The Pennsylvania State University

The Graduate School

College of Communications

WHAT FACTORS CONTRIBUTE TO INDIVIDUALS PERCEIVING TECHNOLOGIES AS ESSENTIAL?
AN EXPLORATION OF PSYCHOLOGICAL PREDICTORS OF PERCEIVED ESSENTIALITY IN COMMUNICATION TECHNOLOGIES

A Dissertation in

Mass Communications

by

Anamarcia Lacayo

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Doctor of Philosophy

August 2012

The dissertation of Anamarcia Lacayo was reviewed and approved* by the following:

Michel M. Haigh
Associate Professor of Communications
Dissertation Advisor
Chair of Committee

Krishna Jayakar
Associate Professor of Communications

S. Shyam Sundar
Distinguished Professor of Communications

Richard D. Taylor
Palmer Chair of Telecommunications Studies and Law

Gary S. Cross
Distinguished Professor of Modern History

Marie Hardin
Associate Dean for Graduate Studies and Research

*Signatures are on file with the Graduate School

ABSTRACT

Communication technologies have become deeply embedded in and fundamental to people's lives, yet little is known about what makes these technologies essential. An online survey ($N = 309$) was administered to explore which psychological variables predicted whether individuals perceived a communication technology as essential. Participants tended to be young and frequent users of communication technologies. According to the results of a backward, stepwise multiple regression analysis, functional considerations, social influence factors, and dependency influenced perceived essentiality among frequent technology users. Together, compatibility, bandwagon perceptions, and technology dependency best predicted whether an individual perceived a communication technology as essential.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENTS

Throughout my doctoral studies, I received an immense amount of support and encouragement from many different people. I am very grateful for all of the support I received and would like to take the time to acknowledge those individuals whose support was especially essential to my completing this dissertation.

First, I would like to thank the members of my committee, Michel M. Haigh, Krishna Jayakar, S. Shyam Sundar, Richard D. Taylor, and Gary S. Cross. Thank you for helping me reach my goal. Special thanks go to Michel for all of her support and for taking me on as an advisee. Thank you also for all of the continual proofreading and entertaining pictures of G and for the open line of communication we established at the outset.

Many thanks are also in order to my mentor and honorary member of my committee Jorge Reina Schement and to Nancy Kranich. I will always cherish the many fond memories I have of our time together on Holmes Street.

Thank you also to the College of Communications staff who helped me along the way, including Betsy Hall, Yu-Tai Chung, and Serena Sidwell, and to many of the past and current members of Shyam's Lab Group, particularly Saras Bellur for her kindness, thoughtfulness, and support.

Additionally, I would like to recognize my survey's participants as well as those who helped encourage others to participate in the study for their contributions. Thank you for sharing some of your experiences with your most essential technology with me and for your part in helping me see this study to completion.

A big thank you also goes to my PTC colleagues, particularly Sharon Nakama for

giving me the space and time to complete this dissertation. Thank you for your continuous support and encouragement and for making my priority high on your list as well.

Lastly, thanks to the friends and family who were rooting for me throughout my doctoral studies. I consider myself extremely fortunate in that there are too many of you to acknowledge individually without writing a separate dissertation to thank all of you. Please know I am incredibly grateful for all of your love and support.

Thank you, Mom, Dad, and Brother. I've learned so much from each of you. Thank you for encouraging me to see this project through and for your patience and understanding while I did so. Thanks also to you, Ed and Lourdes, for your encouragement and for giving me something extra wonderful to look forward to when I defended my dissertation—meeting Logan Alexander.

I would like to conclude by acknowledging the select group of people who were physically and actively present while I worked on and completed this particular project, including Anthony Olorunnisola, Philip Ayoub, Cara, Jim, Adiana, and Raiden K., and Eli Wekenman.

But first, an honorary shout out goes to Pia Deas. Although she was not in State College during the last stretch of my time at Penn State, she provided much encouragement, understanding, countless cheers, and great analogies from afar. Thank you, Pia.

My dear amigo Anthony, you were instrumental in my regaining the momentum necessary to complete this project and to earn my degree. Thank you for your great friendship, our delightful conversations, and your sage advice as you encouraged me to

"visualize the outcome" and reminded me you knew I could this.

Phillip, we did it! Thanks for the moral support and for the many hours spent at Wegman's working together. I probably ate a few too many cookies, but I enjoyed being able to ride through some of the highs and lows of completing a dissertation with you. I'm excited to see where our next adventures take us.

Jim and Cara, thank you both for all of your love, encouragement, constant support, and amazing friendship. Thank you also for making two wonderful children who have been a regular source of joy, laughter, learning, and great hugs in my life. Adiana and Raiden, thank you for enriching my life, for your unconditional love, and for always putting smiles on my face.

To my dearest Eli, to write how much you mean to me and how instrumental you were in my completing this project and earning my degree would result in many, many hours of writing. Thank you immensely for your constant love and support and your amazing patience. Thank you also for taking such great care of me in the time leading up to my writing this dissertation, while I was writing, and since I've finished. 1-4-4-4-3, Wu. Now, let's go home!

To my family, circa 1982.

"La patria de uno es adonde uno esta bien."
– Dr. Donald Lacayo Nuñez

1

INTRODUCTION

In a recent survey conducted by the Science Museum (2011), participants rated how important a variety of items were in their everyday lives. The survey results caught the attention of international news agencies because, among other findings, respondents rated an Internet connection as more important than clean drinking water, refrigeration, and indoor plumbing. In fact, an Internet connection was second in importance only to sunshine. Of the top ten things British participants said they could not live without, four were communication technologies, including an Internet connection (number two on the list), Facebook (number five on the list), e-mail (number eight on the list), and mobile phone/smartphone (number 10 on the list).

The British are not alone in valuing their technologies. According to a recent report from Cisco (2011), 58% of college students in the United States said they could not live without the Internet and viewed the Internet as integral to their daily lives. For young professionals between the ages of 21 and 29, the percentage rose to 73%. Additionally, almost one-third (31%) of college students and 27% of young professionals felt the Internet was as important to their lives as air, water, food, and shelter. Another 37% of college students and 58% of young professionals reported the Internet was not as important as water, food, air, and shelter, but that it was "pretty close." When asked what technology was most important to them in daily life, 60% of college students and 44% of young professionals indicated it was their computer. The smartphone was the second most popular technology among both college students (20%) and young professionals (37%). By comparison, only 6% of college students and 11% of young professionals

rated television as their most important technology.

Studies suggest the tendency to consider communication technologies necessary is not limited to college students and young professionals, but occurs among adults of all ages in the United States (Pew Research Center, 2006, 2009). The Pew Research Center (2009) asked adults between 18 and 65+ to rate 13 items as either a necessity or a luxury they could easily do without. Of the communication technologies on the list, the landline phone was what most of the respondents (68%) rated as a necessity. Nearly half of all respondents thought a TV set (52%), home computer (50%), and a cell phone (49%) were necessities. Almost a third (31%) of the sample felt high-speed Internet access was a necessity. While these results are likely skewed because three-quarters of the sample participated in the telephone survey via a landline phone, the results demonstrate most people perceive at least one communication technology as necessary.

People have come to perceive communication technologies as essential.[1] People have developed relationships with their communication technologies, and communication technologies have become deeply embedded in people's everyday lives. Nevertheless, little is known about how users come to perceive communication technologies as essential.

Though existing scholarship offers insights into various aspects of people's relationships with communication technologies, the literature seldom addresses topics related to perceived essentiality. The diffusion of innovations literature, for instance, explains how innovations diffuse through a social system, but stops at adoption (Rogers,

[1] Existing scholarship and dictionary entries tend to treat terms such as *necessary*, *essential*, and *indispensable* as synonymous. Essential is preferred in this study because the term is neither as restrictive as necessity nor as static or as dismissive of non-functional considerations (e.g., emotions) as *indispensable* (Schifferstein & Zwartkruis-Pelgrim, 2008).

2003). Similarly, both the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) identify predictors of technology acceptance, however, both end at use (F. D. Davis, Bagozzi, & Warshaw, 1989; Venkatesh, Morris, Davis, & Davis, 2003). And while the uses and gratifications (U&G) literature focuses on use, it only tends to do so in a very functional sense by assuming all use is goal-directed (Palmgreen, Wenner, & Rosengren, 1985; Rubin, 2009), largely ignoring the role of emotions and attitudes. Finally, other scholarship assumes adoption and use, and examines effects (e.g., Sundar, 2008). While scholars continue to examine different aspects of people's relationships with technologies, little is known about the rich relationships people develop with their technologies.

How is it individuals come to perceive communication technologies as essential? Is perceived essentiality determined by functional considerations such as usefulness? Perhaps perceived essentiality is the result of social influence. Or is it the emotional bond—the attachment—a person develops toward his or her technologies that leads him or her to perceive them as essential? Could perceived essentiality be a matter of habit or compulsion? Or, is it something internal—a demographic characteristic such as age or gender, for instance—that influences perceptions of a technology as essential? What is the role of dependency in influencing perceived essentiality? These questions guide this study.

The purpose of this study is to explore the individual psychological factors that help predict if individuals perceive communication technologies as essential. Specifically, this study examines the individual-level determinants influencing individuals' perceptions of a technology as essential and identifies which combination of

variables best predicts perceived essentiality.

In this study, *essential* refers to something "fundamental or central to the nature of something or someone" ("New Oxford American Dictionary," 2005). An essential technology, then, is a technology so deeply embedded in a person's life the person perceives the technology as fundamental to his or her life.[2] The perception of a technology as essential therefore reflects a relationship an individual forges with the technology. Essentiality can be studied at both the micro- or individual-level and the macro- or societal level. This study focuses on essentiality at the individual level.

Though essentiality may be described as an attribute of a technology (e.g., "essential communication technology"), in the present case, the attribute is perceived by the individual rather than inherent to the technology. As a result, a technology's status as essential is dynamic. That is, a technology an individual perceives as essential today may not be one he or she perceives as essential in the future. The concept, *essential*, in contrast, is static. Although the technologies individuals perceive as essential may change, what it means for a technology to be perceived as essential does not.

This study of perceived essentiality is important for a number of reasons. With regards to theory, this study adds to the sparse literature on the significance and centrality of communication technologies in people's lives at a time when individuals are increasingly living continuously connected lives (Pew Internet & American Life Project, 2011). This study's focus on essentiality also provides additional context to existing lines of research, such as effects, privacy, and prevention research. For instance, in effects

[2] A communication technology is a system, device, application, or service that grants users access to communication networks. In a more colloquial sense, a communication technology is a system, device, application, or service individuals use to communicate. This study adopts Rogers' (2003) view that technologies are often comprised of both a hardware (i.e., "the tool that embodies the technology as a material or physical object" [p. 13]) and a software ("the information base for the tool" [p. 13]) component. However, users can attribute essentiality to either or both hardware or software.

research, essentiality could serve as a moderating variable. Perceptions of technologies as essential could influence people's notions of privacy and their willingness to disclose personal information. Essentiality might also have implications for prevention research, particularly in the case of the use of mobile devices while driving.

2

LITERATURE REVIEW

No single literature or theory exists to explain how individuals come to perceive a technology as essential. This chapter begins by examining the most relevant work on the topic, Hoffman et al.'s (2004) conceptual model of Internet indispensability, and its limitations before delving into the literature in communication and related fields for guidance on individual-level variables with potential implications for understanding what factors influence how essential individuals perceive communication technologies.

Conceptual Model of Internet Indispensability

Hoffman et al. (2004) argue the Internet has become indispensable. They state, "something becomes indispensable if it becomes part of one's daily routine" (p. 40). To make their case for the Internet's indispensability, Hoffman et al. (2004) refer to the growth in Internet adoption rates (i.e., ubiquity), the reported displacement of other technologies (i.e., the telephone and the television) among users, Internet use patterns, and users' attitudes toward computers and the Internet.

Beyond arguing the Internet has become indispensable, Hoffman et al. (2004) propose a model explaining how the Internet becomes indispensable (see Figure 1).[3] The conceptual model of Internet indispensability offers a framework through which to study Internet indispensability. The model begins by identifying the three sets of factors determining whether the Internet will become part of a person's daily routine. The three sets of factors include (a) socio-cultural determinants, (b) technological determinants, and (c) individual-level determinants.

[3] Hoffman et al's (2004) model of Internet indispensability does not appear to have been empirically tested in any published research to date.

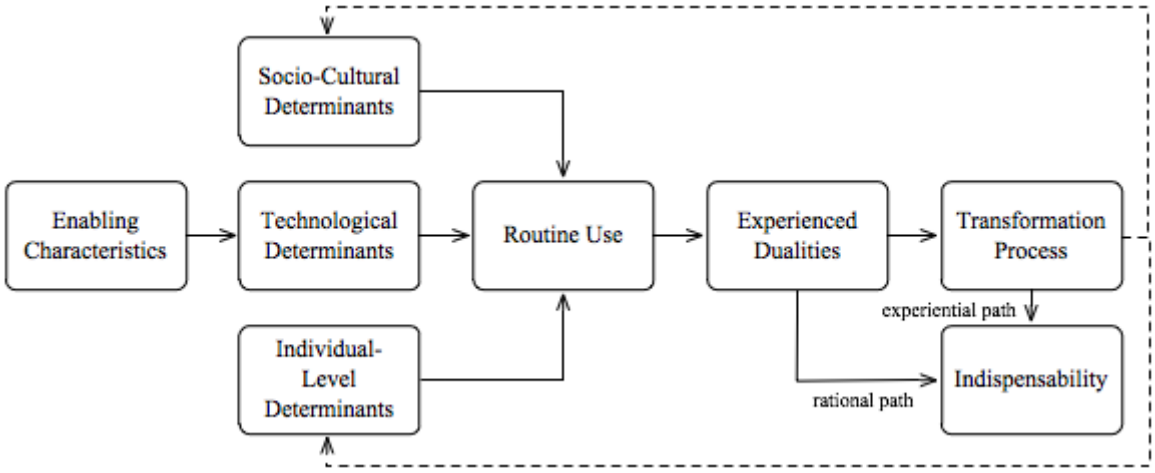

Figure 1. Hoffman et al.'s (2004) conceptual model of Internet indispensability.

Socio-cultural determinants include both the different groups of people using the Internet (usage segments) and the different contexts in which those groups use the Internet (contexts of use). Technological determinants include the number of points (e.g., locations) where users can access the Internet (Hoffman et al., 2004). Lastly, individual-level determinants include individual difference variables such as personality characteristics, interests, and needs. Together, these determinants affect how people use the Internet and can result in the Internet becoming part of a person's daily routine (Hoffman et al., 2004). From here, the model splits into two paths—a rational path and an experiential path—both of which lead to indispensability.

In the case of the rational path, the Internet becomes part of a person's daily routine and flows directly into being indispensable. This "rational" indispensability occurs "because [the Internet] allows essential activities to be conducted with a favorable cost/benefit ratio" (Hoffman et al., 2004, p. 42). Indispensability arrived at via this route is short-lived and temporary (Hoffman et al., 2004). If the cost/benefit ratio is right, or if another technology offers advantages to the individual over those the Internet offers, the other technology can come along and easily disrupt the Internet's indispensability. This is

not so for "experiential" indispensability (Hoffman et al., 2004).

The experiential path to indispensability is a more involved process than the rational path, and the resulting indispensability is more lasting. Per the experiential path, once the Internet has become part of a person's daily routine, said person is likely to experience consequences and tensions (i.e., "dualities") as a result of his or her Internet use. Provided the individual successfully resolves these tensions, he or she will experience a transformation process whereby new behaviors, cultural practices, relationships, and the like emerge, resulting in a "new identity and sense of self" (Hoffman et al., 2004, p. 41). This transformation feeds back into individual-level determinants and affects the social system by feeding back into the socio-cultural determinants. "The key outcome of this transformation process," Hoffman et al. (2004) contend, "is the indispensability of the Internet" (p. 41). The experiential route, then, results in the Internet becoming integrated into a person's life and in its longer-term indispensability.[4]

Hoffman et al.'s (2004) model has several strengths. The model addresses an existing gap in the literature by acknowledging a technology can become indispensable and by offering potential explanations as to how a technology can become indispensable. The model also attempts to account for both micro- and macro-level factors influencing indispensability. Additionally, Hoffman et al.'s (2004) emphasis on Internet use in everyday life and across contexts makes the model truer to life. Lastly, the model helps inform the study of indispensability and, by extension, essentiality by proposing factors that may lead to Internet indispensability.

---

[4] Although the authors do not elaborate on this in their article, the words "necessity, essentiality, and loyalty" appear in the model next to the experiential path. This juxtaposition suggests a person's belief that the Internet is necessary or essential leads to lasting, experiential indispensability.

Despite its contributions, the model has some limitations insofar as understanding how individuals come to perceive technologies as essential is concerned. First, as the model's name suggests, the model is strictly concerned with how the Internet becomes indispensable. The model may have implications for other communication technologies, but the authors do not mention how either the variables or the process described in the model relate to any technologies other than the Internet.

Second, the model focuses on indispensability not essentiality. As Hoffman et al. (2004) note, the two terms are used interchangeably. However, some subtle, semantic differences exist between the two terms. Schifferstein and Zwartkruis-Pelgrim (2008), for instance, argue indispensability is often determined by practical considerations. Essentiality is less constrained in that regard leaving open the possibility for other determinants. Furthermore, essentiality captures a sense of embedment that indispensability does not.

Beyond the model's focus on the Internet and on indispensability, the primary determinants of indispensability proposed in the model also come with their limitations if one is to study essentiality across various communication technologies. Some of the variables identified in the model (e.g., access points), for example, are largely Internet-specific and are therefore less relevant to other communication technologies (e.g., the cell phone).

Furthermore, the specific individual-level determinants Hoffman et al. (2004) identify (i.e., personality, needs, interests, and demographics) are quite limited. For one, all of the variables could more accurately be described as "individual characteristics" or "characteristics of individuals" rather than factors to be studied at the micro-level as the

term "individual-level determinants" may suggest. Furthermore, the model does not account for the possibility socio-cultural determinants can be approached as individual-level determinants. Individuals hold perceptions about some socio-cultural variables such as how many people they perceive are using a given technology. Individuals' perceptions of some of these socio-cultural factors are important to examine alongside individual characteristics when studying either indispensability or essentiality as psychological (i.e., perceptual) variables rather than as attributes of a technology.

The final limitation of Hoffman et al.'s (2004) model to be discussed here relates to the variable at the crux of the model: routine use. In the model, routine use appears as the key determinant of indispensability. Although how individuals use a technology is likely to influence how indispensable or even essential they perceive the technology, other variables such as dependency-related variables may be stronger determinants than routine use.

Given the narrow scope of the individual-level determinants identified in Hoffman et al.'s (2004) conceptual model of Internet indispensability combined with the present study's focus on individual-level determinants, the rest of this chapter reviews the literature to identify specific individual-level determinants prior research suggests may predict individuals' perceptions of communication technologies as essential.

