

## Motivations for cell phone use by older Americans

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*S. Kubik. Motivations for cell phone use by older Americans. Gerontechnology 2009; 8(3):150-164; doi: 10.4017/gt.2009.08.03.007.00* Despite various limitations and challenges, older Americans increasingly use cellular phones. This exploratory study examined the positive reasons why community-dwelling older adults who lived in Midwestern towns located in the United States used mobile phones. Common responses generated from interviewing 18 senior cell phone users were placed on an original survey instrument given to 100 cell phone users, ages 57-97. Results showed that young old and old old users differed in terms of how and why they used their cell phones. An exploratory factor analysis identified two underlying and correlated factors measuring why older adults used cell phones: usefulness and security. Significant predictors of the level of importance assigned to a cell phone included education, the ability to drive, usefulness, security, and frequently traveling short and long distances.

**Key words:** cellular phones, older Americans, technology, exploratory

Contradicting current advertising messages, cellular coverage in the United States is not one hundred percent ubiquitous nor is it one hundred percent reliable. Anyone traveling to the USA can experience the frustrations of dropped calls and dead zones firsthand, especially if they travel to less urban parts of the country. Unlike other technologies, the USA is lagging behind numerous countries when it comes to this technology's adoption or saturation rate by the population, the infrastructure necessary to sustain and grow adoption, and the development and implementation of cell phone features and applications. On the one hand, usability studies have shown that it was not easy for elders to use a cell phone<sup>1,2</sup>. On the other hand, it was estimated that in 2008, the percentage of those who owned a cell phone and were between the ages of 50 to 69 were roughly equal to the percentage of all American adults who owned a cell phone<sup>3</sup>. American seniors are exhibiting paradoxical trends by showing high levels of frustration and low ease of use of these devices combined with high adoption rates.

To date, what is missing in the area of gerontological and technological research is a

non-experimental study examining the reasons why community-dwelling, normally aging older adults who live in the United States use cellular phones. This is especially important if a device is used by an audience even though it was not specifically designed for them (for instance, older adults gaming with the Wii as a means of physical exercise). Why do different audiences use various technologies? What specific meaning does each technology carry? The goal of this study was to determine the reasons why older adults who lived in midsized towns in the Midwest used cellular technology and what meaning they assigned to their cellular phones. The approach to assessing the technology was not to focus on anecdotal evidence, the product design, or on specific human-computer interactions. Rather, it was to understand the reasons why a particular age group would embrace a technology given the existing potential complexities, frustrations, and challenges when using these devices.

The research questions included why older adults used cellular phones, why they were important to them, and what the meanings of the cell phones were to this cohort. The

descriptive outcomes described the characteristics of, and reasons for, cell phone use for those under 75 and over 75 in addition to the entire sample. The interpretative outcomes predicted variables for cell phone importance by this sample of elders and refined knowledge of technology use through the adoption of one *a priori* theory. The study involved both qualitative and quantitative methodologies, two different data sources, and two phases of data collection.

## USA CELLULAR TECHNOLOGY

The current number of worldwide cell phone subscriptions is over four billion<sup>4</sup>. In a 2006 study<sup>5</sup> of over 1200 USA cell phone users, 26 percent said they cannot live without their cell phones. Yet a 2004 study<sup>6</sup>, found that 30 percent of American adults claimed that the cell phone was the invention they hated the most, but also the one they were most unable to live without. Why do people have such a love/hate relationship with this technology? Possible reasons for negative opinions of cellular technology may include complicated designs, poor usability, and function creep (or the overloading of features on a device). Mixed feelings about the technology include the ease of which a person can be contacted by way of a cellular phone, and the potentially overwhelming amount of information made available through the technology in addition to other sources like newspapers, the television, and the Internet<sup>7</sup>. Opposing findings include a 2007 study<sup>8</sup> where 45 percent of Americans said that information technology gave them less control over their lives or made no difference and a 2005 study<sup>9</sup> finding that more than 80 percent of cell phone users said that the device had simplified their lives.

On a global scale, adoption of cellular phones in the United States has been slower than in other countries<sup>4, 9</sup>. In 2008, 83 percent of American adults owned a cell phone<sup>4</sup>. Although this percentage is quite high, there are 171 other countries that rank higher than the USA in terms of percentage of cellular subscribers<sup>4</sup>. Reasons for slower

adoption may include the fact this country has a lack of wireless infrastructure compared to other countries, competing cellular standards, and a larger number of companies needed to bring this technology to the masses<sup>10</sup>. In addition, there are possible culture differences (for instance, preferring to text message over talking because texting is a less intrusive means of communication, especially in public areas), gender differences (for instance, men comprising a larger proportion of the 'early adopters' phase in the diffusion of this innovation), and age differences (for instance, new technologies are often first adopted by younger audiences). As well, unlike the personal computer, cell phones have evolving features which vary greatly depending upon location. For example, cell phones have been used as credit cards for the past five years in Japan; this feature will not be found on USA cell phones until 2012 at the earliest<sup>10</sup>. Given the contextual nature of using a cell phone in the United States, are there unique reasons for use by American seniors?

