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Abstract:

The rapid spread of technological innovations like mobile data services (MDS) has made mobile computing a fact of everyday life for many people. Therefore, we need to understand the contribution of mobile computing to overall quality of life (QoL). Employing the satisfaction hierarchy model and bottom-up spillover theory, this study proposes a theoretical model in the context of MDS that connects user satisfaction (a traditional outcome variable of IT) with contribution to QoL (a new outcome variable for mobile computing) in a range of life domains. The validity of the proposed model and outcome variable was tested through three empirical studies conducted in Korea. User satisfaction with MDS was found to affect the contribution of MDS to QoL in eleven life domains, and these contributions in turn influenced the overall contribution of MDS to QoL. The paper ends with a discussion of the study's implications and limitations.

Keywords: *Quality of Life, Mobile Data Services, Contribution to Quality of Life, Life Domain, Online Survey*

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1. Introduction

Mobile computing is the use of portable computing devices either in transit or from a remote location (Lyytinen and Yoo, 2002). A mobile computing environment composed of multiple small devices, such as PDAs and mobile phones, allows users to download files or to access information anywhere and at any time. Mobile computing is rapidly becoming popular worldwide as computer networking, light-weight computing devices, and wireless communication become less expensive and more efficient. One widely dispersed component of mobile computing is mobile data services (MDS).

MDS can be conceptualized in two ways. The first is a rather broad view, where MDS refers to the convergence of mobile communications and the Internet (ITU, 2002), and thus includes any access to the Internet through wireless connections (e.g., Wi-Fi, Bluetooth, WiMax, WiBro). The second conceptualization, a narrower view, refers specifically to data services accessed through a mobile communication network (e.g., CDMA, TDMA, GPRS, GSM) that connect users with each other and with commercial providers in various ways. For instance, users exchange pictures and e-mail, check bus schedules, reserve movie tickets, and play online games (Hong and Tam, 2006). Our study adopts the narrow definition, confining itself to MDS accessed via cellular phones. By the end of 2005, the total population of MDS users, thus construed, was estimated at 2.129 billion. The number is expected to increase to 3.964 billion by the end of 2011 (Portio-Research, 2006).

Traditional IT devices are generally used in a certain place and for a certain purpose. A PC connected to the Internet is used mostly at home or in a business setting, a digital TV system mostly at home for entertainment (Kim, 2002). MDS, however, are used for diverse purposes and can be used in any place and at any time (Hong and Tam, 2006). A portable multimedia player, for instance, can be used for entertainment (e.g., watching music videos) as easily as for utilitarian purposes (e.g., studying a foreign language). In a mobile computing environment, the system is usually embedded in the user's life, and its tasks and system configurations change ceaselessly (Norman, 1998). Not surprisingly, users in such an environment exhibit usage patterns radically different from those of traditional IT users (Tamminen et al., 2004).

The performance of a traditional information system (IS) is usually measured in terms of how effective it is at achieving specific goals (e.g., Gefen et al., (2003)) or how satisfying it is to use for particular tasks (e.g., Bhattacherjee and Premkumar (2004)). In other words, the outcome variables of traditional IS studies focus mainly on systems and tasks in themselves. Similarly, prior studies of mobile computing have employed satisfaction (Choi et al., 2005) and intention to use (Yang, 2005) to investigate the impact of mobile computing technologies. These outcome variables measure users' feelings or attitudes at the time they use the system, rather than the impact of the system on their overall quality of life (QoL). Other IS research has examined the individual, organizational, and social impact of information systems, but again without directly addressing the impact of IS on overall QoL. While this narrow focus may be appropriate for traditional IT devices, it seems inadequate in the case of MDS, which likely affect interrelated facets of everyday life in ways stationary devices do not. Mobile systems are diffuse and pervasive, so interwoven into users' lives as to become almost invisible. Because of their ubiquity, they may influence users' lives in ways that traditional outcome variables—feelings and attitudes at the time of use—cannot detect.

At the very least, a more holistic approach, one that uses outcome variables related to quality of life (QoL), would round out our picture of how MDS affect users' lives. Such an approach would address not how MDS use has been satisfactory in accomplishing specific tasks but how system use has enhanced QoL generally. At present we have little sense of how or how much IS affects quality of life, because, as said, quality of life has largely been ignored in mainstream IS literature—perhaps because a strong theoretical framework with well defined outcome variables has been wanting. At present we do not even know into which domains of a user's life to inquire.

One of the goals of any technology should be to increase the quality of its users' lives (Straub and Watson, 2001). Despite this natural, or even mandatory, relationship between technology and QoL, few studies have actually developed metrics to analyze the relationship. The main goal of this study is to construct a theoretical model that can reliably and validly measure the relationship between MDS and QoL. We designate "contribution to QoL" as an alternative outcome variable for MDS and examine, through three consecutive empirical studies in Korea, whether and how MDS contribute to users' QoL.

2. Theoretical Background

2.1. Quality of Life

QoL is a matter of how happy people are or how fulfilled they are in terms of their various wants and needs. In other words, QoL is a cognitive evaluation in important life domains, involving judgments about the fulfillment of one's needs, goals, and wishes (Campbell et al., 1976, Diener, 1984). A life domain is defined by the circumstances that surround it, the activities frequently performed in it, and the events that are frequently experienced within it (Andrews and Withey, 1976). The various life domains explored in prior studies are listed, with definitions and references, in Table 1.

Table 1. Life Domains

Life Domain	Defining Activities, Circumstances, Events	Reference
Cultural	Activities and relationships with cultural richness	Sirgy and Cornwell (2002)
Leisure	Non-working activities, spare time activities, recreation	Andrews and Withey (1976)
Work	Mental and physical activities required by jobs and tasks	Sirgy et al. (2001)
Educational	Learning and teaching activities	Andrews and Withey (1976)
Consumer	Purchase, preparation, consumption, possession, maintenance, and disposition activities of goods and services	Meadow (1983)
Financial	Activities for pay and revenues	Campbell et al. (1976)
Health and Safety	Activities pertaining to mental and physical health and safety	Heisel and Flett (2005)
Family	Activities with parents, children, and home	Postin et al. (2003)
Friend	Activities with colleagues and friends	Andrews and Withey (1976)
Social	Activities with people other than family, colleagues, and friends	Waters et al. (2005)
Self	Activities for self-representation and self-efficacy	Leelakulthanit et al. (1991), Waters et al. (2005)
Neighborhood	Relationships with one's neighborhood	Bruin and Cook (1997)
Spiritual	Religious and spiritual activities	Kelly (1995)

QoL researchers have identified a number of distinct life domains that encompass various places, things, activities, roles, and relationships with or in which a person typically finds himself engaged (Andrews and Withey, 1976, Campbell et al., 1976). Prior studies have found that people actually experience and store various life events in distinct domains and focus on the specific life domains that most hold their interest (Andrews and Withey, 1976, Campbell et al., 1976).

Studies of QoL have been conducted in diverse areas, including marketing (e.g., (Arnould et al., 2002, Lee and Sirgy, 1995)), health-care (e.g., Danna and Griffin (1999), Heisel and Flett (2004), Leung et al. (2004)), and education (e.g., Huebner and Gilman (2002), Seligson et al. (2005)). The field of IS, however, shows a dearth of QoL research. Among the few extant studies are those of Artz (1995), who asserted that the invention of the computer has changed the modern world in substantial ways and has improved QoL generally, and Wei and Leung (1998), who found that new media technologies are an indispensable part of people's lives. Hills and Argyle (2003) found that the use of the Internet was associated with work, social, leisure, and home life, and that individuals' use of the Internet is affected by their personality. Contarello and Sarrica (2007) found that the Internet is related to quality of social life. However, these studies were very general and neither measured the contribution of IT to QoL empirically nor provided any theoretical model that explicitly linked IT usage and QoL.

