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ORIGINAL INVESTIGATION

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Grandparents use of new communication technologies in a European perspective

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Abstract This study examined the pattern of use of different forms of contact between grandparents and grandchildren, and especially the use of new technologies (SMS, e-mail) and factors affecting this. Questionnaire data are reported from 408 grandparents in the UK, Spain, Finland and Estonia, regarding contacts with grandchildren mostly in the 10–15-year age range. Face-to-face contact remained the most frequent mean, followed closely by landline telephone; there was moderate use of mobile phones, and many used letters/cards occasionally; and a minority used SMS and e-mails (about one-half to one-third of those with mobile phones, and networked computers, respectively). When contacting grandchildren, most grandparents accumulate different forms of contact, but others compensate some forms of contact. There were no differences by age of grandparent, but grandmothers made more use of e-mail than grandfathers, as did more highly educated grandparents and those with older grandchildren. Implications for use of Information and Communication Technology by older people are discussed.

Keywords Intergenerational relations · Grandparents · ICT

Websites: http://www.stakes.fi/include, http://www.tiresias.org/cost219ter/about.htm

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Introduction

Research on grandparenting over the last two decades shows that becoming a grandparent is an important event in the lives of some 70% of older people and, generally, the relationship between grandparents and grandchildren is seen as positive, and important, by both generations. Contact with grandchildren is highly valued by grandparents, and most grandparents see many grandchildren at least once a month, sometimes much more often, and wish to maintain regular contact with them (Smith and Drew 2002). Regarding studies in Europe and especially those countries involved in our study, data from the British social attitudes (BSA) survey in 1998 (Dench and Ogg 2002) show that communication between generations has traditionally happened via direct contact or landline telephone. Thirty percent of grandparents declared seeing grandchildren several times a week, and only 32% less than once a month; grandmothers appeared to see and speak on the phone with grandchildren more than grandfathers. Very few studies on grandparenting are available in Finland and Estonia, and most Spanish studies focus on the emotional and socializing role of grandparents inside the family.

An important study on contact between grandparents and grandchildren (Cherlin and Furstenberg 1986) found that traditional forms of contact (direct contact, landline telephone calls) are not used by grandparents in a compensatory way. If grandparents meet often with their grandchildren, they also phone them more frequently; thus they do not compensate for infrequent meetings by phoning. Here, we will refer to a pattern of contact where different forms of communication covary with each other as an ''accumulation model'' (more direct contact, more phone calls); we will use the term ''compensatory model'' to refer to a pattern of contact where different forms of communication vary inversely with each other (more direct contact, less phone calls or less direct contact, more phone calls).

New forms of communication such as mobile phone calls, SMS and e-mail are also spreading among older groups of the population, but there are no available data on contact between grandparents and grandchildren via new communication technologies. In this study, after delineating the situation regarding older Europeans and the Information Society today, and presenting the relationship between old and new media according to the theory of niche and gratification opportunities, we will try to explain the relationship between different forms of contact between grandparents and grandchildren in four European countries: the UK, Finland, Spain and Estonia. In doing so, the accumulation and the compensatory models will be used.

Older Europeans and Information Society

Recent data from Eurobarometers (Commission of the European Communities 2005) have shown that in 2003, slightly more than half of the EU-15 population used a computer and 43.5% were Internet users, compared to 30% in the EU New Members States. Data from the countries of our study (see Table 1) illustrate a similar picture; most of the population own a mobile phone and about half of them (except in Spain where the percentage is lower) use the Internet and can send and receive e-mails.