## PREVIOUS RESEARCH

One of the oldest and most well known technology use theories is the Technology Acceptance Model (TAM), which relies on factors of perceived usefulness and perceived ease of use to influence users' attitudes. This, in turn, influences their behavioral intentions to use a technology<sup>11</sup>. The TAM has been proven both reliable and valid<sup>12-14</sup>, as well as too restrictive and needing either additional constructs<sup>15, 16</sup> or different, more specific constructs<sup>17</sup>. Application of the TAM in previous research focusing on older adults has mainly been limited to studies of computer/Internet use<sup>18, 19</sup> or comparative studies between younger and older adults' overall adoption of technology<sup>20</sup>.

Usability testing involves both the use of theory and practical, objective issues like task speed, stresses, mistakes, and viewing distances. Past studies have shown that the design of the cell phone itself effects task completion in terms of user error rates and

navigating through the phone interface. Specific design elements which impacted usability of phones by elders included button sizes<sup>1</sup>, complexity of the interface<sup>2</sup>, and graphical text sizes<sup>2</sup>. A movement towards distinguishing cell phones from the personal computer has led to the development of systematic guidelines for testing the ease of use of cell phone interfaces<sup>21</sup>. Researchers have noted that cell phone interfaces are not standardized like computers are, and the trend of phone miniaturization combined with functional increases challenges interface designers. As well, factors like environmental lighting, changes in human motion, and task type have been shown to affect mobile phone user performance<sup>22</sup>. In addition, contextual factors affect technology adoption rates.

Although the United States falls behind many countries in terms of cell phone ownership, wireless infrastructure, and a lack of one adopted cellular standard, international research can still be examined if caveats are applied and the technology use is geographically contextualized. In 2007, a mixed-methods study<sup>23</sup> conducted in the United Kingdom found that reasons for ownership of cell phones by older adults included safety reasons, because the phone was fun to use, and because it was cheaper to use than a landline phone. The caveat for this study is that in 2007, 118 people out of 100 in the UK owned a cell phone<sup>4</sup> (i.e., people owned more than one phone). A 2002 study<sup>24</sup> found that Finnish elders willingly embraced concepts of new technology, including using a cell phone to receive public transportation times, linking a cell phone to a security bracelet, and developing a service that could push reminder messages to the cell phone user. The largest limitation to this study is that it was based in Finland, where inhabitants typically own more than one cell phone<sup>4</sup>, and where Nokia, the world's largest mobile supplier is based. This company has developed and installed cell phone applications for the everyday cell phone that are not yet available in the United States.

Findings from recent USA based studies show interesting but high-level results. One recent study<sup>25</sup> solely examined the different types of cell phone users who used their phones for safety and security reasons. Findings showed that security was most important for females, those living in the Northeastern part of the country, those who had an annual household income of less than \$30,000, and those over the age of 65. As a subset of a larger sample, another study<sup>3</sup> found that 75 percent of Americans ages 55 to 99 owned a cellular phone in 2008. This randomly selected national sub-sample of 1020 older adults revealed that 100 percent of them also owned a landline phone. Based on the market penetration and the general knowledge of why older adults own cell phones, what is needed is a deeper exploration of the reasons for use beyond potential communication and security.

Previous research has shown that, indeed, older adults do use cell phones even though it is not without physical challenges and frustrations. Currently in the United States, the questionable promise of continual wireless coverage has led to an extended commercial campaign touting the question, "Can you hear me now?" If that answer is not always "Yes," and if there are real challenges to using this technology, why do elders persist? Are there additional reasons for cell phone use beyond simple communication?

## METHODOLOGY

### Participants

There were two samples for this study; a small sample totaling 18 participants and a large sample totaling 100 participants, with the 18 participants not being a subset of the larger sample. Total age ranges for all was 57 to 97 years old. The interviews were conducted during the months of October and November, 2007. These participants' ages ranged from 53 to 84 (69.1±8.1), with nine of them being female. The survey data was collected during the months of January, February, May, and June 2008, for phase two of this study. These participants' ages ranged

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from 57 to 97 (72.2±9.8), with 64 of them being female (Table 1).

