Paula Vicente* and Inês Lopes

Attitudes of older mobile phone users towards mobile phones

DOI 10.1515/commun-2015-0026

Abstract: Research on mobile technology adoption has focused predominantly on young adults, and little attention has been paid to older people. But with rapidly aging populations in most developed countries, and evidence from many studies that older adults are as capable of adopting and using mobile technology as everybody else, the academic, business and technology industry worlds are devoting more attention to this group. Research has already demonstrated that older people differ from young people in their perceptions, preferences and usage of mobile technology, but there are also differences within the older adults group regarding mobile technology adoption. Using data from a mobile phone survey, this study identifies segments of mobile phone users among older adults based on their attitudes towards mobile phones, and describes the underlying differences between these segments in terms of key values towards mobile phone communications, mobile phone use, and socio-demographics. The analysis led to the identification of three distinct segments, designated as "Apathetic", "Social and hedonic" and "Busy and active".

Keywords: older adults, mobile phones, technology adoption, segmentation

1 Introduction and background

In recent years, mobile communication technology has gained worldwide popularity with mobile phone ownership rates reaching impressive levels in some countries. In 2012, there were nearly 400 million mobile phone subscribers in Europe and almost 629 million active SIM (Subscriber Identity Module) cards, and they are expected to rise to 417 million mobile phone subscriptions and 700 million active connections by 2017 as mobile technology continues to

*** Corresponding author: Paula Vicente,** Instituto Universitário de Lisboa (ISCTE-IUL), Business Research Unit (BRU-IUL), Lisboa, Portugal, E-mail: paula.vicente@iscte.pt
Inês Lopes, Business Research Unit (BRU-IUL), Lisboa, Portugal,
E-mail: inesislopes@gmail.com

Unauthenticated
Download Date | 3/15/16 7:24 PM

spread and mobile phones become the main mode of communication for most people (Fernández-Ardèvol, 2010).

Mobile phones have gained this popularity because they allow people to stay in touch and have easy access to information anywhere and anytime. The level of mobile phone adoption is, however, different across subgroups. In the EU27 member states, almost all citizens below the age of 55 have a mobile phone, but numbers go down to about 55 % for those aged 75 and over. Mobile phone ownership is also less common among those who left school before 16 (78 %) and the retired (78 %) (TNS, 2013). Moreover, there are variations in use patterns. Younger people's use of mobile phones is driven mainly by social and psychological motivations. They tend to use their mobile phones to engage in activities such as social networking, watching videos, instant messaging and to access the internet (Instituto Nacional de Tecnologías de la Comunicación, 2011; Ipsos MediaCT, 2014; MarketingProfs, 2014; Salesforce, 2014). Adults tend to use mobile phones for personal/family safety and job-related purposes rather than social and hedonic reasons (Conci, Pianesi, and Zancanaro, 2009), while the older adults mostly use mobile phones as a support for their functional autonomy, and to enable them to continue living independently in their own homes (Boulton-Lewis, Buys, Lovie-Kitchin, Barnett, and David, 2007). Differences in mobile phone usage are also influenced by characteristics of work, income, education, marital status as well as by the attitudes, behaviors and perceived benefits of mobile phones (Rice and Katz, 2003).

Based on the differences in ownership and usage, and in attitudes and preferences across subgroups, distinct typologies of mobile phone users have been created. Antoine (2003) suggests six segments to distinguish mobile phone users: (1) the "Uninvolved", corresponding to those who make only limited use of their handsets, own old handsets with limited functionality and restrict usage to a few calls per month; these users see the mobile phone merely as a communication tool and do not value any other functionalities, and they are much older than the average, (2) the "New life harmony" subgroup includes users who know a lot about mobile phones but make only limited use of their handsets; although they have recent handsets, they have no interest in new features and tend to be younger than the average, (3) the "Voice as a link" subgroup tends to include "show-offs" who are very focused on the emotional aspects of using a mobile phone; they use the mobile phone to share emotions with others, sometimes for no particular reason and mostly by voice communication; they are generally older than the average, behave as "passive followers", and are not curious about new functions, (4) the "Adopters" are pragmatic users who consider mobile phones a practical tool; despite basic usage, they show a relatively strong personal link with their phone and make considerable

Unauthenticated
Download Date | 3/15/16 7:24 PM

use of it; they are ready to adopt new features if they meet their needs, (5) the "Intense" segment comprises people who see their mobiles as an indispensable link with their relatives; their handset is above all a communication tool, and their use of SMS is well above average; they are expert users with a strong interest in new functions, and much younger than the average, and (6) the "Forerunners" are the passionate users who expect their mobiles to reflect their personality; they are almost addicted to their mobile phones and are generally over-equipped with hi-tech devices; these people use all the handset features, make frequent calls and use both voice communication and text messaging; their mobile phone is no longer simply a communication tool but a multimedia device; they are much younger than the average.

