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Beyond WhatsApp: Older people and smartphones

Abstract

This paper analyzes how older people, living in Spain, use smartphones and smartphone applications. Using a mixed methods approach, we compare quantitative results obtained by tracking mobile app usage amongst different generational samples with qualitative, focus-group discussions with active smartphone users. A sample of Spanish smartphone users were tracked during one month in the winter of 2014 (238 individuals, aged 20 to 76 years-old). This was followed by three focus group sessions conducted in the spring of 2015, with 24 individuals aged 55 to 81. As we learned, WhatsApp is currently the most popular application used by people of all ages, including older adults. Smartphones increasingly are playing a central role in the life of older participants, although the frequency of app access is negatively correlated with age. On the other hand, as our data indicates, older adults also use a number of different types of apps that are distinct from that of younger users. Older participants access personal information manager apps (calendar, address book and notes) more often than other age groups. And comparatively, older participants use the smartphone less often in stable locations (home, office, relatives' home) with Wifi than somewhere else and with mobile data. As we argue, differences in age seem to reflect the evolution in personal interests and communication patterns that change as we grow older. Our study captures new trends in smartphone usage amongst this cohort. It also indicates how a combination of methods may help to assess the validity of the log and qualitative data. We highlight the relevance of conducting careful generational studies in smartphone use and some of the potentials and limitations of making predictive studies of ICT use as we change throughout the life course. Finally, we assert the value of the inclusion of older representatives within research, which ultimately may influence public decisions and the design of new technologies.

Keywords: smartphones; ageing; apps; use patterns; elders; focus groups; log data.

Introduction

Older adults are often portrayed as less avid users of information and communication technologies (ICT), as uninterested in ICTs, or of not being capable to use them properly. These discourses find some support if one examines the existing available data (Eurostat, 2015). Yet, this statistical picture is changing and one must also question how this data was collected and what it may include or include. For example, older adults show the highest growth rate for mobile ICT adoption in developed contexts (Deloitte, 2014). An increasing amount of evidence examines older individuals as active users of social network sites (SNS) such as Face-

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book (Choudrie & Vyas, 2014; Duggan, Ellison, Lampe, Lenhart, & Madden, 2015; Nef, Ganea, Müri, & Mosimann, 2013), their use of virtual spaces for maintaining both weak and strong ties (Hage & Noseleit, 2015; Khvorostianov, Elias, & Nimrod, 2012) or for developing personal interests (Nimrod, 2014). Closer to home, the pervasive use of instant messaging (IM), notably WhatsApp in Spain (CIS, 2016), challenges an array of age stereotypes as demonstrated by a casual observation in the city of Barcelona where people of any age – older people included – are seen busily using their smartphones while on public transport. Such stereotypes of the participation of older people in the world of ICTs are often built on embedded prejudices that run contrary to available empirical evidence. More recent studies address this stereotypical portrait of ICT use in the case of older people (Loos, 2011) and can assist us to understand how research may be contributing to the perpetuation of an age-based digital divide (Lagacé, Charmarkeh, Tanguay, & Annick, 2015).

Digital media use, as a part of the overall landscape of mediated communication, is widely studied with respect to children and youth, but is underdeveloped with respect to older people (Colombo & Fortunati, 2011; Mihailidis, 2014; Silverstone & Haddon, 1996). Teenagers and young people often constitute reference points for ICT studies because it is assumed that they help identify the main trends of adoption and use (Castells, Fernández Ardèvol, Linchuan Qiu, & Sey, 2006; Ito et al., 2010). Contributions that take the older population into account are scarce in comparison, although there is a growing interest in how older adults engage with Internet and ICTs in general (Colombo & Fortunati, 2011; Loos, Haddon, & Mante-Meijer, 2012; Prendergast & Garattini, 2015) and in mobile communication in particular (Comunello, Mulargia, Belotti, & Fernández-Ardèvol, 2015; Fernández-Ardèvol, 2016; Nguyen, Irizarry, Garrett, & Downing, 2015; Pang, Vu, Zhang, & Foo, 2015; Petrovèiè, Fortunati, Vehovar, Kavèiè, & Dolnièar, 2015). There appear to be (non-explicit) normativities that persistently frame the ideal patterns of use and adoption as those belonging to youth, although this is changing.

Ageing and age are socially constructed phenomena and are ongoing processes. Ageing in particular, and phases in the life course in general, shape and are shaped by broader relations of power as Calasannti & King have argued in a recent paper (2015). Being old often has negative connotations (Garattini & Prendergast, 2015) because of prevailing age-related norms that often portraying older people as limited individuals who are objects of others' actions (Jolanki, 2009). Such norms limit the perceived agency of older people in different ways. Yet as Ling has argued in 2008, intimate personal network can act either as a supportive mechanism or a limiting one (Ling, 2008). This set of conditions and context affects ICT adoption in particular and perceptions of digital technologies in general (Buccoliero & Bellio, 2014). As other research indicates, personal values and interests change over the lifetime (B. L. Neugarten, 1996) and personal communication patterns and the use of media evolve as we grow old, as Ling, Bertel, & Sundsoy (2012) have demonstrated in analyzing differences in SMS use between different age groups. Stereotypes surrounding ICT use may contribute significantly to digital inequalities, as they deploy implicit modes of operation that may shape social behaviors (Greenwald & Banaji, 1995), including ICT skills (Lagacé et al., 2015)

Studies that track online individual behavior have multiplied recently, and older people have started to be included in such analyses (Azuddin, Malik, Abdullah, & Mahmud, 2014; Pang et al., 2015). Tracking online activities offers new ways of achieving an accurate understanding of users' behaviors (Gonçalves & Ramasco, 2009) that partially correlates with reported use (Boase & Ling, 2013). However, these analyses tend to be ahistorical ((Up-

richard, 2012), static or focused on very short-term observations (Thomas et al., 2013). Despite the obvious necessity to question the assumptions involved in the huge capacities that big data bring to research(boyd & Crawford, 2012), few approaches try to understand the meaning behind the existing databases, databases that reflect online activity in terms of individuals' everyday life perspectives (DeLyser & Sui, 2013). In this regard, a key contribution to our understanding of data is to compare and confront the results obtained with log-tracked data with the opinions and perceptions of different groups, such as older people.

