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EXPLORATION OF INSTANT MESSAGING BEHAVIOR IN SMARTPHONE IN TAIWAN

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ABSTRACT

Smartphones have become increasingly popular among consumers, and their popularity has given rise to various kinds of applications, or apps. This study attempts to use consumer gender and real world interpersonal relationships to explore the moderating effect of popular cellphone communication software usage on interpersonal interactions. This study uses variance analysis to test its hypotheses, collecting data from a research sample of 128 university students who use instant messaging (IM). The results show that when users have good interpersonal relationships, they also have good interpersonal interactions. Even if consumers use cellphone IM software infrequently, users who have good interpersonal relationships in daily life can also interact via other communication channels because they have better interpersonal interaction techniques.

Keywords: *Smart Phones, Interpersonal Interaction, Instant Messaging*

1. INTRODUCTION

In modern society, mobile phones feature far more than just calling and text messaging capabilities. In the 21st century, smartphones occupy a very important place in people's lives. For example, people can receive and send emails through their mobile phones at any time, browse Facebook to catch up with friends anytime and anywhere, or make contact with clients and friends through the Line or WhatsApp applications. If the user gets lost, the GPS installed in mobile phones can be used to locate the intended destination very quickly.

According to Gartner (2012), the sales volume of mobile phones in the first quarter of 2012 reached 419.1 million [1]. Although the figure is down 2% compared with the same period in 2011, smart phone sales are a constant driver of the mobile phone market. The sales volume of smartphones for the first quarter of 2012 was 144 million, up 44.7% from 2011. In Asia, the percentage of smart phones that were sold grew from 20% of the mobile phone market in 2008 to 39% in 2012.

In recent years, consumers have continued to increase their dependence on the Internet, particularly as Internet usage has gradually developed toward mobile models, further strengthening the concept of mobile Internet applications. New forms of mobile network application services have changed the way consumers use cellphones, with smart mobile devices being fully introduced into the mass market to satisfy more of the user's physical and mental needs. In Taiwan, a study by the Institute for Information Industry (III) (2012) reported that in 2011, 85.3% of Taiwanese consumers owned cellphones, with 16.6% of these having smartphones [2]. In 2012, InsightXplorer conducted a study on smartphones for Taiwanese netizens, finding that other than the basic function of "making telephone calls," among the usage behaviors for smartphones, the ratio of "browse webpages online" (44.5%) is the highest among various mobile application services, followed by "send and receive text messages" (37.0%). This result shows that cellphones have become an important way for Taiwanese people to transmit messages [2].

Free mobile communications software has become the optimal tool for communication among friends [3]. New technology has taken an intermediary role in interpersonal communication. Past studies have focused on computer operations and the use instant messaging (IM) in work situations for communication among colleagues [4-6]. Moreover, the real-time interaction of cellphone IM is an advantage over the comparative

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inconvenience of personal computers and the non-prevalence of notebook computers, and cellphone IM has been significantly utilized for both communication between and building relationships among friends. Neo & Skoric (2009) noted that university students in both the West and East are heavy users of IM [7]. Hu et al. (2004) surveyed 138 American university students, reporting that as many as 90% of university students communicate primarily through IM; a survey of 268 Canadian university students indicated that 97% were IM users [8]. Nearly all Taiwanese university campuses have wireless Internet [9], making university students heavy users of online IM.

Previous IM research explored whether IM usage can help users multi-task [10-12] and whether medical institutions can use IM to provide real-time medical consultation services [13]. Other studies have used psychology to evaluate the character traits and social perceptions of people who prefer using IM as their primary communication medium [14-15]. Yet other research compared differences caused by different electronic media (including IM) on the communication levels of users [16-17].

