



## Understanding Individual Adoption of Instant Messaging: An Empirical Investigation\*

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### **Abstract**

*The wide diffusion of Instant Messaging (IM) in a voluntary social context calls for studies to examine the value of computer-mediated communication technologies in developing interpersonal relationships. By integrating three interpersonal factors into a model of motivation from the technology acceptance literature, we develop and test a research model to explain an individual's continuous use of IM in keeping and sustaining interpersonal relationships. We find that the behavioral intention to continue using IM was predicated by perceived usefulness, perceived enjoyment, and perceived critical mass. Attachment motivation, relationship commitment, and perceived critical mass were all positively associated with perceived enjoyment. Perceived enjoyment and perceived critical mass had significant effects on perceived usefulness. The results imply that IM is a useful and fun tool for fulfilling one's need for attachment and commitment and for gathering online with one's friends, family members, and others. In addition, perceived enjoyment is the dominant factor explaining grassroots adoption of communication technologies. Finally, it is important to integrate utility factors (usefulness and enjoyment) with social factors in studying communication technologies.*

**Keywords:** Instant messaging, Communication technologies, Attachment motivation, Relationship commitment, Critical mass, Motivation, Technology adoption

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## **Introduction**

The Internet is often characterized as an efficient channel for research, entertainment, education, and e-commerce (e.g., Chau et al., 2002; Ives and Jarvenpaa, 1996; Jarvenpaa and Tractinsky, 1999), as well as for interpersonal communication (Boneva et al., 2001; Cumming et al., 2002; Kraut et al., 1999; Kraut, Patterson, et al., 1998). While email has been the dominant Internet communication technology, one recent widely diffused innovation is interactive online communication, in particular Instant Messaging (IM). Millions of adults and teenagers are using IM with their friends and families for online social communication and recreation. According to a recent study from the Pew Internet & American Life Project, 53 million people in the U.S. use IM, among whom the most active are Generation Y Americans ranging in age from 18 to 27 (Shiu and Lenhart, 2004). Further, 46 percent of these Generation Y users rely on IM more frequently than email. The adoption of IM has also been extended to business settings (Shiu and Lenhart, 2004), including communication among coworkers (Drucker, 2000) and business-to-consumer marketing (Golvin et al., 2003). One industry report predicts that IM will be the next wave in the communication technology revolution (Jahnke, 2002).

In short, IM is an Internet-based application that provides close to real-time communication between people. According to Rennecker and Godwin (2003), IM has five unique features: presence awareness, "popup" recipient notification, within-medium polychronic communication (simultaneous involvement in more than one conversation at the same time) (Bluedorn et al., 1992), silent interactivity, and ephemeral transcripts. These features distinguish IM from other communication technologies and, more importantly, also apply to face-to-face communication (Rennecker and Godwin, 2003). The similarities between IM and face-to-face communication may suggest that IM is a better alternative to face-to-face communication than other technologies. Unlike email, which will not notify a communicator when the recipient is available, IM's presence management feature allows a user to quickly determine whether his communication partner is present online and whether the partner is available to communicate. Thus, IM has the potential to provide shorter turnaround times and quicker responses than email. Besides enabling an individual to engage in multiple conversations simultaneously, the chat room function allows groups of individuals to interact. Furthermore, IM allows a user to keep a list of people, often called a buddy list or contact list, with whom the user wishes to maintain contact. An individual can also expand his or her communication network via the partners' contact lists, so that an online community can be built based on referrals through partners.

From an information systems research perspective, understanding the adoption behavior of IM is both interesting and important. First, studying IM will help to reveal why and how people use communication technologies for keeping and building interpersonal relationships such as friendships, employee relationships, and business-customer relationships. Electronic mail has been the dominant electronic communication medium for the past several decades. Over time, face-to-face communication has decreased and people have become more isolated (Boneva et al., 2001; Cumming et al., 2002; Kraut, Patterson, et al., 1998). Decreased communication has also been found in the business context (Sarbaugh-Thompson and Feldman, 1998). In contrast, IM offers features to enhance the conversational and relationship-oriented attributes required for communication technologies (Kraut et al., 1999). The rapid diffusion of IM may indicate that people are reexamining their need for the co-presence experienced in face-to-face communication (Sarbaugh-Thompson and Feldman, 1998). It may also be a reflection of an individual's desire for social contacts, building and keeping both online and offline relationships through IM. The popularity of IM provides confirming evidence that

interpersonal communication is driving most people's use of the Internet (Kraut et al., 1999).

Second, studying IM will contribute to our understanding of the value of information technologies in social communications for connecting people to their friends, family members, and communities, and for providing social support and help (Kraut et al., 1999). Prior technology adoption research has concentrated mostly on IT applications designed or intended primarily for use in either individual or organizational work settings. The value of information technologies in social communications, especially the relational dimension of communication, is underestimated (Keyton, 1999; Kraut et al., 1999). Our understanding of such value is quite limited (Soe and Markus, 1993) and has yet to be explored in depth (Venkatesh and Brown, 2001; Walther, 1992). Research has found that relational aspects of communications are intertwined with, and supportive of, task-oriented communications (Keyton, 1999; Frey and Barge, 1997; Walther, 1995). Thus, further IS research is required to investigate how communication technologies help to build and maintain the relationships among co-workers, work groups, different functional units, or different companies. Such research should also examine the effects of such relationships on resource exchange (Bouty, 2000), knowledge transfer (Szulanski, 2000), and business performance (Schultze and Orlikowski, 2004), as well as the functioning of groups and teams in a broader social context (Kraut et al., 1999).

Third, understanding the factors affecting the adoption and use of IM may shed light on the grassroots adoption of information technologies. Personal computers and the Internet have been widely used at home (Kraut, Patterson, et al., 1998). Home users are becoming more empowered and more knowledgeable, are actively seeking and trying new information technologies, and are building affiliations with other social entities through these technologies (Lamb and Kling, 2003). In the present study, we look at adoption with an "intention to continue using" perspective, similar to those from Bhattacharjee (2001) and Karahanna et al. (1999), because unlike other more complex and large-scale information technologies, acquiring and installing IM or a similar application is, in general, inexpensive and easy. This makes the one-time adoption decision less of an issue than the continued use of the technology. The current wide diffusion of IM in both social and business contexts (e.g., Shiu and Lenhart, 2004) also provides us the opportunity to investigate continuous use of IM.

This paper reports on an empirical study that examined such technology adoption issues in a social context. We focus our discussion on the social use of IM in building and maintaining social relationships among friends, family members, and others, rather than organizational use of IM among employees or for customer relationship management. We aim to reveal the underlying factors that account for the adoption of IM in everyday life. Synthesizing relevant prior research, we developed a research model to explain the behavioral intention to continue using IM in social interactions. We base the proposed research model on a model of motivation by Davis et al. (1992) (hereafter the Motivational Model, following Venkatesh et al. (2003)), and further augment it with three antecedent factors from interpersonal relationship theories. Our key research questions are: (1) Why are motivational factors salient in explaining the behavioral intention to continue using IM? (2) How do the motivational factors and their antecedent factors influence behavioral intention?

The rest of the paper is organized as follows. We first present the theoretical background of the study along with the research model and its corresponding research hypotheses. Then we discuss the methodology used to test our research hypotheses, followed by the results of our data analyses. The paper concludes with implications for theory and practice derived from these results.

## **Theory**

In this section, we present the theoretical foundations for the present study. Specifically, we look at relevant prior research in two main areas--motivation to adopt and interpersonal relationships. The former area is important because several recent technology adoption studies (e.g., Davis et al., 1992; Igarria et al., 1996; Teo et al., 1999) have found empirical support for research models built with a motivation-to-adopt perspective (Venkatesh et al., 2003). The second area is relevant because prior studies in adoption and use of communication technologies suggest that one crucial element in the adoption and use decision is how and how well an interpersonal relationship is developed and maintained in the community that the technologies support (e.g., Kraut, Rice et al., 1998; Walther, 1992).