A few IS researchers have also studied the effects of IT in non-work environments. For example, Brown and Venkatesh (2001) analyzed the adoption of personal computers in homes, Bhattacherjee (2001) investigated users' continuance behavior in online banking systems, and van der Heijden (2004) examined differences in adoption models for utilitarian and hedonic systems. All of these studies suggest that IT does have an influence on users' QoL. For example, van der Heijden's (2004) study of adoption behavior for hedonic systems implies that IT may have effects on leisure or culture life. Bhattacherjee's (2001) account of users' continuance behavior in online banking systems implies that such systems affect QoL in the domain of financial life.

In sum, the few IS studies that implicitly consider QoL suggest that IT has an impact on QoL in several life domains. However, no study has investigated a full set of life domain, or explored the effects of IT on overall quality of life.

Our study differs from prior studies in two respects. First, drawing on theories from other disciplines, such as marketing, medicine, and social science, we construct a theoretical model that links traditional IT measures (e.g., user satisfaction) to overall QoL. Second, we explicitly measure how much MDS affect QoL across the full spectrum of life domains and ask in what life domain MDS have the greatest impact on overall QoL.

2.2. The Satisfaction Hierarchy Model and the Bottom-up Spillover Theory

Two theoretical approaches dominate the QoL literature: the satisfaction hierarchy model and bottom-up spillover theory. The former, initiated by Maslow (1943), posits that people's behaviors are guided or motivated by a sequence of needs. Maslow argued that each level of the hierarchy is a prerequisite for the levels above. As a need category lower in the hierarchy becomes satisfied, the next higher need category becomes salient (Adler, 1977). Maslow's model has been generalized into the satisfaction hierarchy model (Figure 1). Satisfaction in a given life domain is influenced directly by satisfaction with particular events and experiences within that domain (Sirgy et al., 1994). The premise of this model is that people have a variety of needs they seek to fulfill, and the more they satisfy these needs the more they feel good about their lives (Adler, 1977). To satisfy their needs, people engage in a variety of activities, and the events related to those activities generate a certain amount of satisfaction and/or dissatisfaction. These affective experiences are stored in memory in specific life domains, such as family life, health life, and consumer life (Sirgy, 2002). For example, when a person is asked how she feels about her consumer life, she is likely to reflect on her affective experiences in relation to activities of purchase, preparation, consumption, possession, maintenance, and disposition (Lee et al., 2002).

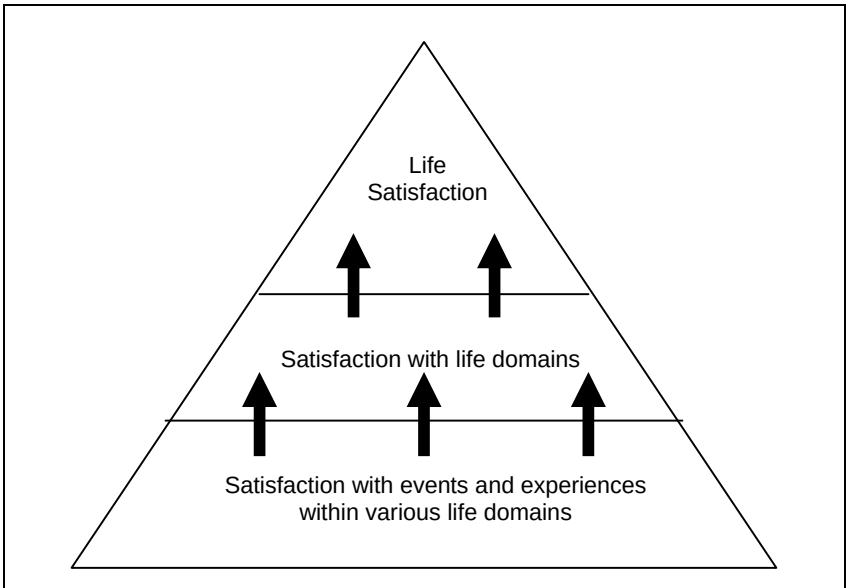

Figure 1. Satisfaction Hierarchy Model

The satisfaction hierarchy model has been used in marketing disciplines (particularly in consumer research) to explain how customers perceive and evaluate their product-use experiences (Gutman, 1982). Consumer marketing researchers have used this logic to conceptualize the determinants of consumer satisfaction (Lee et al., 2002). For example, Sirgy et al. (2006) maintained that the Internet yields various benefits, including enhancement of group conversation, the convenience of handling messages left at an earlier time, and opportunities to meet new people. These benefits are all related to social activities, indicating that satisfaction with social activities conducted through the Internet increased satisfaction with social life, thereby enhancing overall life satisfaction.

The satisfaction hierarchy model has been concretized in the QoL field in the form of the bottom-up spillover theory (Lee and Sirgy, 1995), which models the relationship between individual life domains and overall QoL (Andrews and Withey, 1976, Campbell et al., 1976, Diener, 1984, Loscocco and Roschelle, 1991). Many multi-attribute attitude models use this theory to predict and explain attitude (Lee et al., 2002). The bottom-up spillover theory holds that QoL in individual domains has spillover effects on overall QoL. In other words, happiness in subordinate individual life domains can spill over to produce superordinate overall happiness (Argyle, 2001). The premise here is that overall life satisfaction is positively related to satisfaction within each individual life domain, which is itself affected by satisfaction with specific events in that domain (Sirgy, 2002). Life satisfaction occurs at various levels of specificity and is influenced by evaluations of each individual life domain (Andrews and Withey, 1976). The more satisfaction a person feels across different life domains, the more satisfied he feels with life in general.

Sirgy and Cornwell's (2001) work provides a general template for QoL research, which takes the bottom-up spillover theory as its framework (Rahtz and Sirgy, 2000, Sirgy and Cornwell, 2002). They measured satisfaction with government, business, and nonprofit services, QoL in the community domain, and overall QoL. They found that overall quality of life is directly affected by the quality of community life, which is in turn related to satisfaction with the three types of service.

2.3. Theoretical Model and Hypotheses

We propose a theoretical model drawn from the bottom-up spillover theory and the satisfaction hierarchy model (Figure 2). The main difference between our outcome variable and that of the satisfaction hierarchy model is that we focus on the *contribution* of MDS to QoL, rather than on QoL itself. We are more interested in how MDS contribute to QoL than in how satisfied users are with their lives generally.