Hutchby (2001) pointed out that as a type of technology, media participates in the communication and interactions of humans in the workplace[18]. Differences in the characteristics of media alter interpersonal relationships and interactions; thus, to further understand the nature of human communication, it is possible to observe how human communication is affected by messaging software on smartphones. This type of study also helps us understand how these new technologies affect and change human interaction. People's life behaviors have been transferred to the Internet as a result of the prevalence of mobile web devices, resulting in consumer behavioral changes in how individuals connect to the Internet. There are few current studies of how Chinese university students use their cellphones to conduct IM communication. To fill this research gap, this study seeks to explore the interpersonal relationships of university students, their use of smartphone IM, and the effect of gender on interpersonal interactions, clearly presenting the interactive effects caused by the above factors.

1.1. Interpersonal Relationships, Gender, And Interpersonal Interaction

Interpersonal relationships concern interactions between people, with behaviors, emotions, and thoughts expressing interactive relationships, such as attraction, cooperation, leadership, submission, or rejection. Interpersonal relationships can satisfy basic human needs for survival, such as the prevention of loneliness, the search for identification, the need for social comparison, the search for certainty, and the possibility of personal development, making such relationships important for the lives, emotions, and work of each person [19-20]. Mills (1982) classified interpersonal relationships into two types: communal relationships and exchange relationships [21]. Communal relationships generally exist among family members, friends, and relatives and comprise a tacit agreement regarding each other's concerns and happiness, thereby establishing long-term close relationships. Conversely, individuals in exchange relationships are only concerned with their own profit; individuals in these relationships focus on profit and would only help another person for payment. Mills (1982) believed that people can simultaneously maintain a communal and exchange relationship with another person, and exchange relationships can occasionally develop into communal relationships [21,22]. In constructing a conflict resolution theory for Chinese society, Hwang (2009) proposed that individuals live in social networks with which they identify, and when an individual faces interpersonal conflict, to meet personal objectives, he or she uses direct expression to make his appeal [23]. To maintain interpersonal harmony, this individual may address conflict by compromise, tacit rejection, or tolerance. Wu's (2006) study of emotional labor in research work showed that after individuals express anger in interpersonal interactions at work [24], they are not only worried about interpersonal consequences but occasionally must also repair the broken social relationships caused by their impulsive behavior.

Impression management is a basic interpersonal objective that primarily seeks to lower uncertainty with others. The uncertainty reduction theory attempts to explain how people form images of other people, placing the focus on the interpersonal communication process that takes place at the original interaction [25]. The theory hypothesizes that when people meet others, they consider primarily how to lower uncertainty between one another and to increase predictive ability for others' behavior. When an individual experiences uncertainty, he generally seeks information from the external environment to lower ambiguity [26]. Uncertainty is not the only factor involved when people first interact, but management of uncertainty is a maintenance technique that can enhance the development of close relationships. Uncertainty can also occur in established relationships, however,

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and thus is continuous state in all types of relationships [27].

Oral communication apprehension(OCA) refers to fear or anxiety that forms when an individual communicates or anticipates orally communicating with other people. A description of interpersonal relationships and interaction noted that this type of apprehension is both a character trait in communication and an indicator of maladjusted social communication [28]. People with oral communication apprehension find it more difficult to maintain successful interpersonal relationships and tend to be subject to negative comments from peers [29]. Personal interactive behavior is primarily affected by the evaluation of possible actions by the object of the interaction or by an individual's fear of being threatened by others. When the behavior expressed by someone new conforms to the interpersonal threat perceived by the individual, he may attempt to block the interaction between them; conversely, when a new person's actions have the effect of reducing interpersonal threats that the other person fears facing, actions to promote interaction between them may be taken [30]. In interactions with family and close friends, individuals generally have a significant level of mutual understanding due to their longstanding connection, especially in terms of whether they are in danger of criticism [31]. When an individual is rejected by another in the course of establishing an interpersonal relationship or even in maintaining the relationship he wants, great fear [32] or even negative effects on personal, mental and physical health can result [33,34]. Thus, if the object of interaction is someone with whom it is difficult to get along, others may not be willing to have further contact with him or even actively avoid further contact; in some situations, however, such as with colleagues and classmates, individuals cannot choose with whom they interact.