The segmentation proposed by Horrigan (2007) is based not just on mobile phone usage but also on overall Information and Communication Technology (ICT) usage. He identifies ten distinct groups but they can fit broadly into three segments: (1) "Elite users", namely people with the most information technology, heavy and frequent users of the internet and mobile phones and, to varying degrees, engaged in user-generated content; their levels of satisfaction with the role of ICT in their lives is generally high, (2) the "Middle-of-the-road users", namely people with a task-oriented attitude towards information technology; they use ICT for communication more than for self-expression, and (3) the "Few technology assets", namely people for whom modern gadgetry is at, or near, the periphery of their daily lives; some find it useful, others do not, and others simply stick to the plain old telephone and television.

More recently, Krum (2010) referred to five main segments that distinguish mobile phone users based on attitudes towards mobile communications: (1) the "Up-to-date" segment, that is, those who use their mobile phone as a resource to keep them connected with real-time information about the world around them, (2) the "Social and curious", that is, those using their mobile phones to network, keep up with friends and stay in touch with the people they care about, (3) the "Busy and productive" segment, that is, mobile phone users who want all information that enhances their personal efficiency and ability to cope with a busy schedule; they use mobile phones because they are more portable, accessible or convenient than traditional computers; they are interested in anything that can help them manage their multiple priorities and meet the demands of their busy day, (4) the "Latest and greatest", that is, people who want to be the first to try something, want to use the latest technologies and applications and to belong to the newest social networks and communities, and (5) the "Just the basics", that is, people whose only interest in the phone is to make life easier; they are not impressed by the newest technology or the marketing appeals of most applications.

Unauthenticated
Download Date | 3/15/16 7:24 PM

Young adults have been the focus of most discussions about technology, technological devices and their adoption and use, while older people tend to have been neglected. The general idea that older adults are not very relevant when studying technological issues has been fueled by several factors. First, older adults are believed to be averse to technology, reluctant to experiment new products and services and to prefer to do things the old-fashioned way (Abascal and Civit, 2000; Hazer and Sanli, 2010; Nasir, Hassan, and Jomhari, 2008; Szmigin and Carrigan, 2000). Second, there has been a negative image of the elderly since the early 21th century, due to their lack of productivity and loss of social prestige (Dias, 2012). Additionally, many studies on the digital divide report a strong negative correlation between age and technology adoption and use (e.g., Czaja and Lee, 2007; Morris, Goodman, and Brading, 2007; Neves and Amaro, 2012; van Deursen and van Dijk, 2014), which further devalues the older adult group. However, this situation is gradually being inverted and older adults are gaining more attention in academic, business and technology industry worlds for a number of reasons. First, in most developed countries, older adults are the fastest growing demographic group. People aged 55 or over represent approximately 35 % of the European population, and are expected to increase to 44 % by 2030 (European Commission, 2012). Additionally, the older adults of today have different values, attitudes, life expectancy, life styles and financial possessions from those of previous generations and therefore our knowledge about older adults needs to be updated (Ahmad, 2002). Moreover, a number of studies present evidence that older adults are just as likely as anybody else to accept and adopt technology (e.g., Conci et al., 2009; Mallenius, Rossi, and Tuunainen, 2007; Morris et al., 2007; Rogers, Mayhom, and Fisk, 2009; Rogers and Mynatt, 2003; Selwyn, 2004; Steele, Secomble, and Wong, 2009; Vuori and Holmlund-Rytkönen, 2005), so it is unfair to consider them technophobic. Older adults' expectations of mobile communications are not very different from those of generic users, namely reliable personal communications and services to improve safety and quality of life (Swindell, 2002). Mobile phones can bring benefits to the daily lives of the elderly as they provide a convenient and inexpensive connection with family and friends, and may play a crucial role in the safety-security domain. Devices with safety alarm and person location functions, for example, enable the elderly to get immediate emergency help and health support by pushing the emergency button. Mobile phones can also be used as memory aids to compensate for age-related memory decline. The appointment reminder, alarm, and address book functions can help the elderly schedule and remember daily activities. Even the potential mental training and entertainment offered by games and audio-visual player functions may be attractive to older adults (Chen et al., 2013; Nasir et al., 2008).