The goal of this paper is to understand the ways that older people appropriate smartphones from a perspective that challenges ageist stereotypes. To do so, we create a dialogue between the results of a generational log data study and the reported experiences of older smartphone users. We first tracked the activity of 238 smartphone users aged between 18 and 76 years old for one month. We then gathered reported experiences, related to the results of the first part of the study, in three focus groups with 25 individuals aged between 55 and 81 years old. Our analysis is oriented in two inter-related directions: the specific uses (what?) by older adults of smartphones and the routines established by our older participants (where?). We explore the specificities of smartphone use among older people, to better articulate the relevancy that the smartphone, and smartphone applications (or apps) have for older individuals. The (new) perspective that log data brings to the study of digital devices allows for an increase in our overall knowledge on the current use of smartphones while our focus group research adds nuance to these issues. With this in mind we look more closely at current research on smartphones.

Studying smartphone use

Smartphones have specific affordances and capabilities, different from computers or tablets. The comparison of use patterns among136 smartphone users and 160 laptop users in the US, including the analysis of log data gathered in 2009, shows that use sessions tend to be shorter and more distributed through the day in smartphones than in laptops (Oulasvirta, Rattenbury, Ma, & Raita, 2012). One study, undertaken in Flanders, Belgium, analyzed news consumption on mobile devices –smartphones and tablet computers combined interviews, diaries, and automated data logs of 30 participants tracked during one week (Van Damme, Courtois, Verbrugge, & Marez, 2015). Researchers found that news media are consumed on different screens, such as computers, laptops, television, or mobile devices. The authors also identified a noticeable shift towards news consumption on mobile devices, which is considered an individual activity. Interestingly, the consumption of news on mobile devices is mostly non-mobile, as the consultation of news when at home exceeded that during the rest of the day. Indeed, the mobile phone tends to be used most (from stable locations, such as the home, work, or school (Castells et al., 2006) than on the go. This is, perhaps, a reflection of the social dynamics that articulate everyday life (Giddens, 1987 ch. 6). For instance, the Spanish population, aged 10 years old and over, spend most of the day at home (16:34 hours on average), while the second most common place for people to be is their place of work or school (2:45 hours). In addition, people spend one hour a day on the street or in open spaces, and 1:08 hours on transportation.

Mobile phones constitute important everyday life tools that allow for permanent connection (Katz & Aakhus, 2002). Permanent connection means being able to reach others at any moment, however this does not mean that individuals spend the whole day on their smart-

phones. The consultation period on the device tend to be short. What one finds are brief usage sessions repeated over time, which represent an important part of smartphone use and constitute one of its particular characteristics. Ørmen & Thorhauge (2015) term these 'microroutines', which are embedded into everyday life patterns. In the US, the 6-month tracking of 25 users demonstrated that smartphones are in the idle state most of the time (Shye, Scholbrock, Memik, & Dinda, 2010).

The design and goals of log data studies are diverse. In Finland, 20 smartphone users were tracked during four weeks and interviewed to determine their social networking patterns through a specific social network aggregator service, LinkedUI (Cui & Honkala, 2011). The authors also observed that people form habits of checking their mobile devices at frequent intervals. In South Korea, a national panel of 1646 users provided by a marketing research company, were tracked during one month in 2011 to measure usage concentration of smartphone apps (Jung, Kim, & Chan-Olmsted, 2014). While panelists' time was concentrated on a few apps, the array of game apps used was diverse. That is, most people used the same few apps but in the case of games the market was much more segmented. In addition, there seems to be the conjoint use of apps, as a study in the USA showed. Based on data traffic and the time access of apps collected from a set of 600.000 unique subscribers, gathered evidence suggests that, for instance, weather and news apps are used together (Xu et al., 2011). Finally, according to Barkhuus & Polichar (Barkhuus & Polichar, 2011), individuals use their smartphones in highly individual manners to suit their needs and lifestyle. For example many people use mobile devices during parallel activities of personal interest, such as streaming music while cycling or playing games while watching TV (Lord et al., 2015).

Smartphone logs to predict smartphone use

An array of studies have attempted to make predictions on different aspects of smartphone use (Ørmen & Thorhauge, 2015). In 2004, the MIT Human Dynamics Laboratory conducted a pioneer study that gave rise to the reality mining dataset (Eagle & Pentland, 2006) by tracking 100 smartphones to "extract patterns that predict future human behavior".[1] Within the project, a classification of daily routines based on mobile phone data, which then encouraged researchers to make predictive statements on the routines in an individual's everyday life (Eagle & Pentland, 2009). Similarly, Nokia Research Center conducted the Lausanne data collection campaign in 2009-2010 (Kiukkonen, Blom, Dousse, Gatica-Perez, & Laurila, 2010). They analyzed smartphone log data together with self-reported information. This mixed method was used to determine personality traits of mobile phone users that could feed machine learning methods (Chittaranjan, Jan, & Gatica-Perez, 2011).