Thus, this study proposes the following research hypothesis:

H1: Users' interpersonal relationships will positively influence their interpersonal interactions

Enns (1992) noted that in the socialization process, women tend to maintain high connections with other interpersonal relationships and that women develop interpersonal relationships before autonomy [35, 36](Straub, 1987). Because men are competition oriented, they find it more difficult than women to form friendships [37]. Greely & Tinsley (1988) showed that women are more willing than men to disclose themselves, thus making it easier for women to find closeness in interpersonal relationships [38]. In terms of interpersonal relationships, women generally outperform men [39]; thus, the present study proposes the following research hypothesis:

H2: Women are better than men at conducting interpersonal interactive relationships

1.2. The Moderating Effect Of Instant Message Usage Behavior

IM works in the following way: "a user can set up a group of one's own partners, and when they write and send messages, the user can see the message on the screen [40]. Carmeron & Webster (2005) wrote that IM is a communication technology that allows users to send and receive real-time textual messages as well as to see who is currently online [5].

The market share of smartphones has continued to expand, and most people like to use free communication software to contact friends and family, replacing the text message systems of the past. Among this type of software, WhatsApp and Line are popular smartphone communication applications, or apps. Such software allows customers to send instant messages, images, and videos for free. A survey by Allot Communications found that the broadband traffic of WhatsApp in IM was only 3% in the first half of 2011 but grew rapidly to 18% in the second half of the year [41]. According to data published by WhatsApp, in October 2011, WhatsApp needed to process approximately one billion messages per day; by February 2012, this number had increased to two billion [42].

The process of interpersonal interaction on the Internet, from first meeting to image formation and then to further interaction, is not as illusory and difficult to grasp as people imagine. In fact, there are still observable cognitive and perceptive processes involved. When two people meet, the social identity function is initiated, and various types of categories are used to orient the other person. One's existing information about the category, or the schema, is then extracted, and a decision is made regarding how to interact with the other person [43].

Castells (1998) noted that in the Internet age, a new space of flow has replaced the traditional space of places [18]. Through computer and online communications technologies, people can easily conduct remote interactions that are similar to face-

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to-face interactions. The uniqueness of IM media is that it allows people to interact in real-time across different areas, an interaction that may have anonymity because users are not actually near one another [18]. Giddens (1990) proposed the disembedding mechanism, which refers to social relationships being lifted out from their interactive contexts in places and then reconstructed after crossing time and space [18]. Users and Internet communication software jointly establish interpersonal relationships as disembedding.

Online communication provides a way for people to write messages and present an interpersonal image, use symbols to provide attractive information, and increase the sense of closeness with others [16]. Social information processing theory states that people who use computers to mediate communication can use interactive communication to create and manage interpersonal images [44]. Scholars note that for poor social communicators, computer-mediated communication (CMC) can reduce anxiety and help such individuals conduct more social interactions [45, 46]. Thelwall & Wilkinson (2010) pointed out that users seek connection with others and communicative satisfaction when using the Internet, in which one is not required to fully express oneself but can still gain social contact; such channels can be used to satisfy the need for establishing close relationships with peers [47].

IM software provides users with the ability to maintain relationships with friends at any time and in any place, and the intimacy provided by this medium is more relaxed; all friends on the software's list maintain contact with the user, but they do not pressure the user to find a topic to chat about [48]. Thus, the Internet brings a carefree, liberating, and non-threatening character to interpersonal interaction. Online interpersonal relationships and interactions are defined by the extent to which, in an online community, the members perceive themselves as a community and both interact and share with other members of the community. The construction of interpersonal relationships can foster greater participation and interaction with other community members [3,49]. Levinger (1980) proposed that relationships of self-disclosure change from superficial disclosure to very intimate disclosure and that the more time spent communicating with friends in more intimate ways on IM, the greater the intimacy felt [50].

Men and women have different attitudes toward technology: women see technology as having a socializing function, while men see technology as a machine [51]. When men and women work in groups, women communicate verbally, provide constructive criticism [52], and like to discuss interpersonal problems. Men continue to work on computers and prefer not to address interpersonal conflict in real-life [53]. In addition, Hong (2010) reported that when MSN is used to maintain relationships, male university students are more active than female university students. Men have a more positive attitude toward technology than women [54], and with respect to CMC participation, men are more likely than women to post longer messages [28]. Thus, men are more willing to use cellphone IM software. This study therefore proposes the following research hypotheses:

H3-1: Those with low cellphone IM software usage have better real-life interpersonal relationships and better interpersonal interactive relationships.