### ***Motivation to Adopt***

Technology adoption research has seen the application of a wide range of theories and models from different academic fields, such as Diffusion of Innovation (DOI) (Rogers, 1995), the Theory of Reasoned Action (TRA) (Fishbein and Ajzen, 1975), the Theory of Planned Behavior (TPB) (Ajzen, 1991), and the Technology Acceptance Model (TAM) (Davis et al., 1989). The current study is based on the Motivational Model from Davis et al. (1992), which investigates technology acceptance from the motivation-to-adopt perspective. There are two rationales for us to adopt a motivational approach. First, the Motivational Model is the least investigated model among the many competing theories. To our knowledge, there are few empirical studies based on the model, except for those of Davis et al. (1992), Igarria et al. (1996), and Teo et al. (1999). Based on the study of Venkatesh et al. (2003), we can identify three advantages of using the Motivational Model. First, the model has better parsimony (e.g., without moderating effects of other variables such as gender, age, and experience) than those of other theories. Second, the power of explaining the variance of behavioral intention is no less than those of other theories. Third, the variables of the model (i.e., extrinsic motivation and intrinsic motivation) are consistently significant in predicting behavioral intention across time and in both mandatory and voluntary contexts.

Second, there are three reasons for replacing perceived ease of use with perceived enjoyment when we compare the Motivational Model and TAM. First, empirical studies using longitudinal samples and those focused on the post-adoption stages have found that perceived ease of use has little or no effect on behavioral intention after the technology has been adopted for a period of time (e.g., Chau, 1996; Davis et al., 1989). Second, the hedonic aspect of using IM for fun and pleasure may suggest that enjoyment is the dominant predictor of intentions to use the technology (Van der Heijden, 2004). Third, studies on affective human computer interactions have suggested that ease of use has become a given feature of the technology and that software design should consider joy of use and the hedonic qualities of the technology (e.g., Hassenzahl et al., 2001). We believe that conducting additional empirical studies on joy of use is necessary to shed light on our understanding of the significance of affective computing.

From a practical standpoint, we believe that intrinsic motivation (i.e., enjoyment) is especially important for an individual who is using communication technologies. The enjoyment derived from using a communication technology to interact with communication partners should be more salient than the enjoyment from interacting with the computer (Webster and Martocchio, 1992). This is especially true for IM, which is mainly used for communication among friends and close family members. The real-time interactions provided by IM will drive an individual to use IM.

As theoretically advocated by Deci (1975) and empirically supported by several studies (e.g., Davis et al., 1992; Igbaria et al., 1996; Teo et al., 1999), an individual's behavior can be predicted by his or her motivation to perform the behavior. Among the various conceptualizations of motivation, extrinsic motivation and intrinsic motivation are two important concepts and have been integrated into the Motivational Model (Davis et al., 1992). Extrinsic motivation refers to an individual's engagement in an activity as something that is perceived to be instrumental in achieving some valuable outcomes and goals (Davis et al., 1992). On the other hand, intrinsic motivation indicates that an individual conducts an activity for its own sake, such as fun, enjoyment, and pleasure; these factors are both inherent in the activity itself and are generated in the process of performing the activity (Davis et al., 1992). In the context of using a communication technology, the intrinsic motivation may be derived from the interactions with other communication partners or the enjoyment and pleasures conveyed from those partners.

In the technology adoption literature, it is generally agreed that perceived usefulness is an example of extrinsic motivation, while perceived enjoyment is an example of intrinsic motivation (e.g., Davis et al., 1992; Igbaria et al., 1996; Teo et al., 1999; Venkatesh et al., 2003). Perceived usefulness refers to an individual's expectation for improved job performance, effectiveness, and productivity from using a particular type of information technology. A large body of literature has reported the significant positive association between perceived usefulness and adoption (e.g., Davis et al., 1989; Venkatesh and Davis, 2000).

On the other hand, perceived enjoyment also affects an individual's adoption of information technology (Webster and Martocchio, 1992). Davis et al. (1992) found that, in addition to perceived usefulness, perceived enjoyment has a significant effect on the behavioral intention to use computers in the workplace, although the effect is not as strong as that of perceived usefulness. Consistent findings have also been derived from studies on using microcomputers (Igbaria et al., 1996), the Internet (Teo et al., 1999), and personal computers at home (Venkatesh and Brown, 2001).

### ***Interpersonal Relationships***

Social psychologists believe that relationships with other people are at the very heart of human existence and are the foundations of social behaviors (Hinde, 1979). Prior studies have looked at relationships from the "self" side and the "other" side. Two critical factors emerge in the "self" side--attachment motivation to keep in constant contact with others and relationship commitment to maintain established relationships. There are three reasons for the selection of these two factors. First, both attachment and commitment are fundamental to social interactions and relationships (Reichers, 1985; Reis and Patrick, 1996). They are the central concepts for building and maintaining friendships (Rusbult, 1980), close relationships (Rusbult, 1983), community relationships (Kanter, 1972), employee-organization relationships (Becker, 1992; Mowday et al., 1982), marketing relationships (Morgan and Hunt, 1994), and so on. Second, both attachment and commitment have been examined more extensively than other variables such as loyalty, which is considered a consequence of commitment (Morgan and Hunt, 1994). There are abundant investigations of these two factors in many disciplines, such as social psychology (Baumeister and Leary, 1995), organizational behavior (Mowday et al., 1982), and marketing (Morgan and Hunt, 1994), which will provide both theoretical and empirical supports for the current study. Third, we believe that investigating the effects of attachment and commitment on individuals' adoption of IM will contribute to our understanding of the drivers for grass-roots adoption of new technologies. Since this is one of the first introductions of these two factors to information systems research, we provide the theoretical background of attachment and commitment in the following paragraphs.

According to Bowlby (1969), attachment motivation is a personality attribute that reflects an individual's desire for social interaction and a sense of communion with others. A person has such motivation because a child's attachment to his mother is carried on into adulthood as an attachment to organizations, groups, leaders, and supervisors (Reis and Patrick, 1996). "Human beings have a pervasive drive to form and maintain at least a minimum quantity of lasting, positive, and significant interpersonal relationships" (Baumeister and Leary, 1995, p. 497). People motivated to keep attachments with others feel safe with each other and are very active in seeking support from their social networks (Reis and Patrick, 1996).

The effects of attachment motivation on an individual's attitude, cognition, personality, and behavior have been well examined in a large body of recent studies (see Reis and Patrick (1996) for references). People with higher motivation to be affiliated with others, or people of the secure attachment style (Hazan and Shaver, 1987), have higher levels of self-esteem and self-confidence. They are very confident in their dealings with different social situations and inclined to seek social support from others as a source of information and help (Mikulincer, 1995). Secure people view others as trustworthy, helpful, and dependable. They also value interactions with others and feel valued by others. On the other hand, people with less attachment motivation describe themselves negatively and feel anxious about social interactions with others (Collins and Read, 1990). They tend to withdraw from social interactions. These people also hold negative opinions about others, often viewing people as undependable, untrustworthy, and unlikely sources of support. They often feel isolated from others and of little value themselves (Mikulincer, 1995).

While attachment meets an individual's basic need for belongingness, no other higher level need can be satisfied without stable and enduring interactions (Baumeister and Leary, 1995). The concept of relationship commitment measures whether an individual tends to continue with an established relationship. It reflects an individual's internal representation of dependence on an established relationship, including both long-term orientation and psychological attachment to the relationship (Rusbult, 1983). Relationship commitment may also suggest an individual's intrinsic motivation to persist in a relationship (Agnew et al., 1998). The research community has long recognized commitment to specific and dyadic close relationships between dating couples, parents and children, and husbands and wives (Agnew et al., 1998; Rusbult, 1983). Fehr (1999), however, has found that laypeople's commitment extends to family, friends, relatives, etc., and to principles such as education. The foci of commitment can also be a general social system, such as a community (Kanter, 1972), friendships (Rusbult, 1980), labor unions (Gordon et al., 1980), work groups and teams (Becker, 1992; Mowday et al., 1982), an employing organization (Mowday et al., 1982), or different types of partnerships with an organization (Morgan and Hunt, 1994). Thus, the target of relationship commitment could be a collective, as well as a single individual, in the social context. In the organizational commitment literature, Reichers suggests that an employee may be committed to multiple coalitions and constituencies of an organization, including "co-workers, supervisors, subordinates, customers, and other groups and individuals that collectively comprise the organization" (Reichers, 1985 pp.472).