From a Conceptual Model of Internet Indispensability Toward an Understanding of Predictors of Perceived Essentiality in Communication Technologies

The individual-level determinants explored in this study are grouped into three sets of factors: functional considerations, social influence factors, and dependency (see Figure 2). Functional considerations include needs, expectations, compatibility, and

usefulness. The social influence factors include critical mass, network externalities, bandwagon effect, and subject norms. These variables are comparable to Hoffman et al.'s (2004) socio-cultural determinants but are conceptualized and measured in terms of individuals' perceptions rather than at the macro-level. Finally, those sets of determinants falling under the dependency heading include technology dependency, habituation, deficient self-regulation, and attachment and are an alternative to "routine use" in Hoffman et al.'s (2004) model. The existing literature suggests individuals' perceptions of technologies may be influenced by functional considerations, by social influence factors, and by dependency.

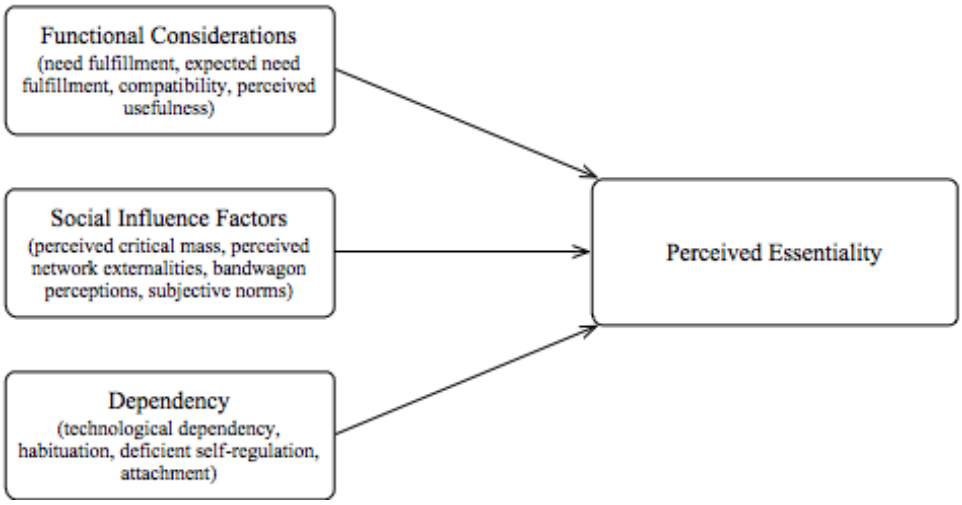

Figure 2. Overview of this study's proposed determinants of perceived essentiality.

Functional Considerations

Existing literature suggests functional considerations can influence how people respond to and evaluate technologies. Although functional considerations do not explicitly appear in Hoffman et al.'s (2004) model, the rational path also lends support to the role of functional considerations in influencing the perceived significance of technologies in individuals' lives.

The functional considerations examined in the present study include how well a person expects a technology to fulfill his or her needs (expectations, specifically expected need fulfillment), how well the technology actually fulfills the person's needs (needs, specifically need fulfillment), how compatible the technology is with a person's life (compatibility), and how useful the person perceives the technology (perceived usefulness).

Needs and Expectations

Both needs and expectations can influence how individuals respond to technologies (e.g., Hoffman et al., 2004; LaRose & Eastin, 2004; Palmgreen et al., 1985). The uses and gratifications (U&G) approach suggests needs and expectations influence media selection and media use (E. Katz, Haas, & Gurevitch, 1973; Rubin, 2009).

As E. Katz, Blumler, and Gurevitch (1974) summarize, studies in the U&G tradition "are concerned with (1) the social and psychological origins of (2) needs, which generate (3) expectations of (4) the mass media or other sources, which lead to (5) differential patterns of media exposure (or engagement in other activities), resulting in (6) need gratifications and (7) other consequences, perhaps mostly unintended ones" (p. 20). In the context of U&G, scholars tend to assume audiences are active, and their media selection and use is functional and purposive (Palmgreen et al., 1985; Rubin, 2009).

U&G scholars discuss needs in two different ways. First, needs act as catalysts for media exposure (Palmgreen et al., 1985). These are needs individuals seek to fulfill through their media exposure, which U&G scholars refer to as gratifications sought (GS). Needs re-emerge post-media exposure, this time as "need gratifications." Need gratifications refer to the needs fulfilled (i.e., gratifications obtained [GO]) as a result of

media exposure. The needs fulfilled via media exposure are not necessarily the same as the needs triggering the media exposure in the first place. Or, to use U&G terms, gratifications obtained are not always the same as gratifications sought (Palmgreen & Rayburn, 1985; Palmgreen et al., 1985). [5]

Like needs, expectations can also play a part in how people respond to media (LaRose & Eastin, 2004; Palmgreen & Rayburn, 1985; Palmgreen et al., 1985). Palmgreen and Rayburn (1985) define an expectation as "the belief (subjective probability) that X possesses some attribute or that a behavior related to X will have a particular outcome" (p. 63). "X" can represent a particular medium, program, genre, or the like.

According to the U&G literature, individuals develop expectations of media (e.g., E. Katz et al., 1974; Palmgreen et al., 1985). These expectations influence people's media consumption behaviors as well as their perceptions and participation in other, non-media-related activities (E. Katz et al., 1974; Palmgreen et al., 1985). Palmgreen and Rayburn's (1985) expectancy-value model of GS and GO predicts individuals will seek need fulfillment from a particular medium if they (1) expect the medium will possess the relevant attributes for need fulfillment or expect a particular behavior (e.g., media consumption) will result in need fulfillment and (2) positively evaluate the medium's attributes or the outcomes associated with the behavior (Palmgreen & Rayburn, 1985). As Palmgreen et al. (1985) note, "if audience members are to select from among various media and nonmedia alternatives according to their needs, they must have some perceptions of the alternatives most likely to meet those needs" (pp. 21–22). Most U&G

[5] Through empirical studies, U&G scholars have determined the particular gratifications sought as well as the gratifications obtained via individual media. However, when describing the U&G literature in general, scholars do not discuss specific needs and instead tend to discuss needs broadly and in the abstract.

studies have tended to examine needs over expectations.

Many U&G studies have focused on traditional media, but in the past decade or so, scholars have employed a U&G perspective to explore individuals' uses and gratifications of modern communication technologies, including the Internet (e.g., LaRose, Mastro, & Eastin, 2001; Papacharissi & Rubin, 2000; Stafford, Stafford, & Schkade, 2004) and online services and applications like social networking services (e.g., Joinson, 2008; N. Park, Fee, & Valenzuela, 2009; Raacke & Bonds-Raacke, 2008).

Papacharissi and Rubin (2000) studied predictors of and motivations for college students' Internet use. Papacharissi and Rubin (2000) found the gratifications students obtained from using the Internet included interpersonal utility, information seeking, the passing of time, convenience, and entertainment. Joinson (2008) examined college students' use and gratifications derived from the social networking service Facebook. He (2008) identified seven gratifications users obtained from Facebook, which he termed social connection, shared identities, photographs, content gratifications, social investigation, social network surfing, and status updates. These two studies suggest users derive both functional and diversionary gratifications from digital communication technologies.

Scholars have also studied mobile devices, including MP3 players (e.g., Ferguson, Greer, & Reardon, 2007; Zeng, 2011) and mobile phones (e.g., Leung & Wei, 2000), via a U&G approach. Ferguson et al. (2007) examined the gratifications college students obtained from using MP3 players. The study findings suggested students used MP3 players because the devices helped students relax/escape, were stimulating and entertaining, helped with loneliness, and helped alleviate boredom.

Leung and Wei (2000) studied the gratifications users in Hong Kong derived from their cell phones as well as the relationship between gratifications sought and cell phone use. According to Leung and Wei (2000), users sought the following gratifications from their cell phones: fashion/status, affection/sociability, relaxation, mobility, immediate access, instrumentality, and reassurance, supporting the idea communication technologies fulfill both practical and entertainment-related needs.

Irrespective of the specific gratifications described in these studies, they each result in a common outcome of contemporary U&G studies: a typology of motivations for using a particular type of content, medium, or technology (Rubin, 2009). These typologies of motivations can also be thought of as a typology of the gratifications users obtain or the needs users fulfill as a result of using a particular medium or the like.

The current study is not concerned with typologies of gratifications obtained or sought. Instead, this study examines whether any needs—practical or diversionary—must be fulfilled for users to perceive a technology as essential. The existing literature suggests gratifications obtained influence individuals' perceptions and evaluations of a medium, therefore overall need fulfillment may influence how essential a person perceived a technology.

Similarly, expectations of need fulfillment (i.e., the obtainment of gratifications) may also influence how individuals come to perceive technologies as essential. The U&G literature, including Palmgreen and Rayburn's (1985) model, indicates expectations, like needs, influence behavior. Compeau and Higgins' (1995) study of computer use revealed positive correlations between workers' expected outcomes of using computers and their actual computer use, including how often and for how long the individuals used

computers. Similarly, LaRose et al. (2001) found positive outcome expectations of using the Internet were positively related to Internet usage among undergraduate students. Expected outcomes have also positively influenced users' intentions to continue using the Internet (Hsu, Chiu, & Ju, 2004) as well as users' blogging intentions (K.-Y. Wang, Chih, & Jhong, 2009).

Few empirical studies have examined the relationship between expectations and individuals' perceptions of communication technologies. However, the U&G literature suggests expectations can influence individuals' perceptions of media (e.g., Palmgreen et al., 1985).

Although the empirical evidence supporting a relationship between expectations and users' evaluations of technologies is scant, the Compeau and Higgins (1995), LaRose et al. (2001), Hsu et al. (2004), and the K.-Y. Wang et al. (2009) studies have each shown expectations can influence how people evaluate technologies. These findings, in conjunction with the theoretical assertions advanced in the U&G literature, suggest individuals' expectations of a technology's ability to fulfill their needs and may influence their perceptions of a technology as essential. Beyond need fulfillment and expected need fulfillment, compatibility is another functional consideration that may also influence how essential individuals come to perceive communication technologies.

Compatibility

Compatibility refers to the consistency between an innovation and "the existing values, past experiences, and needs of potential adopters" (Rogers, 2003, p. 240). Compatibility is about the fit individuals perceive between an innovation and their lives and needs.

Compatibility influences people's behaviors, intentions, and attitudes. Agarwal and Prasad (1997) found compatibility positively predicted how much respondents reported using the Internet. In addition to studying current use, Agarwal and Prasad (1997) also studied respondents' future intentions to use the WWW. Compatibility did not predict users' intentions to continue to use the technology in the future. But these findings are inconsistent with those of Yang et al. (2011) whose findings indicate compatibility positively predicted intentions to use a mobile payment system among both current and prospective users.

Results from additional studies have also shown statistically significant associations between compatibility and behavioral intentions in other technological contexts, such as online shopping (Van Slyke, Bélanger, & Comunale, 2004) and the use of state e-government services (Carter & Bélanger, 2005).

Taylor and Todd (1995b) compared three different models of technology use by studying business school students as potential users of a computing resource center. The researchers examined the relationship between compatibility and attitudes, but found compatibility was not a statistically significant predictor of students' attitudes toward using the center. Van Slyke et al.'s (2004) findings also failed to support a relationship between compatibility and attitudes.

In contrast to these sets of findings, Agarwal and Prasad (2000) found a positive relationship between compatibility and perceptions. They examined the effect of programmers' and analysts' beliefs about the programming language *C* on intent to use the language. They predicted respondents' beliefs about the programming language, which included compatibility, would influence attitudes toward using the language.

Results indicate the more compatible the participants perceived the innovation, the more favorable their attitudes were toward using the innovation (Agarwal & Prasad, 2000).

Research supports the relationship between compatibility and technology use. Although studies have produced mixed support regarding the relationship between compatibility and individuals' evaluations of technologies, compatibility has been found to influence evaluations. Compatibility is likely to be particularly important in influencing perceived essentiality because presumably a technology must be perceived as compatible with a person's life for he or she to perceive said technology as essential. Perceived usefulness may also play a role.

Usefulness

On the surface, the answer to the question of what makes individuals perceive a technology as essential seems fairly straightforward: individuals perceive a technology as essential to the extent they perceive it as useful because it meets needs. The idea a technology's usefulness influences how people respond to it has been supported in the technology acceptance literature.

Davis (1986) introduced the concept of "perceived usefulness" in his Technology Acceptance Model (TAM), which aimed to explain the determinants of computer acceptance. As an information systems theory, TAM has primarily been applied to organizational contexts (e.g., F. D. Davis et al., 1989; Venkatesh & Davis, 2000). Davis et al. (1989) define perceived usefulness as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organization context" (p. 985). TAM posits how useful a person perceives a technology determines the person's intention to use the technology, which in turn, predicts actual use

of the technology (F. D. Davis et al., 1989).

Perceived usefulness can influence technology use. Igbaria and Iivari (1995) studied the role of self-efficacy on computer usage among office workers at Finnish corporations and found perceived usefulness was positively related to self-reported computer use. Strader, Ramaswami, and Houle (2007) examined e-mail and instant messaging acceptance and use among undergraduate and graduate students. Strader et al. (2007) found perceived usefulness was positively associated with user intentions to use e-mail but not instant messaging.

Perceived usefulness has also been found to influence users' evaluations of technologies. Perceived usefulness had a direct and positive effect on first-year college students' intentions to continue using an Internet-based learning system and satisfaction with the system (Limayem & Cheung, 2011).

Among experienced users of a computer resource center, perceived usefulness positively influenced their self-reported intentions to continue to use the center as well as attitudes toward using the center (Taylor & Todd, 1995a). Perceived usefulness was positively related to users' attitudes toward continuing to use a new computer operating system (Karahanna et al., 1999).

The predictive power of perceived usefulness seems to grow over time. Davis et al. (1989) found perceived usefulness predicted users' intentions to use a word processing application after a one-hour introduction to the application, but did so alongside perceived ease of use. However, when the study's participants were surveyed 14 weeks later, perceived usefulness was the sole predictor of behavioral intention. This finding suggests perceived usefulness becomes increasingly important over time.

Studies of perceived usefulness tend to show the variable affects how individuals respond to technologies. Perceived usefulness has not yet been studied in relation to how essential a technology is, but the study findings concerning perceived usefulness suggest perceived usefulness may influence perceptions of essentiality.

Together, the literature on perceived usefulness, need fulfillment, expected need fulfillment, and compatibility indicates each of these variables influence how people respond to, evaluate, and ultimately perceive technologies. Such functional considerations should therefore contribute to how essential a person perceives a communication technology. Stated more formally:

> H_1: Functional considerations, including need fulfillment, expected need fulfillment, compatibility, and perceived usefulness predict whether an individual perceives a communication technology as essential.

Social Influence

Consistent with Hoffman et al.'s (2004) model, research suggests social influence factors can affect individuals' behaviors and evaluations of technologies. This effect is true of both actual social and perceived social influence factors. Other people's thoughts, behaviors, and attitudes as well as individuals' perceptions of others' thoughts, behaviors, and attitudes can have an affect of those of individuals. In the present study, social influence factors are conceptualized as psychological factors users perceive about others that have some bearing on users' behaviors and evaluations. The social influence mechanisms examined in this study include critical mass, network externalities, the bandwagon effect, and subjective norms.

Critical Mass

The term *critical mass* originated in physics, where it refers to the minimum amount of fissile material necessary to achieve a nuclear chain reaction (Asimov, 1993; P. Oliver, Marwell, & Teixeira, 1985). Scholars in the social sciences have since adopted the concept, albeit in a more figurative sense (e.g., Markus, 1987; P. Oliver et al., 1985). In the context of social movements and collective action, Oliver et al. (1985) define a critical mass as the "small segment of the population that chooses to make big contributions to the collective action" (p. 524).

Scholars have also applied the concept to the diffusion of innovations (e.g., Markus, 1987; Rogers, 2003). According to Rogers (2003), a critical mass is reached when "enough individuals in a system have adopted an innovation so that the innovation's further rate of adoption becomes self-sustaining" (p. 343).

While the precise point when a technology reaches a critical mass is difficult to measure (Cho, 2011; Van Slyke, Ilie, Lou, & Stafford, 2007), individuals have perceptions regarding whether a technology has reached a critical mass (Lou, Luo, & Strong, 2000). Lou et al. (2000) define this perception, which scholars (e.g., Cho, 2011; Lou et al., 2000; Van Slyke et al., 2007) refer to as perceived critical mass, as "the degree to which a person believes that most of his or her peers are using [a] system" (p. 95).

Perceived critical mass has been found to positively influence users' perceptions of and/or intentions to use various technologies, including groupware technologies (Lou et al., 2000) and social networking services (Sledgianowski & Kulviwat, 2009). Lou et al. (2000) explored the effect of perceived critical mass on students' acceptance of a groupware technology. Groupware technologies are technologies like e-mail "designed to

support group communication and collaboration" (p. 94). The results indicated perceived critical mass had direct and positive effects on perceived usefulness, perceived ease of use, and on how much of an effort participants made to use the technology. Lou et al. (2000) interpreted these findings to mean “a user is more likely to adopt a groupware application if he thinks that other members of his group are using it” (p. 100).

Sledgianowski and Kulviwat (2009) studied the effect users’ perceptions had on both their intent to use and their actual use of social networking services. Perceived critical mass was one of the strongest predictors of the respondents’ self-reported intentions to use a social networking service within six months of participating in the study.

Scholars have also studied perceived critical mass in relation to instant messaging (Van Slyke et al., 2007) and 3G mobile phone services (Cho, 2011). Van Slyke et al. (2007) tested the effect of perceived critical mass on college students’ beliefs about and intentions to use instant messaging. Results indicate the more likely students were to perceive instant messaging as having reached a critical mass, the more likely they were to believe using instant messaging was useful, easy to use, and compatible with how the students communicated. Perceived critical mass also influenced users’ intentions to use instant messaging in the future and perceptions that others important to them believe they should use instant messaging (i.e., subjective norms).

Cho (2011) explored the differences between two social influence variables—perceived critical mass and subjective norms—on Singaporeans’ beliefs about and intentions to use 3G mobile phone services among people who had not yet adopted 3G phones. Perceived critical mass was based on participants’ estimates of the number of

people they knew were using 3G services at the time, the number of people they expected would use those services in the next year, and participants' estimates of the national penetration rate of 3G services in Singapore over the next year. Cho's (2011) results revealed perceived critical mass exhibited direct and positive effects on perceived usefulness of various 3G services as well as on respondents' intentions to use the services during the following year.

The findings across these studies suggest perceived critical mass can influence people's intentions to use or adopt technologies as well as their beliefs about and perceptions of technologies, which would suggest a relationship between perceived critical mass and essentiality. But the number of other people individuals perceive to be using a technology (perceived critical mass) only tell part of the story. The value an individual believes he or she derives from the number of other users (perceived network externalities) can also affect how an individual perceives a technology.

Network Externalities

Related to critical mass is the concept of network externalities.[6] In the context of communication technologies, "network externalities" refers to the idea the number of users of a given technology influences the utility any particular user derives from said technology (M. L. Katz & Shapiro, 1985).[7] In the case of positive network externalities, the utility a user derives from a technology increases in conjunction with the number of people in the user's network using the technology (M. L. Katz & Shapiro, 1985). In instances of negative externalities, users experience costs as a result of a greater number of users (i.e., the demand placed) on a network (Liebowitz & Margolis, 1994).