These figures nevertheless are strongly affected by regional differences, as well as by education, sex and age (Bell et al. 2004). In all countries, men use the Internet more than women (Commission of the European Communities 2005) and, in a comparative study addressed to the EU-15 population aged over 50, Seniorwatch (2002) (http://www.seniorwatch.de) has found that 5.3% in Finland, 20.6% in the UK and 8.1% in Spain said that they had virtually no clue about the use of a computer (among those who had used one). In Estonia, according to the Estonian market study company EMOR (October 2004), only 18% of persons aged 49–74 use computers and send e-mails. This digital divide, meaning the disparity between those who have use of and access to Information and Communication Technology (ICT) and those who do not (Foley et al. 2003), noticeable among older groups of the population, may be due to different educational opportunities and to a fear of these forms of communication which seems to increase with age (Walker 1999; Gilligan et al. 1998).

Table 1 Ability index (DAI) and use of ICT in UK, Finland, Spain and Estonia

	DAI[a]	Percentage of Internet users and e-mail users[b]	Percentage of mobile phone subscribers[c]
UK	0.77	57	53
Finland	0.79	57	85
Spain	0.67	34	80
Estonia	0.67	44	65

[a]The digital access index (DAI) was developed by the International Telecommunication Union (ITU World Communication Report 2003) to measure the overall ability of individuals in a country to access and use ICT. It distinguishes itself from other indices by including a number of new variables, such as education and affordability. It also covers a total of 178 economies, which makes it the first truly global ICT ranking

[b]Eurobarometers (Commission of the European Communities 2005)

[c]The ITU World Communication Report (2003)

As access to ICT may reduce feelings of isolation and enhance older people ability to participate more widely in the society (Foley et al. 2003), initiatives have been organised in many European countries to overcome the economic, cultural and generational limitations in accessing the information society. Projects such as Action Plan for Older People (2003–2007) in Spain, and INCLUDE (Inclusion of disabled and elderly people in telematics) (http://www.stakes.fi/include), DASDA and Varttuneet (The Seniors) in Finland, as well as the COST Programme (2005) at the European level, have main objectives of supporting a positive image of older people, engaging older people in their communities, and improving access to the information society; these projects work on the education of the elderly, and through co-operation with ICT companies to design more user-friendly equipment (http://www.tiresias.org/cost219ter/about.htm). However, as recent studies have demonstrated (Selwyn et al. 2003; Foley et al. 2003) a lack of content rather than access to technology is a critical barrier to bridging the digital divide. Initiatives to raise awareness of the benefits of ICT are required; once awareness has been reached, providing non-users with access to ICT can be worthwhile.

Old and new media: the Theory of the Niche and Gratification opportunities

The Theory of the Niche (Dimmick et al. 2000) defines the niche of a medium as the position of this medium in the multidimensional resource space of the environment. The pattern of resource use of a medium is its strategy for survival and growth. According to Dimmick et al. (2000), the macrodimensions of the resource space include gratifications, gratification opportunities, advertising, consumer time, and consumer spending. Each macrodimension, in turn, can be divided into several microdimensions.

When looking at the relationship between old and new media, the Theory of the Niche predicts that a new medium or communication channel may or may not compete with existing media. If competition does exist, then the consequences for the older media consist of exclusion, replacement, or displacement, wherein the new medium takes over some of the roles played by the older medium. By integrating the Theory of Use and Gratification (Katz et al. 1974) into the framework of niche theory, Dimmick et al. (2000) introduced the concept of gratification niche of a medium, which is

defined within a domain of common gratification and gratification opportunity measures. Gratification opportunities are defined as users' beliefs that a medium allows them to obtain greater opportunities for satisfaction; specifically, they are properties of a medium that amplify or attenuate the opportunities for deriving gratification from the medium.

When looking at the relationship between two communication media, the overlap between the two and competitive superiority must be measured (Dimmick et al. 2000). The overlap index measures the similarity in gratification levels provided by the two media, and the competitive superiority index is computed to answer the question of whether one or the other of a pair of media provides greater gratifications to the user. Overlap and superiority, taken together, define two conditions that must be satisfied for a new medium to replace or partially replace an older form of media. First, the new medium must gratify the same needs as the older medium, and the degree of overlap must be high. Second, the newer medium must be superior to the older form.