A lack of generational perspective

Most papers analyzing smartphone use do not collect or report the age of participants, do not include older people, or do not report the nuances of smartphone use depending on age differences. Among this rising number of studies that track smartphone use, almost none focus on older people or make generational comparisons. One possible exception is a study on

the excessive dependence on smartphones comparing 'digital natives' and 'non natives', where (non) nativity was based on the participant's age (Ahn & Jung, 2014). The majority of research analyzes youth and adults together (Cui & Honkala, 2011; Eagle & Pentland, 2009; Oulasvirta et al., 2012; Van Damme et al., 2015). There are also studies that look at a specific age group, such as youth (Lee et al., 2014; Mihailidis, 2014; Pan, Chen, & Rau, 2013; Raento, Oulasvirta, & Eagle, 2009) or adults (Barkhuus & Polichar, 2011; Kiukkonen et al., 2010). Jung et al. (Jung et al., 2014) analyze a sample of individuals grouped by age from 10 years old to 50 years old and over, ignoring nuances for each generation. In Chittaranjan, Jan, & Gatica-Perez (Chittaranjan et al., 2011), the sample ranges from 19 to 63 years old with no specific analysis of the age dimension. Finally, some studies do not even mention the age of participants in the case study (Böhmer, Hecht, Schöning, Krüger, & Bauer, 2011), either because authors do not consider it relevant for the topic of the study, or because it was not possible to access that information (Lord et al., 2015; Shye et al., 2010; Xu et al., 2011). Given this context, one of our goals is to contribute to a reflection on the current shortage of data on older individuals in the study of smartphone by providing specific empirical evidence and by discussing its interpretation. The research question we have is: What are the specificities, if any, in the use of smartphones by older adults?

Method

To answer this question, we have used a mixed methods approach. First, we tracked users' smartphone activity in a sample of 283 adults during a period of one month. Second, we conducted three focus groups with older adults to have insight into the way they used their smartphones.

Research based on the log data generated by smartphones have proliferated since the mid 2000s. Smartphones open the door, as do other on line digital media, to automated log data which allow non-intrusive records of mundane everyday life activities and make possible "augmented longitudinal, process, and context-sensitive investigations" (Raento et al., 2009). Log data are used to obtain "real use" data not only in the field of the social sciences, but also in computing sciences in general (Shye et al., 2010) and in human computer interaction in particular (Cui & Honkala, 2011). However, "the log data per se cannot provide the most important insights, namely the context and purpose of use" (Ørmen & Thorhauge, 2015) and it is necessary to keep in mind that not all data gathered on the device corresponds to the activity of the user (Raento et al., 2009). Thus, a mixed methods approach (Creswell, 2003) is used to complement the quantitative data from smartphone logs, with qualitative data from focus groups. In what follows we detail these two very different yet related studies, one using mobile app tracking and one based on focus groups. Some details of the tracking are necessary for an appropriate interpretation of results.

Mobile app tracking

As we are researchers who live and work in the context of Spain, we have used a market research panel that focuses on the Spanish population to track the online activities of a set of

panelists on their smartphones (from now on in this paper we will refer to them as panelists). The panelists are active internet users, already registered in the panel when we started the study. They installed an app on their device(s) to become part of the tracked panel and received non-economic rewards for participating in the activities of the panel-mainly surveys and tracking. The dataset corresponds to one month of activity between 17 November and 16 December 2014. The software registers every time each user accesses an app, the date and time of the access, the active length of the session, and the type of connection (Wi-Fi or mobile data). For example if a panelist opens a fitness app (i.e. Endomondo) to track their running, the software counts one access when they activate it, and then logs the length of the session until the panelist moves onto another app or their phone returns to the idle mode.

The sample within our study corresponds to 171.360 hours of smartphone activities. It belongs to a wider log data collection which, in the same period, the tracked the activity of 455 panelists either on their computers or on their mobile devices. The selected sample resembles the characteristics of the Spanish population who are active Internet users (INE, 2014). The oldest panelist was only 76, which is a reflection of (online) market research interests, which do not consider older people as a prominent target (Sawchuk & Crow, 2011). After filtering, the final sample of smartphone users was 238 panelists, which gave us access to 242 devices, as four panelists participated with two smartphones. With 122 women (51,2%) and 116 men (48,7%), age ranges from 20 to 76 years old: 36 panelists (15,1% of the sample) can be classified as young individuals – 20-24 years old; 94 (39,5%) as young adults – 25-39 years old; 91 (38,2%) as adults – 40-59 years old; and 17 (7,1%) as older individuals – 60-76 years old.

Focus groups

25 participants—15 men and 10 women, aged 55 to 81, participated in the focus groups (from now on in this paper we will refer to them as participants). When using quotations from participants we will indicate their sex and age to guard their privacy. Participants were involved in one two-hour session, divided in three groups of 8, 8 and 9 participants. All had different levels of experience with smartphones, from four months to three years of use. All of them are involved in a self-learning group on smartphones, showing their interest in the use of their smartphones. Participants meet weekly at Àgora, a highly participatory, lifelong-learning community, to share their knowledge about smartphones, to express their doubts and concerns, and to learn new things from their others. Àgora is committed to strengthening the social inclusion of older people and immigrants in Barcelona (Catalonia, Spain) by providing them with free courses on a wide range of areas, such as Internet and languages (Sanchez Aroca, 1999).

Three researchers, two of them the authors of the paper, conducted the focus groups. To answer the research question, the outline of the conversations included four issues: a) participants' history with smartphones, b) What do they use them for? c) Where do they use them? and d) When do they use them? Focus groups were voice recorded for further transcription. The authors listened to the audios, read the transcriptions, and discussed the more prominent topics in order to make a thematic analysis (Braun & Clarke, 2006).

Description of the data set

As we discovered, our participating panelists accessed 2247 different apps on their smartphones during the tracked month. We used OpenRefine to identify different versions of the same app and group them under the same label, e.g. "Facebook" and "Facebook for HTC" were labeled as Facebook.[2] In this paper we focus on the number of accesses, the time and day of access, and the type of connection (Wi-Fi or mobile data) used when the app was accessed.

For analytical purposes we have categorized the mobile apps in the sample. To optimize the research effort, we have reduced the number of apps to be categorized by applying three non-exclusive criteria to select the most used apps, namely the number of users, the number of access and the mean time of use during the tracked month. In each case we have included the top 300 apps. In terms of users, the app in the 300th position had 4 users while the top app had 233 (WhatsApp); in terms of accesses, the 300th app had 88 accesses while the top app had 188.911 accesses (WhatsApp); and in terms of average length of session, the app in the 300th position accounted a mean time of 2:57 minutes of access and the app in the 1st position accounted 60 minutes (Clean). The resulting set of apps represented 30% of the accessed apps (675 out of 2.247) and accounted for 97% of accesses among the sample, and for 98% of the time spent by the 238 panelists in their tracked devices.