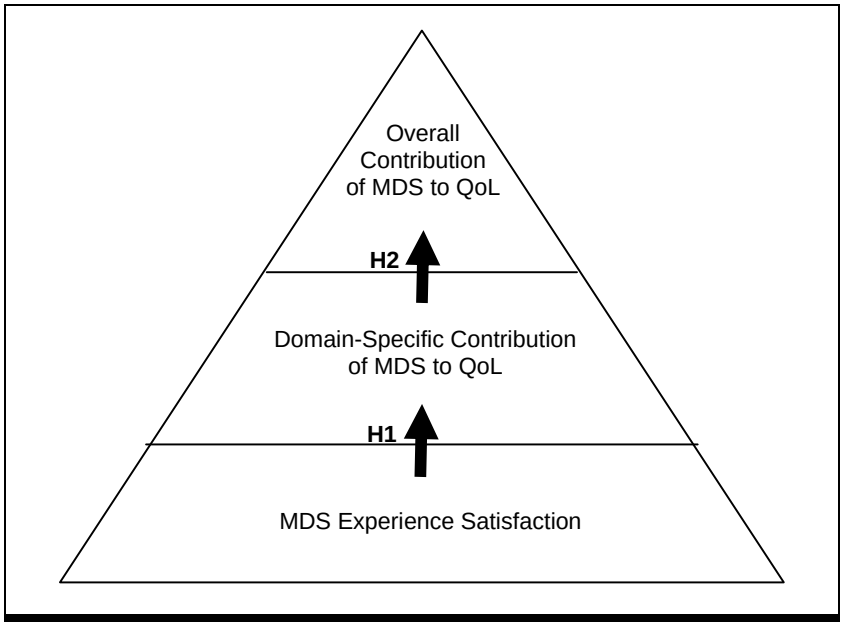

Figure 2. Theoretical Model and Hypotheses

The bottom layer of the satisfaction hierarchy model represents a person's satisfaction with events and experiences in various life domains. The corresponding layer in our model represents the satisfaction of MDS users with MDS experience (henceforth, MDS Experience Satisfaction) in various life domains. Within the leisure domain, for example, MDS Experience Satisfaction would include how satisfied a user is with the experience of playing mobile games while waiting on the street for a friend. While the middle layer of the satisfaction hierarchy model represents satisfaction within life domains, the corresponding layer of our model represents the contribution of MDS to QoL in those domains (henceforth, Domain-Specific Contribution of MDS to QoL). For example, this layer would include the contribution of MDS to quality of leisure life or consumer life. Finally, the top layer of the satisfaction hierarchy model represents overall life satisfaction, and the corresponding layer in our model represents the contribution of MDS to overall QoL (henceforth, Overall Contribution of MDS to QoL).

The satisfaction hierarchy model and the bottom-up spillover theory also provide a framework for checking the nomological validity of our measures for MDS Experience Satisfaction, Domain Specific Contribution of MDS to QoL, and Overall Contribution of MDS to QoL. A sequential relationship has been demonstrated in prior research between the three levels of

the satisfaction hierarchy model, and we propose that, among the three layers of our own model, the contribution of MDS to QoL may have a similar sequential relationship. This possibility may be tested by two hypotheses, one concerning the relationship between the bottom and middle layers of our theoretical model, the second concerning that between the middle and top layers.

First, because of the characteristics of mobile computing, MDS are likely to have effects in many, perhaps all, life domains. MDS users shopping on the mobile Internet can find products and services well suited to their needs (Ozen et al., 2004, Panatiotou and Samaras, 2004, Pashtan et al., 2004) more quickly and efficiently than they could otherwise. Satisfaction after using MDS may thus be higher than before use, and if so, MDS have affected QoL in the domain of consumer life. MDS users may find hospital consultation hours, stock prices, or movie listings, or coordinate events in their lives with family, friends, or acquaintances (Sellen and Murphy, 2002). Thus MDS may affect QoL in the health and safety, financial, cultural, family, friend, and social domains. MDS also affect work life by allowing employees to communicate easily and effectively with others as they complete work-related tasks (Sirgy et al., 2006), so in this domain, too, MDS may affect QoL. In sum, the activities MDS makes possible may enhance users' QoL across a range of life domains. In the terms of our model, Experience Satisfaction with MDS in a given domain would increase the Domain-Specific Contribution of MDS to QoL. In other words, a user who has positive experiences using MDS in a given life domain (MDS Experience Satisfaction) would have a higher QoL in that domain after using MDS (Domain-Specific Contribution of MDS to QoL) than before using them. Hence our first hypothesis:

> *Hypothesis 1: MDS Experience Satisfaction in a life domain is positively associated with Contribution of MDS to QoL in that domain.*

Second, the basic premise of the bottom-up spillover theory is that satisfaction within individual life domains affects overall life satisfaction (Sirgy and Cornwell, 2002). Adopting this premise, our model predicts that the contributions of MDS to QoL within individual domains (Domain-Specific Contributions of MDS to QoL) will affect the contribution of MDS to overall QoL (Overall Contribution of MDS to QoL). In other words, overall QoL before using MDS should be positively affected by QoL in specific domains before using MDS, just as overall QoL *after* using MDS should be positively affected by QoL in specific domains *after* using MDS. Therefore, if MDS usage improves QoL within individual domains, it should also improve overall QoL. In a related study, Moon et al. (2006) found that blogging enhances social interactions among bloggers and thereby improves the quality of their lives. In other words, blogging appears to have a positive effect in the domain of social life, an effect that spills over into satisfaction with life generally. Along the same lines, we expect that improvement of QoL in each life domain after using MDS will positively influence overall QoL. Hence our second hypothesis:

> *Hypothesis 2: Domain-Specific Contribution of MDS to QoL is positively associated with Overall Contribution of MDS to QoL.*

Accepting the two sets of hypotheses indicates that the metrics proposed in this study can faithfully represent the relationships among the three layers of our model, which are consistent with the relationships among layers in the bottom-up spillover theory. To test the hypotheses empirically for the nomological validity of the proposed outcome variable, we conducted three consecutive studies.

3. Research Method

Without actual empirical evidence, it is difficult to know which domains are most relevant to MDS. The widespread use of mobile phones has blurred the boundaries between home and work (Haddon, 1998) and between work and play. MDS can be used across many times and places (Palen, 2002) and thus have the potential to affect many life domains. Therefore, thinking it premature to delve into any specific life domain, we first conducted qualitative studies to identify life domains influenced by MDS usage.

We conducted our research in three stages. In the first stage, we conducted several focus-group interviews (FGI)[1] to identify common MDS use experiences, to devise appropriate questions for MDS Experience Satisfaction, and to identify important life domains related to MDS use. In the second stage, we conducted mall-intercept interviews (MII)[2] to test the validity of our measures for Domain-Specific Contribution of MDS to QoL and Overall Contribution of MDS to QoL, and also to identify

[1] In a focus group interview, a trained moderator leads a discussion in a non-structured and natural manner with a small group of respondents (Malhotra, 1999).

[2] The mall-intercept interview is a survey research method that involves interviewing people found in the common areas of a shopping mall. Shoppers are randomly intercepted and brought to a survey facility in the mall. The interviewer administers a questionnaire, just as in an in-home personal survey.

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use experiences and life domains not captured in the first stage. After identifying major life domains for MDS and testing the measures produced in the first two stages, we conducted a large-scale online survey to test our hypotheses and the nomological validity of the measures.

Stage 1: Focus Group Interviews

We took stratified samples from five MDS user groups defined by age and occupation: a group of six middle school students, a group of five high school students, a group of five college students, a group of seven working adults, and a group of six MDS experts. The participants were selected by means of convenience sampling through open recruitment advertisements on online portals. We ascertained age, gender, and MDS usage through a preliminary survey; only those who had used MDS were allowed to participate in the FGI session. The participants were given the equivalent of $30 USD for their participation. Eighteen males and ten females participated in the FGI sessions. The average age was 23.75 years. On average they used MDS around 24 minutes a day.

During the FGI sessions, we asked participants two open-ended questions: "What mobile data services do you use frequently and in what context?" (for MDS Experience Satisfaction) and "In what areas of your life do you use mobile data services frequently?" (for Individual Domain). We videotaped all FGI sessions and transcribed all responses transcribed verbatim. Demographic information for the FGI participants is shown in Table 2.