---

[6] Another term for *network externalities* is *consumption externalities* (e.g., Church & Gandal, 1993; M. L. Katz & Shapiro, 1985).

[7] Liebowitz and Margolis (1994) refer to this phenomenon as *network effect*.

Two themes are common in studies of network externalities. First, the literature on network externalities often studies the concept in relation to adoption. Second, scholars have tended to study network externalities in the context of firms or industries (e.g., Church & Gandal, 1993; M. L. Katz & Shapiro, 1986). Network externalities can operate at the individual level as well as at the societal level. In their formal model of network competition, M. L. Katz and Shapiro (1985) note "consumers will base their purchase decision on *expected* network sizes" (p. 426). Scholars (e.g., Pae & Hyun, 2002; Strader et al., 2007) have referred to these expected network sizes as perceived network externalities. This micro-level and perceptual approach to network externalities is the one employed in this study.

To date, few studies have examined perceived network externalities. Nevertheless, researchers have studied the effects of perceived network externalities in the context of a range of digital communication technologies, including e-mail (Strader et al., 2007), instant messaging (Strader et al., 2007), a computer operating system (Pae & Hyun, 2002), peer-to-peer (P2P) file-sharing technologies (Song & Walden, 2007), and an online video sharing service (C. Yang, Hsu, & Tan, 2010). Perceived network externalities have been found to positively influence users' technology use (e.g., Strader et al., 2007), their intentions to use a technology (e.g., Pae & Hyun, 2002; Song & Walden, 2007; Strader et al., 2007; C. Yang et al., 2010), and their perceptions of a technology (e.g., Song & Walden, 2007; Strader et al., 2007).

Pae and Hyun (2002) and C. Yang et al. (2010) found evidence of a relationship between perceived network externalities and users' intentions. Pae and Hyun (2002) surveyed computer users in South Korea to examine predictors of return patronage of the

Windows personal computer operating system. Results indicated greater network externalities were associated with greater intentions to re-purchase or continued use of the operating system in the future (i.e., return patronage). C. Yang et al. (2010) studied users of YouTube, the online video sharing service. C. Yang et al. (2010) were interested in identifying predictors of users' intentions to share videos via the service. Perceived network externalities directly and positively predicted users' sharing intentions.

Other scholars have examined perceived network externalities' effects not just on intentions, but also users' behaviors and perceptions. Song and Walden (2007) explored the effects of both economic and social factors on college students' intentions to adopt P2P file-sharing technologies. The study's findings suggested perceived network externalities influenced users' intentions to adopt P2P technologies as well as the benefits users believed they would experience as a result of using P2P technologies. In the Strader et al. (2007) study of students' e-mail and instant messaging use and acceptance, perceived network externalities were positively related to users' behavioral intentions to use e-mail and instant messaging, how often they actually used both technologies, and users' perceptions of how easy to use and how useful both e-email and instant messaging were.

Study findings have repeatedly shown perceived network externalities are positively related to a number of different variables across a range of communication technologies, suggesting perceived network externalities may influence how essential individuals perceive communication technologies. Another social influence factor possibly influencing perceived essentiality is known as bandwagon perceptions and is a consequence of the bandwagon effect.

Bandwagon Effect

A concept related to both network externalities and critical mass is the bandwagon effect. Bandwagon effect refers to an individual's desire to purchase a commodity because others are purchasing the commodity. As Leibenstein (1950) puts it, the bandwagon effect "represents the desire of people to purchase a commodity in order to get into 'the swim of things'; in order to conform with the people they wish to be associated with; in order to be fashionable or stylish; or, in order to appear to be 'one of the boys'" (p. 189). Individuals' perceptions and behaviors are influenced by others.

The bandwagon effect has been studied in a variety of contexts, including the adoption of personalized license plates (Biddle, 1991) and prestige-seeking consumer behavior (Vigneron & Johnson, 1999). The concept has received the most attention in relation to elections, voting behavior, and public opinion (e.g., Bartels, 1985; Henshel & Johnston, 2005; Nadeau, Cloutier, & Guay, 1993; Navazio, 1977).

Albeit it to a lesser degree, scholars have also studied the concept in technological contexts, including an online video sharing site (Fu & Sim, 2011), an online news service (Sundar & Nass, 2001), and an e-commerce site (Sundar, Oeldorf-Hirsch, & Xu, 2008). Fu and Sim (2011) were interested in the effect of popularity cues on online video viewership. The researchers used a web crawler to scrape data from an online collection of user-generated content. Their analyses revealed the online videos audiences watched the most were those a lot of other people had already watched, as indicated by high view counts. These findings demonstrated the presence of a bandwagon effect in online video viewership, demonstrating, as Fu and Sim (2011) summarized, "user choices tend to be successively imitative in nature" (p. 2392).

Sundar and Nass (2001) also found evidence of a bandwagon effect when testing whether different types of communication sources resulted in different psychological responses among readers of online news stories via an online service. Participants who believed other users of the service had selected the stories the participants read liked the stories more and thought the stories were of higher quality than participants who believed either a news editor or the participants themselves had chosen the stories. Consistent with the bandwagon effect, participants' perceptions were subject to the influence of others.

Similarly, Sundar et al. (2008) found others' opinions (bandwagon perceptions) of a technology product positively affected respondents' attitudes toward and perceptions of the technology. The findings suggest the more favorable users perceived others' attitudes toward a technology, the more likely they would purchase the technology, and positively evaluate the technology's quality and value. Bandwagon perceptions also positively influenced individuals' attitude toward the technology.

These studies show users' perceptions of others' behaviors and evaluations can influence users' own behaviors and evaluations. In the context of essential technologies, these findings suggest individuals are more likely to perceive a technology as essential if they believe others perceive the technology favorably (bandwagon perceptions). Subjective norms may also result in a similar effect to that of bandwagon perceptions.

Subjective Norms

The influence others exert on an individual's perceptions, attitudes, and behaviors extend beyond an individual's perceptions of what those other people are doing (bandwagon perceptions), whether there are enough of them doing it (perceived critical mass), and whether there are enough of them doing it to be of value to the individual

(perceived network externalities). Social influence can also take the form of perceived external pressures or demands. These perceived external pressures, namely subjective norms, can affect how people respond to technologies.

Subjective norms refer to an individual's perception of whether or not other people think he or she should engage in a specific behavior (Fishbein & Ajzen, 1975). In other words, subjective norms are what a person thinks other people think he or she should or should not do. Notably, these "other people" are important to the individual and are people with whom the individual is motivated to comply (Fishbein & Ajzen, 1975; Venkatesh & Davis, 2000).

In the context of technologies, subjective norms have been found to influence people's evaluations of technologies, including individuals' intentions to adopt or to continue using a technology (e.g., Cho, 2011; Karahanna et al., 1999; Schepers & Wetzles, 2007; Taylor & Todd, 1995a; Venkatesh & Davis, 2000) as well as individuals' perceptions of the technology (e.g., Cho, 2011; Schepers & Wetzles, 2007; Venkatesh & Davis, 2000).

Venkatesh and Davis (2000) examined the relationship between subjective norms and behavioral intentions across four longitudinal field studies. The pooled results indicate subjective norms positively influenced the degree to which the study's participants intended to use a technology. Subjective norms also positively predicted respondents' perceptions of how useful the technologies were. These findings were corroborated in a meta-analysis of TAM studies (Schepers & Wetzles, 2007).

However, as both Venkatesh and Davis (2000) and Schepers and Wetzels (2007) have noted, the effects of subjective norms have been inconsistent across studies. To

complicate matters, the effects of subjective norms can be mediated by other factors, including experience with a technology, perceptions of a technology, and the degree to which people perceive their use of a technology as voluntary (Venkatesh & Davis, 2000). In Cho's (2011) study of potential adopters of 3G mobile services, subjective norms did not directly predict behavioral intentions. But subjective norms influenced how useful potential adopters perceived 3G services. Perceived usefulness, in turn, predicted behavioral intentions.

Other examples of variations in findings are available. Taylor and Todd (1995a), Karahanna et al. (1999), and Van Slyke et al. (2007) all found positive effects for subjective norms on behavioral intentions. Taylor and Todd's (1995a) findings, however, revealed the relationship between subjective norms and intentions was stronger among inexperienced users than among experienced users of a computer resource center. Karahanna et al. (1999) observed a similar pattern between users and potential adopters of a computer operating system, except subjective norms only statistically significantly predicted potential users intentions to adopt the technology.

By and large, subjective norms have influenced how people evaluate technologies, be it in the form of behavioral intentions or perceptions of the technologies. Therefore, subjective norms may influence perceived essentiality.

The research on subjective norms, perceived critical mass, perceived network externalities, and bandwagon perceptions suggests each of these factors help predict how people evaluate and perceive technologies. Social influence factors may therefore also help predict perceived essentiality given that individuals' impressions of communication technologies are not formed in isolation from others. Taken together, the research

findings concerning the various social influence factors suggest:

> H_2: How much an individual's perceptions of a communication technology are influenced by others through perceived critical mass, perceived network externalities, bandwagon perceptions, and subjective norms predicts whether the individual perceives a communication technology as essential.

Dependency

Just as functional considerations (need fulfillment, expected need fulfillment, compatibility, and perceived usefulness), social influence factors (critical mass, network externalities, bandwagon perceptions, and subjective norms), and to a degree demographic characteristics (age and gender) influence people's interactions with and responses to a technology, how individuals use the technology, particularly their dependency (both pathological and non-pathological) on the technology, can also influence how they respond to the technology. Dependency-related variables include technology dependency, habituation, deficient self-regulation, and attachment.

Technology Dependency

Scholars have argued people can develop a dependence on media (Ball-Rokeach, 1985; Ball-Rokeach & DeFleur, 1976; Rubin & Windhal, 1986). Ball-Rokeach and DeFleur (1976) define dependency as "a relationship in which the satisfaction of needs or the attainment of goals by one party is contingent upon the resources of another party" (p. 6). Several paths can lead to media dependency. Individuals can become dependent on media if the media fulfill their information needs (Ball-Rokeach & DeFleur, 1976). The number of functions a medium serves and the centrality of those functions to a person's life can also influence dependency (Ball-Rokeach & DeFleur, 1976).

Two communication models directly address the topic of dependency: media-

system dependency theory and the uses and dependency model of mass communication.[8] Ball-Rokeach and DeFleur's (1976) dependency model of mass media effects, or media-system dependency theory, argues for a reciprocal relationship between society, media, and audiences. The theory proposes audiences can become dependent on the information resources of media systems. According to Ball-Rokeach and DeFleur's (1976) theory, the degree of this dependency is critical to understanding the cognitive, affective, and behavioral effects of media. Although the theory examines dependence on media systems at the societal and structural levels, the theory also posits dependencies can develop at the individual level (Ball-Rokeach, 1985). The application of dependency in this study occurs at the individual level and focuses on Ball-Rokeach and DeFleur's (1976) conceptualization of dependency and the implications of dependency on users' perceptions of technologies.

The other communication model examining dependency is Rubin and Windhal's (1986) uses and dependency model of mass communication. The model combines Ball-Rokeach and DeFleur's (1976) model with U&G literature to posit "needs, motives, or desires lead to personal and mediated behavior, which may lead to dependency on a mass medium, its content, or functional alternatives" (Rubin & Windhal, 1986, p. 187). Consistent with Ball-Rokeach and DeFleur (1976), dependency in the uses and dependency model can result in cognitive, affective, or behavioral effects or consequences (Rubin & Windhal, 1986). This model approaches dependency at the micro-level.

---

[8] A separate literature on dependency exists in psychology. The tendency in that literature is to approach dependency as a pathology (e.g., Dowling & Quirk, 2009; C.-H. Liao & Wan, 2010; C.-C. Wang & Yang, 2007). This study adapts the communication literature's (i.e., media dependency) approach to dependency, which does not treat dependency as a pathology. A discussion of more problematic uses of communication technologies appears below in the subsection titled "Compulsion and cognitive preoccupations."

Both theoretical approaches tend to focus on media systems and mass communication media and messages. However, researchers have also applied media dependency approaches to individuals' relationships with and their use of other technologies. Stafford, Belton, Nelson, and Peevyhouse (2010) explored dependency among smartphone users in a university work setting. They found smartphone dependence in the workplace was comprised of four primary dimensions: information utility, communication usefulness, work usefulness, and recreation (Stafford et al., 2010). This study found evidence of technology dependency (in the media dependency sense of the term) in two new contexts: smartphones and the workplace.

Patwardhan and Yang (2003) examined the influence of dependency on individuals' online activities. Patwardhan and Yang (2003) found dependency (again, in the media dependency sense of the word) positively influenced how often a person shopped online and as well as how much time he or she spent reading news online. Consistent with both media-system dependency theory and the uses and dependency model of mass communication, dependency was associated with behavioral effects.

These studies describe some of the cognitions involved in dependency as well as how dependency can influence behaviors. However, they reveal little about how dependency might relate to users' perceptions of a technology. Nevertheless, dependency may predict perceived essentiality.

Technology dependency reflects a logical response to and relationship with technologies, but as the literature on habits and habituation suggests, psychological responses to and interactions with technologies can also be entirely automatic.

Habituation

According to Verplanken and Aarts (1999), habits are "learned sequences of acts that have become automatic responses to specific cues, and are functional in obtaining certain goals or end-states" (p. 104). Habits are characterized by repetition, the pairing of acts with cues, and automaticity (Verplanken & Orbell, 2003). They are typically goal-directed, difficult to control, performed "without awareness," and efficient because they require little cognitive effort and "free mental capacity to do other things at the same time" (Verplanken & Orbell, 2003, p. 1317). While habits might start out as goal-directed, individuals need not consciously intend these goals (Ortiz de Guinea & Markus, 2009).

Researchers have explored the role of habit in continued information technology (IT) use post-adoption (e.g., Cao & Yin, 2010; Gefen, 2003; C. Liao et al., 2006; Limayem & Hirt, 2003; Wu & Kuo, 2008). Habits influence perceptions, behavioral intentions, and technology use. According to Limayem and Hirt's (2003) study of the role of habit in information systems use, habits positively affected students' attitudes about using a web-based electronic bulletin board as well as the students' actual use of it. C. Liao et al. (2006) found habitual use of a website positively affected users' intention to continue using the website. Increased habitual use influenced the users' perceptions of the website as useful and of the web retailer as trustworthy (C. Liao et al., 2006).

Gefen (2003) found habitual use of e-commerce websites positively influenced users' intentions to continue using the websites. Habitual use also led to respondents perceiving the websites as useful and easy to use. Similarly, Wu and Kuo (2008) found habitual use of Google search positively influenced users' perceptions of how useful and

easy to use the service was. Individuals who displayed more habitual use of Google's search engine rated the technology as more useful and easier to use than less habitual users rated the technology. Habitual use also influenced users' intentions to continue to use Google's service.

Even though many of these findings indicate habitual use of a technology can lead users to perceive it more favorably, some evidence suggests the favorable perceptions might predict habitual use. Cao and Yin (2010) found perceived usefulness and perceived ease of use predicted accounting professionals' habitual use of a tax consultant website. Prior literature (e.g., Gefen, 2003; C. Liao et al., 2006; Limayem & Hirt, 2003; Wu & Kuo, 2008), in contrast, suggested habitual use predicted perceived usefulness or perceived ease of use. In line with previous studies, however, Cao and Yin (2010) found habit influenced users' intentions to continue using the technology.

The two dependency-related variables described thus far—technology dependency and habituation—tend not to be studied as pathologies, but pathological dependencies on technology also exist. A pathological approach to dependency is reflected in the deficient self-regulation literature. Though deficient self-regulation need not be pathological, technology scholars have often examined deficient self-regulation as a pathology.

Deficient Self-Regulation

Deficient self-regulation is "a state in which conscious self-control is relatively diminished" (LaRose, Lin, & Eastin, 2003, p. 232). Two dimensions comprise deficient self-regulation: compulsion and cognitive preoccupation (Caplan, 2010). Compulsion is a behavioral aspect of deficient self-regulation whereas cognitive preoccupation is a

cognitive one. Compulsion is about poor impulse control and cognitive preoccupation concerns "obsessive thought patterns" (Caplan, 2010, p. 1090).

Deficient self-regulation of technology use has primarily been studied in the broader context of problematic Internet use. Problematic Internet use refers to Internet use "that creates psychological, social, school, and/or work difficulties in a person's life" (Beard & Wolf, 2001, p. 378), and is characterized by a preference for online social interaction over face-to-face interactions, Internet use for the express purpose of mood regulation, deficient self-regulation, and negative outcomes (Caplan, 2010).

Of the two dimensions of compulsion and cognitive preoccupation, compulsion has received the most scholarly attention. Most of the research on compulsiveness has focused on measurement development (e.g., Caplan, 2002, 2010; R. A. Davis, Flett, & Besser, 2002; Meerkerk, Van Den Eijnden, Vermulst, & Garretsen, 2009), predictors of compulsiveness (e.g., Jia, 2009; B.-W. Park & Lee, 2011), or the contexts in which compulsiveness is most likely to occur (e.g., Van Rooij, Schoenmakers, Van den Eijnden, & Van de Mheen, 2010).

Park and Lee (2011) provide evidence of compulsive smartphone use. The authors found both satisfaction and innovativeness predicted the compulsive use of smartphones among Korean smartphone users (B.-W. Park & Lee, 2011). Van Rooij et al. (2010) studied the relationship between the use of various Internet applications and compulsive Internet use. The results indicate several online applications were associated with compulsive Internet use, including online games, social networking sites, blogging, and chatting. Of all of the applications, online games were most strongly associated with compulsive Internet use.

Scholars have placed less emphasis on cognitive preoccupation than on compulsion. But as Caplan (2010) summarizes, "the literature suggests that how individuals think about the Internet may help explain whether they experience negative outcomes associated with their use" (p. 1090). Perhaps this is true of other technologies as well.

Scholars have tended to study deficient self-regulation in relation to technology use and/or negative consequences stemming from technology use. Both Caplan (2010), in his study of Internet use, and Lee, Cheung, and Thadani (2012), in their study of Facebook use, found deficient self-regulation predicted negative outcomes. In a separate study of Internet use conducted by LaRose et al. (2003), deficient self-regulation was positively related to Internet use, habit strength, and depression. Soror, Steelman, and Limayem (2012) found deficient self-regulation positively predicted mobile phone use, habitual mobile phone use, and negative consequences resulting from mobile phone use.

Numerous studies support the relationships between deficient self-regulation and technology use and deficient self-regulation and negative outcomes or consequences. But these relationships reveal little about the possible associations between deficient self-regulation and how users evaluate technologies.

Much of the literature reviewed in this section has largely ignored the possible role of affect in influencing perceived essentiality. But affect, particularly attachment, may also play a part.