In studying IM, the target of the relationship commitment might be explored at both the individual and the group level. In fact, IM is a communication tool not only for dyadic communications but also for groups of friends and communication partners. At the group level, these people are not isolated and independent of each other, but are joined as an interdependent community. Thus, in such a collective, relationship commitment indicates that an individual tends to keep the interactions with the group as a whole.

As with attachment motivation, relationship commitment also has various effects on an individual's emotion, cognition, and behavior. For example, commitment is positively associated with satisfaction and trust in relationships (Morgan and Hunt, 1994; Mowday et al., 1982; Rusbult, 1983; Wieselquist et al., 1999). Highly committed people strive to maintain their relationships and reduce their turnover intention (Becker, 1992; Hill, 1987; Mowday et al., 1982). Committed people have a positive attitude toward each other and are unlikely to break the bond or tie between them (Mowday et al., 1982; Rusbult et al., 1998). They also have a stronger cognitive illusion of merging themselves with their relationship partners so that they cannot tell the boundary between themselves and the partners (Agnew et al., 1998; Reichers, 1985). A committed individual is willing to sacrifice self-interest to improve the well-being of his relationship partner and the quality of the relationship (Mowday et al., 1982; Van Lange et al., 1997).

Both attachment motivation and relationship commitment exist for an individual regardless of the deployment of information technologies. Certain information technologies, however, have unique advantages of potentially cultivating an individual's attachment motivation and relationship commitment. For instance, IM provides a cyberspace for individuals from different geographical locations to keep stable, effective, and constant communication with others. An individual's need to build interpersonal relationships may be reflected in the continuous use of IM to get to know others in the virtual community. People may also depend on IM for keeping and maintaining their existing relationships.

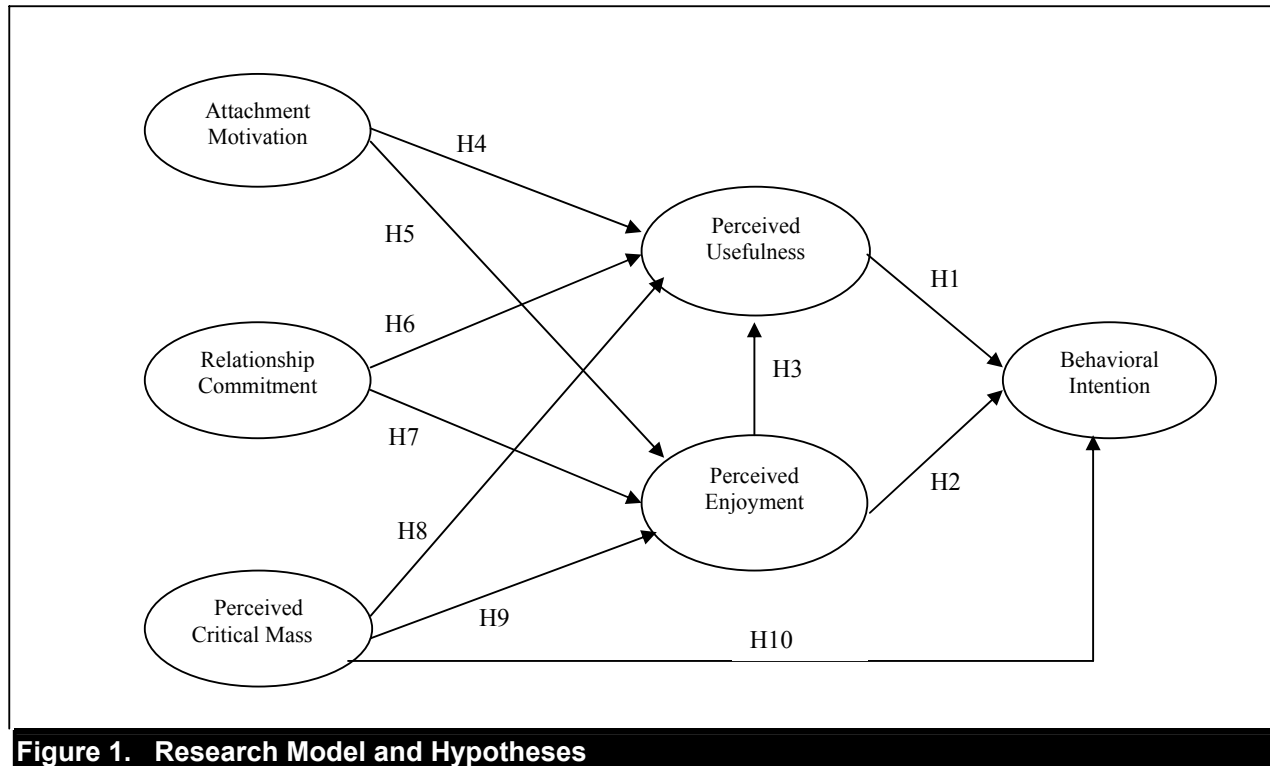
As noted above, attachment motivation and relationship commitment are factors from the "self" side of a relationship. However, the "other" side of a relationship cannot be overlooked. In the development of an individual's personality, an "internal working model" is formed and maintained. According to Bowlby (1969), the "internal working model" is a mental representation of the self, the other (i.e., the attachment figure), and the social environment. The model influences the individual's perceptions of and beliefs about social relationships (Bowlby, 1969; Hazan and Shaver, 1987).

In a group or community, an individual is embedded with and influenced by others, i.e., the "other" side of the relationship. A crucial factor in this "other" side as identified in prior literature is the perceived critical mass. The concept of critical mass indicates that the rate of adopting or using a new technology suddenly accelerates when a certain minimum number of users have adopted the technology (Rogers, 1995). Critical mass is a well-established concept and has been studied in many different disciplines, such as economics, marketing, sociology, and communication. In the use of interactive communication technologies, critical mass is especially important because an individual's use of the technology cannot be separated from his communication partner's use (Markus, 1987). While the idea of critical mass is appealing in studying interactive communication technologies, it is difficult to find an objective measure. However, an individual may use a communication technology based on the perception of the number of users rather than the actual number, as evidenced by the empirical study in Lou et al. (2000).

## **Research Model and Hypotheses**

The focus of the present study is an individual's behavioral intention to continue using IM. Similar to many other behaviors, technology acceptance can be measured by intention to use as well as actual use. Using intention to explain or predict actual behavior has an established theoretical foundation that has accumulated sufficiently strong empirical support (e.g., Chau, 1996; Sheppard et al., 1988; Venkatesh and Davis, 2000; Venkatesh et al., 2003). Continuance intention implies that an individual has extended his acceptance decision and has incorporated the technology into daily life (Bhattacharjee,

2001; Rogers, 1995). Based on the theoretical review in the previous section, we developed a research model that is depicted in Figure 1. The three interpersonal relationship factors are hypothesized to influence the two motivation factors, which, in turn, are hypothesized to affect the intention to continue using the technology being investigated, i.e., IM. The appropriate paths in the model are labeled with the corresponding hypothesis numbers. We discuss the theoretical underpinnings of each of the ten hypotheses below.



**Figure 1. Research Model and Hypotheses**

### ***Perceived Usefulness and Perceived Enjoyment***

Perceived usefulness in the current study is defined as an evaluative belief about the communication technology that builds and maintains interpersonal relationships in a social context (this contrasts with a widely-accepted definition of perceived usefulness that refers to job-related or business utility generated through adopting and using a type of information technology in the work environment (e.g., Davis et al., 1989; Venkatesh and Davis, 2000). Usefulness is a very general perception about the efficiency of the communication technology in providing instant feedback, conveying multiple cues, and expressing feelings and emotions, regardless of the conditions of communication tasks (Fulk, 1993; Soe and Markus, 1993). For example, usefulness is positively correlated with the range of communication situations in which a technology is usable (Schmitz and Fulk, 1991). The utility of a communication technology is a mixture of both technological features and the attributes of user group and social contexts supported by the technology (Soe and Markus, 1993). Both technological utility and social utility have been found to be independent of users' tasks and should be considered together in predicting the use of communication technologies (Soe and Markus, 1993).