Unauthenticated
Download Date | 3/15/16 7:24 PM

Although there is some evidence that the over-55-years group is not one homogeneous group but contains several sub-groups with distinct life styles, values and motivations (Bone, 1991; Vuori and Holmlund-Rytkönen, 2005), most studies on the adoption of the mobile phone communications by older adults have focused on identifying the determinants of mobile phone usage (e.g., Abascal and Civit, 2000; Chen, Chan, and Tsang, 2013; Conci et al., 2009; Mallenius et al., 2007) without considering the heterogeneity among this group. The segmentations proposed by Antoine (2003) and Krum (2010) are evidence of the distinct subgroups that can be found among the general population of mobile phone users. Different segments among the elderly are also likely to exist since some studies have noted that older people's motivations for adopting and using mobile technology vary (e.g., Duggan, 2013; European Senior Watch Observatory and Inventory, 2002; Tang, Leung, Haddad, and McGrenere, 2013). Segmenting mobile phone users, permits different feelings towards mobile phone adoption to be identified, and this can assist mobile technology designers and service providers when developing new communication devices and services to meet users' needs and expectations. In fact, older people can only be successfully reached if there is a good understanding of their abilities, needs, and preferences (Rogers and Mynatt, 2003; van Biljon and van Dyk, 2011). This study contributes to this area by segmenting older mobile phone users according to their attitudes towards mobile phones and describing the differences underlying the various groups in terms of usage, key values towards mobile phone communications and socio-demographics. The paper is organized as follows: In the next section, we describe the data and methods of the study. The results are presented in the section that follows, and finally, we present our conclusions and discuss the implications of our findings.

2 Data and methods

Data used in this study was collected by means of a mobile Computer-Assisted Telephone Interviewing survey using a national random digit dialing sample of mobile phone numbers. The survey was conducted in May 2012 and covered the general Portuguese population of users of mobile phones aged 15 years or older. Sample selection was not list-assisted as there is no database of mobile phone numbers that can be used as a sampling frame. Mobile phone numbers have nine digits and the first two digits identify the operator. Information from the Portuguese Telecommunications Regulation Authority about the market share of each of the three mobile phone operators in Portugal was used to

Unauthenticated
Download Date | 3/15/16 7:24 PM

stratify the population according to service operator. For each operator, mobile phone numbers were created by a generator of seven-digit random numbers, thus making the sample selection method very similar to simple random sampling. A total of 11,472 numbers were dialed, 7,769 of which were eligible numbers. Up to 15 call attempts were made to eligible numbers. The respondent was the person who answered the call on the mobile number, after ensuring he/she was 15 years or older. A total of 1501 mobile phone users were interviewed, 363 of whom were aged 55 or older, which corresponds to 24 % of the sample.

The questionnaire comprised three sections. The first included questions on mobile phone ownership, expenses incurred, and functionalities used. The second section included a set of 16 items designed to evaluate the respondents' attitudes towards mobile phones. These items were measured by means of a four-point Likert-type scale (1 = totally agree, 2 = agree, 3 = disagree, 4 = totally disagree). These items were constructed using the results of the "Portugal Mobile" study conducted in 2007 by OberCom Portuguese Communications Observatorium (Cardoso, Gomes, Espanha, and Araújo, 2007). The third section addressed socio-demographics with questions on the respondent's sex, age, employment status, educational level, region of residence and social class.

The analysis starts with a Principal Components Analysis carried out on the 16 items used to assess attitudes towards mobile phones. Older mobile phone users are then segmented according to their attitudes towards mobile phones by means of a Hierarchical Cluster Analysis. Attitudinal variables were chosen as classification variables because other empirical studies reveal the importance of attitudes to understanding mobile phone usage (Duggan, 2013; Tang et al., 2013; Vehovar, Belak, Batagelj, & Cikic, 2004). The segmentation is complemented by a description of the clusters in order to assess differences between the groups.

3 Results

3.1 Respondents

Almost all of the older respondents are the owners of their mobile phone (96 %), and about one quarter own more than one. The most common tariff among these respondents is the rechargeable card without a top-up tariff (55 %). The mean age of the respondents is 64.6 years, ranging from 55 to 92 years (std deviation = 7.4). Table 1 summarizes the socio-demographic profile of the 363 older respondents.

Unauthenticated
Download Date | 3/15/16 7:24 PM

Table 1: Demographic profile of older respondents.

		%
Sex	Female	51.8
	Male	48.2
Age	55–64	55.6
	65–74	34.2
	75+	10.2
Professional situation	Self-employed	9.9
	Employed by a third party	25.1
	Other	65.0
Educational level	Basic education (9 years)	65.0
	Secondary education (12 years)	19.3
	University level	15.7
Social Class	Upper/Upper middle	17.6
	Middle	31.4
	Lower middle/Low	51.0
Region	Metropolitan area of Lisbon and Oporto	36.6
	North and Centre Coast	32.8
	North Interior	17.4
	South	13.2

The respondents are mostly in the 55–64 age subgroup (55.6 %), have 'other' as professional occupation (which includes the retired and housewives) (65 %), have a basic level of education (no more than 9 years of schooling) (65 %), belong to the lower middle or low social class (51 %), and the majority live outside the large metropolitan areas in Portugal – Lisbon (the capital) and Oporto (the biggest city in the North) (63.4 %). This profile is in line with the profile of the 55+ age group in the overall Portuguese population (Dias, 2012; Marktest, 2012; OberCom, 2007).