Aims of the study

Dimmick et al. (2000) have shown that personal e-mail and the landline telephone provide similar gratification opportunities to their users and are, therefore, in competition with each other. As one critical displacement effect of the new media lies in the reduction of time spent with older media (Dimmick et al. 2004), we expect more generally, that communication channels in competition with each other will show a compensatory pattern, while communication channels which provide different gratification opportunities will show an accumulation pattern. In this study, we were interested in whether grandparents showed 'accumulation' or 'compensation' between different forms of contact in their communication modes with grandchildren. As different communication channels, both traditional and new (e.g. face-to-face and landline telephone; SMS and e-mail) provide different gratification opportunities, we expected to find an accumulation pattern within the use of traditional or new forms of contact, and a compensatory one between traditional and new forms of contact. Also, we wanted to examine the demographic factors affecting the use of ICT, especially whether males still showed more new technology use (Commission of the European Communities 2005) in the area of grandparent–grandchild communication where traditionally females show higher rates of contact (Dench et al. 2002).

Data and methods

This investigation was carried out as part of a Research Training Network embracing different states within the European Community. The four teams involved in this research came from the UK, Finland, Spain and Estonia. These four European societies differ in respect of their social, economic, political and religious standing. We collected data from a total sample of 408 grandparents; 128 in the UK, 118 from Spain, 102 from Estonia and 60 from Finland (see Table 2). The majority of participants were grandmothers (255 vs. 153 grandfathers), and their mean age was 68.7 years. Most of them were retired (80% of the total sample, but this goes down to 53% in Estonia where grandparents' mean age is lower), and they had 3.9 grandchildren on the average.

Data on grandchildren (see Table 2) do not include step-grandchildren; only 7.6% of the sample had step-grandchildren (65 step-grandchildren, compared to 1,548 grandchildren). Information was gathered in late 2004 and early 2005. A new communication technologies questionnaire (grandparents) was devised. Following detailed pilot work in the UK with 39 grandparents, and cross-team discussions, the final version contained four sections: (a) on use of new communication technologies, (b) numbers of children and grandchildren, (c) nature and frequency of contacts with grandchildren, and views about using new technologies with grandchildren, (d) demographic information. Here we report certain quantitative information from (a) and (c), relating them to certain demographic variables from (b) and (d).

In (a), grandparents were asked if they used both a mobile phone and a networked computer and if they were familiar with sending text messages, e-mail, e-card and internet chat.

In (b), age of grandchild and geographical proximity to him/her (4 = another country; 3 = other parts of the country; 2 = same town or city; 1 = same neighborhood; 0 = same house or building) was assessed for up to three grandchildren, prioritizing those in the age range 10–15 years. In (c), each grandparent was asked to rate on a 5-point scale (4 = many times a week; 3 = about once a week; 2 = once/twice a month; 1 = several times a year; 0 = less often/does not apply) how often on the average, he/she contacts each grandchild under consideration via different ways. In (d), grandparents were asked to provide his/her age, sex and educational level (1 = compulsory; 2 = further vocational or higher).

As a consequence of difficulties experienced in recruiting grandparents using the same method in each country (mostly related to national diversity issues), each team adopted a sampling procedure considered the most appropriate from those considered in the cross-team discussion. As the use of ICT among older people in Spain is relatively rare, Spanish grandparents were recruited from a University for Old People and a New Technology Center for Old People in Madrid and the vicinity. In Finland, data were gathered by personally contacting older members of associations of various kinds from the countryside around Vaasa. Attempts were made to obtain grandparents in the closest university town Vaasa, via grandchildren in schools, but this was not possible due to competing demand on the schools.