In terms of the quantitative data, Table 1 shows the results of the frequencies of the demographic survey items and a comparison between the distributions of the young old cell phone owners to the old old cell phone owners. To remain consistent with previous gerontological research showing

that older adults are not a homogenous group<sup>28</sup> and that age differences exist with the use of or attitudes toward other technologies<sup>29, 30</sup>, young old were defined as those under 75 years old, and old old were those ages 75 and up<sup>31</sup>. In the full sample (N=100), the majority of the participants were women, were married, were in good health, lived in private residences, drove, were retired, and not working for pay. More than one-third

Table 1. Respondent characteristics; Due to non-responses, figures may not add up to n; Statistical differences between young old and old old cell phone users were tested by 2-tailed independent sample t tests and chi square tests

Respondent characteristics	Total (n=100)	Young old (n=58)	Old old (n=42)	p
Age (years)	72.2± 9.8	64.9± 4.1	82.2±5.2	0.000
Gender				0.710
Male	33	20	16	
Female	64	38	26	
Married	67	42	25	0.176
Self-rated health				0.711
Poor	3	2	1	
Fair	23	11	12	
Good	42	25	17	
Excellent	32	20	12	
Residence				0.000
Private residence	70	51	19	
Independent living	25	7	18	
Assisted living	5	0	5	
Ability to drive	89	54	35	0.126
Retired	74	34	40	0.000
Work status				0.000
Not at all	60	22	38	
Part-time for pay	21	20	1	
Full-time for pay	19	16	3	
Volunteering	43	22	21	0.258
Hours per week	5.2± 4.9	3.8±2.6	6.6±6.1	0.065
Education				0.373
<High school	7	6	1	
High school	30	18	12	
Some college	20	12	8	
Bachelor's	21	9	12	
>Bachelor's	21	12	9	
How often travelling <50 miles				0.070
Not at all	10	2	8	
1 time/day	41	25	16	
2-3 times/day	37	22	15	
≥4 times/day	11	8	3	
How often travelling ≥50 miles				0.346
Not at all	36	19	17	
1 time/month	34	19	15	
2-3 times/month	21	12	9	
≥4 times/month	8	7	1	

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volunteered; slightly less than half had a bachelor's degree or higher. Regarding their mobility, 41 percent traveled a short distance from their house once a day, and the majority traveled long distances at least one time per month.

As much as possible, demographic characteristics were kept the same between each sample. All participants in this study were non-paid volunteers and were recruited through either purposeful or convenience sampling. The researcher asked people she knew if they knew of anyone 60 years and over who owned a cell phone, went to the local senior center, went to a local independent living facility, and went to a continuing care facility that had both independent and assisted living branches. All participants lived in or near towns ranging in populations of 17,000 to 61,000 located in northwest Indiana.

## Procedures and measurements

For phase 1 of the study, individuals were interviewed in either their homes, at a local senior center, or at the places where they worked or volunteered. Interviews ranged from 30 to 60 minutes, were audio taped and then transcribed. Because current cellular phones display call logs differently (for instance, some only display the most recent ten calls, some do not display repeat numbers, some phones completely delete call logs when space becomes an issue), and to avoid potential privacy issues, cell phone usage was measured by asking the participant the number of hours he or she spent talking on the cell phone over the course of a week, the number of people called when using the cell phone over the course of one week day, and the number of people who called the participant on their cell phone over the course of one week day. Open-ended questions included asking what phone features were used, the initial reason for purchasing the phone, why they currently owned the device, and what they liked and disliked about cell phones. To determine activity and mobility levels, participants were asked how much they traveled short distances each day,

long distances each month, and their typical weekly activities.

Phase 2 was the distribution of a paper-based survey to the larger sample. The main reason for the survey was to validate the findings from the interviews. Therefore questions used the same constructs and measurements, but were in closed-ended formats consisting of the common answers to the interview questions as possible item selections. The survey was pilot tested on three different people (the average age was 55) to assess the content of it in terms of intelligibility, format and wording. The appropriate changes were made, leading to the final survey, which was either given directly to the participant or read to the participant over the phone.

## Data analysis

The qualitative data was first deductively analyzed with the main constructs of the Technology Acceptance Model (TAM). A symbolic interactionism framework allowed for the emergence of a new theme, 'Security', through inductive analysis. Coding consisted of open coding, or reading and sorting through the transcripts and memoing notes to extract categories, axial coding, or comparing new codes to the codes derived from the TAM, and then selective coding, or systematically coding with respect to a core concept<sup>26, 27</sup>. To address the main research question, "Why do you use a cellular phone", responses from the participants interviewed were grouped under the two themes from the TAM ('Usefulness' and 'Ease of Use'), as well the new theme of 'Security'. These responses were rephrased into survey items and used in phase 2 of the study.

## RESULTS

Compared to the full sample, the young old cell phone owning group (n=58) had a smaller percentage that was retired, and a much smaller percentage in terms of not working for pay. As well, they had slightly lower percentages than the full sample when it came to having at least a bachelor's degree and volunteering. Compared to the full sample,

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the majority of the old old cell phone owning participants (n=42) had a slightly higher proportion of males, more were retired and not working for pay, and half volunteered about six and a half hours per week. Almost equal percentages of the old old lived in private residences as opposed to independent living communities. Of interest were the non-significant results of the age comparison tests: Mobility and the ability to drive.