Table 2. Demographic Characteristics of FGI Participants

Subject	Group Type	Gender	Age	Usage Time (Min/ Day)	Subject	Group Type	Gender	Age	Usage Time (Min/ Day)
P1	Middle school students	Male	14	25	P16	Working Adults	Male	22	25
P2		Male	15	5	P17		Male	25	10
P3		Male	15	10	P18		Male	25	120
P4		Female	15	5	P19		Male	30	2
P5		Female	16	45	P20		Male	30	5
P6	High school students	Male	18	15	P21		Female	30	10
P7		Male	19	20	P22		Male	33	10
P8		Male	19	10	P23	MDS experts	Female	28	5
P9		Female	19	25	P24		Female	28	10
P10		Female	19	30	P25		Male	30	30
P11	College students	Male	22	60	P26		Female	31	30
P12		Female	22	10	P27		Male	34	20
P13		Male	23	20	P28		Male	34	10
P14		Female	24	15	Average			23.75	23.41
P15		Male	25	60					

We analyzed the transcripts to identify life domains and use experiences. Based on the definition of each life domain (see Table 1), two independent reviewers codified the transcripts into use experiences and corresponding life domains, according to three factors: goal (the purpose for which MDS were used), context (time, place, and circumstances of use), and type of MDS used (e.g., ring tone download). For example, the statement "I download ring tones through my MDS to pass the time while I am out" was codified as passing time (use experience) in leisure life (life domain). Inter-coder reliability was 0.809, well above the threshold value of 0.7 (Holsti, 1969). Use experiences on which the reviewers did not agree were reconciled through discussions with the authors. Table 3 provides, for each life domain identified in the sessions, examples of use experiences and their associated goals, contexts, and services.

Through the FGI sessions, a total of 265 distinctive use experiences were identified. They entailed eleven distinct life domains—cultural, leisure, work, educational, health and safety, financial, consumer, family, friend, social, and self— of the thirteen life domains that have been identified by prior QoL studies (see Table 1). That MDS are used in a wide array of life domains supports our contention that MDS may have effects on overall QoL undetected by studies that focus on specific tasks and functions.

Questions measuring MDS Experience Satisfaction in the eleven life domains were based on MDS use experiences mentioned frequently in the FGI sessions. We used the formative indicators for MDS Experience Satisfaction in accord with our theoretical foundation, the satisfaction hierarchy model, which requires highly specific events and experiences at the

Table 3. Eleven Life Domains and FGI Scripts				
Life Domain	Examples of QoL Perceptions of MDS Users			Examples from Interviews
	Goal	Context	Service	
Cultural	Enjoying movies	On the street	Movie information	"I use MDS to learn more about movies."
Leisure	Passing time	Alone	Mobile games	"I use mobile games when I don't have anything to do and there's nobody around."
Work	Doing office work	Outside the Office	E-mail	"I use MDS to test new applications."
Educational	Studying	On the bus	Dictionary	"I use MDS to translate English words."
Health and safety	Physical wellbeing	When I'm sick	Health information	"I use MDS to get medical information when a PC isn't available."
Financial	Checking bank accounts	When I'm out	Mobile banking	"I use MDS to check my bank account balance."
Consumer	Consuming products/services	When I have to buy something urgently	Mobile shopping mall	"I use MDS to check prices of something I need to buy."
Family	Improving family ties	When family members are late	GPS	"I use MDS to locate my sister when she doesn't answer the phone"
Friend	Improving friendships	When I need to contact someone urgently	Photo mail	"I use MDS to send photo mail to a friend."
Social	Improving relationships with community members	When I have an online community meeting	SMS	"I use MDS to let our members know our meeting schedule."
Self	Self-presentation	When I feel depressed	Ring-tone download	"I use ring tones to express my identity."

bottom level. Subjects were asked to rate each specific experience of MDS use on an eight-point Likert scale that ranged from 0 for "have never experienced" through 1 for "very dissatisfied," 4 for "neutral," and 7 for "very satisfied."

Stage 2: Mall-Intercept Interviews

We conducted mall-intercept interviews to pre-test the questions developed for MDS Experience Satisfaction, Domain-Specific Contribution of MDS to QoL, and Overall Contribution of MDS to QoL.[3] The method has been used in many studies to ensure the validity and reliability of survey questions (Bush and Hair, 1985).[4]

One advantage of the mall-intercept interview is that it is more efficient for the respondent to come to the interviewer than for the interviewer to go to the respondent (Malhotra, 1999, Siu and Cheng, 2001).

In this stage of our study, visitors to a multiplex movie theater were randomly solicited with compensation equivalent to $7 USD. A total of 249 subjects were interviewed. Of these, 212 were MDS users, and only their answers were analyzed for reliability and validity. Of this set, 91 were males and 121 females. Their ages ranged from 14 to 47, with an average age of 21.7 years.

Each respondent was first asked to review the formative questions for MDS Experience Satisfaction and to add any further MDS use experiences. In each life domain, several usage events cited by the interviewees were selected for questions about MDS Experience Satisfaction.

3. Interviewees were mainly young, active MDS users. For each interview, before beginning, we confirmed that the subject had a cellular phone with MDS capabilities.

4. Bush and Hair (1985) compared the telephone interview and the mall-intercept interview in terms of validity and reliability. In a study with 610 participants they found that the latter method produced more accurate and less distorted responses.

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Subsequently, each respondent was asked to explain how he understood the questions for Domain-Specific Contribution of MDS to QoL. In each of the eleven domains, this contribution was to be measured by a single "D-T Question" that asked for an assessment of the difference between levels of satisfaction with life in that domain before and after the use of MDS. We chose a single metric (one frequently used in QoL studies (Andrews and Withey, 1976)) because the question would be asked repeatedly, once for each of the eleven life domains. Thus, for example, the question measuring the contribution of MDS to QoL in the domain of leisure life was "How has the quality of your leisure life changed since you first started using MDS? (1 = have become very dissatisfied, 7 = have become very satisfied)."

Third, the interviewees were asked to review four questions about Overall Contribution of MDS to QoL. We constructed questions measuring Overall Contribution of MDS to QoL as reflective indicators based on the Satisfaction with Life Scale (SWLS), which is one of the most widely used scales in QoL research, with high internal consistency and test-retest reliability (Pavot and Diener, 1993). The four questions were phrased to elicit the contribution of MDS to overall QoL on a seven-point Likert scale (ranging from 1 for "strongly disagree" to 7 for "strongly agree")

We modified all the questions according to the results of the mall-intercept interviews. The final versions of the questions are shown in Appendix 1.

Stage 3: Survey

Using the questions developed in Stage 2, we conducted a large-scale online survey in Korea to test our hypotheses. To draw survey participants from diverse MDS user groups with different educational and economic profiles, we posted banner advertisements on several popular Internet portals. Before being presented with the survey, prospective subjects were asked whether they had used MDS, defined as the assortment of data services available from mobile service providers through a mobile phone. Thus, our survey excluded users of other devices such as laptops, small desktops, and PDAs that can be connected to transmission stations through local wireless connections (e.g., Bluetooth, Wireless LANs).

Completing the survey took about 30 minutes. A total of 6,481 people participated in the survey. They received compensation equivalent to $2 USD on average. We verified with telecommunication companies that subjects' mobile phone numbers had logged MDS usage. Only those who had used MDS at least once before completing the survey were retained. The final number of effective participants was 6,431. Among the final respondents, there were more male participants than female, and users in their twenties predominated (63.9% of the sample). Demographic information on the survey participants is presented in Table 4.

Table 4. Demographic Characteristics of Online Survey Respondents

Gender	Under 19	20–29	30–39	Over 40	Total
Male	196	2,499	855	166	3,716
Female	390	1,934	315	76	2,715

4. Results

We used the partial least squares (PLS) method to test the research model. PLS is appropriate for handling both formative indicators (MDS Experience Satisfaction) and reflective indicators (Overall Contribution of MDS to QoL) (Chin, 1998). PLS is also used in the primitive stage of model building and is, thus, appropriate for our study, the first attempt to investigate empirically the relationship between MDS and QoL.