In the UK, questionnaires were filled in by the members of an association for retired people in

Table 2 Details of the grandparent samples in the four countries

	N (male, female)	Mean age; age range (years)	Percent in further education[a]	Percent retired	Mean number of grandchildren	Mean age of grandchildren (years)
UK	128 (58,70)	71 (44–85)	70	94	3.7	13.7
Spain	118 (52,66)	69 (59–85)	41	85	3.9	11.9
Finland	60 (14,46)	71 (56–89)	35	92	4.3	13.8
Estonia	102 (28,73)	63.9 (49–80)	54	53	3.7	12.1
Total	408 (153,255)	68.7 (44–89)	52	80	3.9	12.8

[a]As the education system was partially different in the countries under consideration, we used the term "further education" to refer to education at vocational training or university level

Aberdeen (65% of the sample), and by grandparents across the country who received the questionnaire from their grandchildren contacted via schools.

The Estonian sample was gathered around Tallinn and Harju county via grandchildren contacting their grandparents. Response rates were not easy to estimate but for those questionnaires given out via grandchildren were 32% in the UK and 30% in Estonia.

Results

We first compared the use of traditional and new forms of contact between grandparents and grandchildren. Grandparents were asked to rate the frequency of use of ten forms of contact with up to three nominated grandchildren. For this analysis we took the frequency for the first nominated grandchild.

We report frequencies for face-to-face, landline telephone talk, mobile telephone talk, text messages and e-mail text for the total sample and for each country in Table 3.

Frequencies for use of the other five forms of contact at least several times a year were very low across the total sample: faxes $n = 4$, e-mail pictures $n = 29$, e-cards $n = 18$, and Internet chat $n = 12$; more used letters/cards ($n = 145$, mean = 1.57, sd = 0.55; but only $n = 14$ used letters/cards more than several times/year).

As Table 3 shows, face-to-face was the form of contact most frequently used, followed closely by use of landline phone, these each occurring on average about once a week. Mobile phone use for telephone calls was less frequent, and contact by both SMS and e-mail still less frequent and restricted to a minority of the sample (see also Figs. 1, 2, later).

To see how different communication channels accumulate or compensate with each other when grandparents contact grandchildren, we inter-correlated the frequencies of contact across these five modalities for the whole sample (see Table 4); we also controlled for geographical proximity.

The correlation matrix shows an approximately two-factor structure. Face-to-face, landline and mobile telephone calls show moderate positive correlations between each other; separately, SMS and e-mail show a modest correlation (with SMS also correlating moderately with mobile phone use for calls) between each other. This result seems to support our hypothesis of an accumulation pattern within forms of contact of the same type (traditional vs. new). On the other hand, face-to-face contact and e-mail show a moderate negative correlation between each other supporting a compensatory model. Geographical proximity to grandchild is negatively correlated with all forms of contact except e-mail, with which shows a modest positive correlation. The correlation with SMS is however near zero and in fact shows a (statistically non-significant) curvilinear trend, SMS being used most when the grandparent is neither very close to the grandchild, nor very distant.

A factor analysis (principal axis solution with a Varimax rotation) confirmed a two-factor structure, with two factors with an eigenvalue over one extracted. In the rotated solution, face-to-face (loading 0.66),

Table 3 Mean values (standard deviations in brackets) for the frequency of contact between grandparent (GP)–grandchild (GC) via different modes, on a 5-point scale

	Face-to-face	Landline phone	Mobile phone	SMS	E-mail text
UK	2.15 (1.36)	2.17 (1.29)	0.55 (1.06)	0.23 (0.69)	0.17 (0.53)
	$n = 126$	$n = 126$	$n = 128$	$n = 128$	$n = 128$
Spain	2.71 (1.06)	2.90 (1.21)	1.30 (1.47)	0.47 (1.03)	0.48 (0.84)
	$n = 115$	$n = 112$	$n = 93$	$n = 82$	$n = 88$
Finland	2.65 (1.27)	2.40 (1.09)	1.08 (1.40)	0.15 (0.55)	0.00 (0.00)
	$n = 60$	$n = 60$	$n = 60$	$n = 60$	$n = 60$
Estonia	2.66 (1.11)	2.02 (1.45)	1.63 (1.54)	0.14 (0.49)	0.11 (0.38)
	$n = 96$	$n = 91$	$n = 94$	$n = 90$	$n = 84$
Total	2.51 (1.22)	2.38 (1.32)	1.09 (1.41)	0.25 (0.73)	0.20 (0.58)
	$n = 397$	$n = 389$	$n = 375$	$n = 360$	$n = 360$