Many similarities existed between those under 75 and those over 75 in terms of phone

use and ownership (Table 2). Participants had owned a cell phone about six years, the large majority also owned landline phones, and most were on contractual plans. On average, they used the cell phone to talk to other people less than three hours per week. Over the course of one week day, they would call fewer than three people. Significant differences existed between the young old and old old cell phone users in terms of how they used their phones. The younger group had more contractual plans than the older, with the older group having nearly

Table 2. Phone use characteristics; Due to non-responses, figures may not add up to n; Statistical differences between young old and old old cell phone users were tested by 2-tailed independent sample t tests and chi square tests

Respondent characteristics	Total (n=100)	Young old (n=58)	Old old (n=42)	P
Own a landline phone	92	51	41	0.118
Length of owning cell phone in years	6.0±4.1	5.8±4.1	6.3±4.3	0.577
Cell phone plan type				0.046
Contract	75	47	28	
Pre-paid	23	9	14	
Hours talking on cell phone/week	2.8±4.7	3.3±5.5	2.1±3.2	0.218
Outgoing cell phone calls/week day	2.9±2.8	3.3±3.2	2.3±1.9	0.051
Incoming cell phone calls/week day	2.2±2.8	2.9±3.2	1.3±1.7	0.003
Always carrying cell phone?				0.001
No	7	1	6	
½ Of the time	15	4	11	
Most of the time	31	18	13	
All of the time	45	33	12	
Cell phone turned on				0.011
Rarely	2	1	1	
For outgoing & incoming calls, and check of voice mail	24	9	15	
Most of the time	29	17	12	
Always	35	28	7	
Most common location to carry cell phone				0.125
Purse (female only)	41	24	17	
Pocket	28	20	8	
Male	19	12	7	
Female	9	8	1	
Car or truck	14	5	9	
Male	5	0	5	
Female	9	5	4	
On belt	8	4	4	
Male	6	4	2	
Female	2	0	2	
On counter	3	1	2	
Family member holds it	3	2	1	
On a cord around the neck	1	0	1	
Cell phone importance: 1=not at all important, 10=extremely important	6.3±3.0	6.8±2.8	5.5±3.0	0.024

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one-third of the participants using pre-paid cell phones. Young old cell phone owners would receive daily calls from more than two people on their cell phones while old old cell phone owners would receive daily calls from less than two. More than half of the young old cell phone owners always carried their cell phones on them whenever they left their homes. Only 29 percent of the old old cell phone owners did the same. Of the young old group, almost one-half always had their phones turned on versus only 16 percent of the old old group. On a scale of one to ten, with ten being the highest level of importance assigned to one's cell phone, there was almost a level and a half increase in terms of how important the cell phone was for the young old versus the old old cell phone users.

The final 19 items (*Table 3*), were used to measure the survey participants' levels of agreement with statements regarding why they used cell phones. Answers to these questions were coded as 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree.

The young old cell phone owners had significantly higher agreement with eight items: Using the cell phone to call friends and family, using their phone when traveling long and short distances, using the phone to notify others when they were running late, that a cell phone gave them more freedom, that it was easy to use, and that the features on a cell phone were perceived as more useful than those on a landline phone. There was strong agreement in both groups regarding using the cell phone for cases of emergencies. To distinguish between emergencies and non-emergencies, the item, "I use my cell phone for the 'what-ifs' in life" was measured. This phrasing came directly from the phase 1 participants' responses.

## Exploratory factor analysis

Exploratory factor analysis is used to measuring the latent constructs underlying a set of observed variables<sup>32</sup>. Before the factor analysis occurred, it was hypothesized that

*Table 3. Reasons for cell phone; 5=strongly agrees, 4=agrees, 3=neutral, 2=disagrees, 1=strongly disagrees; Statistical differences between young old and old old cell phone users were tested by 2-tailed independent sample t tests*

Item	Total (n=100)	Young old (n=58)	Old old (n=42)	p
Gives a sense of security	4.2±0.8	4.3±0.8	4.1±0.9	0.217
Gives peace of mind	4.0±0.8	4.0±0.9	4.0±0.7	0.913
Gives my family peace of mind	3.9±1.1	3.9±1.1	3.9±1.1	0.991
Contact with family	4.0±1.0	4.2±0.9	3.7±1.1	0.030
Contact with friends	3.3±1.2	3.5±1.0	3.0±1.3	0.034
Personal reasons	4.0±0.8	4.1±0.8	3.8±0.8	0.093
Easy to use	3.8±1.1	4.0±0.9	3.6±1.2	0.041
Too many features on cell phone	3.3±1.2	3.2±1.2	3.3±1.2	0.666
Cell phone more useful than landline	3.2±1.1	3.4±1.1	2.9±1.1	0.035
Cell phones more expensive than landline	3.0±1.2	3.0±1.2	3.1±1.2	0.736
Gives more freedom	3.5±1.0	3.7±1.0	3.2±1.1	0.025
Convenient to carry	3.9±0.8	4.0±0.7	3.7±1.0	0.073
To multi-task	2.6±1.1	2.7±1.1	2.5±1.3	0.294
To notify others when running late	3.6±1.1	3.9±0.8	3.3±1.3	0.004
When traveling <50 miles	3.7±0.9	3.9±0.7	3.4±1.1	0.013
When traveling ≥50 miles	3.9±0.9	4.1±0.7	3.6±1.2	0.045
In cases of emergencies	4.7±0.6	4.7±0.4	4.5±0.7	0.095
'What if's' in life	3.9±1.0	3.8±0.9	3.9±1.0	0.707
Essential part of my life	3.3±1.1	3.4±1.1	3.2±1.2	0.567