3.2 Attitudes towards mobile phones

We investigated several attitudes towards mobile phones using an exploratory principal component analysis (KMO = 0.762; Bartlett's test p-value = 0.000). In total, 16 items are represented in a five-factor structure which together account for 56 % of the total variance. The resulting five-factor solution and the factors' labels are shown in Table 2.

According to the highest loadings in each dimension (loadings above 0.50), the labeling of the new dimensions is as follows: Component 1: The mobile phone is an addictive device; Component 2: The mobile phone is a social status

Unauthenticated
Download Date | 3/15/16 7:24 PM

Table 2: Loadings of components of attitudes towards mobile phones.

Components and items	Loadings[a]	% Variance explained	Cronbach's α
Component 1: The mobile phone is an addictive device		21.0	0.569
Without the phone, I feel disconnected from the world	+0.692		
I feel calmer when I have the mobile phone	+0.685		
I feel anxious when I can't have the mobile phone	+0.635		
The mobile phone allows me to manage the family and private life more efficiently	+0.571		
Without mobile phone, my life would be happier and peaceful	−0.505		
Component 2: The mobile phone is a social status object		12.4	0.597
The opinion of others about my mobile phone is important to me	+0.786		
The design of my mobile phone means a lot to me	+0.634		
The mobile phone allows social status to be identified	+0.628		
Component 3: The mobile phone is a working tool		8.5	0.493
The mobile phone helps me at work	+0.704		
My mobile phone is an essential tool for solving professional problems at any time	+0.624		
The mobile phone helps me remain informed	+0.609		
Component 4: The mobile phone is a device to connect people		7.3	0.461
The mobile phone is a technical device mostly to make and receive calls	+0.818		
My mobile phone is only useful to me if it is permanently on	+0.584		
The mobile phone allows me to be in contact with family and friends	+0.516		
Component 5: The mobile phone is a device that negatively affects privacy and tranquility		6.3	0.272
Most professional calls I get out of working hours are unwelcome and invade my privacy	+0.746		
I often need to turn off the mobile phone for calls that I receive so as not to be disturbed	+0.667		

[a] After varimax rotation. The items are sorted by the size of their factor loadings on a respective factor. Loadings greater than 0.50 are shown.

Unauthenticated
Download Date | 3/15/16 7:24 PM

object; Component 3: The mobile phone is a working tool; Component 4: The mobile phone is a device to connect with people; Component 5: The mobile phone is a device that negatively affects privacy and tranquility.

3.3 Segments in the 55+ mobile phone users group

A cluster analysis was performed with the 363 cases. The older adults were grouped using the components of attitudes towards mobile phones as clustering variables. The Hierarchical Clustering Ward method pointed to a three-cluster solution. The three clusters identified were designated "Apathetic", "Social and hedonic" and "Busy and active". Table 3 contains the size, key attitudes towards mobile phones, mobile phone ownership and use, and socio-demographics for each cluster/segment.

The "Busy and active" segment includes that group of older adults who are still professionally active and for whom the mobile phone is a useful working tool in their professional life and not just a basic communication device or social status object. Their positive feelings towards mobile phones are highlighted by the fact that they disagree that the mobile is addictive or a device that upsets tranquility or privacy. The high percentages of users in this group owning more than one mobile phone (59.1%), spending more than € 20 a month on mobile communications (54.8%) and with a monthly contract tariff (58.7%) are evidence of a pattern of intensive and frequent mobile phone use. Respondents in this cluster are more likely to use the mobile phone to make personal or professional calls, send SMSes, access the internet, consult/edit the mobile phone agenda, take photos and read e-mails than in the other two groups. They seem to be younger than the respondents in the other two clusters, as 55% of respondents aged between 55 and 64 years belong to this cluster; they are more likely to be employed, have a higher educational level, belong to upper social classes, and the majority of those living in heavily urbanized areas are in this group (54.3%). The "Busy and active" segment represents 50% of the sample.

The "Social and hedonic" cluster includes respondents who essentially consider the mobile phone to be a social status object; their negative feelings are related to the disturbance of privacy and tranquility caused by mobile phones and the risk of addiction. The percentage of older adults that use the mobile phone to access the internet (4.5%), consult/edit the agenda (5.6%), read e-mails (6.2%), send SMSes (10.9%), take photos (12.8%) and make personal calls (18.1%) is the lowest of all three clusters. However, they use the mobile phone predominantly to make and receive personal calls which indicates they consider voice communication to be an important way of staying in

Unauthenticated
Download Date | 3/15/16 7:24 PM

Table 3: Characteristics of the three clusters.