n number of eligible respondents

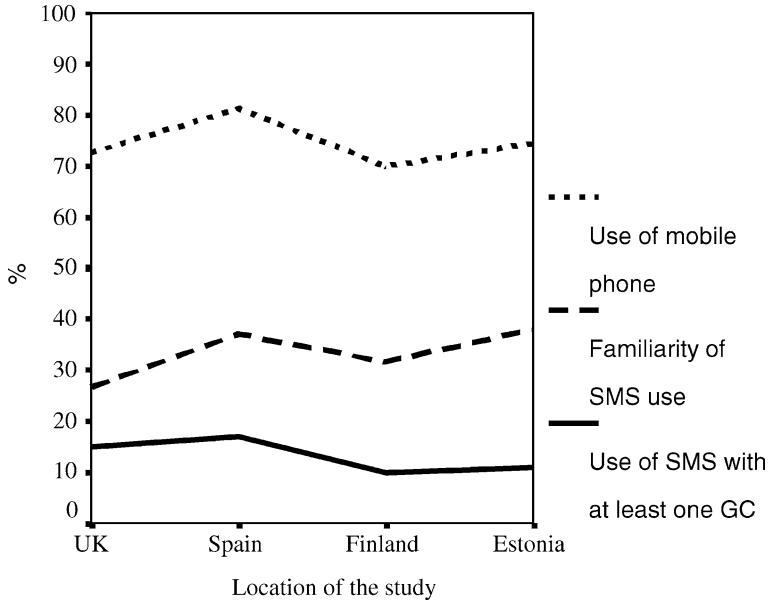

Fig. 1 Percentage of respondents who (a) use a mobile phone, (b) are familiar with sending SMS/text messages on a mobile phone and (c) use SMS/text messages with (any grandchild)

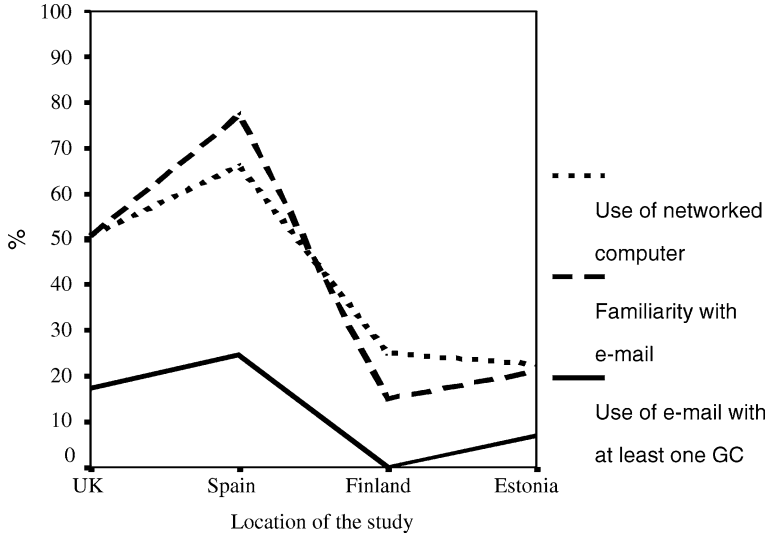

Fig. 2 Percentage of respondents who (a) use a networked computer, (b) are familiar with sending e-mails on a computer and (c) use e-mails with (any grandchild)

mobile phone (0.54) and landline phone (0.52) contacts loaded on the first factor, interpreted as a traditional, spoken communication factor. Contacts by SMS (0.60) and e-mail (0.46) loaded on the second factor, interpreted as a new, written technology factor.