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the factors would probably be correlated with each other. This was based on the fact that the qualitative data from the interviews could have been placed under many different themes. For example, "Having a cell phone gives me more freedom" could have been placed under both the theme of 'Usefulness' and of 'Security'. Therefore, an initial oblique rotation was chosen; had the factors not been correlated with each other, the estimates of the correlations between the factors would be close to zero<sup>33</sup>. To determine the number of factors to keep in the analysis, both a scree plot and a parallel analysis of the data were used. The parallel analysis test revealed that three factors should be retained, while the scree plot suggested only two. With a goal of parsimony, the two factor solution was chosen.

The initial exploratory factor analysis with a two factor solution used a principal axis extraction with a promax rotation on all 19 items answered with a five-point Likert-type scale. Three items were dropped due to not loading at 0.3 or above or double loading onto the rotated pattern matrix (Table 4). The

N:p ratio was 6.25:1; the p:f ratio was 8:1; the KMO test resulted in a value of 0.809 which would be interpreted by Kaiser, Meyer, and Olkin as the second best category, 'meritorious'<sup>34</sup>. Each factor had at least three indicators with communalities of 0.3 or higher, and all items loaded onto only one factor thereby achieving simple structure. Both factors were highly overdetermined; Factor 1 had ten items load onto the rotated pattern matrix and accounted for 35.5 percent of the total variance explained. Cronbach's alpha of the subscale and items was 0.87. Factor 2 had six items load onto it in this same matrix, accounted for 9.5 percent of the total variance explained, and had a reliability analysis of the subscale and items of 0.74. The factors were positively correlated with each other by 0.48.

## Usefulness

In oblique rotations, the pattern matrix represents the coefficients (similar to those obtained in multiple regressions) while the structure matrix represents the correlations the items have with the factor. Both matrices are important for interpretation. Factor

Table 4. Exploratory factor analysis on 16 items: Principal axis extraction with a promax rotation; Reliability of 10 items loading onto Factor 1 pattern matrix =0.868; Reliability of 6 items loading onto Factor 2 pattern matrix =0.737; Inter-factor correlation between Factors 1 and 2 = 0.481; Loading values of 0.3 or below are not shown; Factor 1 is labeled 'Usefulness' and Factor 2 'Security'

Measure	Pattern Coefficient		Structure Coefficient		Communalities
	Factor 1	Factor 2	Factor 1	Factor 2	
Contact with family	0.839		0.765		0.603
Travel ≥ 50 miles	0.806		0.674		0.512
Contact with friends	0.732		0.702		0.496
More freedom	0.702		0.757	0.453	0.584
Travel <50 miles	0.605		0.608		0.370
Essential part of life	0.574		0.694	0.527	0.531
Multi-tasking	0.572		0.579		0.336
Running late	0.543		0.645	0.473	0.450
Personal reasons	0.401		0.499	0.396	0.281
Features are useful	0.355		0.482	0.435	0.286
Sense of security		0.843		0.785	0.628
Emergencies		0.631		0.558	0.329
"What-if's"		0.585		0.547	0.304
Convenient to carry		0.579	0.384	0.630	0.405
Peace of mind		0.458	0.418	0.553	0.336
Easy to use		0.430	0.366	0.507	0.279



1 was labeled 'Usefulness' and consisted of ten items relating to communication, travel, freedom, and personal use. The findings showed that the items that exerted the strongest change in Factor 1 included contacting family and friends, traveling long and short distances, and having more freedom. Moderate loadings included using the phone to multi-task, using it to call others when running late, and considering the phone an essential part of one's life. Weak loadings included using the phone for personal reasons and feeling that the cell phone's features were useful.

## *Security*

Factor 2 was labeled 'Security' and consisted of six items which addressed issues of both uncertainty and convenience. The items that applied the strongest change in Factor 2 included using the phone because it provided a person a sense of security, and using it in cases of emergencies. Moderate loadings included using the phone for the "what-ifs" in life and because it was convenient to carry. Owning a cell phone for a person's peace of mind and because it was easy to use weakly affected this factor.