Item Reliability

We first assessed the reliability of the constructs. We tested reflective and formative indicators using different methods (Wixom and Watson, 2001) and were thus tested using different methods. In PLS, loadings represent the influence of individual scale items on reflective constructs; weights represent the comparable influence on formative constructs (Bollen and Lennox, 1991). We checked the reliability of the reflective indicators for Overall Contribution of MDS to QoL and found its composite reliability to be 0.923, well above the threshold value 0.7 (Forenll and Larcker, 1981). We then examined the weights of the formative items for MDS Experience Satisfaction. The weights and t-statistics for the formative questions are presented in Table 5.

All formative indicators were found to bear significantly on MDS Experience Satisfaction in each life domain. For example, the weight of "Downloading ring tones and logos through MDS in my spare time" (LSR1) was found to be significant for MDS Experience Satisfaction in leisure life (weight = 0.52, $t = 30.23$, $p < 0.01$), and the weight of "Searching for the definitions of words through MDS when I'm out" (EDU3) was significant for MDS Experience Satisfaction in the domain of educational life (weight = 0.72, $t = 26.24$, $p < 0.01$). We did not check reliability for Domain-Specific Contribution of MDS to QoL because it is a single-indicator construct.

Table 5. Item Reliability							
Construct	Indicator	Weight	t-Stat	Construct	Indicator	Weight	t-Stat
Cultural life	CUL1	0.30	12.85*	Consumer life	CSR1	0.31	11.91*
	CUL2	0.32	9.64*		CSR2	0.49	22.99*
	CUL3	0.56	17.60*		CSR3	0.38	12.41*
Leisure life	LSR1	0.52	30.23*	Family life	FAM1	0.52	19.05*
	LSR2	0.31	16.14*		FAM2	0.54	18.38*
	LSR3	0.45	22.93*		FAM3	0.11	3.66*
Work life	WOR1	0.13	3.36*	Friend life	FRI1	0.34	25.38*
	WOR2	0.32	7.47*		FRI2	0.55	30.19*
	WOR3	0.65	21.40*		FRI3	0.33	17.64*
Educational life	EDU1	0.15	3.17*	Social life	SOC1	0.36	14.94*
	EDU2	0.23	4.80*		SOC2	0.37	12.93*
	EDU3	0.72	26.24*		SOC3	0.35	10.62*
Health and Safety life	HESA1	0.35	16.33*	Self life	SEL1	0.37	14.84*
	HESA2	0.43	18.34*		SEL2	0.28	17.47*
	HESA3	0.43	19.45*		SEL3	0.51	21.95*
Financial life	FIN1	0.30	10.57*	Construct	Indicator	Loading	t-Stat
	FIN2	0.42	14.35*	Overall life	OVER1	0.87	219.32*
	FIN3	0.45	21.66*		OVER2	0.86	184.58*
					OVER3	0.88	291.00*
					OVER4	0.84	182.17*

* $p < 0.01$, ** $p < 0.05$, *** $p < 0.1$

Convergent and Discriminant Validity

Overall Contribution of MDS to QoL had convergent validity, with significant loadings and t-statistics well above the threshold value (Wixom and Watson, 2001), as illustrated in the lower right-hand corner of Table 5. The discriminant validity of Overall Contribution of MDS to QoL is not testable because Overall Contribution of MDS to QoL is the only reflective measure in our research. Neither convergent nor discriminant validity can be checked for Domain-Specific Contribution of MDS to QoL because it is a single-indicator construct.

To assess convergent and discriminant validity of formative indicators,[5] Diamantopoulos and Winklhofer (2001) propose using the correlations of formative items with a global item that summarizes the essence of the construct. This recommendation was implemented for the validation of our formative constructs using techniques developed by Ravichandran and Rai (2000) and Loch et al. (2003). To test the construct validity for the MDS Experience Satisfaction constructs, we multiplied values by their individual PLS weights and summed them for each construct, a formulation suggested by Bagozzi and Fornell (1982). We also created a weight score for each measure and a composite score for each formative construct. Using these values, we were able to run inter-item correlations as well as item-to-construct correlations and create a matrix of these values, as shown in Appendix 2.

The inter-item correlations for MDS Experience Satisfaction constructs were all significant, offering persuasive evidence of the convergent validity of the instrument. Discriminant validity indicates that the inter-item and item-to-construct correlations will be higher with each other than with the measures of other constructs and composite constructs (Campbell and Fiske, 1959). Comparing values in each of the eleven life domains with values in their rows and columns, we found this threshold consistently met, suggesting that the measures for MDS Experience Satisfaction had a high level of construct validity.

Nomological Validity Testing

We tested nomological validity of the proposed metrics with the two hypotheses across the three levels of our theoretical model (see Figure 2). First, we examined whether MDS Experience Satisfaction had a significant relationship with Domain-Specific Contribution of MDS to QoL (H1) by examining the relationship between MDS Experience Satisfaction and Contribution of MDS to QoL in each of the eleven life domains. R^2 ranged from 0.182 to 0.444, indicating that the fit of MDS Experience Satisfaction with Domain-Specific Contribution of MDS to QoL was acceptable. We found that MDS

[5] It is standard practice to conduct a discriminant validity analysis by generating average variance explained (AVE) statistics. However, AVE analysis can be performed only with reflective measures. Because we have adopted formative measures for the MDS Experience Satisfaction construct, AVE cannot be used in our study.

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Experience Satisfaction had a significant positive effect on Contribution of MDS to QoL in all life domains, confirming our first hypothesis. The results are presented in Figure 3.