Perceived enjoyment is defined as the perception of the fun, enjoyment, and pleasure inherent in using communication technology to keep and develop interpersonal



relationships, following the definition from Davis et al. (1992). Enjoyment also suggests a type of intrinsic value from using communication technology in everyday social life (Kraut, Rice, et al., 1998; Webster and Martocchio, 1992). Playfulness was also an inseparable part of one's use of communication technologies in the organizational context (Finholt and Sproull, 1990). Based on various theoretical and empirical studies (e.g., Davis et al., 1989; Davis et al., 1992) about the effects of perceived usefulness and perceived enjoyment on information technology adoption, acceptance, and use, we hypothesize:

*H1: Perceived usefulness is positively associated with behavioral intention.*

*H2: Perceived enjoyment is positively associated with behavioral intention.*

Previous studies based on the Motivational Model have not fully examined how perceived usefulness and perceived enjoyment were related to each other (e.g., Davis et al., 1992; Igarria et al., 1996; Teo et al., 1999). Although Davis et al. (1992) found an interaction effect of perceived usefulness and perceived enjoyment on the behavioral intention to use computers, they did not reveal how perceived enjoyment affected perceived usefulness. An understanding of the relationship of these two constructs has been advanced only recently. In an extension of TAM, Venkatesh (2000) found that two types of intrinsic motivation - computer playfulness (Webster and Martocchio, 1992) and perceived enjoyment (Davis et al., 1992) - were significant determinants of perceived ease of use, which further affected perceived usefulness. The current study proposes that perceived enjoyment has a direct positive effect on perceived usefulness. We posit that the fun, pleasure, and enjoyment derived from using IM with friends will positively affect an individual's perception of the usefulness of IM in supporting the interaction process, as well as building and maintaining the relationships among the users. Thus, we hypothesize:

*H3: Perceived enjoyment is positively associated with perceived usefulness.*

### **Attachment Motivation**

According to attachment theory (Bowlby, 1969), children have the instinctive tendency to be attached to their caregivers. This kind of attachment will be carried over to colleagues, friends, and groups when the children grow up. To keep frequent and pleasant interactions with other partners, an individual may actively search for new communication channels to "maintain" social networks. This is especially true when the other people in the social network are not physically present. As discussed above, IM allows an individual to know whether his or her communication partners, especially those in distant locations, are present and available for conversation. This is a very special feature for interpersonal communication (Sarbaugh-Thompson and Feldman, 1998). Therefore, in the context of using communication technologies, people with high levels of attachment motivation may perceive these technologies to be more useful. Thus, we hypothesize:

*H4. Attachment motivation is positively associated with perceived usefulness.*

Also from the attachment theory literature, pleasant and frequent interactions with others are critical for the well-being of an individual's mental and emotional health. People will respond with various positive emotions when they are willing to be attached to a relationship (Baumeister and Leary, 1995). People with higher attachment motivation enjoy a higher level of happiness with their partners (McAdams and Bryant, 1987). If an individual is willing to express feelings, worries, and concerns to others, any appropriate and supportive responses from them will create an enjoyable atmosphere (Reis and Patrick, 1996). Compared with other media, IM has the advantage of facilitating reciprocal effects, support, and responsiveness between the partners, which are important for an individual to experience enjoyment. Thus, we hypothesize:

*H5: Attachment motivation is positively associated with perceived enjoyment.*

### **Relationship Commitment**

Modern communication technologies provide a social space for relationship partners, groups, and teams to preserve their relationships with others even though the actual face-to-face interaction is not present. Sending messages to another person or group via IM will assure a person that a relationship is intended to be continued, which is very similar to sending greeting cards in the traditional context (Baumeister and Leary, 1995). Further, as Baumeister and Leary have explained, "people still resist dropping each other's name from the mailing list because to do so signifies a final dissolution of the social bond" (Baumeister and Leary, 1995, p.503). As mentioned above, IM helps people to communicate with their friends and relationship partners, unlike discussion groups or chat rooms in which there are many strangers. Compared to less committed people, more committed people may feel IM is more useful for presenting their real-time messages to and exchanging information among the friends and partners who are in different locations. IM may also help create the cognitive illusion that an individual is physically together with his or her friends (Agnew et al., 1998). Therefore, we hypothesize:

*H6: Relationship commitment is positively associated with perceived usefulness.*

As mentioned earlier, an individual's relationship orientation affects his emotional and mental health. Commitment indicates a psychological and emotional attachment to a specific partner or friendship in general (Rusbult et al., 1998). High-level commitment to a relationship is necessary for happiness, which cannot be achieved with isolated relationship partners. On the other hand, absence of such a highly committed relationship is accompanied by various manifestations of negative affect, such as depression, anxiety, and loneliness (Baumeister and Leary, 1995). Highly committed people also tend to share their stress with their partners and expect them to cheer up the atmosphere. Committed partners develop affective bonds during their interactions over time (Rusbult et al., 1998). This happiness, affection, and enjoyment shared between committed partners should be reflected during the use of communication technologies such as IM. Thus we hypothesize:

*H7: Relationship commitment is positively associated with perceived enjoyment.*

### **Perceived Critical Mass**

In social science, critical mass was originally referred to as "a small segment of the population that chooses to make big contributions to the collective action" (Oliver et al., 1985, p. 524). Markus (1987) first applied critical mass theory to the diffusion of communication technologies. Communication technology is different from traditional information technologies because it requires collective efforts and interdependence between two or more people. The benefit of using a communication technology cannot be achieved by an individual if his or her communication partners do not use the technology. As noted earlier, an individual may use a communication technology based on a subjective perception of the critical number of current users (Lou et al., 2000). The perception may be developed during an individual's interactions with other partners in the communication community. In the current study, if an individual perceives that many partners are using IM, or these partners suggest the use of IM, the individual may perceive IM to be useful (e.g., Lou et al., 2000; Markus, 1987). Thus, we hypothesize:

*H8: Perceived critical mass is positively associated with perceived usefulness.*

While critical mass theory emphasizes the benefits and costs of using a communication technology, the entertainment value of such a technology has not been fully explored.

However, the theory has pointed out that there are some individuals who have “the personal characteristics of being sought after” by others (Markus, 1987, p.503). These individuals may derive pleasure and enjoyment from being sought after, and this may create an enjoyable atmosphere for using the communication technology. On the other hand, these individuals may also have different interests (Markus, 1987) that may be expressed in their communications. If an individual perceives that many of his or her friends and relationship partners are using IM, the perception of having fun collectively or being present with each other via IM may be higher. Thus, we hypothesize:

*H9: Perceived critical mass is positively associated with perceived enjoyment.*

Based on critical mass theory (1987) and social influence theory (Fulk, 1993), perceived critical mass is believed to have a direct effect on technology adoption, acceptance, and use. The direct effect has been tested and found to be significant in several empirical studies (e.g., Lou et al., 2000; Soe and Markus, 1993). As a source of informational or potentially normative influence, a large number of users may directly influence an individual's adoption and acceptance of a particular technology. Social influence, which is a similar notion to critical mass, has been shown to have a direct effect on behavioral intention (Venkatesh and Morris, 2000; Venkatesh et al., 2000) in addition to its indirect effect mediated by perceived usefulness (Venkatesh and Davis, 2000). Thus, we hypothesize:

*H10: Perceived critical mass is positively associated with behavioral intention.*

## **Research Method**

### ***Data Collection***

We used the survey method to collect data. The respondents were undergraduate students in business courses in the colleges of business at two mid-western public universities. Bonus course credits were given with instructor agreement to motivate successful completion of the survey. Of a total of 400 questionnaires distributed to different classes, 331 were returned. Of the returned questionnaires, 23 indicated that the respondents had no experience with IM, and 22 were identified as incomplete responses. We excluded all these responses. To ensure that subjects were familiar with the technology being investigated, we also removed 13 respondents who reported that they had used IM for less than six months. We kept a total of 273 responses in the final sample. Since we found no significant differences between the responses from the two universities, we analyzed all the responses as a single sample.