## *Essential*

Originally, the item "I feel that my cell phone is an essential part of my life" was intended to measure usefulness because the term 'essential' was a synonym for 'useful'. Yet the results of the factor analysis showed that the item was correlated with each of the two factors; it had a strong positive correlation with Factor 1 (0.694) and a moderate positive correlation with Factor 2 (0.527).

Seven other items correlated with both factors. Using the cell phone because it provided a person more freedom and using the phone to notify others when they were running late correlated highly with Factor 1 and weakly with Factor 2. Three items correlated moderately to highly with Factor 2 and weakly with Factor 1: Using a cell phone because it was convenient to carry, using it because it gave a person peace of mind,

and believing that the phone was easy to use. The items of using the phone for personal reasons and feeling that the features were useful weakly correlated with both factors. Once the factor loadings were analyzed, factor scores were computed through regression analysis for each case and each factor. This is a preferable computation over simply summing the items together because it takes into account weighting for each of the items used.

## **Multivariate linear regressions**

To answer the question, "What predicts the level of importance an older adult assigns to their cell phone?" multiple OLS regressions were conducted on the group as a whole. The dependent variable in each case was the level of importance assigned to a person's cell phone. Answers ranged from 1 to 10, with 1 being 'not at all important' and 10 being 'extremely important'. Independent variables were input through multiple steps: Demographic predictors first, mobility behavior variables second, and factor scores third. The set of variables was first chosen because past research<sup>24, 35</sup> has shown that mobility and independence were important to seniors. As well, since significant age differences were found in this study between the levels of agreement in using a cell phone for both long and short distance travels, it leads one to consider that these variables might be significant in a predictive analysis. Three regressions were performed (*Table 5*).

In the first regression, age was the only significant predictor to the level of importance an older adult assigned to their cell phone. Controlling for health, gender, education, and driving status, as age decreased, the level of importance assigned to a cell phone increased. When the two categorical items that assessed mobility in terms of travel were added, age was no longer significant, but education was. The less educated a person was, the more important their cell phone became. As well, if a person traveled frequent long distance trips, this greatly impacted how important they viewed their cell

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phone to be. When the two factor scores were added to the regression, the proportion of the variation explained by the model became 0.630. In this final analysis, the three variables that significantly predicted an increase to the level of importance an elder assigned to their phone included the security scores, the usefulness scores, and traveling long distances four or more times a month versus not traveling long distances at all. Three variables significantly predicted a decrease to the level of importance an elder assigned to their cell phone: Their level of education, their ability to drive, and if they frequently traveled short distance less than 50 miles a week versus not traveling at all. Overall, security had the greatest positive effect on cell phone importance and frequently traveling short distances had the greatest negative effect (Figure 1).

## DISCUSSION

Because of the limitation of this study to having non-randomly selected participants,

the results are not generalizable to all cell phone owning older adults who live in the United States. Future research could include conducting a random sample, administering the survey used in this study, and then comparing the results. Other research might include administering this survey to a sample that live in a more urban setting, where cellular coverage will be more ubiquitous than it was in mid-sized towns in northwest Indiana. Due to the contextual implications of cellular coverage, this geographic change might reveal different person-environment interactions.

Like other gerontechnological studies, this study also found that beneficial services for older adults are those that help facilitate social relationships and the ability to live independently at home<sup>24</sup>. In addition, findings from this study support the research that a strong reason for cell phone use by American elders is for purposes of security<sup>25</sup>. However, this study is unique in that it com-

Table 5. Predictors of the perceived level of importance of a cell phone (n=100) in three different regression analyses; B=unstandardized coefficient; SE=standard error; Beta=standardized coefficient; \*= $p<0.05$ , \*\*= $p<0.01$ , \*\*\*= $p<0.001$

Measure	1 <sup>st</sup> multivariate linear regression			2 <sup>nd</sup> multivariate linear regression			3 <sup>rd</sup> multivariate linear regression		
	B	SE	Beta	B	SE	Beta	B	SE	Beta
Demographics									
Age	-0.07*	0.03	-0.21	-0.05	0.03	-0.15	-0.02	0.02	-0.05
Gender	0.16	0.63	0.03	0.42	0.62	0.07	0.45	0.44	0.07
Self-rated health	0.55	0.42	0.15	0.18	0.44	0.05	0.01	0.31	0.00
Education	-0.33	0.18	-0.20	-0.54*	0.21	-0.32	-0.37*	0.15	-0.22
Ability to drive	-1.35	1.06	-0.14	-1.40	1.08	-0.15	-1.76*	0.80	-0.17
Travel (short: <50 miles; long ≥50 miles)									
Short 1/week				0.37	1.13	0.06	-0.02	0.86	-0.00
Short 2-3/week				0.61	1.20	0.10	0.145	0.91	0.02
Short ≥4/week				-0.53	1.37	-0.06	-2.20*	1.02	-0.24
Long 1/month				0.23	0.75	0.04	0.378	0.53	0.06
Long 2-3/month				1.30	0.94	0.18	0.97	0.66	0.14
Long ≥4month				3.85**	1.35	0.33	2.93**	0.94	0.26
Factor scores									
Usefulness							1.10***	0.28	0.35
Security							1.46***	0.29	0.45
R <sup>2</sup>	0.120			0.209			0.630		
Adjusted R <sup>2</sup>	0.072			0.108			0.571		