Table 1 collates our classification of mutually exclusive categories. The 675 apps were categorized using an iterative and open form of thematic analysis (Braun & Clarke, 2006). Three researchers participated in the three-iteration process that used the name of the app and its description. For those apps related to more than one category we chose the most relevant category to allow for a univocal taxonomy. While previous studies have used adaptations of the app store taxonomy (Böhmer et al., 2011; Carrascal & Church, 2015; Xu et al., 2011) we created an app taxonomy taking into account both the multimodal mass media and the interactive, horizontal networks of communication built around the Internet and wireless communication provided in the context of "mass self-communication" (Castells, 2009, p. 4).

For the analysis we focused on a selection of categories deemed relevant to the topic of our study, a generational comparison of online activities. We did not include System and Market research tools in our further analysis, as they mostly constitute activities the mobile device does by itself, or are not the users' intended activity. For instance, launchers (part of the system category) are accessed every time the user accesses the device, but usually the purpose is to open another app. In addition, we excluded eBooks and Health & Fitness categories due to their limited number of users.

Results

Given this data, we can now discuss how smartphone use is different – or not – for older participants and why particular smartphone apps are relevant to the participants in the three focus groups. We contrast most significant results of the generational tracking study, mainly in terms of app access with the experiences reported in the focus groups, in terms of specific uses (what?) and routines (where?) participants use their smartphones in order to better understand this data.

Table 1. Categories of mobile apps and their description, by alphabetical order. Number of users and number of apps in each category

Category	Users	Apps
Bank	72	9
Financial corporations' apps.		
Browsers & Searchers	208	10
Internet browsers and search engines.		
Device Management	220	52
Tools for management, improvement, and optimization of the smartphone (antivirus, app managers, battery savers and cleaning systems, amongst others).		
eBooks	34	8
Apps to read and/or download eBooks.		
Email	187	10
Apps to manage email, such as Gmail, email (for Android), or Yahoo.		
File Management	206	20
Tools for managing files inside the smartphone or with other devices, such as Gallery or Dropbox.		
Games	145	171
Games and gambling apps.		
Health & Fitness	31	9
Tools to manage data related with health & fitness, such as sport trackers and calorie counters.		
IM, Voice & Video Calls	237	20
Apps for instant messaging, phone calls, video calls, SMS or MMS.		
Market Research Tools	9	140
Apps to participate in surveys and market studies.		
Mass Media On Demand	167	34
Mainstream audiovisual contents on demand, with the exception of appsincluded in the Radio & TV category.		
Media Creator Tools	175	27
Tools for media creation including the camera, voice recorders and apps to edit pictures.		
Personal Information Managers	205	28
Tools to manage personal information, namely calendars, contacts, notes, etc.		
Personal Interest Content	125	43
Apps with personal interest contents including catalogues, loyalty programs and scoreboards.		
Personal Tools	220	88
Utility tools of general interest including bar codes scanner, tools to download media, flashlights, GPS, educational apps, maps and dictionaries.		
Press & Weather	116	23
Mainstream press and weather apps.		
Productivity Tools		
Tools for professional performance, including Office Mobile or Polaris Office.		
Radio & TV	68	12
Mainstream radio and TV channel apps.		
Shopping	78	24
Apps mainly devoted to sales.		
Social Network Sites (SNS)	225	25
It includes general and specialized social networks sites as well as social curator systems.		
System	37	219
Launchers.		

Older panelists accessed less often their smartphones than the rest. However, it is a central part of their lives.

Our panelists access their smartphones 100 times a day on average (outliers excluded). While the number of accesses per day are negatively correlated with age; that is, the older you are the less times you access your phone (r = -.148, p < .05, n=234, see Figure 1). However, the focus group participants demonstrat how embedded smartphones are in the everyday lives of all of the panelists, and the central role they play, as comments from two of our oldest participants illustrate: *"Except for [cooking] fried eggs, I use it [the smartphone] for everything" (Woman, 70). "I almost don't use the computer now; I do everything in my smartphone" (Man, 78).* Indeed this type of response is made by panelists who were initially reluctant to have a smartphone, or relayed a strong discourse against mobile phones overuse, e.g. "*The smartphone was a gift from my husband (Aged 60) who was tired of me not having WhatsApp*" (Woman, 60). She complains about his excessive smartphone use "*Does it only happen to me, that you are talking with somebody and then he gets distracted by his WhatsApp and you end up talking with nobody?*" (same Woman, 60). So, while she is both a reluctant adopter, and is critical of the smartphone, she has become an active user who accepts its centrality within her everyday routines and rituals: *"You see, I have no problem if you show me the picture of your grand children during a dinner with more friends"* (same Woman, 60). The smartphone is also expressed as a central part of the everyday life of participants who report turning off their device when they are at home (Man, 69). Even these participants prefer to have it at hand and admit that they check it from time to time (Man, 75), or keep the smartphone close to them so they could use it whenever it was needed (Woman, 81).

Figure 1. Mean accesses a day by age break. N=234 (4 outliers excluded).
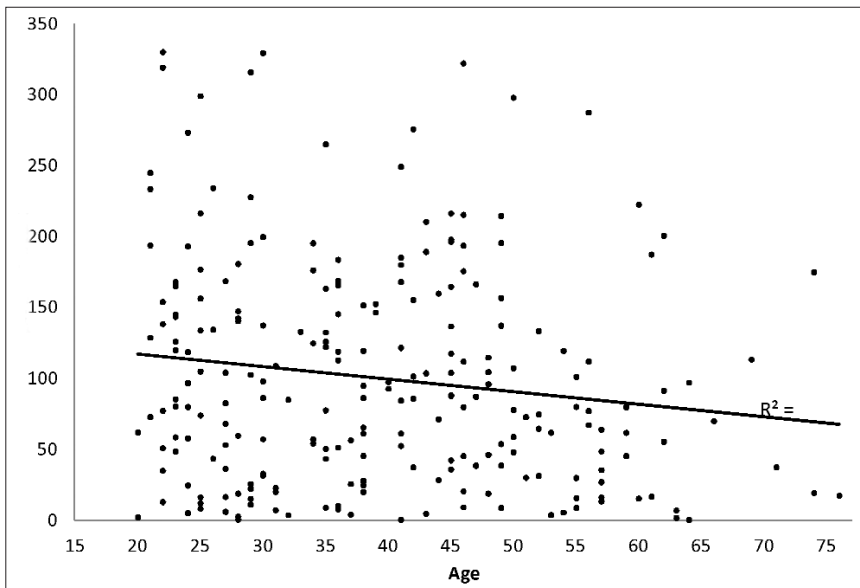
Communicating and socializing via WhatsApp: what the panelists do on smartphones