	Cluster 1: "Apathetic"	Cluster 2: "Social and hedonic"	Cluster 3: "Busy and active"
Attitude towards mobile phones[(a)]			
Addiction device	Indifferent	Agree	Indifferent
Social status object	Disagree	Strongly agree	Disagree
Working tool	Disagree	Indifferent	Strongly agree
Device to connect with people	Agree	Disagree	Disagree
Negatively affects privacy and tranquillity	Indifferent	Agree	Disagree
Owns 2 or more mobile phones	24.7 %	16.1 %	59.1 %
Mobile phone monthly expense > € 20	31.5 %	13.7 %	54.8 %
Tariff: Monthly contract	28.6 %	12.7 %	58.7 %
Receives personal calls	32.4 %	18.2 %	49.4 %
Makes personal calls	32.5 %	18.1 %	49.4 %
Makes professional calls	10.0 %	11.4 %	78.6 %
Sends SMSes	23.4 %	10.9 %	65.7 %
Accesses the internet	18.2 %	4.5 %	77.3 %
Consults/edits agenda	13.0 %	5.6 %	81.5 %
Reads e-mails	12.5 %	6.2 %	81.2 %
Takes photos	17.0 %	12.8 %	70.2 %
Male	24.6 %	18.9 %	56.6 %
Female	38.8 %	17.6 %	43.6 %
55–64	26.7 %	18.3 %	55.0 %
75 +	47.8 %	15.2 %	37.0 %
Employed	20.2 %	22.9 %	56.9 %
University educational level	17.9 %	7.5 %	74.6 %
Upper/upper-middle social class	21.9 %	9.4 %	68.8 %
Metropolitan Areas of Lisbon and Oporto	33.6 %	12.1 %	54.3 %
n (%)	116 (32 %)	66 (18 %)	181 (50 %)

[(a)] The mean value of each attitudinal item per cluster can be found in Table A.1 of the Appendix.

touch with others. Taking photos is this cluster's second most common use of the mobile phone, which is a sign of a hedonic/leisurely relationship with the device. Respondents in this cluster do not seem as old as respondents in other clusters as only 15.2 % of those aged 75+ are in this group; they are less likely to be highly educated, as only 7.5 % of respondents with university education are classified in this cluster, and less likely to belong to the upper/upper-mid-

Unauthenticated
Download Date | 3/15/16 7:24 PM

dle social classes (9.4 %). This is the minority cluster, representing only 18 % of the sample.

The "Apathetic" segment, representing 32 % of the overall sample, was given this name as it includes older adults who only value the mobile phones as a device that allows them to get in touch with others, and are indifferent to (or do not value) all other aspects. While this group is positioned between the other two clusters in most of the mobile phone ownership and use items, it stands out socio-demographically in terms of age and gender. The cluster seems to comprise predominantly elderly women – it has the highest percentage of people aged 75 years or older people (47.8 %) and nearly 40 % of women are in this cluster –, probably widowed and living alone, for whom the mobile phone provides a sense of security or safety, as family members can be contacted in case of emergency.

4 Discussion and conclusion

The aim of this study was to segment older mobile phone users according to their attitudes towards mobile phones. Through the cluster analysis, we identified three segments with different attitudes towards mobile phones: "Apathetic", in which users regard the mobile phone as a mere communication device useful to stay in touch with family and friends, "Social and hedonic", in which the mobile phone is seen mostly as a social status object, and "Busy and active" in which the mobile phone is essentially a working tool. Half of the sample is made up of "busy and active" older adults. The sample did not contain as many clusters as in the literature. One explanation may be that only attitudinal variables were used for classification and not behaviors and socio-demographic characteristics as in other segmentations. Another explanation could be that our segmentation is performed on a restricted subgroup – those aged 55+ – rather than the entire population of mobile phone users and heterogeneity among a smaller group is likely to be lower than in large groups. Nevertheless, our results demonstrate that the older-adult population is not a homogeneous group but includes people with distinct key attitudes towards the mobile phone.

The differences observed between the three segments are probably due to the distinct lifestyles, time occupation and life cycle that impact the importance older adults attribute to mobile phones and their pattern of mobile phone use. The "Busy and active" are more likely to be younger, highly educated, belong to the upper social classes, and be employed; this is coherent with a busy

Unauthenticated
Download Date | 3/15/16 7:24 PM

lifestyle for either professional or social reasons that entails more frequent use of the mobile phone and its various functionalities to stay in touch with others and/or to resolve problems efficiently. This group has some similarities with the "Middle-of-the-road users" of Horrigan (2007) because of their very task-oriented use of the mobile phone, and also shares characteristics with the "Busy and productive" (Krum, 2010) and the "Adopters" segments (Antoine, 2003), which demonstrates that some older people have busy schedules and need mobile phones to cope with multiple tasks.