Attachment

Attachment refers to "the propensity of human beings to make strong affectional bonds to particular others" (Bowlby, 1977, p. 201). The concept was originally studied in

the context of caregiver-child relationships (Bretherton, 1992). Early attachment research examined the components of attachment behavior (e.g., Bowlby, 1958) as well as the responses children exhibited when separated from their mothers (e.g., Bowlby, 1960). Though attachment is primarily characterized by a strong emotional bond, when separation or loss occurs, attachment can result in what Bowlby (1977) describes as "many forms of emotional distress and personality disturbance, including anxiety, anger, depression and emotional detachment" (p. 201). Since Bowlby's early work on attachment, scholars have found individuals develop attachments not only to their mothers, but also with other people (Bretherton, 1992) and possessions (e.g., Ball & Tasaki, 1992; Schifferstein & Zwartkruis-Pelgrim, 2008).

In the consumer behavior literature, attachment tends to be referred to as consumer-product attachment (Schifferstein & Zwartkruis-Pelgrim, 2008). Consistent with Bowlby (1977), Schifferstein and Zwartkruis-Pelgrim (2008) define consumer-product attachment as the "strength of the emotional bond a consumer experiences with a durable product" (p. 1). Scholars have examined a range of products in consumer-product attachment studies, including lamps, clocks, cars, ornaments (Schifferstein & Zwartkruis-Pelgrim, 2008), dining furniture (Ramirez, Ko, & Ward, 2010), cameras (Mugge, Schifferstein, & Schoormans, 2010), and mobile phones (Mugge et al., 2010; Wehmeyer, 2008).

Many studies of consumer-product attachment identify product characteristics associated with attachment (e.g., Ball & Tasaki, 1992; Kleine & Baker, 2004; Mugge et al., 2010; Mugge, Schoormans, & Schifferstein, 2009; Schifferstein & Zwartkruis-Pelgrim, 2008). Ball and Tasaki (1992) found possessions reflecting a concept of self for

a person are more likely to result in greater attachment than goods less associated with identity. Personalization of goods has also been found to result in greater attachment (Ball & Tasaki, 1992; Blom & Monk, 2003; Mugge et al., 2009). Attachment usually occurs with better-performing products (Mugge et al., 2010) and with products evoking memories (Kleine & Baker, 2004; Mugge et al., 2010; Mugge et al., 2009; Schifferstein & Zwartkruis-Pelgrim, 2008). The latter point suggests prior experience with a good is necessary for attachment to develop.

By comparison, few scholars have studied how attachment relates to psychological outcomes or user evaluations of products or technologies. Schifferstein and Zwartkruis-Pelgrim (2008) examined the relationship between attachment and indispensability. Schifferstein and Zwartkruis-Pelgrim (2008) developed and tested a consumer-product attachment measure. They predicted attachment and indispensability would not be related because indispensability is about functionality (and, according to the authors, is therefore devoid of emotional considerations), whereas attachment has a strong emotional component. As predicted, the data did not support a relationship between the attachment and indispensability.

Unlike indispensability, essentiality can include an emotional component, suggesting essentiality and attachment could be related. Furthermore, in this study, essential technologies are assumed to be technologies users have prior experience with and perceive to be better performing, both of which are factors influencing attachment. Therefore, based on Schifferstein and Zwartkruis-Pelgrim's (2008) logic and the relationship between prior experience and attachment, attachment may be associated with perceived essentiality.

Based on the literature, attachment, technology dependency, habituation, and deficient self-regulation, can each affect how people respond to technologies. Because perceived essentiality in the context of technologies is in part about the embedment of a technology in a person's life, dependency-related factors are likely to be of particular importance in the case of perceived essentiality. How can a technology become embedded in a person's life without some form of dependency? In other words,

> H_3: Whether a person is dependent on a technology based on technology dependency, habituation, deficient self-regulation, and attachment predicts whether he or she perceives a communication technology as essential.

Summary

This chapter began with a description of Hoffman et al.'s (Hoffman et al., 2004) conceptual model of Internet indispensability and examined the ways in which the model contributes to understanding essentiality as well as the ways in which the model fell short in that regard. An alternate set of determinants of perceived essentiality was proposed based on a review of the communication and related literatures with possible implications for essentiality in communication technologies.

As this review demonstrated, the communication and supporting literatures offer valuable insights into variables that may contribute to how people respond to and evaluate technologies. Numerous factors may help influence how individuals come to perceive communication technologies as essential. The three main sets of determinants of perceived essentiality identified in this study—functional considerations (need fulfillment, expected need fulfillment, compatibility, and usefulness), social influence factors (perceived critical mass, perceived network externalities, bandwagon perceptions, and subjective norms), and dependency (technology dependency, habituation, deficient

self-regulation, and attachment)—together are expected to influence how essential individuals perceive a their most essential communication technology.

3

METHOD

This study explored the psychological factors contributing to how essential individuals perceive communication technologies. An online survey was administered to examine the relationships between the 12 variables—need fulfillment, expected need fulfillment, compatibility, perceived usefulness, perceived critical mass, perceived network externalities, bandwagon perceptions, subjective norms, technology dependency, habit strength, deficient self-regulation, and attachment—and perceived essentiality.[9]

Research Instrument and Procedure

Participants became aware of the study via recruitment postings. Each recruitment posting described the study's topic, procedure, and duration, and included a hyperlink to the online survey, which was created using Qualtrics Labs, Inc.'s (2009) Qualtrics survey software. When participants clicked on the hyperlink, an implied informed consent form loaded in their browser. Once participants confirmed they were at least 18 years of age, had read the consent information, and were ready to participate in the study, the Qualtrics survey software directed them to the online survey.

The online survey was divided into three main sections (see Appendix A for the survey). The purpose of the first section, labeled Part One, was to learn about each respondent's most essential communication technology. Participants first identified the one communication technology most essential to them in their everyday lives.[10] They

[9] Data collection took place over the course of eight weeks.

[10] The list of communication technologies included in the survey was drawn from the results of an online poll of 79 undergraduate students enrolled in a communication course at The Pennsylvania State University. Poll participants were asked to list the three communication technologies that were most essential to them in their everyday life. All of the responses were compiled into the list of communication technologies included in this study's survey.

then responded to items about what made the technology they chose essential to their lives, how essential the technology was to them, as well as when they adopted the technology and when it became essential.

The survey's second section (Part Two) assessed respondents' expectations of, use of, and attitudes toward their most essential communication technology. Participants also responded to items about their perceptions of other people's use of and attitudes toward their (i.e., the respondents') most essential technology.

The third and final section (Part Three) of the survey asked participants about themselves. Participants reported their age, gender, highest level of education completed, race, and ethnicity.

Once participants completed the survey, they were directed to a page where they were thanked for their participation. To conclude their participation, respondents clicked on a link to exit the study, which redirected them to a university's homepage.

Participants

A convenience sample of 309 people participated in this study.[11] Participants learned of the study via e-mail, postings to websites, electronic mailing lists, and social networking services. Some participants were recruited from a general education course at a large northeastern university via e-mail. Participants were free to share the survey link and to invite others to participate in the study. Anyone 18 years of age older, proficient in English, and with access to the Internet was eligible to participate. Because this study involved the completion of an online survey, respondents were able to participate in the study from the location of their choice. Only the 166 participants from the general

[11] A total of 397 people began the survey, but 86 did not complete it. As discussed in Appendix C, two cases were multivariate outliers and were subsequently removed from the sample, leading to a final sample size of 309.

education course received compensation (i.e., extra course credit) for their participation.

The 309 respondents in the sample ranged in age from 18 to 63, with a mean age of 27.32 (*SD* = 10.77). Fifty-nine percent of participants were female (59%) and 41% were male. The sample's racial composition was as follows: 76% White, 9% Black or African American, 7% Asian, 2% American Indian or Alaska Native, 1% Pacific Islander, and 5% other. Fifteen percent (15%) of the sample was of Hispanic, Latino, or Spanish origin.

Most of the sample (85%) reported having completed at least some college (39% had completed some college, 4% had earned a two-year college degree, 16% had earned a four-year college degree, 14% had earned a Master's degree, 11% had earned a doctoral degree, and 1% had earned a professional degree [e.g, JD or MD]). Fifteen percent (15%) of the sample reported "high school / GED" was the highest level of education completed. Approximately 54% of participants were currently enrolled in college.

Characteristics of the Sample's Most Essential Communication Technologies

Twelve communication technologies comprised the sample's most essential communication technologies. Table 1 lists all twelve of these technologies by frequency. The cell/mobile phone was the most essential communication technology for a majority (61%) of participants. The second and third communication technologies participants reported most often were the Internet (15%) and a computer (10%), respectively. Though some traditional media (i.e., television, landline phone, and radio) appeared among the sample's most essential technologies, 99% of the sample cited newer media technologies as their most essential technologies.

Table 1

Frequency Distribution of Participants' Most Essential Communication Technology

Communication technology	*f*	%
Cell/mobile phone (feature phone or smartphone)	187	60.5
Internet	45	14.6
Computer (desktop or laptop)	32	10.4
E-mail	18	5.8
Text messaging	12	3.9
Internet (mobile phone)	5	1.6
Social network service (e.g., Facebook or Twitter)	3	1
Portable media player (e.g., iPod)	2	0.6
Television	2	0.6
Landline telephone	1	0.3
Radio	1	0.3
Tablet computer (e.g., iPad)	1	0.3
Total	309	100

The time since adoption varied for the technologies. Eighty-six percent (86%) of the sample adopted their most essential technology between 9.5 months and 38 years ago. The remaining 14% did not recall when they first adopted the technology. On average, participants had adopted their most essential communication technology over 7 years ago (M = 7.56 years, SD = 5.64 years).

Similarly, when participants first deemed the technologies essential varied. Twelve percent of respondents indicated the technology was essential before they had adopted the technology. For 42% of participants, the technology became essential when they adopted it. For the remaining 46% of respondents, the technology became essential

post-adoption. When asked to estimate how long ago their most essential technology had become essential, 14% of respondents reported they did not remember. For the remaining 86% of participants, the technologies had become essential as recently as two months ago and as long as 38 years ago. On average, the technologies had become essential over 6.5 years ago ($M = 6.61$, $SD = 5.06$).

The survey results suggested essential technologies receive a lot of regular use. All 309 participants indicated they used their most essential technology on a daily basis. Ten percent used the technology one to six times per day, and eight percent used the technology between seven and 20 times per day. Nearly 46% of respondents said they used their most essential technology too many times in a day to count and 36% indicated they used the technology "all the time."

In general then, essential communication technologies were primarily newer media participants used numerous times per day. Though the time since the technologies were adopted and became essential varied, the technologies tended to become essential post-adoption.

Measures

Predictor Variables

This study's predictor variables included need fulfillment, expected need fulfillment, compatibility, perceived usefulness, perceived critical mass, perceived network externalities, bandwagon perceptions, subjective norms, technology dependency, habit strength, deficient self-regulation, and attachment. Appendix B lists all of the items included in each of the final measures as well as each measure's corresponding reliability coefficient, mean, and standard deviation.

Need fulfillment. Seven original items were created to measure how well a technology met participants' needs. The individual needs were adapted from Katz, Haas, and Gurevitch (1973). All of the items were measured on a seven-point scale adapted from Oliver (2010) ranging from "falls short of my needs" to "exceeds my needs" with "just meets my needs" as the mid-point. The final measure consisted of the following seven questions: "How well does this technology fulfill your need for social interaction?," "How well does this technology fulfill your information needs?," "How well does this technology fulfill your emotional needs?," "How well does this technology fulfill your entertainment needs?," "How well does this technology fulfill your communication needs?," "How well does this technology fulfill your need for self-expression?," and "In general, how well does this technology fulfill your needs?" (α = .88, M = 5.16, SD = 1.12).

Expected need fulfillment. Similar to need fulfillment, seven original items measured how well participants expected their most essential communication technology to fulfill their needs. Each of the needs included in the individual items were adapted from Katz et al. (1973). The items were measured on seven-point scales ranging from "fall short of my needs" to "exceed my needs" with "just meet my needs" as the mid-point (adapted from Oliver [2010]).

The final measure included the following seven questions: "How well do you expect this technology to fulfill your need for social interaction?," "How well do you expect this technology to fulfill your information needs?," "How well do you expect this technology to fulfill your emotional needs?," "How well do you expect this technology fulfill to your entertainment needs?," "How well do you expect this technology fulfill to

your communication needs?," "How well do you expect this technology fulfill to your need for self-expression?," and "In general, how well do you expect this technology to fulfill your needs?" (! = .85, *M* = 5.07, *SD* = 1.07).

Compatibility. This study's measure of compatibility was adapted from Moore and Benbasat's (1991) compatibility measure. The four items, which were measured on seven-point Likert-type scales ranging from "strongly disagree" to "strongly agree," included the following statements: "Using this technology is compatible with all aspects of my life," "Using this technology is completely compatible with my current situation," "I think that using this technology fits well with the way I like to live," and "Using this technology fits into my lifestyle" (! = .82, *M* = 5.34, *SD* = 1.02).

Perceived usefulness. Moore and Benbasat's (1991) eight-item "relative advantage" measure served as the basis for this study's perceived usefulness measure. One additional item ("In general, I think this technology is useful") was adapted from Cho (2011) to assess users' overall perceptions of the technology's usefulness. All nine items were measured via seven-point Likert-type scales ranging from "strongly disagree" to "strongly agree." The final perceived usefulness measure consisted of the following items: "Using this technology enables me to accomplish tasks more quickly," "Using this technology improves the quality of my life," "Using this technology makes it easier to live my life," "Using this technology improves my life," "Overall, I find using this technology to be advantageous," "Using this technology enhances my effectiveness," "Using this technology gives me greater control over my life," "Using this technology increases my productivity," and "In general, I think this technology is useful" (! = .92, *M* = 5.88, *SD* = 0.96).

Perceived critical mass. The measure of perceived critical mass employed in this study was adapted from Cho (2011). Cho (2011) measured perceived critical mass by asking participants to estimate the number of current and future users of a particular technology (3G mobile services). In this study, perceived critical mass was measured by averaging participants responses to the following eight questions: "What percentage of your friends currently uses this technology?," "What percentage of your family members currently uses this technology?," "What percentage of your colleagues currently uses this technology?," "What percentage of the U.S. population currently uses this technology?," "What percentage of your friends do you expect will use this technology in the next year?," "What percentage of your family members do you expect will use this technology in the next year?," "What percentage of your colleagues do you expect will use this technology in the next year?," "What percentage of the U.S. population do you expect will use this technology in the next year?" (! = .91, *M* = 84.19, *SD* = 14.54).

Perceived network externalities. This study's measure of perceived network externalities was adapted from Pae and Hyun's (2002) three-item network externalities measure. The three items comprising the perceived network externalities measure, which were measured on seven-point Likert-type scales ranging from "strongly agree" to "strongly disagree," included "Most people are using this technology," "The number of people using this technology will increase the usefulness of this technology to me," and "Many people will use this technology in the future" (! = .73, *M* = 6.06, *SD* = 0.98).

Bandwagon perceptions. This study adapted Sundar et al.'s (2008) measure of bandwagon perceptions. Six of the original measure's eight questions were included in this study. (The two omitted items were less applicable because they referenced bargains

and product ratings.) One extra question ("How likely are other people to think this technology is essential?") was added to the original measure. The seven questions were measured on seven-point Likert-type scales that ranged from "not at all likely" to "highly likely." The final measure consisted of the following five questions: "How likely are other people to think this is a good technology?," "How likely are other people to adopt this technology?," "How likely are other people to recommend this technology to their friends?," "How likely are other people to think this technology is worth adopting," and "How likely are other people to think this technology is essential?" (α = .91, *M* = 6.08, *SD* = 0.84).

Subjective norms. This study adapted Cho's (2011) measure of subjective norms. Three items were measured on seven-point Likert-type scales ranging from "strongly disagree" to "strongly agree." The three items comprising the measure were "People who influence me think that I should use this technology," "People who are important to me think that I should use this technology," and "People whose opinion I value prefer that I use this technology" (α = .92, *M* = 4.25, *SD* = 1.52).

Technology dependency. To measure technology dependency in the media dependency sense of the concept, this study adapted Stafford et al.'s (2010) five-item measure. One additional item ("Overall, I am dependent on this technology") was included to assess overall technology dependency. The following four items were included in the final measure: "Using this technology is one of the more important things I do each day," "I would rather use this technology than do anything else," "I would feel lost without this technology," and "Overall, I am dependent on this technology" (α = .75, *M* = 4.33, *SD* = 1.35).

Habit strength. Verplanken and Orbell's 12-item Self-Report Habit Index was adapted to measure habit strength in this study. Participants' responses to nine items comprised the final measure of habit strength (α = .90, M = 5.84, SD = 1.04). Examples of the nine items include "Using this technology is something I do automatically," "I feel weird if I do not use this technology," and "I start using this technology before I realize I'm doing it." (Appendix B lists all nine final habit strength items.)

Deficient self-regulation. This study's deficient self-regulation measure was adapted from Caplan's (2010) Generalized Problematic Internet Use Scale 2. Consistent with Caplan (2010), six items measuring both compulsivity and cognitive preoccupation measured deficient self-regulation. The items were measured on a seven-point Likert-type scale ranging from "strongly disagree" to "strongly agree." The final measure consisted of five items including "I have difficulty controlling the amount of time I spend using this technology," "I have a hard time resisting the urge to use this technology," "When I haven't used this technology for some time, I become preoccupied with the thought of using it," "I would feel lost if I was unable to use this technology," and "I think obsessively about using this technology when I am not using it" (α = .84, M = 4.01, SD = 1.40).

Attachment. To measure respondents' attachment to their most essential technology, this study adapted Schifferstein and Zwartkruis-Pelgrim's (2008) five-item consumer-product attachment measure. The final measure included the following three statements, each measured on seven-point Likert-type scales ranging from "strongly disagree" to "strongly agree": "I feel emotionally connected to this technology," "This technology is very dear to me," and "I have a bond with this technology" (α = .93, M =

3.92, *SD* = 1.75).

Criterion Variable

Essentiality. To measure the degree to which respondents perceived a technology as essential, participants were asked to indicate their level of agreement with 12 items measured on seven-point Likert-type scales ("strongly disagree" to "strongly agree") (see Appendix B). Four items were adapted from Schifferstein and Zwartkruis-Pelgrim's (2008) indispensability measure. The other eight items were developed for this study.

The final measure included the following 12 statements: "This technology is essential to me," "I could easily live without this technology" (reverse-coded), "This technology is a central part of my life," "My life requires this technology," "I must have this technology," "This technology is deeply embedded in my life," "This technology is not important to me" (reverse-coded), "I cannot do without this technology," "My life is fine without this technology" (reverse-coded), "This technology is necessary for me," "This technology is indispensable for me," and "I need this technology to live the way the way I want to live" (α = .89, *M* = 5.42, *SD* = 1.03).

4

DATA ANALYSIS AND RESULTS

This study aimed to discover the factors leading individuals to perceive communication technologies as essential. To determine what predictor variables best predicted essentiality, three backward, stepwise multiple regressions were performed. [12] An a priori significance level of .05 was selected for all statistical tests. Participants' responses to open-ended survey questions were also reviewed for additional insights into the predictors of perceived essentiality.