# Cell phone use

compares young old and old old American cell phone users, links cell phone use to lifestyle activities, explores additional reasons for cell phone use beyond communication and security, and further defines what 'use' actually means.

## Age differences

Older adults are not homogeneous in terms of their attitudes toward technologies<sup>36</sup>, and attitudes affect technology use<sup>20</sup>. This study showed that age differences existed between young old and old old cell phone users who lived in mid-sized towns in Indiana. The young old adults carried their phones on them more, talked on them more, considered their phones of greater importance, and easier to use than did the old old age group. One could argue that those over 75 are more flexible for adopting technology given that they've experienced technologies ranging from the Polaroid to Skype, from jet engines to hybrid cars, from wireless telegraphy to wireless phones. However, one reason the younger cohort used and valued their cell phones more could be due to greater overall technology experience throughout their lives. This study's findings showed that for both age groups, lengthy talking on the cell phone appeared not to be the main pur-

pose of the communication device. Participants did not spend endless hours talking on their cell phones, and the number of people they conversed with over the course of the week was less than three. In addition, the large majority of participants selected in this study also owned landline phones, which follows the current national trend of phone ownership for American elders<sup>3</sup>. Therefore the assumption that can be made is that the cellular phone was perceived as important to the seniors, but not as a primary means of communication.

## Cell phones and lifestyles

The majority of elderly Americans are highly mobile; they take more trips over the course of one day than the general population<sup>37</sup>. Yet this highly mobile cohort is the least likely to own a mobile phone<sup>3</sup>. This study has shown that cell phone owning seniors largely own phones for security reasons, both in terms of emergencies and non-emergencies. If the most important psychological resource that a person has to handle during the advancement of aging is their belief about self-efficacy, intellectual skills, and feelings of control<sup>38</sup>, the sense of security that a cell phone provides is that it allows a senior to remain independent.