The "Apathetic" segment comprises people who do not make much use of the mobile phone, probably because they find it difficult to deal with technological devices due to their advanced age – 47.8 % of people aged 75 or older belong to this segment – and low education – this cluster includes only 17.9 % of university graduates. Older adults in this segment are more likely to be retired and therefore have fewer communication and social networking needs. They give greatest value to the fact that the mobile phone allows them to connect with family and friends and so helps fight loneliness and isolation; they use the phone mainly for making personal calls (32.5 %) and sending SMSes (23.4 %), and do not value the mobile phone's other features. This group shares some characteristics with the "Uninvolved" (Antoine, 2003) and "Just the basics" (Krum, 2010) segments in that they make limited use of the mobile phone and feel predominantly that it serves to get in touch with family and friends.

The "Social and hedonic" segment has a less utilitarian and functional relationship with the mobile phone. The social image of the mobile phone is important to the people belonging to this segment, and their main use of the mobile phone – receiving and making personal calls – is evidence that it fulfills their needs for social networking and keeping up with friends. The group also highlights addiction and invasion of privacy as the strongest feelings towards mobile phones, which means they probably spend a lot of time on the phone. This group has some similarities with the "Voice as a link" (Antoine, 2003) and the "Social and curious" (Krum, 2010) segments due to the social importance attributed to the mobile phone.

The outcomes of the study reveal that mobile communications play different roles in the lives of older adults, so those who design mobile phone devices, conceive and implement mobile applications or provide mobile communications services should recognize that an approach of the type "one model fits all" is not the most adequate to reach older adults. In the future, the "Busy and active" segment will undoubtedly grow as people must remain professionally active longer due to increases in the retirement age (e.g., in Portugal). At the same time, there will always be place for the other segments to exist, namely because older adults is a subgroup with specific characteristics arising from

Unauthenticated
Download Date | 3/15/16 7:24 PM

ageing – changes in perception, cognition, movement, and psychosocial functioning – which affects the way they use technology in general and mobile phones in particular.

Data used in this study was collected by means of a mobile Computer Assisted Telephone Interviewing survey, a fact that needs to be taken into account when interpreting specific outcomes of this study. The frequency and intensity of mobile phone use is most marked in the "Busy and active" segment, which is also the biggest segment, weighting 50 % of the sample. However, there should be caution in concluding that the majority of the older adult population are "Busy and active" because the size of this segment in the sample may be a consequence of the survey mode. Indeed, it is precisely the people who use mobile phones more often and with more confidence that are more likely to agree to participate in a mobile phone survey, thus leading to their overrepresentation in the sample. Consideration should also be given to the values of Cronbach's Alpha associated with the attitudinal dimensions as they are below the adequate standards (≥ 0.7), suggesting a low internal consistency of the attitudinal components. This may be a consequence of some measurement error introduced in the data caused by administering the questionnaire via mobile phone. It is well recognized that the mobility of the mobile phone allows mobile phone interviews to be responded to in a variety of places and circumstances, some of which are not the most favorable to listen properly to the questions and think carefully about the answers (AAPOR 2010). More than a quarter of the older adults in the sample were interviewed outside the home (on the street, in shops, in someone else's home), and this might have affected data quality, thus causing lower Cronbach's Alpha values.

As the proportion of older adults is expected to grow and the ubiquitous presence of mobile communications is increasingly an attribute of modern societies, the adoption of mobile technology by older adults should be examined carefully to help mobile technology designers and service providers develop new communication devices and services that meet these users' needs and expectations. The exponential growth of smartphone ownership has already been identified as a trend in the mobile communications market (eMarketeer, 2014), but there is a lower penetration rate of these devices among older age groups, and they have greater difficulty in using them (e.g., MarketingProfs, 2014; Nielsen, 2013). Whether this is a cause for the mobile exclusion of the elderly, and whether the same segments would be found if the analysis was restricted to owners of smartphone devices are both interesting avenues for future research.

Acknowledgments: This work has the financial support of *Fundação para a Ciência e Tecnologia* through the PTDC/EGE-GES/116934/2010 project.

Unauthenticated
Download Date | 3/15/16 7:24 PM

References

AAPOR. 2010. *Cell phone task force report. American Association for Public Opinion Research*. Retrieved August 12, 2012 from http://www.aapor.org/Cell_Phone_Task_Force_Report.htm.

Abascal, J. & Civit, A. 2000. *Mobile communication for older people: New opportunities for autonomous life*. Paper presented at the Workshop on Universal Accessibility of Ubiquitous Computing: Providing for the Elderly. Retrieved December 4, 2015 from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.121.6634&rep=rep1&type=pdf.