A Note on Demographics

Demographic variables are seldom included as part of the analysis in empirical studies of technologies (e.g., Caplan, 2002; Karahanna, Straub, & Chervany, 1999; C. Liao, Palvia, & Lin, 2006; Song & Walden, 2007; S. Yang, Lu, Gupta, Cao, & Zhang, 2011). Nevertheless, two bivariate correlations were performed in the present study prior to hypothesis testing to determine whether age and gender were related to perceived essentiality. (See Table 2 for the Pearson-product moment correlations (r), the coefficients of determination (r^2), and the percentage of shared variance for the correlations between age, gender, and each predictor and perceived essentiality.) No significant relation emerged between age and essentiality, $r(303) = .01$, $p = .91$ or between gender and essentiality, $r(300) = -.07$, $p = .20$.[13] Age and gender were therefore excluded from subsequent analyses.

---

[12] A description of the data screening process appears in Appendix C.

[13] These findings do not reveal anything about the relations between age and gender and the 12 predictor variables. However, the possible effects of age and gender on variables other than perceived essentiality are beyond the scope of this study.

Table 2

Pearson-Product Moment Correlations, Coefficients of Determinations, and Percentages of Variance Shared for Bivariate Correlations between Predictor Variables, Age, and Gender and Perceived Essentiality

Variable	*r*	r^2	%
Age	.01	.00	0
Gender	-.07	.00	0
Technological innovativeness	.15††	.02	2
Need fulfillment	.22***	.05	5
Expected need fulfillment	.31***	.10	10
Compatibility	.46***	.21	21
Perceived usefulness	.41†††	.17	17
Perceived interactivity	.45†††	.20	20
Sense of agency	.37***	.14	14
Technology dependency	.56***	.31	31
Habit strength	.42***	.18	18
Deficient self-regulation	.35***	.12	12
Attachment	.42†††	.18	18
Perceived critical mass	.16**	.03	3
Perceived network externalities	.19†††	.04	4
Bandwagon perceptions	.36†††	.13	13
Subjective norms	.24***	.06	6

Note. Missing values were excluded via pairwise deletion.
**p < .01, two-tailed. ***p < .001, two-tailed.
††p < .01, one-tailed. †††p < .001, one-tailed.

Hypothesis Testing for Hypotheses 1–3

Hypotheses 1–3 predicted various individual-level determinants would influence the degree to which individuals perceived their most essential communication technology as essential. Specifically, Hypothesis 1 predicted functional considerations could help predict whether individuals perceived a communication technology as essential, Hypothesis 2 predicted social influence factors could help predict perceived essentiality, and Hypothesis 3 predicted dependency-related factors could help predict perceived essentiality. A backward, stepwise multiple regression including all 12 predictor variables

and the single criterion variable, perceived essentiality, was performed to simultaneously test all three hypotheses. Table 3 presents a summary of the results of the model resulting from the backward, stepwise multiple regression.

Table 3

Summary of Model Derived from Backward Stepwise Multiple Regression Analysis of All 12 Predictors of Perceived Essentiality (N = 282)

Variable	*B*	β	r^2	sr^2	*t*
Need fulfillment	–0.25	–0.27	.06	.03	–3.38***
Expected need fulfillment	0.25	0.25	.09	.02	3.17**
Compatibility	0.19	0.19	.21	.02	3.30**
Bandwagon perceptions	0.29	0.24	.15	.05	4.67***
Technology dependency	0.31	0.41	.28	.12	7.26***
Constant (*Y* intercept)	1.31				

Note. $F(5, 276) = 37.57$, $p < .001$, $R^2 = .41$, adjusted $R^2 = .39$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Five variables emerged as statistically significant predictors of perceived essentiality in the regression model: need fulfillment, expected need fulfillment, compatibility, bandwagon perceptions, and technology dependency. The results of the backward, stepwise multiple regression revealed the multiple correlation between the six predictor variables and perceived essentiality was .64, $F(5, 276) = 37.57$, $p < .001$. Together, all six variables accounted for 41% (39% adjusted) of the variability in perceived essentiality.

All but one of the variables—need fulfillment—predicted perceived essentiality in the anticipated direction. The negative beta coefficient for need fulfillment hinted at the possibility of multicollinearity in the model. An inspection of the correlation matrix of all 12 predictor variables included in the regression analysis revealed a correlation of .80 between need fulfillment and expected need fulfillment (see Table 6), providing further

evidence for the possibility of multicollinearity given the negative beta coefficient.

Tabachnik and Fidell's (2007) recommended procedures for formally testing for multicollinearity were performed. Both need fulfillment and expected need fulfillment had variance proportions greater than .50 on the same dimension with a conditioning index greater than 30, indicating multicollinearity was present. Based on Tabachnik and Fidell's (2007) recommendation, the variable with the highest variance proportion of the two, in this case expected need fulfillment, was removed from the analysis. A second multiple regression excluding expected need fulfillment was performed.

Table 4 presents a summary of the results from the model produced by the backward stepwise multiple regression of 11 predictors of perceived essentiality excluding expected need fulfillment.

Three variables emerged as statistically significant predictors of perceived essentiality in the final model: compatibility, bandwagon perceptions, and technology dependency. The multiple correlation between the three predictor variables and perceived essentiality was .62, $F(3, 278) = 56.37$, $p < .001$. The three variables accounted for 38% (37% adjusted) of the variability in perceived essentiality. Together, compatibility, bandwagon perceptions, and technology dependency accounted for 19% of the unique variance in essentiality. The remaining 19% of the variability (18% adjusted) was shared variability contributed by all three predictor variables.

A third backward stepwise multiple regression was performed to examine the effects of expected need fulfillment in the model. This time, expected need fulfillment was included and need fulfillment was excluded. The regression analysis resulted in the same final model as the second multiple regression (see Table 4).

Table 4

Summary of Final Model Derived from Backward Stepwise Multiple Regression Analysis of All 12 Predictors of Perceived Essentiality Except Expected Need Fulfillment (N = 282)

Variable	*B*	β	r^2	sr^2	*t*
Compatibility	0.18	0.18	.21	.02	3.14**
Bandwagon perceptions	0.29	0.23	.15	.05	4.54***
Technology dependency	0.30	0.39	.28	.11	7.00***
Constant (*Y* intercept)	1.43				

Note. $F(3, 278) = 56.37$, $p < .001$, $R^2 = .38$, adjusted $R^2 = .37$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Hypothesis 1

Hypothesis 1 predicted functional considerations, including need fulfillment, expected need fulfillment, compatibility, and perceived usefulness could help predict whether individuals perceived a communication technology as essential.

Compatibility was the only variable of the functional considerations to help predict how perceived essentiality. Therefore, Hypothesis 1 was partially supported. Compatibility ($\beta = 0.18$, $t = 3.14$) accounted for 2% of the unique variance in perceived essentiality.

Participants' responses to open-ended survey questions often cited functional considerations as determining how essential the participants perceived their most essential communication technology. Participants tended to emphasize considerations such as usefulness and convenience. For one respondent, essentiality in communication technologies is determined by "[the] ability to get information and make and communicate decisions based on that information without delay." The person continued with the following:

In our small buisness [sic] we can see pictures of situations, prices of

> materials and avoid the waste of waiting for our work crew. In our regular jobs *[it] allows us to be . . . more efficient in our use of time* [emphasis added].

Others expressed related sentiments, with two respondents explicitly referring to their most essential communication technology (in both cases, the mobile phone) as a Swiss Army knife. One said,

> "my [sic] phone is with me 24 hours a day. [It's] my phone, email and texting device. it [sic] is my gps [sic] unit with real time traffic, which is critical for getting around los angles [sic]. it [sic] is my connection to the internet when [I] am not home. it [sic] is my alarm clock. it [sic] is my connection to social networking sites. *it [sic] is a swiss army [sic] knife for communication* [emphasis added]."

Although compatibility was the only statistically significant predictor of essentiality present in the final regression model, few participants addressed the role of compatibility in contributing to whether they perceived a technology as essential. One participant, however, described an essential communication technology as "central to the work that I do and *[to] how I live* [emphasis added]." This sentiment was shared by a respondent who described his most essential communication technology as "[the] one I most need to do my work and *live my life as I see fit* [emphasis added]." Another participant provided a short narrative alluding to her most essential technology's compatibility with her life. She wrote,

> I use my cell phone as my bank, alarm clock, internet, email, social networking, gaming, directions, everything. Yesterday my boyfriend and I went out of town, in the car i [sic] looked up directions to a museum and used the GPS on my phone to get us there. I [checked] in on Foursquare and got some information on deals and tips. We then decided to go see a movie and I checked movie times and read movie reviews. All the while keeping in touch with my worrying mother and made plans with my friend for the next day.

Together, these open-ended responses suggested participants were aware of the role of functional considerations in participants' perceptions of communication

technologies as essential. However, participants tended to play up usefulness and convenience and mostly ignore the importance of compatibility.

Hypothesis 2

Hypothesis 2 predicted how much an individual's perceptions of a communication technology were influenced by others via perceived critical mass, perceived network externalities, bandwagon perceptions, and subjective norms could help predict whether the individual perceived the technology as essential.

Of the four social influence factors included in this study, only bandwagon perceptions helped predict perceived essentiality, lending partial support to Hypothesis 2. Bandwagon perceptions ($\beta = 0.23$, $t = 4.54$) accounted for 5% of the unique variance in perceived essentiality.

In their responses to the open-ended survey questions, many participants referenced others as contributing to their perceptions of a communication technology as essential. However, references to others were primarily framed as functional considerations. Respondents perceived communication technologies as essential because the technologies enabled the respondents to connect with others. As one woman wrote, "[I] am a mother, a daughter, a sister, a fiance [sic], a student, a friend... keeping in touch and feeling that I can be reached by my loved ones is the most important [and] necessary function of my phone." Another described the cell phone as essential "because it allows me to get in touch with almost anyone quickly and easily. It is the technology I turn to both for emergencies and for keeping in touch with friends and family."

Other participants emphasized the importance of continuous connectedness. One wrote,

> I need to be able to contact my friends and family 24/7 in order to feel complete. If i [sic] did not have my phone with me I would feel cut off from the world. When I admit this I feel silly for feeling this way but it is true.

Another espoused a similar feeling about the social networking service Facebook:

> I [use] Facebook for just about everything. I use it almost every hour of the day. *I use it to communicate with others . . . and stay in contact with people constantly* [emphasis added]. Without this technology my life and daily routine would bedrastically [sic] changed.

Amid the emphasis on social functions as influencing perceived essentiality, participants seldom referenced social influence, pressures, or demands as determinants of perceived essentiality. Respondents who did allude to social influence factors focused on factors more akin to the presence of a critical mass, perceived network externalities, or subjective norms than to bandwagon perceptions.

One person described e-mail as most essential because "it is something that *just about everybody uses or has some kind of access to* [emphasis added] so it is the most consistent way to make contact across diverse groups." Another suggested e-mail was essential due in part to the number of people using the technology and the value derived therefrom:

> I use [e-mail] most frequently for work and outside of work. It is consistent, allows me to include items other than text (i.e. photos, PDF's, other documents) free of charge and *most everyone else uses it* [emphasis added], so it's a reliable way to communicate with others.

Yet another respondent focused on subjective norms, stating "[the iPhone] is essential to me because [it] allows me to do everything I need to do such as text, call, and check my e-mail *which are all functions that have become vital parts of today's culture* [emphasis added]."

Not a single respondent directly mentioned others' perceptions or evaluations of a

technology (i.e., bandwagon perceptions) as influencing how essential he or she perceived his or her most essential communication technology.

Hypothesis 3

Hypothesis 3 predicted whether a person was dependent on a technology based on his or her technology dependency, habituation, deficient self-regulation, and attachment could predict whether he or she perceived a communication technology as essential.

Technology dependency was the sole variable among the dependency variables helping to predict how essential individuals perceived a communication technology, partially supporting Hypothesis 3. Technology dependency ($\beta = 0.39$, $t = 7.00$) accounted for 11% of the unique variance in perceived essentiality.

Responses to open-ended survey questions indicated participants acknowledged the influence of dependency-related factors on perceiving a technology as essential. However, references to technology dependency were often embedded in mentions of either functional considerations or of more pathological forms of dependency.

Subtle references to technology dependency appeared most often in relation to functional considerations. One participant said,

> I . . . use my cell phone to check the time, since I normally don't wear a watch. My cell phone is also essential for reminders in text and email form so I remember obligations an meetings I have to go to. *Without my email on my phone, I would fall behind on remembering what I'm supposed to be doing each day* [emphasis added].

Another participant wrote,

> I use [my iPhone] to communicate with people constantly via talk, text, chat, Facebook, etc. I use it more than my computer. I also use it as a calendar, alarm clock, reminder, personal assistant, and for some games. I use google [sic] constantly if I need to know someting [sic]. I use the maps features all the time. I use the GPS for geocaching and on the golf course. *It is ridiculous how many things I use the iPhone for* [emphasis added].

Although both excerpts describe what the participants used the technology for, both are also indicative of participants' dependence on their most essential technology. Respondents not only used their technology for various purposes, they also depended on the technology for those purposes.

Beyond conflating technology dependency with functional considerations, participants also tended to conflate technology dependency with more pathological forms of dependency. As one participant summarized, “When I think of all the ways I use my laptop and then try to imagine doing the same tasks without it, my anxiety levels rise.” Another said,

> The thing which I am the most on in terms of communication tools is google talk [sic] actually, this one is cross platform in that I use it daily all day on my laptop and when I am not in front of that on my phone. I am constantly in contact with my friends, mybusiness [sic] partners, my girlfriend, etc. *I can't go more than a few hours without being on google talk* [sic] [emphasis added].

5

DISCUSSION

Individuals have come to perceive communication technologies as important, necessary, and ultimately essential to their everyday lives. This study explored the phenomenon of perceived essentiality in the context of communication technologies to determine what factors contribute to individuals perceiving technologies as essential.

Amid the availability of research on topics concerning individuals and technology, few studies have examined the individual-level factors contributing to perceived essentiality. The present study was motivated by both a desire to understand how technologies become fundamental to and embedded in people's lives and the shortage of available research on the topic.

Limitations

Before the study's findings are interpreted, the study's limitations are discussed to help contextualize the interpretation of the study's findings. This study had four main limitations. The first set of limitations concern the study's sample. Because an online survey was employed, only individuals with access to the Internet participated in the study. Therefore, the results only reflect the views of Internet users. However, the sample does not represent all Internet users because a convenience sample was employed instead of a random one. The study's sample largely consisted of younger, formally educated individuals who were frequent if not continuous users of the technology they perceived as most essential. Together, the study's method and sampling technique limit the study findings' generalizability. Although lower external validity can be problematic, sampling Internet users and younger and more frequent users of technology had the advantage of

increasing the likelihood that the phenomenon of interest, essentiality, would be observed, which was important because this study was among the first to empirically study the phenomenon of perceived essentiality.

The second set of limitations includes those limitations inherent to survey research (see Frey, Botan, & Kreps, 2000). Due to this study's correlational design, causality among variables cannot be inferred. Therefore, while several factors were found to predict perceived essentiality, this study's findings do not reveal whether those factors caused perceived essentiality. Another limitation concerns issues with self-report. Survey research relies on self-report data, which can be inaccurate, dishonest, or subject to error. Dishonesty was less likely to be an issue in this study because the questions were not of a personal nature. Additionally, participants had the option to skip questions. To help reduce inaccuracies in reporting, survey questions included exhaustive and flexible response options, including options such as "I don't remember." Furthermore, survey items were reverse-coded to minimize response sets. Amid the limitations of self-reports, this measurement method was the best option for this study because the psychological factors under study here could not be directly observed.

A third limitation concerned respondents' most essential communication technologies. Participants were free to choose the technology of their choice. The only parameters—neither of which were enforced or explicitly defined—were that the technology be a communication technology and the technology be the respondent's most essential communication technology. This freedom meant survey respondents could interpret "most essential communication technology" at any of a number of levels. For instance, participants could have responded to the survey items with a system (e.g.,

Internet), a device (e.g., cell/mobile phone or computer), or a service or application (e.g., e-mail, text messaging, or a social networking service) in mind. To further complicate matters, participants might have had a specific brand in mind (e.g., iPhone or Gmail) when completing the survey. Participants' responses to some of the survey questions (e.g., "To the best of your memory, how long ago did this technology become essential to you" and "To the best of your memory, how long ago did you first get this technology?") might have varied based on the level at which they interpreted "communication technology" (not to mention the issues with self-reported recall data [see Rogers, 2003]).

That said, the level at which respondents interpreted "communication technology" was of less consequence in this particular study because the focus of the study was not on the specific technologies people perceived as essential, but was instead on essentiality as an attribute individuals can perceive in or assign to any technology. The study results do suggest essential communication technologies share common characteristics, irrespective of the level at which respondents interpreted "communication technology." Future research, however, could look for differences in perceptions of a technology as essential based on level of operationalization.

Finally, a fourth limitation in this study concerned ecological validity. Survey participants were asked to choose the "one" communication technology that was "most" essential to them in their everyday lives. But users may think in terms of technology clusters rather than single technologies or, as Hoffman et al. (2004) observed, users may conflate two technologies with one another (i.e., computer and Internet), which would make the act of choosing a single most essential technology artificial. Again though, because this study was not concerned with the specific technologies people perceived as

essential, this issue was less significant than it might have been in a study with a different purpose.

Interpretation of Findings

This study's key findings primarily concern the variables that either predicted or did not predict perceived essentiality among the study's sample, however, the study also offers some insights into the communication technologies people consider most essential. Among this study's primarily college- and young professional-aged sample, newer and highly interactive communication technologies tended to be perceived as most essential. The majority of the study's participants reported the cell/mobile phone, Internet, or a computer as their most essential technology. These findings are largely consistent with those of the surveys and polls described in the introduction, which were not all limited to a college- and young professional-aged sample and included technologies respondents perceived as necessary, indispensable, or important.

This study departed from the existing surveys by examining predictors of perceived essentiality. Two multiple regressions were required to arrive at the model that best predicted perceived essentiality in this study. The first model suggested five variables best predicted perceived essentiality: need fulfillment, expected need fulfillment, compatibility, bandwagon perceptions, and technology dependency. Although the model accounted for a statistically significant amount of the variability in perceived essentiality, the model was problematic because of the strong relation between some of the variables, namely need fulfillment and expected need fulfillment.

Logically, it makes sense how well a person believed a technology fulfilled his or her needs would greatly overlap with how well the person expected the technology to

fulfill those needs. However, this relation resulted in a model indicating need fulfillment negatively predicted perceived essentiality, which was counter to what was expected based on the existing literature. Once expected need fulfillment and was removed from the analysis, need fulfillment no longer appeared in the model predicting perceived essentiality. Though the existing literature suggested need fulfillment could help predict individuals' perceptions of a technology, need fulfillment did not help predict whether individuals perceived a technology as essential in the present study.

To explore whether expected need fulfillment might help predict essentiality, a regression analysis that included expected need fulfillment but excluded need fulfillment was performed. According to the results, expected need fulfillment did not help predict perceived essentiality. Instead, the same model that emerged when expected need fulfillment was excluded from the analysis reemerged. This more parsimonious model was the study's final model.