According to the generational tracking, the three most accessed app categories are IM & Calls (35,2 accesses per day on average for the whole panel sample, and 23,7 for the older age group), SNS (10,9 and 9,0) and Browsers (9,8 and 5,8) - see Figure 2. WhatsApp is the most accessed app (as discussed above), with an average of 26,4 accesses per day (16,9 among the older panelists). This could be due, in part, because in Spain where this study took place, it is common to have to pay extra for each text message, while having a small mobile data package is cheaper. In this sense, WhatsApp is seen as a cheap communication service.

Figure 3 shows which app categories are comparatively more popular among the four age cohorts. It gathers the age distribution of active users in each app category, measured in terms of average accesses per user. We are able to identify statistically significant differences for some categories of apps. On one side, there are three categories that show negative correlation with age, meaning that accesses decrease with age: IM & calls, SNS and Mass media on demand ($r = -.243$, $p < .001$; $r = -.138$, $p < .05$; and $r = -.155$, $p < .05$ respectively). On the other side, two apps categories show an increase of use with age: Press & Weather and Personal Information Manager ($r = .189$, $p < .01$; $r = .112$, $p < .1$ respectively). In addition, we observe another app category that is comparatively more popular among panelists between 60-76 years of age compared to young adults and adults (ANOVA test, $p < .05$ in both cases).

Figure 2. Mean accesses day by category. All panelists and Older panelists compared.
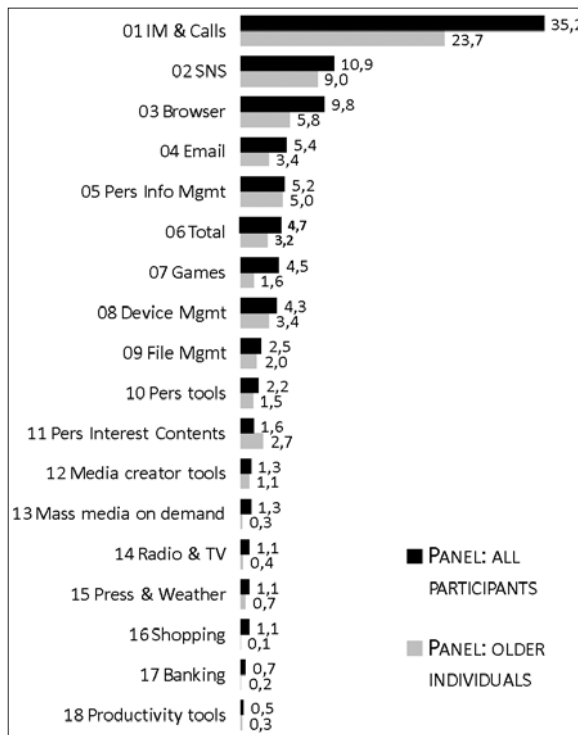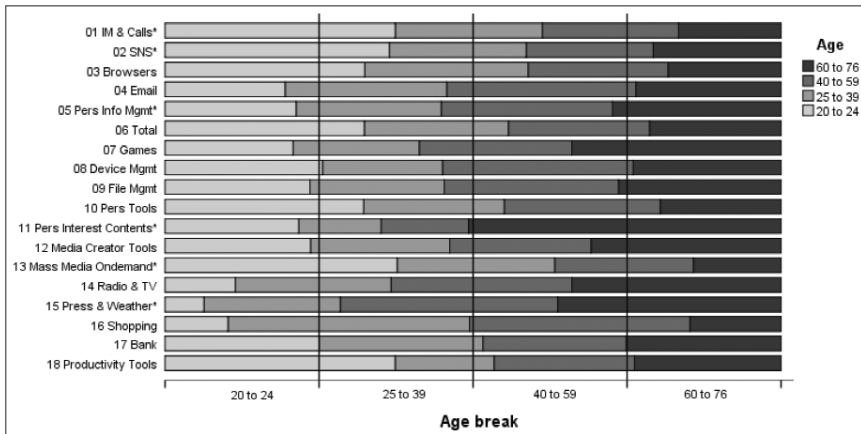
Figure 3. Age distribution of active tracked panelists by app category, in terms of mean accesses by individuals. (Active panelists are those with one or more access to a given category.)

* Statistically significant differences among age groups.

Communicating and socializing within the budget: what is relevant, according to focus group participants

WhatsApp is a very relevant app, as it is always associated to a flat rate bill, it has no limitations and is cheaper than phone calls or text messages (SMS): *"I use WhatsApp extensively, as I have a limited number of phone calls a month"* (Man, 55). Indeed, participants report that they tend to restrict heavy media consumption when using their mobile data plan in order to control their budget. Otherwise they do not care about the use of other services with mobile data if they are not that heavy in terms of data consumption. *"I don't watch YouTube videos, because it consumes my data plan, unless I have Access to a Wi-Fi connection. If I have Wi-Fi I watch YouTube videos"* (Man, 68). Thus, the combined use of traditional voice calls, with text messages and video calls, is influenced by flat rates and the relevance of each communication interest. In fact, phone calls are mostly used to access close personal networks, which includes relatives and friends. *"I have a family group in WhatsApp, but I prefer to call my daughter when I want to talk with her"* (Woman, 70).