### ***Measures***

We measured all research variables using multiple-item scales adapted from prior studies, making minor wording changes to tailor them to the target context. We adapted items for behavioral intention from Agarwal and Karahanna (2000); items for perceived enjoyment from Agarwal and Karahanna (2000) and Davis et al. (1992); items for attachment motivation from Hill (1987); items for relationship commitment from Rusbult et al. (1998); and items for perceived critical mass from Lou et al. (2000). Further, we adapted items for perceived usefulness from Schmitz and Fulk (1991), Fulk (1993), and Davis (1989). Both Schmitz and Fulk (1991) and Fulk (1993) used a single indicator scale, which asked respondents to assess usefulness from 1 (not at all useful) to 5 (extremely useful). We measured attachment motivation using the original 5-point scale from Hill (1987). All the other scales were 7-point. Appendix 1 lists the final items used in the study.

### **Pre-Tests**

We conducted a series of pre-tests to examine and validate the survey instrument, ensuring that it had content validity and reliability at an acceptable level. Before data collection, we conducted personal interviews with ten students to check the face validity of the adapted measures and made changes concerning the format and wording of the questions. Next, the questionnaire was sent to 84 MBA students from one of the two schools. Reliability and validity of the instrument were checked based on returned responses. The results of the pre-tests suggest that the instrument possessed adequate reliability and validity.

### **Sample Characteristics**

The college student sample used in this study (Table 1) was a typical example of Generation Y American users (Shiu and Lenhart, 2004). These students were very experienced with computers, Web sites, and e-mail.

<b>Characteristics</b>	<b>Number (N=273)</b>	<b>Percentage (%)</b>
<b>Age</b>		
< 21	96	35.20%
21 – 25	160	58.60%
26 – 30	5	1.80%
>30	12	4.40%
<b>Gender</b>		
Male	165	60.40%
Female	108	39.60%
<b>Experience with IM</b>		
7--12 Months	6	2.20%
1-2 Year	25	9.20%
> 2 Year	242	88.60%
<b>Experience with IT</b>		
	<b>Mean(Years)</b>	<b>Standard Deviation</b>
Computer	10.1	3.5
Web	6.7	2.2
E-mail	5.9	2.1

## **Results**

### **Measurement Model**

We first assessed the measurement model for the six constructs by a confirmatory factor analysis using LISREL 8.30 and the sample covariance matrix (Appendix 2). The results show a chi-square of 288.18 with 174 degrees of freedom ( $p < 0.001$ ). Given the dependence of the chi-square test on sample size, we examined other indices as well, including goodness-of-fit index (GFI = 0.91), adjusted goodness-of-fit index (AGFI = 0.88), normed fit index (NFI = 0.95), non-normed fit index (NNFI = 0.97), comparative fit index (CFI = 0.98), root mean square residual (RMSR = 0.049), standardized root mean square residual (SRMSR = 0.034), and root mean square error approximation (RMSEA = 0.047). Compared to commonly accepted values suggested in the literature (e.g., Chau, 1997), all measures suggest a good fit of the measurement model.

We further assessed the measurement model for construct reliability and validity. Reliability was assessed using both item reliability and composite reliability (Table 2). Item reliability indicates the amount of variance in an item due to the underlying construct rather than to error and can be obtained by squaring the factor loading. Item reliabilities in our measurement model range from 0.50 to 0.94, satisfying the recommended value of 0.50 (Fornell and Larcker, 1981). We calculated composite reliability using the formula:  $\rho = (\sum \lambda_i)^2 / ((\sum \lambda_i)^2 + \sum \theta_i)$ , where  $\lambda_i$  refers to the *i*th factor loading and  $\theta_i$  to the *i*th error variance. This coefficient has a similar interpretation as Cronbach's Alpha, except that it takes into account the actual factor loadings instead of assuming that each item is equally weighted in determining the composite. Composite reliabilities in our measurement model range from 0.84 to 0.97. Nunnally (1978) suggested a minimum of 0.70 for composite reliability.

**Table 2. Confirmatory Factor Analysis**

Construct	Item	Mean	Standard Deviation	Standard Loading	Item Reliability	Composite Reliability	Average Variance Extracted
Attachment Motivation (AM)	AM1	3.98	0.92	0.78	0.61	0.86	0.61
	AM2	3.83	0.89	0.86	0.74		
	AM3	4.04	0.85	0.77	0.59		
	AM4	3.81	0.93	0.71	0.50		
Relationship Commitment (RC)	RC1	5.64	1.11	0.77	0.59	0.88	0.71
	RC2	5.13	1.30	0.89	0.79		
	RC3	5.22	1.28	0.86	0.74		
Perceived Critical Mass (PCM)	PCM1	5.48	1.46	0.92	0.85	0.86	0.83
	PCM2	5.27	1.59	0.96	0.92		
	PCM3	3.20	1.65	-0.79	0.62		
	PCM4	5.30	1.58	0.96	0.92		
Perceived Usefulness (PU)	PU1	5.88	1.25	0.83	0.69	0.87	0.77
	PU2	5.87	1.23	0.92	0.85		
Perceived Enjoyment (PE)	PE1	5.34	1.21	0.82	0.67	0.84	0.71
	PE2	5.43	1.23	0.89	0.79		
	PE3	2.69	1.37	-0.75	0.56		
	PE4	4.93	1.25	0.86	0.74		
	PE5	5.32	1.27	0.89	0.79		
Behavioral Intention (BI)	BI1	6.09	1.25	0.95	0.90	0.97	0.93
	BI2	6.03	1.29	0.97	0.94		
	BI3	6.08	1.25	0.97	0.94		

We evaluated construct validity using convergent validity and discriminant validity. Convergent validity was assessed by factor loadings and average variance extracted (AVE) (Fornell and Larcker, 1981). According to Fornell and Larcker (1981), the average variance extracted measures the amount of variance due to the construct in relation to the amount of variance due to measurement error. A factor loading greater than 0.70 is considered significant and as evidence of convergent validity. An average variance extracted greater than 0.50 also suggests that the convergent validity of the construct is acceptable (Fornell and Larcker, 1981). As shown in Table 2, all factor loadings for the

items in the measurement model exceeded 0.70 and all average variances extracted were greater than 0.50, thereby demonstrating adequate convergent validity.