H3-2: Those with high cellphone IM software usage have poorer real-life interpersonal relationships and better interpersonal interactive relationships.

H4-1: When those with high cellphone IM software usage are male, they have better interpersonal interactive relationships.

H4-2: When those with low cellphone IM software usage are female, they have better interpersonal interactive relationships.

2. METHOD

Following a discussion of the relevant literature, this investigates the influences of the WhatsApp messenger usage behavior, gender and interpersonal relationships on real word interpersonal interactions.

This study used purposive sampling of university students because they are heavy users of cellphone IM. A questionnaire was distributed at multiple schools to gather data from students. The participants were required to have a habit of using IM and to use WhatsApp messenger to communicate in their daily lives.

To measure scale consistency, this study collected 30 students for a scale pretest, and scale items with a lower correlation coefficient were deleted [55]. The present study primarily used a 5-point Likert scale to measure questionnaire responses. There were 31 questions in the questionnaire: 1 on gender, 14 on real-life interpersonal relationships (revised from Wang, 1984)[56], 10 on interpersonal interactions (revised from Walther and

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Burgoon,1992; Parks and Floyd, 1996)[57,58], and 6 on instant messenger usage behavior (revised from Shu and Chuang, 2009)[59]. Table 1 shows the reliability and validity of the variables; Cronbach's α value is used to measure research reliability. In addition, convergent validity in this study is expressed in average variance extracted (AVE), and confirmatory factor analysis (CFA) is used to test the scale. The results indicate that the questions conformed to the requirements [60,61]. There are two variables in this study: interpersonal relationships and IM usage behavior, which are referred to as high if above the mean and low if below the mean. One hundred fifty questionnaires were released, and 128 valid samples were retrieved, for a retrieval rate of 85.3%.

This study used SPSS 18.0 and Mplus 6.0 as analytical tools and primarily used Cronbach's α value for reliability testing, AVE and CFA for validity testing, and ANOVA analysis and t-tests to test the hypotheses(Table1).

TABLE 1: RELIABILITY AND VALIDITY OF SCALE ITEMS

Variables	Cronbach's α value	AVE	CFA
Interpersonal Relationships	0.817	0.512	χ^2=44.302
IM Usage Behavior	0.947	0.509	CFI=0.965 TLI=0.913
Interpersonal Interaction	0.833	0.599	RMSEA=0.003 SRMR=0.036

3. RESULTS

There were 54 male and 74 female subjects in the present study, averaging 20.1 years of age. Table 2 illustrates the ANOVA test of whether the examined variables differ in terms of the dependent variables. Because the total ANOVA reached significance (F=4.554, p<0.001), it was necessary to test the individual independent and dependent variables, as shown in Table 3.

TABLE 2: ANOVA ANALYSIS OF THE OVERALL MODEL

Variables	Sum of Square	df	Sum of Mean Square	F-value	p-value
The adjusted model	16.020	7	2.289	4.554	0.000*
Gender	0.200	1	0.200	0.397	0.530
Interpersonal Relationships	2.543	1	2.543	5.059	0.026*
IM Usage Behavior* Gender	0.039	1	0.039	0.077	0.782
IM Usage Behavior* Interpersonal Relationships	4.394	1	4.394	8.743	0.004*
IM Usage Behavior* Gender* Interpersonal Relationships	0.080	2	0.040	0.080	0.923

*p<0.05

TABLE 3: POST-HOC TEST RESULTS OF THE VARIABLES

variables		Mean	Standard Deviation	95% CI	p-value
Interpersonal Relationships					
High		4.1	0.1	3.9-4.3	0.026*
Low		3.8	0.1	3.6-4.0	
IM Usage Behavior	Interpersonal Relationships				
High	High	3.7	0.1	3.5-3.9	0.322
	Low	3.8	0.1	3.5-4.1	
Low	High	4.5	0.1	4.3-4.7	<0.001*
	Low	3.7	0.2	3.5-4.1	