Based on this study's final model, whether users perceive a communication technology as essential is determined by functional considerations, social influence factors, and dependency, which was consistent with the evidence provided by existing scholarship. However, not all of the functional considerations, social influence factors, or dependency-related factors examined in this study predicted perceived essentiality.

Of the 12 variables included in this study, together three emerged as the best predictors of perceived essentiality: compatibility (a functional consideration), bandwagon perceptions (a social influence factor), and technology dependency (a dependency-related factor). (Of note, these three variables predicted perceived essentiality in both of the study's models.) These results suggest individuals come to

perceive technologies as essential because the technologies are compatible with the lives users live and want to live, are technologies others view favorably, and are technologies on which users can depend.

The relationship between compatibility and essentiality observed in this study, like several other studies of compatibility (e.g., Agarwal & Prasad, 1997; Moore & Benbasat, 1991; S. Yang et al., 2011), suggests compatibility is important for understanding and predicting individuals' relationships with and perceptions of technologies. Prior studies of compatibility's influence on individuals' evaluations of technologies have produced inconsistent results regarding whether or not compatibility predicts evaluations. This study's finding lends support to those studies that have shown compatibility predicts how users evaluate and perceive technologies (e.g., Agarwal & Prasad, 2000; Carter & Bélanger, 2005; Van Slyke et al., 2004; S. Yang et al., 2011).

How favorably users believed others viewed a technology (bandwagon perceptions) also helped predict whether users perceived the technology as essential. The predictive power of bandwagon perceptions observed in this study provides evidence to suggest the presence of a bandwagon effect in the context of perceived essentiality in communication technologies. This finding is consistent with previous research concerning bandwagon effects and technology use (e.g., Fu & Sim, 2011; Sundar & Nass, 2001; Sundar et al., 2008). The current study's findings extend this literature by suggesting bandwagon cues need not be present for a bandwagon effect to be observed. Furthermore, this study's findings speak to the power of the bandwagon effect because bandwagon perceptions were found to predict whether respondents perceived a technology as essential to their own lives.

Of all the three predictors of perceived essentiality, technology dependency was the strongest, suggesting how essential a person perceives a technology is influenced by how dependent he or she is on the technology. This finding is consistent with both Ball-Rokeach and DeFleur's (1976) media-system dependency theory and Rubin and Windhal's (1986) uses and dependency model of mass communication, both of which suggest dependency can result in cognitive, affective, or behavioral consequences at the individual-level. Specifically, according to the current study's results, technology dependency can affect how users perceive technologies.

The remaining nine variables included in this study—need fulfillment, expected need fulfillment, perceived usefulness, perceived critical mass, perceived network externalities, subject norms, habituation, deficient self-regulation, and attachment—did not help predict perceived essentiality in this study's sample. Contrary to previous studies' findings concerning perceived usefulness and perceptions, perceived usefulness did not predict perceived essentiality in the current study. Though none of these studies' authors measured perceived essentiality, perceived usefulness had been found to predict satisfaction with a technology (Limayem & Cheung, 2011) as well as attitudes toward technologies (Karahanna et al., 1999; Taylor & Todd, 1995a).

Like perceived usefulness, the perceived benefits associated with the number of other people using a technology (i.e., perceived network externalities) also did not predict how essential participants perceived their most essential technology. The mean for perceived network externalities observed in the current study was high, indicating users perceived their most essential communication technologies as experiencing network externalities. This finding is in line with Katz and Shapiro (1985) who argue network

externalities are present in communication technologies. Perhaps the value users derive from essential technologies has little to do with the value associated with a greater number of other users once a critical mass is perceived to have been reached. The value users believe they derive from essential technologies may already be great.

This study's results also revealed habituation was not a statistically significant predictor of essentiality. Although several findings from a number studies suggest habituation predicts individuals' perceptions of a technology (e.g., Gefen, 2003; C. Liao et al., 2006; Limayem & Hirt, 2003; Wu & Kuo, 2008), at least one study would suggest the inverse was true (i.e., Cao & Yin, 2010). Alternatively, the predictive power of habit strength may vary as a function of technology. Habit strength may be a greater predictor of essentiality among some technologies (e.g., cell/mobile phone) than it is among others (e.g., e-mail).

Likewise, deficient self-regulation did not predict how essential users perceived technologies. Findings from Park and Lee's (2011) study of predictors of compulsive smartphone use suggest positive evaluations of a technology (e.g., perceived enjoyment derived from using the technology and satisfaction with the technology) predict compulsive use.

Implications

This study's findings have implications for several areas of studies, including the social influence literature, the study of technology dependency, and Hoffman et al.'s model of Internet indispensability.

The present study's findings have implications for the study of social influence. Scholars have tended to study social influence as a single concept even though numerous

social influence concepts exist (Cho, 2011). As this study shows though, each type of social influence—be it critical mass, network externalities, bandwagon perceptions, subjective norms, or another type—can operate differently and produce different results. In the present study, only bandwagon perceptions helped predict how essential individuals perceived a communication technology.

This study's findings concerning technology dependency point to the importance of continuing to study technology dependency in the media dependency sense of the word, which is to say, non-pathological dependency. Much of the literature concerning dependency and technology use is of a pathological nature because of concerns over issues like technology addiction. In fact, in recent years, scholars have begun to advocate for a new diagnosis to be included in the forthcoming fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) to help practitioners diagnose addictive disorders like Internet addiction (e.g., Hagedorn, 2009). But pathological dependency only represents one type of dependency. As the media dependency literature implies and this study's findings suggest, non-pathological dependency also has significant implications for people's relationships with technologies.

Regarding Hoffman et al.'s (2004) conceptual model of Internet indispensability, technology dependency's predictive power in this study suggests the variable might be an important component in any model of indispensability or essentiality. At the crux of Hoffman et al.'s (2004) model is routine technology use. Although routine use was not measured in the current study, a related concept, habituation, was. But habituation was not a statistically significant predictor of perceived essentiality, suggesting technology dependency may be more fitting than routine use as the central component of a model.

Alternatively, perhaps technology dependency warrants inclusion in the model between routine use and indispensability.

Directions for Future Research

As an initial foray into learning about the phenomenon of perceived essentiality, this study explored individual-level factors predicting how essential individuals perceived communication technologies. Although the final model predicting perceived essentiality accounted for a fair amount of the variance in perceived essentiality, some of variance remained unexplained, suggesting other factors may help predict how essential someone perceives a communication technology. Based on participants' responses to open-ended survey questions, possible variables for future study could include how convenient users perceive the technology, how well the technology helps users feel connected to others, and the amount of mobility and control over their lives users perceive the technology to provide. Other factors may also help predict perceived essentiality. One possibility may include use factors (Hoffman et al., 2004), including how often people use a technology, what they use it for, and in what settings. Additionally, enjoyment, aesthetics, and the degree to which a sense of self is perceived in the technology may also help predict how essential users perceiving a technology as essential. Studies of this nature can apply an approach similar to the one employed in the current study.

Future research could also further explore essential technologies themselves. In this study, newer communication technologies—specifically, cell/mobile phones, Internet, and computers—constituted the majority of participants' most essential communication technology. However, because this study consisted of a convenience sample of Internet users, these results may not be generalizable. Future studies can

examine who perceives what technologies as essential and under what conditions.

Studies could examine potential differences in predictors of perceived essentiality between individual technologies. One potential research question for that line of inquiry could include the following: "In what ways do the predictors of perceived essentiality in the cell phone differ from those of perceived essentiality in personal computers?" Or, more broadly, "In what ways do the predictors of perceived essentiality in the cell phone differ from those of perceived essentiality in communication technologies in general?"

Similarly, future studies can explore potential differences in predictors of perceived essentiality among different generations of users or among users of different genders or ethnicities. Although the present study did not find evidence of a relationship between age or gender and whether someone perceived a communication technology as essential, perhaps some variables are stronger predictors of perceived essentiality among certain groups more so than among others.

Besides being of interest as outcome variable, perceived essentiality can also be studied as a moderator variable or as a predictor variable. Perhaps the effects associated with media and technology use are tempered or exacerbated by how essential a person perceives the technology. Perceived essentiality may also have implications for how people use technologies. Possible research questions for studies examining the effects of perceived essentiality could include “Is there a relationship between how essential users perceive a technology and their willingness to disclose personal information via the technology?” and “Among cell phone users, what is the relationship between how essential users perceive their cell phones and cell phone use while driving?”

Lastly, although this study approached perceived essentiality at the micro-level,

macro-level studies of essentiality could also provide valuable insights. Hoffman et al. (2004) suggest the transformation process resulting from daily Internet use at the micro-level affects the social system at the macro-level, which then feeds back into the process leading to indispensability. This proposition has not been tested, but it provides some initial justification for the potential relationship between essentiality at the micro- and macro-levels. Potential overarching research questions for macro-level studies include "How does a technology perceived to be essential become essential to society?" and "What factors contribute to technologies transitioning from being perceived as essential to public utilities like electricity?"

Conclusion

This study was one of the first to explore perceived essentiality of communication technologies. The study's findings indicated compatibility, bandwagon perceptions, and technology dependency help determine whether individuals perceive a communication technology to be essential, suggesting perceived essentiality is at least in part a matter of function, the perceived opinions of others, and dependence.

Prior to the present study, there was a sense people perceived their communication technologies as very important. Now there begins to be a better understanding of some of the factors that may contribute to such perceptions.

REFERENCES

Agarwal, R., & Prasad, J. (1997). The role of innovation characteristics and perceived voluntariness in the acceptance of information technologies. *Decision Sciences, 28*(3), 557–582.

Agarwal, R., & Prasad, J. (2000). A field study of the adoption of software process innovations by information systems professionals. *IEEE Transactions on Engineering Management, 47*(3), 295–308.

Asimov, I. (1993). *Understanding physics*. New York: Barnes & Noble Books. (Original work published 1966).

Ball, A. D., & Tasaki, L. H. (1992). The role and measurement of attachment in consumer behavior. *Journal of Consumer Psychology, 1*(2), 155–172.

Ball-Rokeach, S. J. (1985). The origins of individual media-system dependency: A sociological framework. *Communication Research, 12*(4), 485–510. doi: 10.1177/009365085012004003

Ball-Rokeach, S. J., & DeFleur, M. L. (1976). A dependency model of mass-media effects. *Communication Research, 3*(3), 3–21. doi: 10.1177/009365027600300101

Bartels, L. M. (1985). Expectations and preferences in presidential nominating campaigns. *The American Political Science Review, 79*(3), 804–815.

Beard, K. W., & Wolf, E. M. (2001). Modification in the proposed diagnostic criteria for Internet addiction. *CyberPsychology & Behavior, 4*(3), 377–383.

Biddle, J. (1991). A bandwagon effect in personalized license plates? *Economic Inquiry, 29*(2), 375–388.

Blom, J. O., & Monk, A. F. (2003). Theory of personalization of appearance: Why users personalize their PCs and mobile phones. *Human-Computer Interaction, 18*(3), 193–228.

Bowlby, J. (1958). The nature of the child's tie to his mother. *International Journal of Psycho-Analysis, 39*(5), 350–373.

Bowlby, J. (1960). Grief and mourning in infancy and early childhood. *The Psychoanalytic Study of the Child, 15*, 9–52.

Bowlby, J. (1977). The making and breaking of affectional bonds. *British Journal of Psychiatry, 130*(3), 201–210.

Bretherton, I. (1992). The origins of attachment theory: John Bowlby and Mary Ainsworth. *Developmental psychology, 28*(5), 759–775. doi: 10.1037/0012-1649.28.5.759

Cao, S., & Yin, H. (2010). Trust and habit in e-service continuance: An integrated model. *Journal of Computational Information Systems, 6*(11), 3595–3604.

Caplan, S. E. (2002). Problematic Internet use and psychosocial well-being: Development of a theory-based cognitive-behavioral measurement instrument. *Computers in Human Behavior, 18*(5), 553–575.

Caplan, S. E. (2010). Theory and measurement of generalized problematic Internet use: A two-step approach. *Computers in Human Behavior, 26*(5), 1089–1097.

Carter, L., & Bélanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors. *Information Systems Journal, 15*(1), 5–25.

Cho, H. (2011). Theoretical intersections among social influences, beliefs, and intentions in the context of 3G mobile services in Singapore: Decomposing perceived critical mass and subjective norms. *Journal of Communication, 61*(2), 283–306. doi: 10.1111/j.1460-2466.2010.01532.x

Church, J., & Gandal, N. (1993). Complementary network externalities and technological adoption. *International Journal of Industrial Organization, 11*(2), 239–260.

Cisco. (2011). Cisco connected world technology report. Retrieved from http://www.cisco.com/en/US/netsol/ns1120/index.html

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly, 19*(2), 189–211.

Davis, F. D. (1986). *A technology acceptance model of empirically testing new end-user information systems: Theory and results.* Unpublished doctoral dissertation, Massachusetts Institute of Technology, Cambridge, MA.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003.

Davis, R. A., Flett, G. L., & Besser, A. (2002). Validation of a new scale for measuring problematic Internet use: Implications for pre-employment screening. *CyberPsychology & Behavior, 5*(4), 331–345.

Dowling, N. A., & Quirk, K. L. (2009). Screening for Internet dependence: Do the proposed diagnostic criteria differentiate normal from dependent Internet use? *CyberPsychology & Behavior, 12*(1), 21–27.

Ferguson, D. A., Greer, C. F., & Reardon, M. E. (2007). Uses and gratifications of MP3 players by college students: Are iPods more popular than radio? *Journal of Radio Studies, 14*(2), 102–121.

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

Frey, L. R., Botan, C. H., & Kreps, G. L. (2000). *Investigating communication: An introduction to research methods* (2nd ed.). Needham Heights, MA: Allyn & Bacon.

Fu, W. W., & Sim, C. C. (2011). Aggregate bandwagon effect on online videos' viewership: Value uncertainty, popularity cues, and heuristics. *Journal of the American Society for Information Science and Technology, 62*(12), 2382–2395.

Gefen, D. (2003). TAM or just plain habit: A look at experienced online shoppers. *Journal of Organizational and End User Computing, 15*(3), 1–13.

Gefen, D., & Straub, D. W. (1997). Gender differences in the perception and use of e-mail: An extension to the technology acceptance model. *MIS Quarterly, 21*(4), 389–400.

Hagedorn, W. B. (2009). The call for a new *Diagnostic and Statistical Manual of Mental Disorders* diagnosis: Addictive disorders. *Journal of Addictions & Offender Counseling, 29*(2), 110–127.

Henshel, R. L., & Johnston, W. (2005). The emergence of bandwagon effects: A theory. *The Sociological Quarterly, 28*(4), 493–511.

Hoffman, D. L., Novak, T. P., & Venkatesh, A. (2004). Has the Internet become indispensable? *Communications of the ACM, 47*(7), 37–42.

Hsu, M. H., Chiu, C. M., & Ju, T. L. (2004). Determinants of continued use of the WWW: An integration of two theoretical models. *Industrial Management & Data Systems, 104*(9), 766–775.

Igbaria, M., & Iivari, J. (1995). The effects of self-efficacy on computer usage. *Omega, The International Journal of Management Science, 23*(6), 587–605.

Jia, R. (2009). Problematic technology use: A negative outcome of computer playfulness and personal innovativeness? *SPROUTS: Working Papers on Information Systems, 9*(45), 1–25.

Joinson, A. N. (2008). *'Looking at', 'looking up', or 'keeping up with' people? Motives and uses of Facebook.* Paper presented at the CHI 2008, Florence, Italy.

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly, 23*(2), 183–213.

Katz, E., Blumler, J. G., & Gurevitch, M. (1974). Utilization of mass communication by the individual. In Jay G. Blumler & E. Katz (Eds.), *The uses of mass communications: Current perspectives on gratifications research* (pp. 19–32). Beverly Hills: SAGE Publications, Inc.

Katz, E., Haas, H., & Gurevitch, M. (1973). On the use of the mass media for important things. *American Sociological Review, 38*(2), 164–181.

Katz, M. L., & Shapiro, C. (1985). Network externalities, competition, and compatibility. *The American Economic Review, 75*(3), 424–440.

Katz, M. L., & Shapiro, C. (1986). Technology adoption in the presence of network externalities. *The Journal of Political Economy, 94*(4), 822–841.

Kleine, S. S., & Baker, S. M. (2004). An integrative review of material possession attachment. *Academy of Marketing Science Review, 2004*(1), 1–35.

Kline, R. B. (2009). *Becoming a behavioral science researcher: A guide to producing research that matters*. New York: The Guilford Press.

Kline, R. B. (2011). *Principles and practice of structural equation modeling* (3rd ed.). New York: The Guilford Press.

LaRose, R., & Eastin, M. S. (2004). A social cognitive theory of Internet uses and gratifications: Toward a new model of media attendance. *Journal of Broadcasting & Electronic Media, 48*(3), 358–377.

LaRose, R., Lin, C. A., & Eastin, M. S. (2003). Unregulated Internet usage: Addiction, habit, or deficient-self-regulation? *Media Psychology, 5*(3), 225–253. doi: http://dx.doi.org/10.1207/S1532785XMEP0503_01

LaRose, R., Mastro, D., & Eastin, M. S. (2001). Understanding Internet usage: A social-cognitive approach to uses and gratifications. *Social Science Computer Review, 19*(4), 395–413.

Lee, Z. W. Y., Cheung, C. M. K., & Thadani, D. R. (2012). *An investigation into the problematic use of Facebook*. Paper presented at the 45th Hawaii International Conference on System Sciences, Maui, Hawaii.

Leibenstein, H. (1950). Bandwagon, snob, and Veblen effects in the theory of consumers' demand. *The Quarterly Journal of Economics, 64*(2), 183–207.

Leung, L., & Wei, R. (2000). More than just talk on the move: Uses and gratifications of the cellular phone. *Journalism and Mass Communication Quarterly, 77*(2), 308–320.

Liao, C., Palvia, P., & Lin, H.-N. (2006). The roles of habit and web site quality in e-commerce. *International Journal of Information Management, 26*(6), 469–483.

Liao, C.-H., & Wan, Y.-B. (2010). *Personality trait, social interaction and mobile phone usage dependence*. Paper presented at the 5th Communication Policy Research South Conference (CPRsouth5), Xian, China.

Liebowitz, S. J., & Margolis, S. M. (1994). Network externality: An uncommon tragedy. *Journal of Economic Perspectives, 8*(2), 133–150.

Limayem, M., & Cheung, C. M. K. (2011). Predicting the continued use of Internet-based learning technologies: The role of habit. *Behaviour & Information Technology, 30*(1), 91–99.

Limayem, M., & Hirt, S. G. (2003). Force of habit and information systems usage: Theory and initial validation. *Journal of the Assocation for Information Systems, 4*(1), 65–97.

Lou, H., Luo, W., & Strong, D. M. (2000). Perceived critical mass effect on groupware acceptance. *European Journal of Information Systems, 9*(2), 91–103.