In addition to being restricted to contacting those who are in a close personal network, voice calls are used for urgent or relevant issues that require an immediate answer. *"A WhatsApp is not an important call"* (Man, 55), while *"[a] phone call urges more"* (Woman, 76). Finally, Skype and other video call systems are mostly used to talk with close relatives living abroad:

I use Skype to talk with my daughter who lives in Morocco, while my grandchild [who lives in the same city] calls me through Hangout, I did not know Hangout, or how it works, but they manage to call me (*Woman, 77*).

WhatsApp is used to keep in touch either with close or extended personal networks, helping to maintain and reinforce both strong and weak ties. WhatsApp groups play a role in these dynamics. In this sense, groups with family, friends or peers are common, and they can be either local or transnational. Groups allow participants to be in touch with relatives who are far from distance*; "We have a family group, and this way my son in Australia is up to date*

on the family issues, and I do not have to update him" (Woman, 70). Finally, it is also widely used for social entertainment:

I think it is a tool to bring joy to people [A woman interrupts to say "Yes, I know it"] to break monotony. Whenever I receive a nice WhatsApp, I forward it immediately, I want others to enjoy it. I do not want to be the only one who can enjoy it (*Woman, 81*).

I have a lot of fun with WhatsApp (*Woman, 76*).

Personal and social concerns over time

Despite its pervasiveness, IM is not exempt from personal concerns or social controversy. Participants report controlling their own access to WhatsApp. Participants speak of situations in which others either had limited face-to-face interaction because of the immediacy of WhatsApp or that WhatsApp had become a distraction from more relevant things: *"You cannot be all the day in WhatsApp"* (Woman, 76). *"I'm in two groups and I receive too many messages, my wife asks me every time if it's from our daughters, I have to check it to confirm that it's not them"* (Man, 72).

As our data indicates, WhatsApp is both one of the main motivations for our participants to get a smartphone and, at the same time, is the most polemic app. Yet, even highly reluctant smartphone users admit that they end up using it:

I was initially reluctant to have a smartphone (…) I only use the smartphone when needed, and to check all the rubbish people send through WhatsApp. (*Man, 69 – ironic comment*)

You know, I am anti WhatsApp but I see no problem to see somebody else's grandchildren pictures in the smartphone. (*Woman, 60*)

While participants described their experiences and enthusiasm for WhatsApp, they did not have the same experience or opinions about Facebook. Most of participants report using this Social Networking Software on their smartphones but only a few of them had experiences to share during focus groups. One woman reports that Facebook allows her to *"get back in touch with old friends from Colombia"* (Woman, 69). Another male participant is dissatisfied with the use of his image on Facebook *"I have seen pictures of myself in Facebook, and I don't agree with it"* (Man, 78). Other participants did not report using other SNS in their smartphones, even though some of them use Moovit – a public transportation SNS. They do not use the social features of this app or Endomondo.

This disparity between the number of accesses of these apps and the short-lived enthusiasm that the participants in our focus group had for these particular apps could be because the tracking of panelists and the focus group selection involved a different cohort of individuals. However, in the focus groups, participants expressed an ambivalence that is worth noting. While they have and may use the Facebook app on their smartphones, they are not necessarily enthusiastic about its presence on their phones or in their lives.. It is possible that for these participants, Facebook's novelty has passed, it is already integrated in the everyday routine, and other tools are more central. In a discussion of the novelty-factor of WhatsApp, one participant reports *"In the beginning you laugh a lot, then you get used to that and you can't be hooked all day"* (Man, 55).

A similar ambivalence for the use of particular apps on the smartphone surfaces in discussions of email, an app that all of the participants have on their smartphones. On the one

hand, participants appreciate the possibility of receiving and *reading* emails at any time; on the other hand, most of them wait to *answer* emails at home as the computer's keyboard and the screen are more comfortable. While some report their efforts in dealing with uninteresting emails, such as junk mail, others report using email to send "interesting" contents to their friends, such as PowerPoint presentations with pictures or jokes (Man, 76a). Another participant uses his Gmail account on the smartphone as Gmail is used by his inner circle. This tactic allows him to automatically avoid receiving irrelevant or uninteresting emails on the device (Man, 76b). Finally, another participant reports using her smartphone to filter uninteresting emails before moving to the computer to go further with the interesting ones (Man, 64).

Calendar, Weather and Games. Other smartphone uses

The tracking study indicates that Personal Information Management apps are used more frequently as we age. Similarly, focus group participants report the extensive use of notes and calendars as memory aids. Some participants use reminders on the smartphone. The management of doctor's appointments by those following a strictly controlled medical program surface in the focus groups as do other uses of notes and calendars as a part of daily or weekly routines: *"I use the calendar to remember medications, and doctor appointments with notes" (*Man, 55). *"I do the shopping list [in the smartphone"* (Woman, 77). The specific app used to remember things is a personal choice for the execution of everyday activities. Amongst participants who rely on mobile apps, some prefer the calendar to remember an appointment while others prefer notes: *"I don't use the calendar, I use notes to remember appointments and other things"* (Man, 69). Finally, others reported that they prefer to use a paper-based calendar, or – for medical appointments – to rely on the doctor to call you the day before (Woman, 76). Some describe the use of such apps as a challenge they want to address, even if they do not need reminders or they are not going to use them for relevant things. In other words, we find that Personal Information Management tools are important to some older participants as they assist them in remembering dates, tasks and other items "to-do" , while for others, these tools symbolize the fun of learning something new, even when "traditional" systems are positively evaluated. As one participant put it: *"I don't use the calendar, I trust this [putting his forefinger in his head]"* (Man, 73).