*p<0.05

On the whole, the main effect of gender is not significant (F=0.397, p=0.530); thus, H2 is not established. H1 (users' interpersonal relationships will positively influence users' interpersonal interactions) was confirmed, with statistical significance (F=5.059, p=0.026). Therefore, post-hoc t-tests were used to analyze the influence of interpersonal relationships on interpersonal interactions. Among the results of these tests, those with better interpersonal relationships scored 4.1 in interpersonal interaction, while those with poorer interpersonal relationships scored 3.8 in interpersonal interaction, thus establishing H1, as shown in Table 3.

When considering the level of consumer cellphone instant messaging use, the main effect of real interpersonal relationships on interpersonal interactions is statistically significant (F=8.743, p=0.004); post-hoc t-tests were therefore used for further analysis. The results indicate that heavy users of communication software with lower interpersonal relationships had a mean score of 3.8 in interpersonal interaction, higher than the score of 3.7 for those with high interpersonal relationships. This difference is not statistically significant (p=0.322), however, and H3-2 is not established. Light users of cellphone messaging software with good interpersonal relationships scored an average of 4.5 in interpersonal interactions, higher than those with poorer interpersonal relationships, who scored 3.7 in interpersonal interaction. This difference reached significance (p<0.001), establishing H3-1 (Table 3).

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Under the moderation of cellphone IM use, the influence of gender on interpersonal interactions is not significant. The analysis of independent sample t-test results for men and women showed that male heavy users of messaging software scored 4.3 in interpersonal interactions, higher than the score of 3.7 for female users. However, this difference is not statistically significant (p=0.231), and H4-1 is not established. For light users of messaging software, men scored 3.8 in interpersonal interactions, lower than the score of 4.1 in interpersonal interactions for women. This difference is not statistically significant (p=0.930), and H4-2 is not established.

4. DISCUSSION

Smartphones have become more popular among consumers, and the variety of available apps has also grown. This study attempts to use gender and real world interpersonal relationships to explore the moderating effect of popular cellphone messaging software use on interpersonal interactive relationships. In the real world, the management of interpersonal relationships begins from the desire (or lack thereof) to establish a relationship with another person. Regardless of personality or body language issues, when people exchange information in face-to-face interactions, the communication is both verbal and non-verbal. Non-verbal cues can be alternately supplementary to verbal communication or a source of confusion. The results of this study show that those with good interpersonal relationships also have better interpersonal interactive relationships. This result confirms H1 and is consistent with studies by other scholars [19,20]. In this vein, Weiss & Baker-Smith (2007) showed that peer relationships in the student stage will affect interactions with others, and Goffman's (1959) analysis of interpersonal interaction showed that the messages that people give explicitly are occasionally not as important as implied messages, indicating that interpersonal relationships and interpersonal interactions affect one another [62]. In addition, this study finds that gender does not affect interpersonal interactive relationships. While this result differs from those of other scholars [36, 39], it is consistent with the findings of Chang, Lin & Yeh (2010)[20]. During development, a person's development of social interaction skills is in some ways more important than changes in physique and biological abilities, especially in the sense that such skills are necessary to create a sense of belonging by establishing close relationships; thus, gender differences do not affect interpersonal interactive relationships.

Lee & Perry (2004) indicated that IM is a substitute for traditional communication channels. The present study is based on those findings and used the extent of cellphone IM software use as the moderating variable to explore the effect of new technology on interpersonal interactions [63]. The results show that when users have better interpersonal relationships in daily life, they can utilize other channels to conduct interactive relationships, even if the user does not frequently use cellphone IM software. The ability to use other communication channels comes from these individuals also being better at managing interpersonal interactions. This result establishes H3-1. Moreover, although the statistical results of this study indicate that, even for frequent users of IM software, there is no significant improvement in interpersonal interactions when users' interpersonal relationships are poor, and those with higher cellphone usage rates have better interaction effects than those with lower cellphone usage rates. In exploring computer MSN messages, Tsao (2008) discovered that[48], while it is very impolite not to say goodbye at the conclusion of a conversation over the telephone, in the emerging media of MSN, this kind of interaction is normal, permitted, and not seen as damaging to interpersonal relationships. Therefore, although H3-2 is not established, it is still worthy of attention.

