is also worth noting that sending SMS mobile messages to immediate family members is done for entertainment. This finding is very much tied to how much the student users enjoy the personalized SMS information they want to receive, e.g. mark six and horseracing betting results, daily news headlines, stock quotes, wallpapers and ringtone downloads, games, polling, weather, daily horoscope, and traffic updates. People regard SMS and MMS not only as a mode of communication, but also as an entertainment. With the recent legalization in Hong Kong of betting on soccer, betting online via SMS, mobile phone, PDA, or on the Web is becoming ever more popular. Users can place their bets on soccer, mark six, and horseracing via SMS using a Telebet account. Mobile phones offer subscribers a great deal of freedom, allowing them to choose features and innovations that suit their budget and lifestyle. The targeted market of SMS, or "texting" as it is more popularly known, has been the young. Today, home audiences can participate in game shows on TV by answering questions that appear on the screen using SMS. Furthermore, mobile operators usually use telemarketing to reach their customers. An SMS M-coupon can be sent to a user's handset, using a one-to-many mode of communication. Users can simply show the SMS M-coupon to enjoy discounts for hotel and cinema services.

In addition to the important motives of convenience and low cost and entertainment, it is also interesting to note that the heavy use of SMS text messaging during idle times in transit or while on the move is strongly linked to affection. This is especially the case for students who are active in face-to-face communication, who use it to send brief messages of encouragement, to let others know that they care about their feelings, or simply to send a goodnight note to loved ones. This makes a great deal of sense because SMS is a social technology and has become a popular communication utility for college students, despite its shortcomings, and no matter whether the users are socially anxious or find face-to-face communication unrewarding. Through SMS, users can express their heartfelt sentiments without using voice communication. In addition, many argue that it is really the notion of "presence," of being in constant peripheral contact with the cast of characters that define one's life, that makes SMS such a powerfully intimate—and potentially burdensome—form of communication. Perhaps more than any other digital technology, SMS messaging enables users to be physically in one place while at the same time they may be participating in an entirely different mental and emotional universe.

Furthermore, the relationship between fashion gratifications and the use of SMS messaging to immediate family from malls and restaurants seems to be unique in its own right. Though it is a concept that has been theoretically explicated, little attention has been paid to it in empirical studies on the adoption of new media. As Rogers (1995) pointed out when describing the characteristics of adopters of new media that higher-status individuals may be especially likely to adopt the new media because they are seen as status symbols. Sending or receiving SMS messages in public places was done as a way of making a status statement that the user was stylish and fashionable. This unique motivation seems to be an integrating force, leading college students to feel that they are connected with their peer networks.

Finally, this study demonstrates that the uses and gratification approach is theoretically powerful in explaining why college students use SMS as a popular channel for interpersonal mediated communication.

In fact, using SMS to show affection, coordinate events/activities, get entertained, look stylish and fashionable, and to escape are all related to elements of “communication” motivation in how students could use SMS to create, share, frame, organize everyday experiences, and to solve problems for themselves. Its success lies in its essential simplicity, quite apart from the low cost of the service. As new communication technologies offer new ways for teenagers and youngsters to communicate, the impact of SMS text messaging as a functional alternative may increase competition between the mobile phone, e-mail, and other instant messaging channels. However, any destabilizing effect this may have may be limited under current circumstances, as the text strings allowed are still brief and restricted to 160 alphanumeric characters or 70 Chinese words in one message. SMS will continue to enjoy a fast diffusing and growing popularity. MMS will start to take-off when differences in interoperability between the networks of different vendors, different terminals, and between networks and terminals of different vendors are reduced or eliminated. In the future, the creation of interesting and useful services, improving the simplicity and transparency of charging plans, and the need to keep the cost of the service low are therefore essential ingredients if MMS is to become a widespread service for more users.

5.3. *Limitations and suggestions for future research*

To conclude, this study contributes to the literature by investigating the extent to which a combination of gratifications, unwillingness-to-communicate, and shortcomings in SMS text messaging can be used to predict SMS usage patterns. However, this research is subject to certain limitations. First, because only college students from one Asian city were sampled, the study may have limited generalizability to other geographical regions, ethnic groups, and cultures. Unlike e-mail, which caught on widely only after corporations began to train their employees to use it, instant messaging, especially SMS, is infiltrating the workplace from the bottom up, by way of the employees themselves. People often find themselves using it to communicate even with their work colleagues. Therefore, future studies should focus on how SMS will continue to grow with value-added features and spread to an even wider segment of the population. Second, the participation in this study was strictly voluntary and there was no follow-up when a questionnaire was not returned. Third, many students were in a hurry to reach their next class; as a result, they might not have understood clearly the questions posed. Despite these difficulties, however, the 88.2% response rate was adequately high. Fourth, as alpha scores for some factors were not exceptionally high, future study should refine the items for better reliabilities. Fifth, interactive communications technology must have a critical mass of users in order to achieve the larger goal of collective adoption (Markus, 1987; Rogers, 1995). But what constitutes an effective critical mass is not clearly defined, and it could vary dramatically depending on different definitions of community of interest. This means that SMS can have differential benefits, which could lead to varying levels of use of SMS by different groups in the critical mass. This study does not investigate SMS use from the perspective of the critical mass. More studies are needed to explain the patterns of adoption, as different people seem to value different parts of the functionality of SMS, and use the tool in very different ways—in part as a reflection of their membership in sub-groups, which have a community of interest. For example, students in settings that particularly value the opportunity offered by SMS for showing affection form part of a distinct kind of critical mass as compared with those students who primarily value it as a tool to be used as an indication of presence. Do use patterns exist which are specific to different communities of interest? Can they be differentiated by gender and would they change with the age of the user? The results of this suggested research could have important implications for the design of future value-added SMS/MMS services.

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