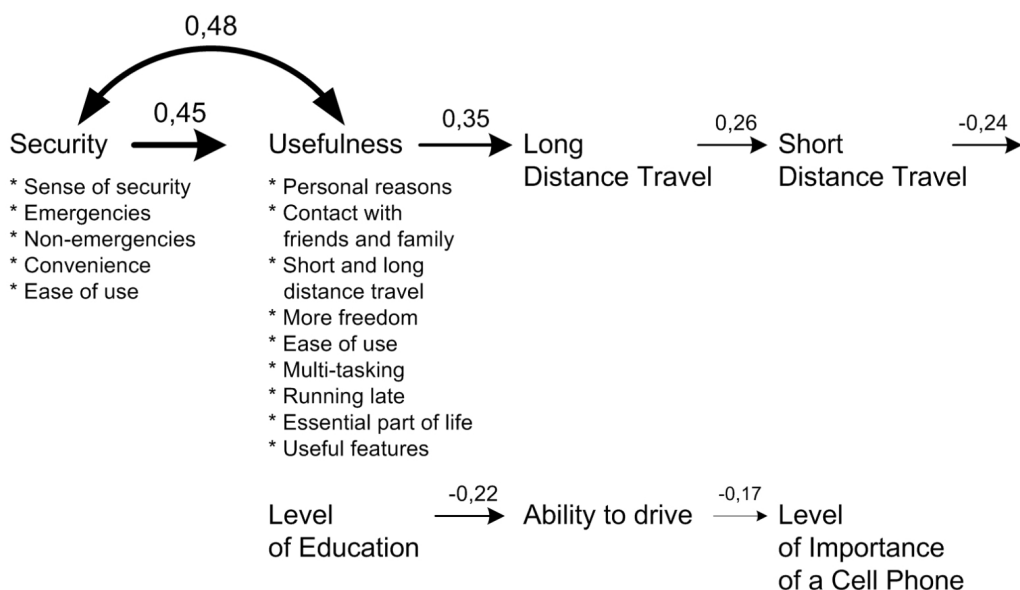


Figure 1. Factors that predict the level of importance assigned to a cell phone

In the context of the USA, it has also been shown that the ability to drive fosters the sense of independence<sup>35, 39, 40</sup>, and that cessation of driving leads to depression in elders<sup>41</sup>. Interestingly, a finding in this study was the significant predictor of ability to drive: Those who drove found their cell phones less important than those who did not drive. The next question would then be, do non-drivers rely more on public transportation? No. Results from a randomized study<sup>42</sup> of over 23,000 non-institutionalized Americans from all 50 states ages 65 to 88 showed that only one percent of all elders surveyed were unable to drive and used public transportation. Possible reasons for non-use of public transportation by seniors include inconvenient routes and schedules, costs, unavailability of public transportation in many areas of the country, and that the physical impairments that prevent driving or walking may make it impossible to use transit<sup>43</sup>. If an elder who does not use public transportation ask friends or family to shuttle him around, a cell phone would be useful to coordinate the details of the trips and reduce the fear that he has of being stranded. According to a survey released by the American Public Transportation Association<sup>35</sup>, more than four in five Americans age 65 or older worry that they will be stranded and unable to get around when they can no longer drive. In the USA, the jump from being a driver to a non-driver can be dramatic and shocking. A misinterpretation of the results of the findings presented in this paper would be that cell phones used by seniors could become the sole intervention during this transitional phase. What the findings do imply is that cellular phones have possible meaning as coping mechanisms to help with the inevitable fate of losing the ability to drive.

## What useful means

Coping mechanisms and assistive technologies are commonly believed to be useful for older adults. As Hine, Petersen, and Zetterström suggested, cell phones could be adapted to become assistive technologies<sup>44</sup>. Features like the telephone book, alarms,

and speed dial could be used to compensate for issues like memory loss and lessened dexterity in the fingers. But defining 'usefulness' of a cell phone for a normally aging population which may or may not want (or need) a technology labeled as 'assistive' is a relatively new concept within American consumer products. This study allowed 'useful reasons' to include the diverse topics of using the cell phone when traveling short and long distances, for contacting friends and family members, to multi-task, to notify others when the person was running late, and because it provided a person with a greater sense of freedom. These reasons are possible latent measures of psychosocial variables like autonomy and quality of life. Gabriel and Bowling's study<sup>45</sup> defined quality of life for elders to include constructs of maintaining social relationships, having mobility and feeling safe; all are also measures of cell phone use as presented in this study.

## Location and limitations

Defining 'usefulness' of cell phones is something that must also be viewed within a context. Like other technologies, the capabilities of the cell phone are subject to the location within which the phone is used; wi-fi hot spots are limited in range, so, too are current USA cellular networks and their coverage. If this country ever achieves the level of network ubiquity that is seen in other countries, cell phones would become more reliable and advanced features that are common on international phones might appear on American phones. Under these terms, findings from international studies (like Kurniawan<sup>23</sup> or Mikkonen et al.<sup>24</sup>) could be used as a comparison to American studies. However, because of the rapidly evolving nature of cellular technology, studies conducted in the past may no longer be generalizable to a wider, present day population. The devices may have radically changed.

Less than thirty years old, the mobile phone has not become a commodity like the personal computer has. Third generation technologies are further pushing apart what one

considers a cellular phone versus a smart phone. Recession aside, it is projected that sales for USA cell phones will remain flat this year, a first<sup>46</sup>. In order to address this, companies are increasing their campaigns to market smart phones to consumers. It has yet to be determined if the development of smart phone applications will be adopted by older adults. But the potential is there, especially if they are telecare or telemedicine applications.

## Owning and using

Numerous anecdotal stories are told where a cell phone is given to an older adult by their adult children. This may also be true on a national level, but ownership of a cell phone does not automatically mean the same thing as using it to make and receive phone calls. Is the phone even turned on? Perhaps the elders somewhat resent the push to own these seemingly complicated, unreliable devices. Perhaps they are dissatisfied with cell phone service and quality<sup>47</sup>. Older adults may own a cell phone, but they may not use it. Or they use it on a limited basis. This study showed that use of a phone is an ambiguous measure that needs to be more clearly defined. Using a phone does not automatically mean that it's turned on all the time, or that it is carried on the per-

son. Only one third of the participants in this study always had their cell phones turned on, and less than half of the participants always carried their phone with them. Yet they still considered these devices to be important to them.

## Concluding

Unlike the Internet and personal computers, cell phones allow people to walk through the world, fully connected<sup>48</sup>. But changes in context impact how a person effectively uses a mobile phone<sup>22</sup>. This contextual reason is why cellular phone research is not easily generalizable. Cell phones are not the same thing as personal computers; findings from one location (be it town, city, state, or country) should not be automatically applied to every location. As well, given the continuous and unpredictable changes of a technology that has not yet matured, research on mobile technology may still be exploratory. Therefore, both objective and subjective measures and research questions beginning with the words 'how' and 'why' are needed in order to comprehensively understand the motivations for use, especially when measuring use by older adults – an incredibly diverse population.

## Acknowledgement

Thank you to Dr. Loren Lovegreen for your valuable comments and feedback.

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