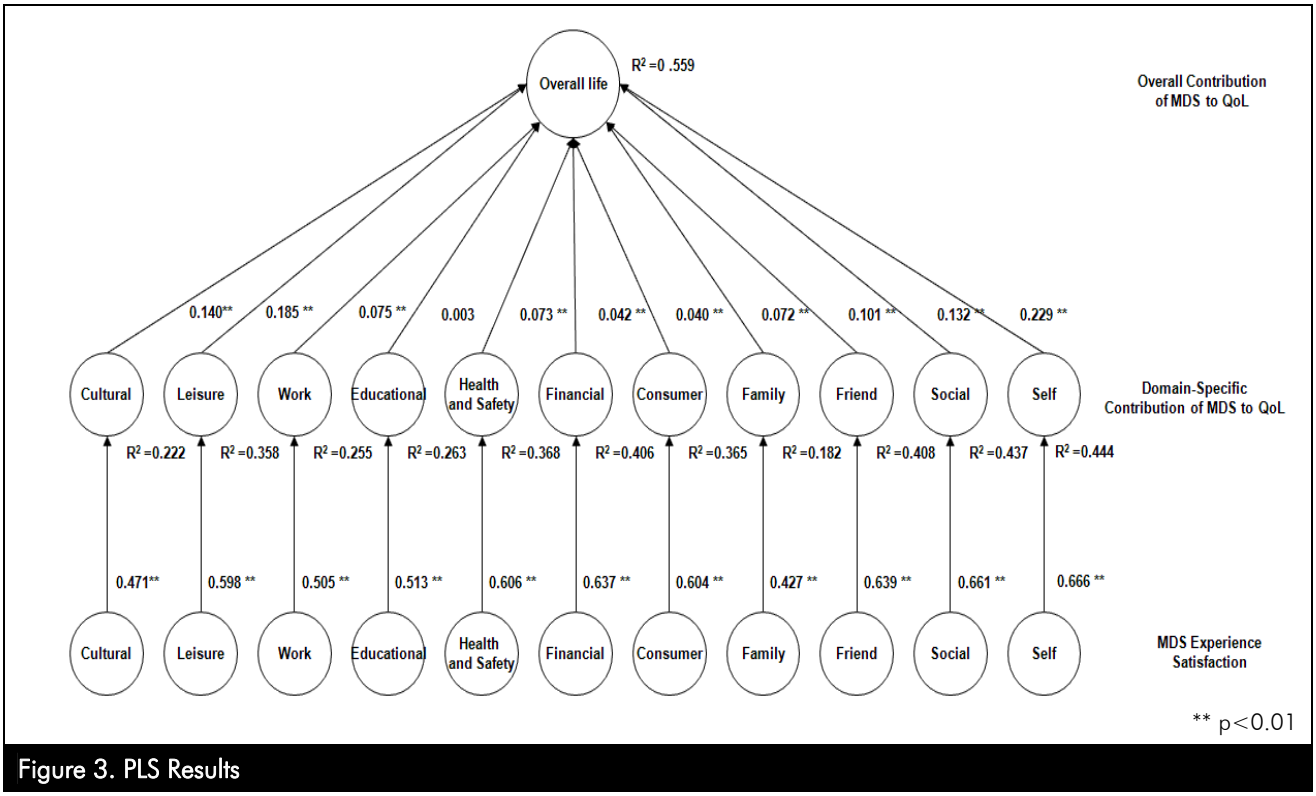

Figure 3. PLS Results

MDS Experience Satisfaction influenced Contribution of MDS to QoL most heavily in the self domain (R^2 = 0.444, β = 0.666), followed, in descending order of influence, by the social domain (R^2 = 0.437, β = 0.661), the friend domain (R^2 = 0.408, β = 0.639), the financial domain (R^2 = 0.406, β = 0.637), the health and safety domain (R^2 = 0.368, β = 0.606), the leisure domain (R^2 = 0.358, β = 0.598), the consumer domain (R^2 = 0.365, β = 0.604), the educational domain (R^2 = 0.263, β = 0.513), the work domain (R^2 = 0.255, β = 0.505) the cultural domain (R^2 = 0.222, β = 0.471), and finally the family domain (R^2 = 0.182, β = 0.427).

We then tested whether Domain-Specific Contribution of MDS to QoL had a significant relationship with Overall Contribution of MDS to QoL (H2). R^2 was 0.559, indicating acceptable fit. As shown in Figure 3, Domain-Specific Contribution of MDS affected Overall Contribution of MDS to QoL positively in all life domains except educational (β = 0.003; t = 0.208; p > 0.05). Contribution of MDS in the self domain affected Overall Contribution of MDS to QoL most heavily (β = 0.229), followed, in descending order, by the leisure domain (β = 0.185), the cultural domain (β = 0.140), the social domain (β = 0.132), the friend domain (β= 0.101), the work domain (β = 0.075), the health and safety domain (β = 0.073), the family domain (β = 0.072), the financial domain (β = 0.042), and finally the consumer domain (β = 0.040). Taken together, Domain-Specific Contribution of MDS explains 55.9% of Overall Contribution of MDS to QoL.

5. Conclusions and Discussion

This study proposes three outcome variables to measure the contribution of mobile data services to users' quality of life. Results from the three consecutive studies clearly indicate that our three variables—MDS Experience Satisfaction, Domain-Specific Contribution of MDS to QoL, and Overall Contribution of MDS to QoL—are valid and reliable. The results also indicate the nomological validity of the three variables by showing that the relationships among them are consistent with those in the satisfaction hierarchy model and the bottom-up spillover theory, the theoretical foundations for the present study. As users felt more satisfied with their MDS experience in a given domain, they perceived a stronger contribution of MDS to the quality of their lives in that domain. Moreover, as they perceived a stronger contribution of MDS in specific life domains, they perceived a stronger contribution of MDS to their overall quality of life.

Two other findings deserve mention. First, the impact of both MDS Experience Satisfaction on Domain-Specific Contribution of MDS to QoL, and Domain-Specific Contribution of MDS on Overall Contribution of MDS to QoL was greatest in the self domain. This may be related to the pervasiveness in Korea of such MDS as photo-mail and ring-tone downloads. These

features offer Korean MDS users a wide variety of ways to establish an identity and present it to others, and they seem to enjoy doing so in MDS spaces. Multinational MDS studies have arrived at similar results (Hong et al., 2006, mGain, 2003)). Second, Contribution of MDS to QoL in the educational domain did not affect Overall Contribution of MDS to QoL. Online education usually involves users engaging with multimedia broadcasting facilities, but the poor usability of mobile devices inhibits active participation, and their limited bandwidth precludes effective use of multimedia broadcasting. It is not surprising, then, that the contribution of MDS to educational life had no significant effect on its contribution to overall QoL.

This study has several limitations. First, the main results were based on online survey data, which may involve a self-selection bias. Although more than 70% of the total Korean population uses the Internet (NIDA, 2004)), our survey group might be skewed toward those who are willing to take the trouble to complete an online survey. Moreover, a preponderance of our subjects were male and in their twenties, perhaps biasing the survey results. We are currently conducting a follow-up study that uses other data collection techniques, such as stratified e-mail surveys and qualitative methods. Second, this study was conducted in Korea with Korean MDS users, and it is not clear whether the results can be applied to other countries. We are currently conducting a multinational study of MDS users in different countries using the questions developed in this study. Third, our results depend on the ability of the survey participants to rate their past experience using MDS in diverse life domains. We took special care to recruit respondents who had used MDS recently, but nonetheless, relying entirely on retrospective data might undermine the reliability of measurements. A future study should explore survey methods that do not rely on memories of past usage. Fourth, MDS might have negative as well as positive effects on QoL. All of the questions for MDS Experience Satisfaction in this study were expressed in positive terms, which might lead to systematic response error (Singleton and Straits, 1998). A future study should add survey questions that consider the possible negative effects of MDS on QoL. Fifth, we did not employ the hierarchical model comparison strategy, which compares among a null model, single-factor models, and a full-factor model (Anderson and Gerbing, 1988), and which would have allowed systematic analysis of the explanatory power of candidate variables, thereby improving overall model fit. However, such a strategy requires more rigorous SEM tools, such as LISREL or EQS, which cannot be used to analyze a model with formative indicators. A future study should explore alternative statistical procedures for conducting hierarchical model comparison with formative indicators. Sixth, these results, based on data gathered from users of MDS available through cellular phones, have limited generalizability to other mobile computing services. Future research should be conducted under a broader definition of MDS to increase the external validity of the results. Seventh, the questions in this paper focused on utilitarian aspects of wellbeing in different life domains, and did not consider, except indirectly, the influence of MDS on affective wellbeing. Forgas et al. (2007) suggest that affect plays a significant role in strategic social behaviors and judgments. Their results imply that the same MDS experience in the same life domain may influence two users' QoL quite differently if they are in different affective states. A future study of the effects of MDS on QoL should take up affective factors directly. Finally, though our study encompassed all life domains affected by MDS, it was unable to examine why certain domains contributed more substantially than others. We are currently conducting a follow-up study that focuses on a few life domains found to be significantly affected by MDS, in order to investigate the impact of MDS in greater detail.