Although the results obtained in the testing of H4-1 and H4-2 are not statistically significant, the phenomenon is still worth examination. When male consumers more frequently use WhatsApp Messenger on cellphones to communicate, interact, and transmit messages, their interpersonal relationships are better maintained. Smiler and Kubotera (2010) found that when love is involved, men are more active in self-disclosure while women passively respond [64]. Therefore, in the context of IM interactions with a romantic purpose, men are more active in emotional exchange. Although women use WhatsApp Messenger less, their interpersonal interactive relationships are not reduced as a result, which is consistent with Greeley & Tinsley's (1988) findings that showed women have less difficulty finding intimacy in interpersonal relationships than men [38]. When men communicate with others, they are more rational and oriented toward principles and problem solving. In the real world, less emotive communication methods may result in alienation in interpersonal interactions. However, after the arrival of electronic media, due to the characteristics of IM software itself, consumers can have naturally brief communications, even using

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symbols to supplement emotional messages. Moreover, a lack of image interference through face-to-face communication can result in better interactive relationships. In communication, women are focused on the details of communication etiquette and emotional support; occasionally communication is only used to pass the time or to air emotional complaints, with the goal of maintaining relationships. Thus, women have diverse communication channels, and messaging software tends to become supplementary; therefore, even though electronic media are not often used, there is still a great deal of interpersonal interaction.

4.1. Practical Contributions

The present study extends the study by Li, Chau & Lou (2005), adding IM usage behavior as the moderating variable and gender as the predictive variable[3]. These variables were added to integrate technology usage behavior and interpersonal relationships into this research model to understand the influence of IM usage on interpersonal interactions. This study uses research theory to explore the influence of the increasing usage rates of new technology and communication devices on the establishment of interpersonal relationships and interactions. The results of this study show that cellphone IM usage indeed influences individual interpersonal communication. Issues that are worthy of attention include how to further extend cellphone IM usage to the work environment in order to (i) enhance work performance or (ii) use cellphone IM interactions to conduct buzz marketing in commercial applications.

In mobile communications, there has been a gradual increase in consumers' use of online services. Many people prefer free messaging software with lively icons for communicating with friends, replacing previous versions of text messaging that required payment and had character limits. In daily life, there are always people who are using their cellphones. Regardless of whether consumers are looking for data, passing time, or keeping in touch with others, the ubiquity of cellphones makes it appear that everyone is using cellphone IM software, even more so than computer-based IM software. Paulos & Goodman (2004) argued that using cellphones can let users know about the existence of "familiar strangers," reducing anxiety in strange environments [65]. Although technology has brought great convenience, when users are constantly using mobile devices to connect to Internet systems, it can also be disruptive to other activities, increasing the incidence rate of traffic accidents and forcing governments to establish laws regulating the times at which new technology can be used. The human enthusiasm for electronics and technology has resulted in a lack of enthusiasm about exploring their environments, which can have a considerable impact on real world interpersonal social networks. In addition, in terms of practical communication, IM software is not as convenient as traditional text messages, as it requires both parties to use the same software for it to function; this limitation should be considered by service providers for future improvement.

4.2. Limitation

The limitation of this study is that it only examines users of WhatsApp Messenger, which was previously developed as the measurement tool. Those consumers who do not use this application were excluded from this analysis. Future studies can incorporate different software for comparison, and it will also be possible to conduct cross-platform comparisons of influence. Moreover, different countries use different mobile Internet technologies. Therefore, researchers should also perform studies in countries with different wireless Internet usage rates to compare the influence of IM on interpersonal interaction. This study's use of a sample of university students who frequently use cellphone IM software to maintain relationships is also a limitation. Future studies should increase the sampling scope and also analyze other age groups.

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