Markus, M. L. (1987). Toward a "critical mass" theory of interactive media: Universal access, interdependence and diffusion. *Communication Research, 14*(5), 491–511. doi: 10.1177/009365087014005003

Meerkerk, G.-J., Van Den Eijnden, R. J. J. M., Vermulst, A. A., & Garretsen, H. F. L. (2009). The Compulsive Internet Use Scale (CIUS): Some psychometric properties. *CyberPsychology & Behavior, 12*(1), 1–6. doi: 10.1089/cpb.2008.0181

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*(3), 192–222.

Mugge, R., Schifferstein, H. N. J., & Schoormans, J. P. L. (2010). Product attachment and satisfaction: Understanding consumers' post-purchase behavior. *Journal of Consumer Marketing, 27*(3), 271–282.

Mugge, R., Schoormans, J. P. L., & Schifferstein, H. N. J. (2009). Emotional bonding with personalised products. *Journal of Engineering Design, 20*(5), 467–476.

Nadeau, R., Cloutier, E., & Guay, J.-H. (1993). New evidence about the existence of a bandwagon effect in the opinion formation process. *Internatlonal Political Science Review, 14*(2), 203–213.

Navazio, R. (1977). An experimental approach to bandwagon research. *The Public Opinion Quarterly, 41*(2), 217–225.

New Oxford American Dictionary. (2005). Oxford University Press.

Oliver, P., Marwell, G., & Teixeira, R. (1985). A theory of the critical mass. I. Interdependence, group heterogeneity, and the production of collective action. *The American Journal of Sociology, 91*(3), 522–556.

Oliver, R. L. (2010). *Satisfaction: A behavioral perspective on the consumer* (2nd ed.). Armonk, NY: M.E. Sharpe, Inc.

Ortiz de Guinea, A., & Markus, M. L. (2009). Why break the habit of a lifetime? Rethinking the roles of intention, habit, and emotion in continuing information technology use. *MIS Quarterly, 33*(3), 433–444.

Pae, J. H., & Hyun, J. S. (2002). The impact of technology advancement strategies on consumers' patronage decisions. *The Journal of Product Innovation Management, 19*(5), 375–383.

Palmgreen, P., & Rayburn, J. D., II. (1985). An expectancy-value approach to media gratifications. In K. E. Rosengren, L. A. Wenner & P. Palmgreen (Eds.), *Media gratifications research: Current perspectives*. Bevery Hills, CA: SAGE Publications, Inc.

Palmgreen, P., Wenner, L. A., & Rosengren, K. E. (1985). Uses and gratifications research: The past ten years. In K. E. Rosengren, L. A. Wenner & P. Palmgreen (Eds.), *Media gratifications research: Current perspectives*. Beverly Hills: SAGE Publications, Inc.

Papacharissi, Z., & Rubin, A. M. (2000). Predictors of Internet use. *Journal of Broadcasting & Electronic Media, 44*(2), 175–196.

Park, B.-W., & Lee, K. C. (2011). The effect of users' characteristics and experiential factors on the compulsive usage of the smartphone. In T.-h. Kim, H. Adeli, R. J. Robles & M. Balitanas (Eds.), *Ubiquitous computing and multimedia applications: Vol. 151. Second international conference, UCMA 2011* (pp. 438–446). Berlin, Gernany: Springer.

Park, N., Fee, K. F., & Valenzuela, S. (2009). Being immersed in social networking environment: Facebook groups, uses and gratifications, and social outcomes. *CyberPsychology & Behavior, 12*(6), 729–733.

Patwardhan, P., & Yang, J. (2003). Internet dependency relations and online consumer behavior: A media system dependency theory perspective on why people shop, chat, and read news online. *Journal of Interactive Advertising, 3*(2), 57–69.

Pew Internet & American Life Project. (2011). Social networking sites and our lives. Retrieved from http://pewinternet.org/~/media/Files/Reports/2011/PIP%20-%20Social%20networking%20sites%20and%20our%20lives.pdf

Pew Research Center. (2006). Luxury or necessity? Things we can't live without: The list has grown in the past decade. Retrieved from http://pewsocialtrends.org/assets/pdf/Luxury.pdf

Pew Research Center. (2009). Luxury or necessity? The public makes a U-turn. Retrieved from http://pewsocialtrends.org/assets/pdf/luxury-or-necessity-2009.pdf

Qualtrics Labs Inc. (2009). Qualtrics. Provo, UT: Qualtrics Labs, Inc.

Raacke, J., & Bonds-Raacke, J. (2008). MySpace and Facebook: Applying the uses and gratifications theory to exploring friend-networking sites. *CyberPsychology & Behavior, 11*(2), 169–174.

Ramirez, M., Ko, K., & Ward, S. (2010). *Introducing industrial design students to long-term product attachment*. Paper presented at the International Conference on Design, Sydney, Australia.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Rubin, A. M. (2009). Uses-and-gratifications perspective on media effects. In J. Bryant & M. B. Oliver (Eds.), *Media effects: Advances in theory and research* (3rd ed., pp. 165–184). New York: Routledge.

Rubin, A. M., & Windhal, S. (1986). The uses and dependency model of mass communication. *Critical Studies in Mass Communication, 3*(2), 184–199.

Schepers, J., & Wetzles, M. (2007). A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. *Information & Management, 44*(1), 90–103.

Schifferstein, H. N. J., & Zwartkruis-Pelgrim, E. P. H. (2008). Consumer-product attachment: Measurement and design implications. *International Journal of Design, 2*(3), 1–13.

Science Museum. (2011). Feeling flush [Press release]. Retrieved from http://www.sciencemuseum.org.uk/about_us/press_and_media/press_releases/2011/09/Feeling%20Flush.aspx

Sledgianowski, D., & Kulviwat, S. (2009). Using social networking sites: The effects of playfulness, critical mass and trust in a hedonic context. *Journal of Computer Information Systems, 49*(4), 74–83.

Song, J., & Walden, E. (2007). How consumer perceptions of network size and social interactions influence the intention to adopt peer-to-peer technologies. *Internatlonal Journal of E-Business Research, 3*(4), 49–66.

Soror, A. A., Steelman, Z. R., & Limayem, M. (2012). *Discipline yourself before life disciplines you: Deficient self-regulation and mobile phone unregulated use*. Paper presented at the 45th Hawaii International Conference on System Sciences, Maui, Hawaii.

Stafford, T. F., Belton, M., Nelson, T., & Peevyhouse, A. (2010). *Exploring dimensions of mobile information technology dependence.* Paper presented at the ICIS 2010.

Stafford, T. F., Stafford, M. R., & Schkade, L. L. (2004). Determining uses and gratifications for the Internet. *Decision Sciences, 35*(2), 259–288.

Strader, T. J., Ramaswami, S. N., & Houle, P. A. (2007). Perceived network externalities and communication technology acceptance. *European Journal of Information Systems, 16*(1), 54–65.

Sundar, S. S. (2008). The MAIN model: A heuristic approach to understanding technology effects on credibility. In M. J. Metzger & A. J. Flanagin (Eds.), *Digital media, youth, and credibility* (pp. 73–100). Cambridge, MA: The MIT Press.

Sundar, S. S., & Nass, C. (2001). Conceptualizing sources in online news. *Journal of Communication, 51*(1), 52–72.

Sundar, S. S., Oeldorf-Hirsch, A., & Xu, Q. (2008). *The bandwagon effect of collaborative filtering technology.* Paper presented at the Conference on Human Factors in Computing Systems (ACM SIGCHI), Florence, Italy.

Tabachnik, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson Education, Inc.

Taylor, S., & Todd, P. A. (1995a). Assessing IT usage: The role of prior experience. *MIS Quarterly, 19*(4), 561–570.

Taylor, S., & Todd, P. A. (1995b). Understanding information technology usage: A test of competing models. *Information Systems Research, 6*(2), 144–176.

Van Rooij, A. J., Schoenmakers, T. M., Van den Eijnden, R. J. J. M., & Van de Mheen, D. (2010). Compulsive Internet use: The role of online gaming and other Internet applications. *Journal of Adolescent Health, 47*(1), 51–57.

Van Slyke, C., Bélanger, F., & Comunale, C. L. (2004). Factors influencing the adoption of web-based shopping: The impact of trust. *Database for Advances in Information Systems, 35*(2), 32–49. doi: 10.1145/1007965.1007969

Van Slyke, C., Ilie, V., Lou, H., & Stafford, T. (2007). Perceived critical mass and the adoption of a communication technology. *European Journal of Information Systems, 16*(3), 270–283.

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186–204.

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly, 24*(1), 115–139.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478.

Verplanken, B., & Aarts, H. (1999). Habit, attitude, and planned behaviour: Is habit an empty construct or an interesting case of goal-directed automaticity? *European Review of Social Psychology, 10*(1), 101–134.

Verplanken, B., & Orbell, S. (2003). Reflections on past behavior: A self-report index of habit strength. *Journal of Applied Social Psychology, 33*(6), 1313–1330.

Vigneron, F., & Johnson, L. W. (1999). A review and a conceptual framework of prestige-seeking consumer behavior. *Academy of Marketing Science, 1999*(1), 1–15.

Wang, C.-C., & Yang, H.-W. (2007). Passion and dependency in online shopping activities. *CyberPsychology & Behavior, 10*(2), 296–298.

Wang, K.-Y., Chih, W.-H., & Jhong, D.-Y. (2009). *Let's blog! A social cognitive perspective of intention to use blog*. Paper presented at the ICEC '09, Taipei, Taiwan.

Wehmeyer, K. (2008). User-device attachment — scale development and initial test. *International Journal of Mobile Communications, 6*(3), 280–295.

Wu, M.-C., & Kuo, F.-Y. (2008). An empirical investigation of habitual usage and past usage on technology acceptance evaluations and continuance intention. *The DATA BASE for Advances in Information Systems, 39*(4), 48–73.

Yang, C., Hsu, Y.-C., & Tan, S. (2010). Predicting the determinants of users' intentions for using YouTube to share video: Moderating gender effects. *CyberPsychology, Behavior, & Social Networking, 13*(2), 141–152. doi: 10.1089=cyber.2009.0105

Yang, S., Lu, Y., Gupta, S., Cao, Y., & Zhang, R. (2011). Mobile payment services adoption across time: An empirical study of the effects of behavioral beliefs, social influences, and personal traits. *Computers in Human Behavior, 28*(1), 129–142.

Zeng, L. (2011). More than audio on the go: Uses and gratifications of MP3 players. *Communication Research Reports, 28*(1), 97–108.

APPENDIX A

RESEARCH INSTRUMENT

Essential Communication Technologies

Thank you for agreeing to participate in this study. This survey asks you about your opinions of and experiences with the communication technology that is most essential to you in your everyday life.

As you complete this survey, please keep in mind that there are no right or wrong answers. We only ask that you respond to the items below as honestly as possible and to the best of your ability.

Please maximize your browser before you continue.

Part ONE

In this part of the survey, we are interested in learning about your most essential communication technology.

What does the word "essential" mean to you in the context of communication technologies?

Now, please select your most essential communication technology from the list below. If your most essential communication technology does not appear in the list, please select "Other." (Please note this list is not intended to be exhaustive.)

- ○ Bluetooth
- ○ Cable
- ○ Cell/mobile phone (feature phone)
- ○ Cell/mobile phone (smart phone)
- ○ Computer (desktop)
- ○ Computer (laptop)
- ○ E-mail
- ○ E-reader
- ○ GPS
- ○ Internet
- ○ Internet (mobile phone)
- ○ Landline telephone
- ○ Mobile application
- ○ Newspaper
- ○ Portable media player (example: iPod)
- ○ Radio
- ○ Social networking service (examples: Facebook, Twitter)
- ○ Tablet computer (example: iPad)
- ○ Television
- ○ Text messaging
- ○ Video game console (examples: PS3, Wii, Xbox 360)
- ○ Voice calling (phone)
- ○ VOIP service (example: Skype)
- ○ Website
- ○ Other

In the space provided below, please describe what makes this technology essential to you in your everyday life. In other words, why is this technology essential to you? (Please think of all of the different contexts in which you use this technology.)

Now, with your most essential communication technology in mind, please tell us how much you agree with each of the following statements:

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
This technology is essential to me.	○	○	○	○	○	○	○
I could easily live without this technology.	○	○	○	○	○	○	○
This technology is a central part of my life.	○	○	○	○	○	○	○
My life requires this technology.	○	○	○	○	○	○	○
I must have this technology.	○	○	○	○	○	○	○
This technology is deeply embedded in my life.	○	○	○	○	○	○	○
This technology is not important to me.	○	○	○	○	○	○	○
I cannot do without this technology.	○	○	○	○	○	○	○
My life is fine without this technology.	○	○	○	○	○	○	○
This technology is necessary for me.	○	○	○	○	○	○	○
This technology is indispensable for me.	○	○	○	○	○	○	○
I need this technology to live the way I want to live.	○	○	○	○	○	○	○

Overall, on a scale from “0” to “10,” with “0” representing “not at all essential” and “10” representing “absolutely essential,” how essential would you say this technology is to you in your everyday life?

Not at all essential	0	1	2	3	4	5	6	7	8	9	10	Absolutely essential

When did this technology become essential to you?

- ○ Before you adopted the technology
- ○ When you adopted the technology
- ○ After you adopted the technology

To the best of your memory, how long ago did this technology become essential to you?

	Years	Months	I don't remember
This technology became essential to me _____ years and _____ months ago.	_____	_____	○

Now please think back to when you first got or signed up for your most essential communication technology.

To the best of your memory, how long ago did you first get this technology?

	Years	Months	I don't remember
This technology became essential to me _____ years and _____ months ago.	_____	_____	○

Part TWO

In this part of the survey, we are interested in learning about your current expectations and use of, as well as your attitudes toward, your most essential communication technology. This section concludes with questions about other people's use of and attitudes toward the technology.

Let's start with your current expectations of the technology.

Please tell us how well you EXPECT this technology to fulfill your various needs.

	Fall short of my needs			Just meet my needs			Exceed my needs
How well do you **expect** this technology to fulfill your **need for social interaction**?	○	○	○	○	○	○	○
How well do you **expect** this technology to fulfill your **information needs**?	○	○	○	○	○	○	○
How well do you **expect** this technology fulfill your **emotional needs**?	○	○	○	○	○	○	○
How well do you **expect** this technology to fulfill your **entertainment needs**?	○	○	○	○	○	○	○
How well do you **expect** this technology to fulfill your **communication needs**?	○	○	○	○	○	○	○
How well do you **expect** this technology to fulfill your **need for self-expression**?	○	○	○	○	○	○	○
In general, how well do you **expect** this technology to fulfill your **overall needs**?	○	○	○	○	○	○	○

Please tell us about your use of your most essential communication technology.

On average, how often do you use this technology?

- ○ On a daily basis
- ○ On a weekly basis
- ○ On a monthly basis

[Answer if "On a monthly basis" is selected:]

In a typical month, how often do you use this technology?

- ○ Once a month
- ○ Twice a month
- ○ Three times a month
- ○ Four times a month

[Answer if "On a weekly basis" or "In a typical month, how often do you use this technology? Four times a month" is selected:]

In a typical week, how often do you use this technology?

- ○ Once a week
- ○ Twice a week
- ○ Three times a week
- ○ Four times a week
- ○ Five times a week
- ○ Six times a week
- ○ Seven times a week

[Answer if "On a daily basis" or "In a typical week, how often do you use this technology? Seven times a week" is selected:]

In a typical day, how often do you use this technology?

- ○ Once a day
- ○ Twice a day
- ○ Three times a day
- ○ Four times a day
- ○ Five times a day
- ○ Six times a day
- ○ Seven or more times a day
- ○ Too many times a day to count
- ○ All the time

[Answer if "In a typical day, how often do you use this technology? Seven or more times a day" is selected:]

Please specify the number of times you use this technology in a typical day.

☐

These next several items ask you about how well your most essential communication technology fulfills your needs. These items might look familiar, but this time we are asking you about how well the technology ACTUALLY fulfills your needs, NOT how well you EXPECT the technology to fulfill your needs.

	Falls short of my needs			Just meets my needs			Exceeds my needs
How well does this technology fulfill your **need for social interaction**?	○	○	○	○	○	○	○
How well does this technology fulfill your **information needs**?	○	○	○	○	○	○	○

	Falls short of my needs			Just meets my needs			Exceeds my needs
How well does this technology fulfill your **emotional needs**?	○	○	○	○	○	○	○
How well does this technology fulfill your **entertainment needs**?	○	○	○	○	○	○	○
How well does this technology fulfill your **communication needs**?	○	○	○	○	○	○	○
How well does this technology fulfill your **need for self-expression**?	○	○	○	○	○	○	○
In general, how well does this technology fulfill your **overall needs**?	○	○	○	○	○	○	○

The next several series of items are about your USE of your most essential communication technology.

Please tell us how much you agree with each of the following statements:

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
I use this technology frequently.	○	○	○	○	○	○	○
Using this technology is something I do automatically.	○	○	○	○	○	○	○
I use this technology without having to consciously remember.	○	○	○	○	○	○	○
I feel weird if I do not use this technology.	○	○	○	○	○	○	○
I use this technology without thinking about it.	○	○	○	○	○	○	○
Not using this technology requires effort.	○	○	○	○	○	○	○
Using this technology is part of my routine.	○	○	○	○	○	○	○
I start using this technology before I realize I'm doing it.	○	○	○	○	○	○	○
I would find it hard not to use this technology.	○	○	○	○	○	○	○
I have no need to think about using this technology.	○	○	○	○	○	○	○

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
Using this technology is typical "me."	○	○	○	○	○	○	○
I have been using this technology for a long time.	○	○	○	○	○	○	○

Again, please tell us how much you agree with each of the statements below. Please remember to keep your most essential communication technology in mind as you respond.

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
I have difficulty controlling the amount of time I spend using this technology.	○	○	○	○	○	○	○
I find it easy to control my use of this technology.	○	○	○	○	○	○	○
I have a hard time resisting the urge to use this technology.	○	○	○	○	○	○	○
When I haven't used this technology for some time, I become preoccupied with the thought of using it.	○	○	○	○	○	○	○
I would feel lost if I was unable to use this technology.	○	○	○	○	○	○	○
I think obsessively about using this technology when I am not using it.	○	○	○	○	○	○	○
People who influence me think that I should use this technology.	○	○	○	○	○	○	○
People who are important to me think that I should use this technology.	○	○	○	○	○	○	○
People whose opinion I value prefer that I use this technology.	○	○	○	○	○	○	○
Others expect me to use this technology.	○	○	○	○	○	○	○
My use of this technology is voluntary (as opposed to required by others).	○	○	○	○	○	○	○
No one requires me to use this technology.	○	○	○	○	○	○	○
Although it might be helpful, using this technology is certainly not compulsory in my life.	○	○	○	○	○	○	○

Please indicate your level of agreement with each of the statements below concerning your most essential communication technology.