Despite these limitations, the study has several important implications. First, it proposes three new variables, specifically relevant to mobile computing environments, that contribute in multiple ways to various facets of a user's life. Second, it verifies the reliability and the convergent, divergent, and nomological validity of the proposed metrics through three empirical studies. These metrics can be used in future studies to measure MDS contribution to QoL, and can be extended to other domains of mobile computing such as WiBro and HSDPA. Third, for policymakers, the study provides a framework in which to evaluate emerging technologies from the perspective of their contribution to quality of life. The potential of an emerging technology is often evaluated from an economic or technological perspective, far less often from the perspective of its actual user. The model and metrics proposed and verified in our study can be used in future studies, with minor modification, to evaluate the potential of various emerging technologies to contribute to quality of life. Such studies would provide objective criteria for allocating scarce resources (e.g., government funding and public bandwidth) among multiple technologies. A final implication concerns MDS providers. If a firm intends to specialize in a specific life domain, our MDS Experience Satisfaction measures can indicate what services will be used, with what goals, in what contexts, and can thus suggest which services will most improve quality of life for their users. The results on the relationship between Domain-Specific Contribution of MDS to QoL and Overall Contribution of MDS to QoL will also help companies allocate resources to the life domains that bear most strongly on overall quality of life.

A technology used in as many contexts as MDS can enhance its users' lives in numerous ways. To assess those contributions, however, we need a fuller picture of how they work than the extant literature, focused on specific tasks and functions, can offer. Our study takes a step in that direction by offering both a theoretical framework and a practical basis for measuring the contributions of mobile data services to quality of life.

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Appendix 1. Survey Questionnaire

I. Experience Satisfaction with MDS in Each Life Domain

How satisfied have you been with your MDS use experiences in each life domain? (0 = have never experienced, 1 = have become very dissatisfied, 7 = have become very satisfied)

Life Domain	Item	Use Experience
Cultural	CUL1	Getting background information through MDS before going to a restaurant
	CUL2	Getting movie information through MDS on the street
	CUL3	Making reservations for movies and concerts through MDS while I am out
Leisure	LSR1	Downloading ring-tones and logos through MDS in my spare time
	LSR2	Using MDS to pass the time while I am out
	LSR3	Playing mobile games to pass the time while on public transportation
Work	WOR1	Searching job listings through MDS
	WOR2	Discussing job-related issues with co-workers through MDS
	WOR3	Working through MDS when I can't use a PC
Educational	EDU1	Getting a class schedule through MDS during the school term
	EDU2	Using MDS to watch educational programs when I can't use a PC
	EDU3	Searching for the definitions of words through MDS when I'm out
Health and Safety	HES1	Using MDS to get medical advice when I can't use a PC
	HES2	Using MDS to figure out where I am when lost in a strange place
	HES3	Using MDS to tell other people where I am when I feel unsafe
Financial	FIN1	Using MDS to send money electronically to someone while I'm away
	FIN2	Using MDS to check my bank account
	FIN3	Using MDS to pay bills
Consumer	CSR1	Buying goods through MDS instead of actually going out shopping
	CSR2	Searching through MDS for information on goods I want to buy
	CSR3	Using MDS to exchange goods
Family	FAM1	Getting in touch with family members through MDS to relieve their worries
	FAM2	Using MDS to download my family's favorite ring-tones and logos
	FAM3	Sending photos to my family with MDS
Friend	FRI1	Sending photos to friends with MDS whenever I want
	FRI2	Contacting friends through MDS whenever I am needed
	FRI3	Wishing friends happy birthday through MDS
Social	SOC1	Using MDS to inform members of an online community of meeting dates
	SOC2	Contacting other community members through MDS about common interests
	SOC3	Wishing other community members happy birthday through MDS
Self	SEL1	Downloading ring tones and logos that suit my taste through MDS
	SEL2	Using MDS to show my photos to others
	SEL3	Downloading the latest ring tones and logos over MDS

II. Domain-Specific Contribution of MDS

How has the quality of your (*individual life domain*) changed since you first started using MDS? (1 = have become very dissatisfied, 7 = have become very satisfied).

III. Overall Contribution of MDS to QoL (Modified Satisfaction-with-Life Scale)

How do you feel about mobile data services (MDS) in terms of your overall quality of life? (1 = have become very dissatisfied, 7 = have become very satisfied)

Item	Metric
Over1	In most ways, my life has come closer to my ideal since I started using MDS.
Over2	The conditions of my life have improved because of MDS.
Over3	I have been more satisfied with my life thanks to MDS.
Over4	So far, MDS have helped me get the things I most want in life.

Appendix 2. Inter-Item and Item-to-Construct Correlation Matrix (** p < 0.05)

	cul1	cul2	cul3	Cul	lei1	lei2	lei3	Lei	wor1	wor2	wor3	Wor	edu1	edu2	edu3	Edu	hes1	hes2	hes3	Hes
cul1	---																			
cul2	.45**	---																		
cul3	.47**	.59**	---																	
Cul	.73**	.79**	.91**	---																
lei1	.15**	.16**	.13**	.17**	---															
lei2	.23**	.28**	.25**	.31**	.35**	---														
lei3	.17**	.20**	.19**	.22**	.30**	.54**	---													
Lei	.23**	.27**	.24**	.30**	.69**	.78**	.84**	---												
wor1	.33**	.42**	.43**	.48**	.08**	.20**	.13**	.17**	---											
wor2	.33**	.44**	.43**	.49**	.09**	.21**	.13**	.18**	.75**	---										
wor3	.32**	.43**	.42**	.47**	.12**	.25**	.16**	.22**	.58**	.65**	---									
Wor	.36**	.48**	.47**	.53**	.12**	.26**	.17**	.23**	.74**	.83**	.95**	---								
edu1	.36**	.45**	.44**	.51**	.12**	.22**	.18**	.22**	.62**	.58**	.49**	.58**	---							
edu2	.36**	.45**	.45**	.51**	.12**	.21**	.17**	.21**	.63**	.62**	.50**	.60**	.78**	---						
edu3	.33**	.44**	.39**	.47**	.17**	.25**	.21**	.27**	.46**	.48**	.48**	.53**	.58**	.59**	---					
Edu	.38**	.49**	.45**	.53**	.18**	.27**	.22**	.28**	.56**	.57**	.54**	.61**	.73**	.76**	.97**	---				
hes1	.28**	.34**	.34**	.39**	.15**	.21**	.20**	.24**	.40**	.40**	.33**	.39**	.45**	.43**	.38**	.44**	---			
hes2	.30**	.40**	.38**	.44**	.14**	.25**	.19**	.25**	.44**	.44**	.43**	.48**	.45**	.46**	.44**	.49**	.42**	---		
hes3	.30**	.32**	.32**	.38**	.15**	.20**	.19**	.23**	.42**	.40**	.37**	.42**	.43**	.45**	.39**	.45**	.36**	.55**	---	
Hes	.37**	.44**	.43**	.50**	.19**	.28**	.24**	.30**	.52**	.51**	.47**	.54**	.55**	.56**	.51**	.58**	.60**	.85**	.83**	---
fin1	.27**	.35**	.39**	.42**	.11**	.20**	.13**	.18**	.42**	.45**	.43**	.48**	.43**	.44**	.39**	.44**	.35**	.42**	.39**	.49**
fin2	.27**	.36**	.37**	.41**	.11**	.21**	.14**	.19**	.40**	.42**	.40**	.45**	.38**	.40**	.39**	.43**	.33**	.40**	.36**	.46**
fin3	.28**	.31**	.33**	.37**	.10**	.18**	.13**	.17**	.39**	.41**	.37**	.42**	.40**	.40**	.35**	.41**	.32**	.36**	.37**	.44**
Fin	.32**	.39**	.42**	.46**	.12**	.23**	.16**	.22**	.47**	.50**	.47**	.53**	.47**	.48**	.44**	.50**	.39**	.46**	.44**	.54**
con1	.30**	.38**	.40**	.44**	.13**	.20**	.15**	.20**	.4**	.48**	.41**	.48**	.52**	.53**	.44**	.52**	.39**	.42**	.42**	.52**
con2	.34**	.43**	.43**	.49**	.15**	.22**	.18**	.23**	.50**	.51**	.47**	.54**	.56**	.57**	.51**	.58**	.38**	.46**	.45**	.54**
con3	.30**	.30**	.31**	.37**	.14**	.20**	.18**	.22**	.37**	.37**	.36**	.40**	.43**	.42**	.39**	.44**	.32**	.36**	.42**	.46**
Con	.37**	.43**	.44**	.50**	.16**	.25**	.20**	.26**	.5**	.53**	.48**	.55**	.58**	.59**	.52**	.60**	.43**	.48**	.51**	.60**
fam1	.07**	.03**	.05**	.06**	.13**	.10**	.11**	.15**	.00	.00	.04**	.03**	.02	.01	.07**	.06**	.04**	.07**	.10**	.09**
fam2	.07**	.06**	.05**	.07**	.22**	.13**	.13**	.21**	.01	.02	.07**	.05**	.02	.01	.08**	.06**	.07**	.08**	.08**	.10**
fam3	.07**	.08**	.08**	.09**	.12**	.09**	.08**	.13**	.06**	.06**	.08**	.08**	.06**	.07**	.10**	.10**	.06**	.10**	.11**	.11**
Fam	.09**	.06**	.06**	.08**	.21**	.14**	.14**	.20**	.01	.02	.07**	.06**	.03*	.02	.09**	.08**	.07**	.09**	.12**	.12**