Ahmad, R. 2002. The older or ageing consumers in the UK: Are they really that different? *International Journal of Market Research* 44(3), 337–360.

Antoine, P. 2003. *Understanding the mobile phone market drivers*. Alcatel Telecommunications Review, 4th Quarter 2003/1st Quarter 2004, 1–7. Retrieved December 4, 2015 from http://www.privateline.com/archive/alcaatel.pdf.

Bone, P. 1991. Identifying mature segments. *Journal of Consumer Marketing* 8(4), 19–32.

Boulton-Lewis, G., Buys, L., Lovie-Kitchin, J., Barnett, K., & David, L. 2007. Ageing, learning and computer technology in Australia. *Educational Gerontology* 33, 253–270.

Cardoso, G., Gomes, M. C., Espanha, R., & Araújo, V. 2007. *Portugal móvel, utilização do telemóvel e transformação da vida social*. Lisboa, OberCom.

Chen, K., Chan, A., & Tsang, S. 2013. *Usage of mobile phone amongst elderly people in Hong Kong*. Proceedings of the International MultiConference of Engineers and Computer Scientists, Hong Kong.

Conci, M., Pianesi, F., & Zancanaro, M. 2009. *Useful, social and enjoyable: Mobile phone adoption by older people*. In T. Gross et al. (Eds.), INTERACT 2009, Part I, LNCS 5729 (pp. 63–79).

Czaja, S., & Lee, C. 2007. The impact of aging on access to technology. *Universal Access in the Information Society (UAIS)* 5(4), 341–349.

Dias, I. 2012. O uso das tecnologias digitais entre os seniores – Motivações e interesses. *Sociologia, problemas e práticas* 68, 51–77.

Duggan, M. 2013. *Cell phone activities 2013*. PewResearchCenter. Retrieved December 4, 2015 from http://pewinternet.org/Reports/2013/Cell-Activities.aspx.

EMarketeer 2014. *Worldwide smartphone usage to grow 25% in 2014*. Retrieved November 12, 2014 from http://www.emarketer.com/Article/Worldwide-Smartphone-Usage-Grow-25-2014/1010920.

European Commission 2012. *E-communications household survey*. Retrieved December 4, 2015 from http://ec.europa.eu/public_opinion/archives/ebs/ebs_381_en.pdf.

European Senior Watch Observatory and Inventory 2002. *Older people and information society technology – A comparative analysis of the current situation in the European Union and of future trends*. Retrieved December 4, 2015 from http://s3.amazonaws.com/zanran_storage/www.edis.sk/ContentPages/45029828.pdf.

Fernández-Ardèvol, M. 2010. *Interactions with and through mobile phones: What about the elderly population*? Paper presented in 3rd European Communication Conference, Hamburg, 12–15 October, 2010.

Hazer, O., & Sanli, S. 2010. The technology opportunities in everyday life for the elderly. *International Journal of Social Sciences and Humanity Studies* 2(2), 97–102.

Unauthenticated
Download Date | 3/15/16 7:24 PM

Horrigan, J. 2007. *A typology of information and communication technology users. Pew research internet project*. Retrieved December 4, 2015 from http://www.pewinternet.org/files/old-media/Files/Reports/2007/PIP_ICT_Typology.pdf.pdf.

Instituto Nacional de Tecnologías de la Comunicación 2011. *Study on safe habits in the use of smartphones by Spanish children and adolescents*. Retrieved December 4, 2015 from https://www.incibe.es/file/lqwWZ8Nhn3R546wrLqmOJw.

Ipsos MediaCT 2014. *Our mobile planet: Portugal – Understanding the mobile consumer*. Retrieved December 4, 2015 from https://pt.scribd.com/doc/243985678/Our-Mobile-Planet-Portugal-2013-EN-pdf.

Krum, C. 2010. *Mobile marketing: Finding your customers no matter where they are*. Indianopolis, IN: Que Publishing.

Mallenius, S., Rossi, R., & Tuunainen, V. 2007. *Factors affecting the adoption and use of mobile devices and services by elderly people – results from a pilot study*. Retrieved December 4, 2015 from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.130.2463&rep=rep1&type=pdf.

MarketingProfs. 2014. *How different generations use smartphones*. Retrieved November 25, 2014 from http://www.marketingprofs.com/charts/2014/25522/how-different-generations-use-smartphones.

Marktest. 2012. *Telecommunications barometer December 2011*. Retrieved December 4, 2015 from http://www.marktest.com/wap/a/n/id~18f8.aspx.

Morris, A., Goodman, J., & Brading, H. 2007. Internet use and non-use: Views of older users. *Universal Access in the Information Society* 6(1), 43–57.