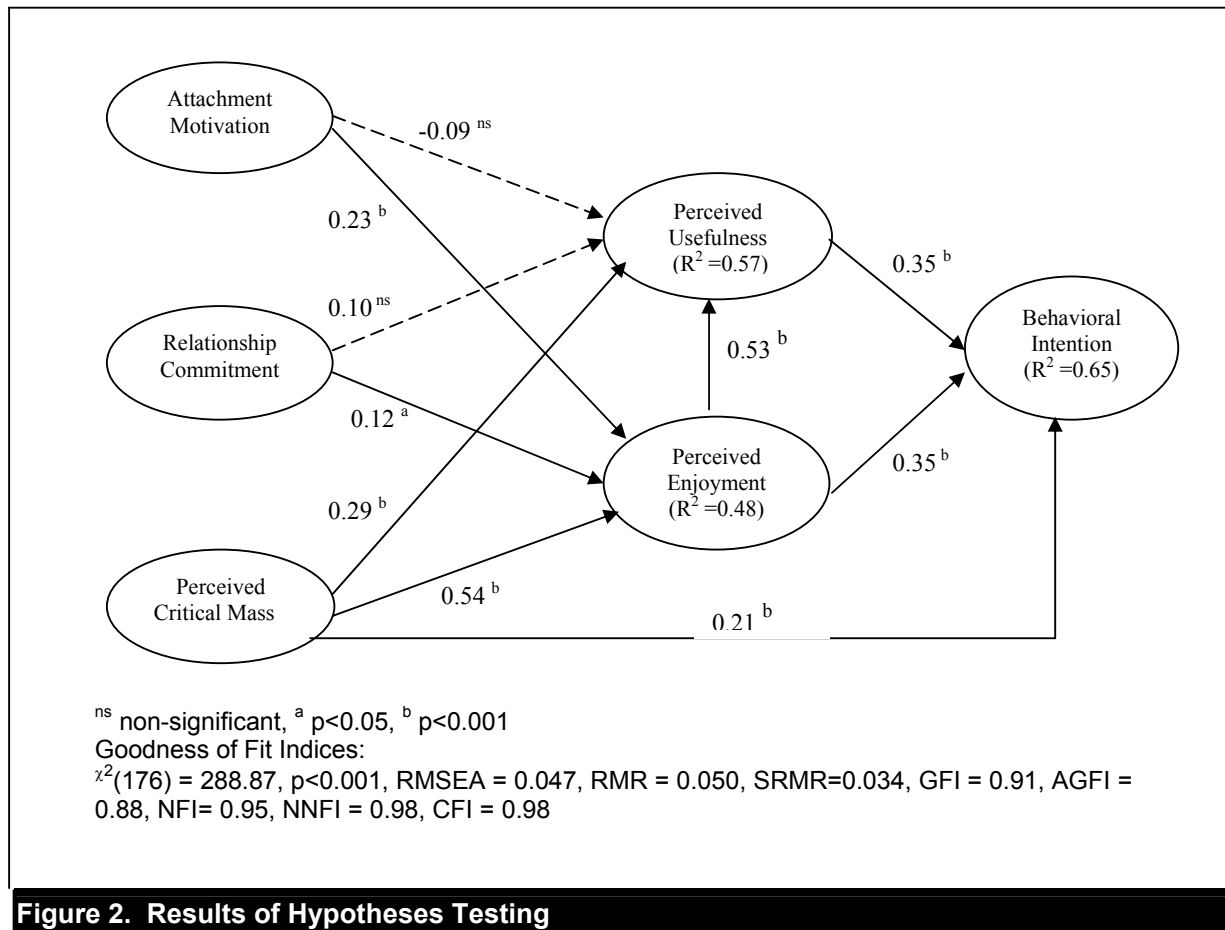
Discriminant validity can be assessed by comparing the shared variances between constructs with the average variance extracted from the individual constructs (Fornell and Larcker, 1981). Lower shared variances between constructs than the average variance extracted from the individual constructs suggest discriminant validity. Table 3 presents the correlations between constructs and the square roots of average variance extracted. The results provide positive support for discriminant validity.

<b>Construct</b>	<b>Inter-construct Correlation</b>					
	<b>BI</b>	<b>PU</b>	<b>PE</b>	<b>AM</b>	<b>RC</b>	<b>PCM</b>
<b>BI</b>	0.96					
<b>PU</b>	0.73	0.88				
<b>PE</b>	0.73	0.72	0.84			
<b>AM</b>	0.30	0.23	0.40	0.78		
<b>RC</b>	0.31	0.34	0.37	0.41	0.84	
<b>PCM</b>	0.65	0.63	0.63	0.23	0.27	0.91

### **Structural Model**

With satisfactory results in the measurement model, we then examined the structural model to test the relationships among constructs. The results are shown in Figure 2 and Table 4. The structural model has a chi-square of 288.87 with 176 degrees of freedom ( $p < 0.001$ ), goodness-of-fit index (GFI = 0.91), adjusted goodness-of-fit index (AGFI = 0.88), normed fit index (NFI = 0.95), non-normed fit index (NNFI = 0.97), comparative fit index (CFI = 0.98), root mean square residual (RMSR = 0.050), standardized root mean square residual (SRMSR = 0.034) and root mean square error approximation (RMSEA = 0.047). These indices suggest a good fit of the structural model.

Assessing the results in terms of paths, we found that eight of the ten proposed hypotheses were supported (Table 4). Perceived usefulness (H1) (coefficient=0.35,  $t_{(176)} = 4.98$ ,  $p < 0.001$ ), perceived enjoyment (H2) (coefficient=0.35,  $t_{(176)} = 5.11$ ,  $p < 0.001$ ), and perceived critical mass (H10) (coefficient=0.21,  $t_{(176)} = 3.79$ ,  $p < 0.001$ ) all had significant effects on behavioral intention, explaining 65% of the variance. H4 and H6 were not supported, meaning that attachment motivation (coefficient=-0.09,  $t_{(176)} = -1.51$ ,  $p > 0.05$ ) and relationship commitment (coefficient=0.10,  $t_{(176)} = 1.76$ ,  $p > 0.05$ ) had no significant effects on perceived usefulness. On the other hand, H3 and H8 were supported, indicating that perceived enjoyment (coefficient=0.53,  $t_{(176)} = 6.94$ ,  $p < 0.001$ ) and perceived critical mass (coefficient=0.29,  $t_{(176)} = 4.44$ ,  $p < 0.001$ ) had significant effects on perceived usefulness, explaining 57% of the variance. The result for H3 also suggested that the indirect effect of perceived enjoyment on behavioral intention was significant. Finally, H5, H7, and H9 were supported, suggesting that attachment motivation (coefficient=0.23,  $t_{(176)} = 3.89$ ,  $p < 0.001$ ), relationship commitment (coefficient=0.12,  $t_{(176)} = 2.14$ ,  $p < 0.05$ ), and perceived critical mass (coefficient=0.54,  $t_{(176)} = 9.60$ ,  $p < 0.001$ ) had significant effects on perceived enjoyment, explaining 48% of the variance.



**Figure 2. Results of Hypotheses Testing**

## Discussion

The purpose of this study was to examine a research model that was expected to explain the behavioral intention to continue using IM in social interactions. Eight of the ten causal links specified by the model were supported. Several results were interesting and deserve further discussion.

Overall, our research model demonstrated a good fit with the data collected in this study. Perceived usefulness, perceived enjoyment, and perceived critical mass collectively explained 65% of the variance in behavioral intention. This level of explanatory power is comparable with those of TAM and TPB (e.g., Davis et al., 1989; Venkatesh and Davis, 2000; Venkatesh et al., 2003). Furthermore, integrating interpersonal factors in the Motivation Model provided additional avenue explaining perceived enjoyment and perceived usefulness. Attachment motivation, relationship commitment, and perceived critical mass explained 48% of the variance in perceived enjoyment, which, together with perceived critical mass, explained 57% of the variance in perceived usefulness.

Consistent with previous research, this study found that perceived usefulness and perceived enjoyment were significant in explaining an individual's behavioral intention to continue using IM. However, contrary to previous findings (e.g., Davis et al., 1992; Igarria et al., 1996; Teo et al., 1999), we found that the explanatory effect of perceived

usefulness on behavioral intention was the same as, rather than much higher than, that of perceived enjoyment. This may be explained by the differences between the types of technologies in our study and previous studies. To our knowledge, previous technology adoption studies have focused on technology use in the workplace for work and task purposes. Thus, the utility of these technologies in supporting one's productivity and performance should be the dominant variable influencing behavioral intention. However, information technologies also have value in providing enjoyable, pleasant, and hedonic outcomes (Venkatesh and Brown, 2001). In their study of electronic groups at work, Finholt and Sproull (1990) have speculated that "people's motivation is more likely to be found in the pleasures of gossip and feeling in-the-know than in any calculation of the instrumental utility of information acquired from these groups" (Finholt and Sproull, 1990, p. 59). Our study has investigated IM as an interactive communication technology and is concerned with its social nature to keep and build interpersonal relationships and communities. IM has the advantage of connecting friends in real time and from different locations, which contributes to an individual's perception that sharing time and experiences with friends is fun and enjoyable. Thus, perceived enjoyment can be as important as, if not more important than, perceived usefulness in determining the behavioral intention to continue using IM. This finding is consistent with those from Venkatesh (1999). In studying the role of intrinsic motivation in computer training, Venkatesh (1999) found that users in a game-based training environment (which was reported as more enjoyable) had a higher level of behavioral intention than users in the conventional training environment (which was reported as less enjoyable). Further, users who reported higher levels of enjoyment during the training perceived the system as easier to use.