While Device Management apps are not particularly relevant for older panelists, participants in our focus groups report the frequent use of these apps. These apps are particularly important for those possessing phones with limited storage space or battery issues. The use of these apps is mainly pushed to the user by notification systems. The cleaning systems, particularly Clean Master, were appropriated by participants who identify it by way of the broom metaphor, the icon that identifies the app: *"I use the broom every day"* (Woman, 81). *"I use it when there is a notification about it"* (Man, 55). The use of this app is influenced by the learning community to which these participants belong, as they had discussed this topic together shortly before the focus groups. Although participants rarely report using browsers directly, some of them use the phone to search and their use of apps related to their personal interests, such as recipes, poetry, history: any topic inciting curiosity.

I use it for inquires while reading, I like Spanish history so I see videos in the smartphone. Then, I like poetry and in the smartphone you can see the meter in a verse. (*Man, 78*)

I use it to follow the football match abroad (…), and I use the app Seient Lliure [to manage his football season ticket]. (*Man, 76b*)

I check the movie listings. (*Woman, 70*)

In line with the tracking study, where News & Weather apps are more popular as age increases, weather apps are popular among participants. One participant, who is very reluctant to have a smartphone, uses a weather widget in his device (Man, 69). Yet, few participants read the news on their smartphones: *"In the morning I read the newspaper, Sports, and El Periódico"* (Man, 76b)*. "I use it to read the headlines in 'El País' and other newspapers"* (Woman, 70).

Finally, games on the smartphone are not that popular among the participants, although those who do play games are quite active. Instead of playing games on the smartphone, most participants play games on the computer, or the tablet because of the bigger screen. Participants describe how playing games on different devices are a part of their routine: *"I play Rummikub on the tablet; whenever I can't play I log in the app [at least] to obtain the daily credits"* (Woman, 77). Beyond the mere fun of the activity, games on the phone are useful in alleviating boring situations and periods of waiting: "*You can spend half an hour in the doctor's waiting room, and it is a pastime"* (Woman, 55). Games are described as a way to build links with grandchildren: *"My grandchild asked me to download a game, War of clash, and then I was hooked because it is addictive, we also exchange things in the game, with my grandchild*" (Man, 68).

Different routines amongst older participants

In the focus groups we asked participants to reflect on how they use their smartphones and how they manage their device's connection. The initial discussion tended to focus on the use of the smartphone outside the home, in the streets, when some information was needed, such as getting in touch with somebody or for practical purposes such as looking for an address: *"I use it outside, when looking for a place, and this way I don't get lost"* (Woman, 76).

While this would explain the extended use of Personal Information Management apps, Media Creator tools, and Health and Fitness apps through mobile data access, this discussion ignores many of the above-described uses of smartphones, which include entertainment, emotional support, social interaction with an extended social network, expressive uses, or its use for non-urgent matters connected to daily life. In the focus groups, it was commonplace to talk about using the phone outside of the home. We needed to prompt further conversation around other locations of use and whether the use of these locations was habitual or not. For example, some participants did not take their mobile phones out when going to a social event, or when going to the cinema, the theatre or other events. In contrast, others turn their phones on silent when they arrived home. Still others explain using the phone when needed, which means having it close to them all the time so that they are able to receive notifications. Others discuss having the device accessible to check notifications, regardless of whether they are at home or outside, with Wi-Fi or with mobile data:

I use it more at home, because of WhatsApp, and because of having the family abroad. (*Man, 64*)

I use it when I need it. (*Man, 78a*)

I have it always with me. (*Man, 76a*)

At home I always leave the phone on a table; from time to time I check it, because I can't hear it. (*Man, 75*)

This became an important insight into a key difference between difference age groups: where data is accessed and how it is accessed. Smartphones work with two different types of internet connection: Wi-Fi and mobile data. Significantly, amongst all panelists with Wi-Fi and Mobile data connection, Wi-Fi is more commonly used to access apps than mobile data connection (56,3% of accesses, ahead of 43,6%).[3] However, older panelists (60 to 76 years old) rely more on mobile data. This cohort use more mobile data than other age group (50,1% vs. 43,6%) and use mobile data as much as Wi-Fi (50,1% vs. 49,9%). The question is why.

All participants in our focus groups have a mobile data plan, and all but one participant has Wi-Fi at home. Those who have it at home always use their Wi-Fi connection when at home, and most of them use Wi-Fi in places they visit *frequently*, such as their children's house, where they know how to connect and they are sure that it is reliable: *"I use Wi-Fi in my everyday places, where I already have the password and it connects automatically, otherwise I use the mobile data"* (Man, 76a). *"For the half hour you are going to be in a bar there is no need (to connect to the bar's Wi-Fi)"* (Man, 69). Joining any and all networks, just to connect for a short or temporary period of time, is not perceived as a desirable option. Public Wi-Fi accesses, however, is relevant when on a trip abroad or for accessing public Wi-Fi while travelling. However, in Barcelona the use of public WiFi connections are not a common practice for the following reasons:

I use Wi-Fi at home, in my son's house, in hotels and abroad in some airports where you can find free Wi-Fi. (*Man, 76b*).

I don't even try to connect to public Wi-Fi accesses, except when I'm on vacations. (*Man, 73*).

Here [municipality's open public] Wi-Fi is that slow, I prefer not to use it. (*Man, 76b*).

In summary, participants use Wi-Fi at home, while visiting familiar locations, or during longer vacation-style trips. Otherwise, this group of over-seventies report that they prefer to use their mobile data connection in other places, while commuting, in non-habitual places, or in habitual places where they do not find it worthwhile to make the effort of accessing the Wi-Fi because it is for too short a period of time or is likely to be too slow.

Discussion

To return to our main research question: What are the specificities, if any, in the use of smartphones by older adults? We have discussed how, in this case study, a combination of qualitative and quantitative data may contribute to a nuanced generational analysis of how changes in interests throughout the life course influence and impact the communication practices and use of mobile media technologies, such as smart phones, amongst older users. We now return to these findings.