	cul1	cul2	cul3	Cul	lei1	lei2	lei3	lei	wor1	wor2	wor3	Wor	edu1	edu2	edu3	edu	hes1	hes2	hes3	hes
fri1	.21**	.22**	.21**	.26**	.27**	.31**	.26**	.36**	.16**	.17**	.18**	.20**	.20**	.20**	.25**	.26**	.19**	.24**	.23**	.28**
fri2	.10**	.07**	.06**	.09**	.27**	.22**	.23**	.30**	-.01	-.01	.04**	.02*	.00	.00	.09**	.07**	.05**	.07**	.09**	.09**
fri3	.18**	.14**	.15**	.19**	.29**	.27**	.25**	.35**	.08**	.08**	.12**	.11**	.11**	.09**	.18**	.18**	.14**	.16**	.18**	.20**
Fri	.20**	.18**	.17**	.22**	.34**	.33**	.31**	.42**	.09**	.09**	.14**	.14**	.12**	.12**	.21**	.20**	.15**	.19**	.20**	.23**
soc1	.15**	.13**	.13**	.16**	.19**	.21**	.18**	.25**	.11**	.11**	.15**	.15**	.10**	.10**	.15**	.15**	.12**	.15**	.17**	.19**
soc2	.12**	.09**	.08**	.11**	.22**	.20**	.17**	.25**	.04**	.05**	.11**	.09**	.04**	.04**	.11**	.10**	.07**	.11**	.13**	.13**
soc3	.14**	.09**	.08**	.12**	.23**	.21**	.19**	.27**	.04**	.05**	.10**	.09**	.05**	.04**	.13**	.11**	.07**	.12**	.14**	.14**
Soc	.15**	.12**	.11**	.15**	.23**	.23**	.20**	.28**	.07**	.08**	.14**	.13**	.08**	.07**	.15**	.14**	.10**	.14**	.16**	.17**
emo1	.09**	.07**	.05**	.08**	.46**	.26**	.23**	.40**	.00	.00	.04**	.02*	.00	.00	.09**	.07**	.07**	.09**	.10**	.11**
emo2	.18**	.18**	.18**	.22**	.27**	.29**	.25**	.34**	.13**	.14**	.15**	.16**	.16**	.16**	.21**	.21**	.17**	.21**	.21**	.25**
emo3	.10**	.10**	.08**	.11**	.43**	.28**	.24**	.40**	.03*	.04**	.08**	.07**	.04**	.04**	.11**	.10**	.09**	.11**	.13**	.14**
Emo	.15**	.14**	.13**	.16**	.46**	.33**	.29**	.46**	.06**	.07**	.11**	.10**	.08**	.08**	.16**	.15**	.13**	.16**	.17**	.20**

	fin1	fin2	fin3	Fin	con1	con2	con3	Con	fam1	fam2	fam3	Fam	fri1	fri2	fri3	Fri	soc1	soc2	soc3	Soc
fin1	---																			
fin2	.74**	---																		
fin3	.54**	.49**	---																	
Fin	.86**	.87**	.82**	---																
con1	.49**	.44**	.48**	.55**	---															
con2	.49**	.47**	.45**	.55**	.82**	---														
con3	.37**	.35**	.36**	.42**	.48**	.55**	---													
Con	.52**	.49**	.50**	.59**	.45**	.55**	.68**	---												
fam1	.05**	.05**	.04**	.05**	.36**	.42**	.47**	.50**	---											
fam2	.05**	.05**	.04**	.06**	.50**	.59**	.82**	.81**	.85**	---										
fam3	.06**	.07**	.05**	.07**	.04**	.05**	.04**	.05**	.10**	.08**	---									
Fam	.06**	.07**	.05**	.07**	.04**	.06**	.05**	.06**	.10**	.09**	.52**	---								
fri1	.18**	.19**	.17**	.21**	.05**	.07**	.06**	.08**	.08**	.09**	.42**	.48**	---							
fri2	.04**	.05**	.05**	.06**	.05**	.07**	.06**	.07**	.12**	.11**	.86**	.86**	.61**	---						
fri3	.14**	.14**	.12**	.16**	.17**	.21**	.22**	.23**	.22**	.26**	.15**	.19**	.23**	.21**	---					
Fri	.15**	.16**	.14**	.17**	.05**	.06**	.04**	.05**	.13**	.10**	.25**	.24**	.12**	.28**	.39**	---				

	fin1	fin2	fin3	Fin	con1	con2	con3	Con	fam1	fam2	fam3	Fam	fri1	fri2	fri3	Fri	soc1	soc2	soc3	Soc
soc1	.15**	.15**	.12**	.17**	.12**	.16**	.14**	.14**	.19**	.19**	.22**	.24**	.14**	.27**	.43**	.58**	---			
soc2	.11**	.12**	.10**	.13**	.14**	.17**	.16**	.17**	.22**	.23**	.26**	.28**	.21**	.32**	.76**	.84**	.81**	---		
soc3	.10**	.11**	.09**	.12**	.12**	.17**	.12**	.14**	.21**	.20**	.24**	.21**	.11**	.25**	.30**	.48**	.43**	.50**	---	
Soc	.13**	.14**	.11**	.15**	.10**	.13**	.08**	.08**	.15**	.14**	.26**	.23**	.11**	.28**	.29**	.55**	.45**	.54**	.71**	---
sel1	.03**	.06**	.03**	.05**	.09**	.12**	.08**	.09**	.16**	.14**	.27**	.23**	.12**	.28**	.30**	.54**	.50**	.55**	.67**	.82**
sel2	.16**	.16**	.15**	.18**	.11**	.15**	.11**	.12**	.20**	.18**	.28**	.24**	.12**	.30**	.33**	.57**	.51**	.59**	.89**	.92**
sel3	.06**	.08**	.06**	.08**	.03**	.05**	.04**	.06**	.09**	.08**	.20**	.27**	.11**	.26**	.32**	.45**	.41**	.49**	.34**	.42**
Sel	.10**	.12**	.10**	.13**	.15**	.18**	.18**	.20**	.19**	.23**	.10**	.16**	.17**	.16**	.68**	.32**	.37**	.57**	.28**	.28**

	sel1	sel2	sel3	Sel
sel1	---			
sel2	.91**	---		
sel3	.43**	.43**	---	
Sel	.30**	.32**	.43**	---

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