**Table 4. Results of Hypotheses Testing**

No.	Hypothesis	Path Coefficient	Supported?
H1	Perceived usefulness is positively associated with behavioral intention.	0.35**	Y
H2	Perceived enjoyment is positively associated with behavioral intention.	0.35**	Y
H3	Perceived enjoyment is positively associated with perceived usefulness.	0.53**	Y
H4	Attachment motivation is positively associated with perceived usefulness.	-0.09	N
H5	Attachment motivation is positively associated with perceived enjoyment.	0.23**	Y
H6	Relationship commitment is positively associated with perceived usefulness.	0.10	N
H7	Relationship commitment is positively associated with perceived enjoyment.	0.12*	Y
H8	Perceived critical mass is positively associated with perceived usefulness.	0.29**	Y
H9	Perceived critical mass is positively associated with perceived enjoyment.	0.54**	Y
H10	Perceived critical mass is positively associated with behavioral intention.	0.21**	Y

\* p<0.05

\*\* p<0.001



Contrary to what we hypothesized, attachment motivation and relationship commitment did not demonstrate significant direct effects on perceived usefulness. However, these two factors exhibited significant effects on perceived enjoyment, which was significantly associated with perceived usefulness (coefficient=0.53). One possible explanation for the lack of direct effects is the mismatch between the purpose and performance of using IM. As explained by Venkatesh and Davis (2000), perceived usefulness is determined by the assessment of the match between important work goals and system performance, in addition to social influence factors. Moreover, the Theory of Media Synchronicity (Dennis and Valacich 1999) also points out that communication effectiveness is determined by the match between the goals of communication processes and the media capabilities. Our results indicate that the consequences of using IM may not match very well with the goals (i.e., attachment and commitment) of building and maintaining social relationships, so that the judgment of the usefulness of IM may be questioned. As suggested by Dennis and Valacich (1999), people may need access to a set of media rather than dependence on a single medium. They may switch among these media. We speculate that people may still use other communication channels with their IM partners in addition to IM. However, we did not collect data about the nature of respondents' relationships with their IM partners or their use of complementary media. Future studies could address these issues.

### ***Limitations***

Before we discuss the research and managerial implications of the study results, we must mention limitations of this study that could be addressed in future studies. First, the data were collected from a student sample and may not reflect the perceptions of people in other age groups or involved in other social or business contexts. For example, generalization of the findings of the present study to interpersonal relationships in the workplace should be made with caution because the factors driving the use of IM in work environments may include task, organization, and environment variables.

As mentioned above, the students in our study were from two regional universities. They might often meet face-to-face with those friends and family members on their IM contact lists, and they might not have many IM partners from other regions. Thus, it may not be surprising to find insignificant links between perceived usefulness and attachment motivation or relationship commitment. Second, the respondents in the student sample were using different IM tools from different vendors and service providers, e.g., MSN, Yahoo, AOL, and ICQ. We did not investigate the differences in the features of these different technologies. However, a preliminary study was conducted about the technology features of these different IMs and suggested that the IMs were very similar to each other in terms of user interfaces and functions. Third, we did not measure actual usage in the study. Given that the system log files reside with the different IM providers, it was not realistic to collect actual usage data. The results might be different if we took into account the context of actual usage. However, recent studies have shown that in the context of continuous use of IT, intention is more important than actual usage as the dependent variable (e.g., Bhattacharjee, 2001; Karahanna et al., 1999). Fourth, we measured perceived usefulness using the items from the original scale (Davis, 1989), which was developed in the traditional workplace setting. It is possible that this scale does not capture the social nature of the communication technology, so that the respondent's perception of the utility of the technology might not have been revealed precisely. Future studies might develop a scale to measure the usefulness of communication technology in the social context.

### ***Implications for Research***

From a research standpoint, the results of this study provide empirical evidence of the usefulness of integrating the Motivational Model (Davis et al., 1992) and interpersonal relationship factors into one research model to understand the adoption and use of IM.

This model is different from TAM and TPB, because both utility factors (i.e., perceived usefulness and perceived enjoyment) and social factors (e.g., attachment motivation, relationship commitment, and perceived critical mass) are included. The model provides an inseparable, complementary, and reinforcing perspective for future studies of communication technologies (Kraut, Rice et al., 1998). By expanding the Motivational Model, this study integrates perceived critical mass as the third variable to explain behavioral intention. Our integration of the three variables, i.e., perceived usefulness, perceived enjoyment, and perceived critical mass, has explained a large percentage (65%) of the variance of behavioral intention while maintaining the parsimony of the research model. The three determinant factors are similar to those from Venkatesh and Brown (2001), who found that utilitarian outcomes, hedonic outcomes, social outcomes, and social influence were significant determinants of adopting PCs at home.

Our study also provides support for the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). Conceptually, perceived usefulness and perceived critical mass in our model are similar to performance expectancy and social influence in UTAUT, respectively. However, because of the reasons mentioned before, our model includes perceived enjoyment rather than perceived ease of use (effort expectancy in UTAUT). Empirically, the finding about the effect of perceived usefulness was consistent with UTAUT, but this was not the case with perceived critical mass. This is because IM is a group or community-oriented technology. An individual's use of IM relies on other people's use. The communication and hedonic nature of IM suggest that future studies need to be more precise about the characteristics of the technologies to be studied before applying and developing research models. Unlike UTAUT, our research does not investigate the effects of moderators, gender and age in particular, which could be examined in future IM studies.

Our introduction of attachment motivation and relationship commitment to the research model has positioned the user differently, from a passive conventional IT user to an active social actor who constantly seeks and explores new technologies in his social life (Lamb and Kling, 2003). The characteristics of these active social actors and those of their interpersonal relationship partners may warrant further investigation by researchers in the area of technology adoption and acceptance. Future studies could investigate other individual difference factors, such as social orientation, disposition to trust, responsiveness, and time use orientation (monochromic vs. polychromic).

Our integration of the literature from social communication and interpersonal relationships emphasizes the social utility of developing and maintaining social relationships, an important but often ignored aspect of information technologies. Unlike traditional Internet-based communication technologies such as email, which originated in the areas of science, research, education, and business, newly developed technologies such as IM were first adopted and accepted by consumers. It would be useful to investigate how an individual's use of IM is carried over to the business environment, how an individual balances the use of IM between home and work, and how the use of IM at work affects the individual's work performance.

The research model may also provide a useful theoretical perspective for researchers to investigate the anticipated proliferation and adoption of other interactive communication technologies in building and cultivating interpersonal relationships and virtual communities. The model does not consider the unique features of the communication technology and can be tested using different communication technologies. For example, although email is not as efficient as IM in terms of turnaround time, responsiveness, presence, and availability awareness (Rennecker and Godwin, 2003), it does help to develop interpersonal relationships (e.g., Boneva et al., 2001; Cumming et al., 2002; Fulk, 1993; Kraut et al., 1999; Kraut, Patterson et al., 1998). It will also be beneficial,

theoretically and practically, to conduct comparative studies on email and IM using our research model. Future studies could also investigate such new interactive communication technologies as short message service (SMS) and mobile e-commerce, because such e-commerce applications also involve building business and customer relationships.

The global nature of the Internet, in terms of its users, also suggests an interesting research issue in technology adoption behavior. Chau et al. (2002) found that Asians tend to use the Internet more for social communications such as to meet new people, to visit a chat room, to influence a group, and to join a group, while Americans use the Internet more for information searches, in which people look for information related to educational, employment, product, or work needs. Our results, however, suggest that when the Internet is used as a communication channel, enjoyment is as important as usefulness even though the subjects in our study were mostly Americans. It would be useful for future studies to apply our research model in different cultures and compare the findings across them.

### ***Implications for Practice***

Findings of the present study shed light on several areas that could benefit vendors, service providers, and corporate users of IM. We suggest that business managers identify the employees with higher levels of attachment motivation and relationship commitment. These workers could be assigned to tasks and positions (such as online real-time customer service, virtual teams, and telecommuting) that require real-time electronic connections with the organization, group members, or customers. They may become the critical mass of the IM virtual community to promote shared understandings, facilitate idea generation and knowledge dissemination, and cultivate organization commitment among group members. These employees may be very helpful in building interpersonal networks within and between business units, especially between people in weak-tie relationships (Granovetter, 1973), which could be examined in future studies.