Nasir, M., Hassan, H., & Jomhari, N. 2008. The use of mobile phones by elderly: A study in Malaysia perspectives. *Journal of Social Sciences* 4(2), 123–127.

Neves, B. & Amaro, F. 2012. Too old for technology? How the elderly of Lisbon use and perceive ICT. *The Journal of Community Informatics* 8(1). Retrieved December 4, 2015 from http://ci-journal.net/index.php/ciej/article/view/800/904.

Neves, B., Amaro, F., & Fonseca, J. 2013. Coming of (old) age in the digital age: ICT usage and non-usage among older adults. *Sociological Research Online* 18(2).

Nielsen. 2013. *The mobile consumer – A global snapshot*. Retrieved November 25, 2014 from http://www.nielsen.com/content/dam/corporate/uk/en/documents/Mobile-Consumer-Report-2013.pdf.

OberCom. 2007. *Portugal Móvel – Utilização do telemóvel e transformação da vida social*. Retrieved December 4, 2015 from http://www.obercom.pt/client/?newsId=29&fileName=rr4.pdf.

Rice, R. & Katz, J. 2003. Comparing internet and mobile phone usage: Digital divides of usage, adoption, and dropouts. *Telecommunications Policy* 27, 597–623.

Rogers, W., Mayhom, C., & Fisk, A. 2009. Technology in everyday life for older adults. In D. C. Burdick & S. Kwon (Eds.), *Gerotechnology research and practice in technology and aging* (pp. 3–11). New York: Springer Publishing Company.

Rogers, W., & Mynatt, E. 2003. How can technology contribute to the quality of life of older adults? In M. E. Mitchell (Ed.), *The technology of humanity: Can technology contribute to the quality of life?* Chicago, IL: Illinois Institute of Technology.

Salesforce. 2014. *2014 Mobile Behavior Report – Combining mobile device tracking and consumer survey data to build a powerful mobile strategy*. Retrieved December 4, 2015 from http://www.exacttarget.com/sites/exacttarget/files/deliverables/etmc-2014mobilebehaviorreport.pdf.

Unauthenticated
Download Date | 3/15/16 7:24 PM

Selwyn, N. 2004. The information aged: A qualitative study of older adults' use of information and communications technology. *Journal of Aging Studies* 18, 369–384.
Steele, R., Secomble, C., & Wong, Y. 2009. Elderly persons' perception and acceptance of using wireless sensor networks to assist healthcare. *International Journal of Medical Informatics* 78(12), 788–801.
Swindell, R. 2002. Technology and the over 65s? *Get a life* 20, 17–23.
Szmigin, I., & Carrigan, M. 2000. The older consumer as innovator: Does cognitive age hold the key? *Journal of Marketing Management* 16, 505–527.
Tang, C., Leung, R., Haddad, S., & McGrenere, J. 2013. *What motivates older adults to learn to use mobile phones*. Retrieved December 4, 2015 from https://www.cs.ubc.ca/~joanna/papers/GRAND2012_Tang_MobilePhone.pdf.
TNS. 2013. e-*Europe: How are Europeans connected?* Retrieved January 26, 2015 from http://www.tns-opinion.com/sites/default/files/THINK%2010.pdf.
van Biljon, J., & van Dyk, T. 2011. *Mobile phone adoption: Optimizing value for older adults in a developing country*. Retrieved December 4, 2015 from http://uir.unisa.ac.za/bitstream/handle/10500/5396/OptimizingValueOlderAdults_IDIA2010.pdf?sequence=1.
van Deursen, A., & van Dijk, J. 2014. The digital divide shifts to differences in usage. *New Media & Society* 16(3), 507–526.
Vehovar, V., Belak, E., Batagelj, Z., & Cikic, S. 2004. Mobile phone surveys: The Slovenian case study. *Metodoloski zvezki* 1(1), 1–19.
Vuori, S., & Holmlund-Rytkönen, M. 2005. 55+ people as internet users. *Marketing Intelligence & Planning* 23(1), 58–76.

Appendix

Table A.1: Mean value of attitudinal components per cluster.

Attitudinal component*	Cluster 1	Cluster 2	Cluster 3
The mobile phone is an addiction device	+0.023	−0.278	+0.087
The mobile phone is a social status object	+0.181	−1.132	+0.297
The mobile phone is a working tool	+0.859	+0.017	−0.557
The mobile phone is a device to connect people	−0.485	+0.123	+0.266
The mobile phone is a device that negatively affects privacy and tranquillity	+0.194	−0.749	+0.148
n (%)	116 (32 %)	66 (18 %)	181 (50 %)

* Standardised variables with mean 0 and standard deviation 1. Positive values indicate an attitude of strong disagreement.

Unauthenticated
Download Date | 3/15/16 7:24 PM