Validity of quantitative and qualitative results

Similar to previous results (Böhmer et al., 2011) our data indicates that IM & calls are the most accessed apps with a lower use among the older panelists (60-76). Even though it is also the most accessed app for all age groups, an easy conclusion would be that for older panelists, IM & Calls is comparatively less important than for younger generations. If we accept

this reasoning, we tacitly are assuming a common normativity: the higher the use of a given technology or service, the better. Yet, discussion groups allow us to understand how important WhatsApp is for participants, who describe both (micro) coordination and expressive uses. They also explain non-dependent uses of the phone and describe a set of issues around the inappropriateness of using WhatsApp e.g. at some hours of the day or to send some type of contents.

We find an important disparity between the number of accesses to some apps, most notably social networking apps, in the tracking and the descriptions by participants in the focus groups of their sense of the importance of these apps. Consistent with older peoples' interest in social networks (Righi, Sayago, & Blat, 2012), it is not surprising that these were the second most often accessed app category, in general for all panelists, and more specifically for older panelists. However, despite their frequency of occurrence in the log data, participants do not report using them with enthusiasm, have few experiences to share and convey little explicit interest in learning more about them. Despite the frequency of appearance of social networking apps, when we probed further, these apps are less important that we initially thought. Beyond the concerns of older people about social network sites (ibid), it seems that the social network sites they use are not a novelty anymore. Even though all participants use them, they do not constitute a topic of conversation. When an ICT becomes a part of everyday life, there might not be that many new anecdotes to put on the table. Conversely, WhatsApp could be seen as a trending topic with more issues to discuss and resolve, such as use-norms. Therefore, it seems that conversations might focus primarily on specific ICTs but not on all of the ICT individuals use in their daily lives.

Beyond age stereotypes, personal interest change throughout the life course

The generational analysis of the data indicates how smartphone use changes throughout the entire life course and how this might influence the results of studies that do not consider the age of participants. Similar to previous studies (Nylander, Lundquist, & Brännström, 2009), our data suggest that users make more application accesses at stable locations with Wi-Fi (56,6% of accesses) than in other places with mobile data (43,6% of accesses), similar to previous findings by Castells et al., 2006. However, given the slight differences between WiFi and mobile data accesses, and the time spent by people at a stable location or somewhere else (Giddens, 1987) it is striking that proportionally, our panelists use the smartphone more outside of their stable locations than we anticipated, and that older panelists use mobile data on the smartphone when they are outside of the home, more than they used a WiFi connection.

In addition to the greater use of mobile data among older panelists than the rest of the panelists, participants often reported their preference for using alternative devices, such as a tablet, computer, TV or fixed phone when possible. The screen size of tablets, the comfort of personal computers, and the ubiquity of smartphones are some of the arguments supporting a position that encourages a wider ecology of media (Hearn & Foth, 2007) at home. As well, specific content might be available only on one of the devices. In other words, making less application accesses on the smartphone does not mean that older adults use ICTs less often, but that they prioritize ergonomics when choosing the ICTs to be used at home.

Conclusion

The aim of this paper has been to analyze the use of smartphones by older adults by putting quantitative and qualitative data on smartphone usage into conversation: log data that indicates general patterns of usage and focus group data that helps to understand usage patterns from the perspective of the users' reported experience. While this approach is not new, the novelty of our study lies in our addition of an age-related dimension to the research. We highlight the relevance of generational studies, showing some of the nuances of smartphone use by different age groups. Without a generational analysis, smartphone use-studies and predictive systems miss the particular interests of older people potentially excluding them from future technology developments.

The paper has examined two dimensions of smartphone use, namely specific uses (what) and routines (where). First, in terms of specific uses we observe that Instant Messaging (IM), particularly WhatsApp, is one of the most prominent services being used by our older panelists. These older panelists access personal information manager apps (calendar, address book and notes) more often than other age groups. Second, regarding routines, focus group participants explain how location shapes their connection decisions – Wi-Fi or mobile data – and the ways that they try to make the most of their data plan. Older participants' discourses highlight the practical uses they make of the mobile phone in public places and the confinement of social network sites, gaming and media consumption to private spheres and, therefore, to the use of a Wi-Fi connection.

From a generational perspective, we find differences in smartphone use-patterns in terms of specific uses and places of use. Such differences seem to reflect the evolution of personal interests and communication patterns as we grow older (B. L. Neugarten, 1996). Empirical evidence emerges from the basic analysis of tracked data while the discussion groups bring insights on these results. In this, the combination of methods helps to assess the validity of the log data. The dialogue between quantitative results and qualitative discourses we have proposed in this paper clearly enriches the interpretation of tracked data and also the interpretation of qualitative data. In addition, we adopt a special focus on older people and a generational approach, that includes generational recruitment and analysis. Empirical evidence on the practices of older people in this area are in need to contest the stereotypes and ageist attitudes that are commonplace.

This study is admittedly a historical one (Uprichard, 2012) and it has limitations. Indeed, both the tracking data and the focus groups include older active users of smartphones, which does not represent the majority of the older Spanish population. There is a clear auto-selection bias as a consequence of volunteering to participate in the two studies. However, participants in the focus groups means that the sample includes old and new smartphone users, those who chose to have a smartphone or who were given one as a gift, and users who range from engaged users to reluctant users with different levels of appropriation and uses of their smartphones in their everyday life. In addition there are not any panelists aged over 76 or focus group participants aged over 81, who have contributed to this study. Similarly, the tracking sample of older people is too small to perform some statistical tests. As well, these results might be influenced by the fact that tracked individuals belong to a market research panel, and that focus group participants take part in an educational group on smartphones. Diverging from other studies, our case study involves different participants in the tracking and in the focus groups. While this can be seen as a limitation, we consider the discussion with old-

er people and the results of the generational tracking relevant as they provide rich and in-depth insights for future research.

Acknowledgments

Notes

[1] http://realitycommons.media.mit.edu/realitymining.html (accessed 06/06/2015).
[2] https://en.wikipedia.org/wiki/OpenRefine (last accessed 15/06/2015).
[3] Average accesses per day ascends to 64,1 (SD=2,9) for Wi-Fi, versus 49,6 (SD=3,3) for mobile data $(t(202) = 3,364, p < ,005)$.

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