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
Using this technology enables me to accomplish tasks more quickly.	○	○	○	○	○	○	○
Using this technology improves the quality of my life.	○	○	○	○	○	○	○
Using this technology makes it easier to live my life.	○	○	○	○	○	○	○
Using this technology improves my life.	○	○	○	○	○	○	○
Overall, I find using this technology to be advantageous.	○	○	○	○	○	○	○
Using this technology enhances my effectiveness.	○	○	○	○	○	○	○
Using this technology gives me greater control over my life.	○	○	○	○	○	○	○
Using this technology increases my productivity.	○	○	○	○	○	○	○
In general, I think this technology is useful.	○	○	○	○	○	○	○
Using this technology enables me to communicate more quickly.	○	○	○	○	○	○	○
Using this technology improves the quality of my communication with others.	○	○	○	○	○	○	○
Using this technology makes it easier for me to communicate with others.	○	○	○	○	○	○	○
Using this technology improves my communication.	○	○	○	○	○	○	○
Using this technology enhances my communication effectiveness.	○	○	○	○	○	○	○
Using this technology gives me greater control over my communication with others.	○	○	○	○	○	○	○

Okay, now that we've covered use, we would like to move on to learn about your perceptions of and attitudes toward your most essential communication technology.

Just as you did before, please indicate your level agreement with the statements below. Please remember to keep your most essential communication technology in mind as you read over each of the statements.

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
I like to use this technology.	○	○	○	○	○	○	○
It is a pleasure for me to use this technology.	○	○	○	○	○	○	○
It is desirable for me to learn how to use this technology.	○	○	○	○	○	○	○
Using this technology is one of the more important things I do each day.	○	○	○	○	○	○	○
I would rather use this technology than do anything else.	○	○	○	○	○	○	○
I could easily do without this technology for several days.	○	○	○	○	○	○	○
I would feel lost without this technology.	○	○	○	○	○	○	○
If this technology were not working, I would not miss it.	○	○	○	○	○	○	○
Overall, I am dependent on this technology.	○	○	○	○	○	○	○
I feel emotionally connected to this technology.	○	○	○	○	○	○	○
This technology is very dear to me.	○	○	○	○	○	○	○
I have a bond with this technology.	○	○	○	○	○	○	○
This technology has no special meaning for me.	○	○	○	○	○	○	○
This product does not move me.	○	○	○	○	○	○	○
I am very attached to this technology.	○	○	○	○	○	○	○
Using this technology is compatible with all aspects of my life.	○	○	○	○	○	○	○
Using this technology is completely compatible with my current situation.	○	○	○	○	○	○	○
I think that using this technology fits well with the way I like to live.	○	○	○	○	○	○	○
Using this technology fits into my lifestyle.	○	○	○	○	○	○	○
Using this technology improves my image.	○	○	○	○	○	○	○
Using this technology is a status symbol.	○	○	○	○	○	○	○

Please continue to tell us how much you agree with each of the statements below while keeping your most essential communication technology in mind.

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
This technology helps me feel like I have control over my voice.	○	○	○	○	○	○	○
I do not feel like I can assert myself when I use this technology.	○	○	○	○	○	○	○
When I use this technology, I do not feel like I am a distinct self.	○	○	○	○	○	○	○
This technology helps me feel like I have control over my actions.	○	○	○	○	○	○	○
This technology helps me feel that I can control my future.	○	○	○	○	○	○	○
I feel like I can exercise my free will when I use this technology.	○	○	○	○	○	○	○
I have control over my life when I use this technology.	○	○	○	○	○	○	○
This technology helps me have a distinct identity.	○	○	○	○	○	○	○
This technology helps me let the world know who I am.	○	○	○	○	○	○	○
When I use this technology, I can influence the nature and course of my life.	○	○	○	○	○	○	○
When I use this technology, I am the center of my universe.	○	○	○	○	○	○	○
This technology helps me feel confident about asserting myself.	○	○	○	○	○	○	○

Please indicate how much you agree with this last set of statements about your perceptions of and attitudes toward your most essential communication technology.

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
I am able to perform a lot of actions with this technology.	○	○	○	○	○	○	○
This technology allows me to have back and forth exchanges.	○	○	○	○	○	○	○
This technology allows me to take actions to control what I want to see (or avoid) while I use it.	○	○	○	○	○	○	○

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
This technology is a good reflection of who I am.	○	○	○	○	○	○	○
I believe this technology offers me a lot of choices while I use it.	○	○	○	○	○	○	○
This technology offers features that encourage me to keep using it.	○	○	○	○	○	○	○
I can customize this technology to make it my own.	○	○	○	○	○	○	○
This technology has a lot of things in it to keep me active.	○	○	○	○	○	○	○
I feel as if this technology constantly responds to my needs.	○	○	○	○	○	○	○
I feel immersed in what I am doing when I use this technology.	○	○	○	○	○	○	○
When I use this technology, I feel like I am involved in an actual conversation with the technology.	○	○	○	○	○	○	○
This technology asks for my input at every stage of my interaction with it.	○	○	○	○	○	○	○
I feel as if the information on this technology is well organized.	○	○	○	○	○	○	○
I have a lot of things to choose from when I use this technology.	○	○	○	○	○	○	○
When I use this technology, I feel like I am in the same place as the person with whom I interact.	○	○	○	○	○	○	○
I feel like I have a lot of control over the flow of information on this technology.	○	○	○	○	○	○	○
Once I start to use this technology, I do not feel like stopping.	○	○	○	○	○	○	○
I feel as if this technology can understand what I am trying to do when I use it.	○	○	○	○	○	○	○

Overall, how interactive would you rate this technology?

Not at all interactive							Highly interactive
○	○	○	○	○	○	○	

All right. That's it for your perceptions and attitudes. Now let's turn to OTHER people's uses and attitudes.

As you've done before, please tell us how much you agree with the five statements below. Please remember to keep YOUR most essential communication technology in mind as you respond.

	Strongly Disagree			Neither Disagree nor Agree			Strongly Agree
Most people are using this technology.	○	○	○	○	○	○	○
The number of people using this technology will increase the usefulness of this technology to me.	○	○	○	○	○	○	○
Many people will use this technology in the future.	○	○	○	○	○	○	○
People who use this technology have more prestige than those who do not.	○	○	○	○	○	○	○
People who use this technology have a high profile.	○	○	○	○	○	○	○

Please tell us what percentage of people from each of the groups listed below you think CURRENTLY use your most essential technology.

	%	Not Applicable
What percentage of your **friends currently** uses this technology?	___	○
What percentage of your **family members currently** uses this technology?	___	○
What percentage of your **colleagues currently** uses this technology?	___	○
What percentage of the **U.S. population currently** uses this technology?	___	○

Please tell us what percentage of people from each of the groups listed below you EXPECT will use your most essential technology in the next YEAR.

	%	Not Applicable
What percentage of your **friends** do you expect will use this technology in the **next year**?	___	○
What percentage of your **family members** do you expect will use this technology in the **next year**?	___	○
What percentage of your **colleagues** do you expect will use this technology in the **next year**?	___	○
What percentage of the **U.S. population** do you expect will use this technology in the **next year**?	___	○

Please tell us how likely you think the following things are likely to occur:

	Not at all likely						Highly likely
How likely are **other people** to think this is a good technology?	○	○	○	○	○	○	○
How likely are **other people** to adopt this technology?	○	○	○	○	○	○	○
How likely are **other people** to recommend this technology to their friends?	○	○	○	○	○	○	○
How likely are **other people** to think this technology is of bad quality?	○	○	○	○	○	○	○
How likely are **other people** to dissuade their friends from adopting this technology?	○	○	○	○	○	○	○
How likely are **other people** to think this technology is worth adopting?	○	○	○	○	○	○	○
How likely are **other people** to think this technology is essential?	○	○	○	○	○	○	○

Part THREE

This last section asks you a little bit about yourself.

How old are you?

☐

What is your gender?

- ○ Female
- ○ Male
- ○ Other

What is the highest level of education you have completed?

- ○ Less than High School
- ○ High School / GED
- ○ Some College
- ○ 2-year College Degree
- ○ 4-year College Degree
- ○ Masters Degree
- ○ Doctoral Degree
- ○ Professional Degree (JD, MD)

What is your race? (Please check all that apply.)

- ☐ American Indian or Alaska Native
- ☐ Asian
- ☐ Black or African American
- ☐ Pacific Islander
- ☐ White
- ☐ Other

Are you of Hispanic, Latino, or Spanish origin?

- ○ No, not of Hispanic, Latino, or Spanish origin
- ○ Yes, of Hispanic, Latino, or Spanish origin

APPENDIX B

MEASURES

Measure (Cronbach's α)	Item wording	*M* (*SD*)
Need fulfillment (α = .88)	1. How well does this technology fulfill your need for social interaction? 2. How well does this technology fulfill your information needs? 3. How well does this technology fulfill your emotional needs? 4. How well does this technology fulfill your entertainment needs? 5. How well does this technology fulfill your communication needs? 6. How well does this technology fulfill your need for self-expression? 7. In general, how well does this technology fulfill your overall needs?	5.16 (1.12)
Expected need fulfillment (α = .85)	1. How well do you expect this technology to fulfill your need for social interaction? 2. How well do you expect this technology to fulfill your information needs? 3. How well do you expect this technology to fulfill your emotional needs? 4. How well do you expect this technology to fulfill your entertainment needs? 5. How well do you expect this technology to fulfill your communication needs? 6. How well do you expect this technology to fulfill your need for self-expression? 7. In general, how well do you expect this technology to fulfill your overall needs?	5.07 (1.07)
Compatibility (α = .82)	1. Using this technology is compatible with all aspects of my life. 2. Using this technology is completely compatible with my current situation. 3. I think that using this technology fits well with the way I like to live. 4. Using this technology fits into my lifestyle.	5.34 (1.02)

Measure (Cronbach's α)	Item wording	*M* (*SD*)
Perceived usefulness (α = .92)	1. Using this technology enables me to accomplish tasks more quickly. 2. Using this technology improves the quality of my life. 3. Using this technology makes it easier to live my life. 4. Using this technology improves my life. 5. Overall, I find using this technology to be advantageous. 6. Using this technology enhances my effectiveness. 7. Using this technology gives me greater control over my life. 8. Using this technology increases my productivity. 9. In general, I think this technology is useful.	5.88 (0.96)
Perceived critical mass (α = .91)	1. What percentage of your friends currently uses this technology? 2. What percentage of your family members currently uses this technology? 3. What percentage of your colleagues currently uses this technology? 4. What percentage of the U.S. population currently uses this technology? 5. What percentage of your friends do you expect will use this technology in the next year? 6. What percentage of your family members do you expect will use this technology in the next year? 7. What percentage of your colleagues do you expect will use this technology in the next year? 8. What percentage of the U.S. population do you expect will use this technology in the next year?	84.19 (14.54)
Perceived network externalities (α = .73)	1. Most people are using this technology. 2. The number of people using this technology will increase the usefulness of this technology to me. 3. Many people will use this technology in the future.	6.06 (0.98)

Measure (Cronbach's α)	Item wording	*M* (*SD*)
Bandwagon perceptions (α = .91)	1. How likely are other people to think this is a good technology? 2. How likely are other people to adopt this technology? 3. How likely are other people to recommend this technology to their friends? 4. How likely are other people to think this technology is worth adopting? 5. How likely are other people to think this technology is essential?	6.08 (0.84)
Subjective norms (α = .92)	1. People who influence me think that I should use this technology. 2. People who are important to me think that I should use this technology. 3. People whose opinion I value prefer that I use this technology.	4.25 (1.52)
Technology dependency (α = .75)	1. Using this technology is one of the more important things I do each day. 2. I would rather use this technology than do anything else. 3. I would feel lost without this technology. 4. Overall, I am dependent on this technology.	4.33 (1.35)
Habit strength (α = .90)	1. Using this technology is something I do automatically. 2. I use this technology without having to consciously remember. 3. I feel weird if I do not use this technology. 4. I use this technology without thinking about it. 5. Not using this technology requires effort. 6. Using this technology is part of my routine. 7. I start using this technology before I realize I'm doing it. 8. I would find it hard not to use this technology. 9. Using this technology is typical "me."	5.84 (1.04)

Measure (Cronbach's α)	Item wording	*M* (*SD*)
Deficient self-regulation (α = .84)	1. I have difficulty controlling the amount of time I spend using this technology. 2. I have a hard time resisting the urge to use this technology. 3. When I haven't used this technology for some time, I become preoccupied with the thought of using it. 4. I would feel lost if I was unable to use this technology. 5. I think obsessively about using this technology when I am not using it.	4.01 (1.40)
Attachment (α = .93)	1. I feel emotionally connected to this technology. 2. This technology is very dear to me. 3. I have a bond with this technology.	3.92 (1.75)
Essentiality (α = .89)	1. This technology is essential to me. 2. I could easily live without this technology. [R] 3. This technology is a central part of my life. 4. My life requires this technology. 5. I must have this technology. 6. This technology is deeply embedded in my life. 7. This technology is not important to me. [R] 8. I cannot do without this technology. 9. My life is fine without this technology. [R] 10. This technology is necessary for me. 11. This technology is indispensable for me. 12. I need this technology to live the way I want to live.	5.42 (1.03)

Note. [R] denotes reverse-coded items.

APPENDIX C

DATA SCREENING

Prior to data analysis, all 12 predictor variables and the criterion variable, essentiality, were screened for data entry errors, missing values, normality, and outliers. Descriptive statistics for all 13 variables appear in Table 5.

All minimum values, maximum values, means, and standard deviations were plausible. Missing values totaled less than 5% of the cases for each variable and were excluded from analyses via listwise deletion unless otherwise specified.

All variables except for perceived critical mass yielded skew and kurtosis indices between –1 and +1. Though the skew index for perceived critical mass fell outside of this range (–1.18), the variable was not transformed. Transforming the variable would have hindered interpretation because the scale for perceived critical mass (0%–100%) was meaningful, not arbitrary (Tabachnik & Fidell, 2007). Furthermore, with a skew index less than 3.0, the skew was not considered extreme (Kline, 2009, 2011).

Six variables had cases with low *z*-scores (i.e., less than –3.29) that were univariate outliers. The individual outliers were treated as missing data. Mahalanobis distance was calculated to test for multivariate outliers. Using a significance level of .001, two of the original 311 cases were found to be multivariate outliers. After both cases were deleted, 309 cases remained for analysis.

Table 5

Descriptive Statistics for Criterion and Predictor Variables

Variable	*N*	*M*	*SD*	Minimum	Maximum	Skewness (*SE* = .14)	Kurtosis (*SE* = .28)
Essentiality	308	5.42	1.03	1.92	7.00	–0.60	0.10
Need fulfillment	305	5.16	1.12	1.86	7.00	–0.39	–0.17
Expected need fulfillment	307	5.07	1.07	1.71	7.00	–0.42	0.07
Compatibility	306	5.34	1.02	2.00	7.00	–0.40	0.06
Perceived usefulness	306	5.88	0.96	2.89	7.00	–0.70	–0.11
Perceived critical mass	296	84.19	14.54	35.19	100.00	–1.18	0.85
Perceived network externalities	298	6.06	0.98	3.00	7.00	–1.00	0.39
Bandwagon perceptions	301	6.08	0.84	3.40	7.00	–0.84	0.26
Subjective norms	305	4.25	1.52	1.00	7.00	–0.32	–0.27
Technology dependency	306	4.33	1.35	1.00	7.00	–0.07	–0.49
Habit strength	306	5.84	1.04	2.56	7.00	–0.88	0.07
Deficient self-regulation	306	4.01	1.40	1.00	7.00	0.26	–.50
Attachment	305	3.92	1.75	1.00	7.00	–0.74	–0.87

Note. Missing values were excluded via pairwise deletion.

An additional technique was performed to ensure the remaining assumptions specific to the backward stepwise multiple regression analysis were met. To test for multicollinearity, collinearity diagnostics were requested from SPSS. Based on the criteria for mulitcollinearity Tabachnik and Fidell (2007) recommend, multicollinearity did not appear to be an issue. Furthermore, as Table 6 shows, none of the correlations between the 13 variables included in the regression exceeded .90 (Tabachnik & Fidell, 2007).

Table 6

Correlation Matrix for all of the Variables Included in the Regression Analysis (N = 282)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Essentiality	—												
2. Need fulfillment	0.24***	—											
3. Expected need fulfillment	0.30***	0.80***	—										
4. Compatibility	0.46***	0.41***	0.37***	—									
5. Perceived usefulness	0.40***	0.39***	0.38***	0.54***	—								
6. Perceived critical mass	0.19***	0.02	-0.01	0.07	0.04	—							
7. Perceived network externalities	0.20***	0.22***	0.19***	0.27***	0.25***	0.32***	—						
8. Bandwagon perceptions	0.39***	0.29***	0.27***	0.37***	0.45***	0.30***	0.56***	—					
9. Subjective norms	0.23***	0.21***	0.18***	0.37***	0.28***	0.15**	0.24***	0.21***	—				
10. Technology dependency	0.53***	0.41***	0.35***	0.51***	0.31***	0.17**	0.21***	0.24***	0.40***	—			
11. Habit strength	0.42***	0.39***	0.39***	0.44***	0.35***	0.06	0.33***	0.34***	0.36***	0.53***	—		
12. Deficient self-regulation	0.33***	0.34***	0.29***	0.34***	0.17**	0.08	0.20***	0.22***	0.40***	0.66***	0.58***	—	
13. Attachment	0.39***	0.37***	0.37***	0.49***	0.22***	0.17**	0.14*	0.19***	0.31***	0.67***	0.40***	0.56***	—

*$p < .05$, one-tailed. **p < .01, one-tailed. ***p < .001, one-tailed.

VITA
ANAMARCIA LACAYO

Education

Ph.D. in Mass Communications, The Pennsylvania State University

M.A. in Communication, The Florida State University

B.A. in Communication, Magna Cum Laude, The Florida State University

Experience

Communications Officer, Pacific Telecommunications Council	July 2009–Present
Conference Assistant, Pacific Telecommunications Council	March 2008–July 2009
Lecturer, The Pennsylvania State University	Fall 2007–Spring 2009
Graduate Teaching Assistant, The Pennsylvania State University	Fall 2004–Spring 2007
Graduate Teaching Assistant, The Florida State University	Fall 2002–Spring 2004

Publication

Kinnally, W., Lacayo, A., McClung, S., & Sapolsky, B. (2008). Getting up on the download: College students' patterns of music downloading and the controversy over CD sales. *New Media & Society, 10*, 893–913.

Select Conference Presentations

Krakowiak, K. M., Lacayo, A., & Pfaff, M. (2007, November). The puzzling effects of multitasking in online educational environments. Poster presented at the annual meeting of the National Communication Association, Chicago, IL.
***Awarded Scholar-to-Scholar Best Overall Display Award.**

Schement, J. R., Lacayo, A., Kittler, J., Ortiz, J. A., & Pierre, K. (2006, November). Pennsylvania rural communities in the information age: Media discourse, demography, and cultural adaptation as Latino immigration comes to central Pennsylvania. Paper presented at the annual meeting of the National Communication Association, San Antonio, TX.

Kinnally, W., & Lacayo, A. (2005, April). The uses and gratifications of music downloading among college students. Paper presented at the annual conference of the Broadcast Education Association, Las Vegas, NV.
***Awarded 1st Place Debut Paper Research Division.**