Of course, one possible caveat to using IM in the workplace is that employees may not draw a clear line between work use and personal use. Personal use of IM may distract workers from business activities, as was the case with email and web browsing. Research findings regarding the pros and cons of IM use in business have been mixed. Thus, an important research project for both theory and practice is to investigate how organizations can design appropriate policies and strategies to ensure the proper use of IM.

Implementing IM in a business environment encourages "casual conversation" (Sarbaugh-Thompson and Feldman, 1998). Greetings to a new employee may indicate that the employee is welcome to develop a relationship with others and suggests the opportunity to be integrated into different organizational groups. "Greetings break the ice and make casual conversation more likely" (Sarbaugh-Thompson and Feldman, 1998, p.693). Casual conversations among current employees may be the lubricants for their existing relationships, suggesting that the relationship is maintained as intended. In the use of electronic communication technologies, email has decreased the chances to greet each other and to conduct informal conversations that help to build trust (Sarbaugh-Thompson and Feldman, 1998). While some people complain that sending "Hi" via IM is interrupting and intrusive, such complaints may be more of a procedural than a substantive issue. If an individual is fully involved in an activity and not available for an IM conversation, he could indicate his unavailability using the functions provided by IM. However, abandoning the use of IM in the organizational context will block a potential channel for employees to be integrated with each other.

Finally, the significant effects of perceived enjoyment on behavioral intention and perceived usefulness suggest the importance of perceived enjoyment in technology adoption (Davis et al., 1992; Hassenzahl et al., 2001; Webster and Martocchio, 1992). Vendors should continuously explore design methods to improve the fun aspect of system use. Providing more customization and personalization features may facilitate the interaction process and enhance the end user's experience of enjoyment at work. Davis et al. (1992) indicated that improved enjoyment of using a system could lead to higher system acceptance and use in the workplace. Playfulness of system use is an important part of organizational life that managers cannot ignore (Finholt and Sproull, 1990).

## Conclusion

As more and more IM applications permeate social environments, IM is becoming a standard part of interpersonal communication for many people. As one of the first studies to investigate the diffusion of this technology, this paper has examined the social nature of IM in building and maintaining social relationships. We have provided a research model to explain the behavioral intention to continue using IM by integrating the Motivational Model and interpersonal relationship theories. The results of this empirical study show good support for our research model. Because it is a revolutionary technology like email, IM will affect how an organization is structured and organized, help to build the relational aspect of business communication, change the way people communicate and collaborate with each other in the business context, and place higher demands on individuals to perform multiple communication tasks simultaneously in their workplaces. It is critical to understand these influences in both social and business environments.

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## Appendix 1: Measures and Scales

### **Attachment Motivation (AM)** (adapted from Hill (1987))

- AM1. I think being close to others, listening to them, and relating to them on a one-to-one level is one of my favorite and most satisfying pastimes.
- AM2. Just being around others and finding out about them is one of the most interesting things I can think of doing.
- AM3. I feel like I have really accomplished something valuable when I am able to get close to someone.
- AM4. One of the most enjoyable things I can think of that I like to do is watching people, talking to them, and seeing what they are like.

### **Relationship Commitment (RC)** (adapted from Rusbult et al. (1998))

- RC1. I am committed to maintaining my relationship with buddies.
- RC2. I feel very attached to my relationship to buddies---very strongly linked to my buddies.
- RC3. I am oriented toward the long-term future of my relationship with buddies.

### **Perceived Critical Mass (PCM)** (adapted from Lou et al. (2000))

- PCM1. Many of my buddies use Instant Messenger.
- PCM2. Of the buddies I communicate with regularly, many use Instant Messenger.
- PCM3. Few buddies I communicate with use Instant Messenger.
- PCM4. A large percentage of my buddies use Instant Messenger.

### **Perceived Usefulness (PU)** (adapted from Davis (1989); Fulk (1993); Schmitz and Fulk (1991))

- PU1. Using Instant Messenger makes it easier for me to interact with buddies.
- PU2. I find Instant Messenger useful for my interaction with buddies.

### **Perceived Enjoyment (PE)** (adapted from Agarwal and Karahanna (2000); Davis et al. (1992))

- PE1. The actual process of using Instant Messenger is pleasant.
- PE2. I have fun using Instant Messenger.
- PE3. Using Instant Messenger bores me.
- PE4. Using Instant Messenger provides me with a lot of enjoyment.
- PE5. I enjoy using Instant Messenger.

### **Behavioral Intention (BI)** (adapted from Agarwal and Karahanna (2000))

- BI1. I intend to continue using Instant Messenger in the future.
- BI2. I expect my use of Instant Messenger to continue in the future.
- BI3. I plan to use Instant Messenger in the future.

**Appendix 2: Sample Covariance Matrix**

	AM1	AM2	AM3	AM4	RC1	RC2	RC3	PCM1	PCM2	PCM3
AM1	0.852									
AM2	0.573	0.797								
AM3	0.438	0.5	0.715							
AM4	0.463	0.492	0.442	0.856						
RC1	0.316	0.242	0.287	0.282	1.232					
RC2	0.238	0.284	0.333	0.29	1	1.688				
RC3	0.339	0.35	0.407	0.369	0.91	1.273	1.626			
PCM1	0.224	0.244	0.209	0.31	0.284	0.422	0.433	2.118		
PCM2	0.271	0.267	0.265	0.335	0.355	0.527	0.497	1.99	2.535	
PCM3	-0.187	-0.219	-0.225	-0.259	-0.02	-0.037	-0.131	-1.389	-1.678	2.725
PCM4	0.209	0.207	0.201	0.28	0.346	0.452	0.497	2.05	2.249	-1.63
PU1	0.159	0.149	0.119	0.293	0.325	0.354	0.408	0.99	1.028	-0.852
PU2	0.225	0.165	0.163	0.224	0.338	0.4	0.477	0.938	1.087	-0.739
PE1	0.316	0.29	0.24	0.334	0.358	0.382	0.409	0.872	1.046	-0.626
PE2	0.359	0.288	0.299	0.338	0.433	0.355	0.461	1.014	1.171	-0.777
PE3	-0.36	-0.233	-0.271	-0.196	-0.362	-0.298	-0.419	-0.86	-0.969	0.87
PE4	0.366	0.297	0.363	0.336	0.379	0.414	0.511	0.949	1.019	-0.655
PE5	0.349	0.272	0.358	0.29	0.48	0.458	0.464	0.987	1.106	-0.674
BI1	0.263	0.255	0.239	0.286	0.335	0.333	0.44	1.041	1.229	-0.893
BI2	0.273	0.265	0.245	0.329	0.351	0.375	0.483	1.087	1.291	-0.935
BI3	0.241	0.245	0.24	0.305	0.352	0.394	0.45	1.066	1.259	-0.909

	PCM4	PU1	PU2	PE1	PE2	PE3	PE4	PE5	BI1	BI2	BI3
AM1											
AM2											
AM3											
AM4											
RC1											
RC2											
RC3											
PCM1											
PCM2											
PCM3											
PCM4	2.492										
PU1	1.047	1.56									
PU2	1.029	1.168	1.519								
PE1	0.916	0.716	0.857	1.467							
PE2	1.081	0.76	0.958	1.155	1.518						
PE3	-0.928	-0.621	-0.765	-0.925	-1.098	1.876					
PE4	0.922	0.723	0.814	1.053	1.163	-1.021	1.565				
PE5	0.995	0.806	0.947	1.083	1.211	-1.181	1.28	1.608			
BI1	1.123	0.937	1.019	0.873	1.008	-0.953	0.914	1.041	1.554		
BI2	1.209	0.941	1.011	0.929	0.974	-0.966	0.921	1.043	1.476	1.657	
BI3	1.193	0.943	0.999	0.871	0.956	-0.906	0.888	1.016	1.438	1.531	1.571

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