We next examined the influence of demographic variables on both the factor scores on the above two factors and on the frequency of contact using the two main forms of new technology, text messages and e-mail. Using a categorical regression analyses

Table 4 Correlation matrix of the frequency of contact via different modes and geographical distance of GC

	Contact face-to-face	Contact by landline phone	Contact by mobile phone	Contact by SMS	Contact by e-mail text
Contact by fixed phone	0.34***				
	$n = 388$				
Contact by mobile phone	0.25***	0.33***			
	$n = 372$	$n = 366$			
Contact by SMS	0.04	0.10	0.35***		
	$n = 357$	$n = 354$	$n = 356$		
Contact by e-mail text	−0.19***	0.04	0.08	0.27***	
	$n = 357$	$n = 355$	$n = 352$	$n = 349$	
Distance of GC	−0.71***	−0.10*	−0.14**	−0.01	0.17***
	$n = 397$	$n = 389$	$n = 375$	$n = 360$	$n = 360$

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$
n number of eligible respondents

(CATREG in SPSS), which quantifies categorical variables and then treats them as numerical variables, we entered age (in years), gender, education of grandparent, geographical proximity to nominated grandchild and age of nominated grandchild. The results are shown in Table 5.

The age of grandparent was not significant in any analyses, whereas sex of grandparent was a significant predictor for the use of e-mail, grandmothers using it more. Distance to grandchild was significant for both the traditional and new communication factors, those living closer using more spoken communication (face-to-face, landline telephone, mobile phone) and those living further using new means of communication (e-mail, SMS) more often—but only for the e-mail component. Age of grandchild differentiated between the use of traditional, spoken communication and new forms of communication; the younger the grandchild is, the more the grandparents communicate in traditional ways and the older they are, the more they use new technology in communication, although SMS is a form of contact preferred with younger grandchildren. Education significantly predicted the use of new communications—but only for e-mail— those having a longer education using e-mail significantly more often.

The above analyses provided data for contact with a nominated grandchild. We also examined how use of the two main new technologies (SMS, e-mail) for contacting grandchildren were dependent on availability of use of mobile phone or networked computer, and familiarity with text messaging or e-mailing. For these analyses, we registered whether the grandparent used text messaging or e-mail (i.e. at least 'several times a year') with any of the nominated grandchildren.

Figures 1 and 2 show the relative proportions of availability for use, familiarity with use, and actual use with any grandchild, of mobile phones/text messaging, and networked computers/e-mailing, respectively.

Figure 1 shows that although an average of 75% of the grandparents used a mobile phone (this figure goes up to 81% in Spain), less than half of these (33% in all) were familiar with using SMS, and again less than half of these (14%) used SMS with grandchildren. Figure 2 shows that on average 44% of the grandparents used a networked computer (but in Estonia only 23% of grandparents do), and a very similar number (38%) are familiar with sending e-mails, but only about a third of these (14% in all) used e-mails with grandchildren.

These patterns of use are very similar in all countries under consideration.

Discussion

This study examined the nature of grandparent–grandchild communication in four European countries, and especially the adoption of an accumulation versus a compensatory pattern when contacting grandchildren via different forms of contact. Data were obtained from over 400 grandparents, mean age 69 years, with an average of 3.9 grandchildren. We prioritized information on contacts with 10–15-year olds, and the mean age of the grandchildren reported was 12.8 years. Although differences between the four countries were found, these are confounded by the nature of the sampling in the four countries. The high frequency of use of ICT in Spain, which is in contradiction with existing data, is for example, the outcome of a slightly biased sample. However, the general structure of the findings was very similar across the four countries, and the combined sample gives an indication of the extent of use of these new technologies in the grandparent–grandchild dyads, of the type of use grandparents make of old and new forms of contact, and of the factors affecting this.

Face-to-face contact remained the most frequent means of contact, followed closely by landline phone calls (this order being narrowly reversed in Spain and the UK). There was moderate use of mobile phones, but much less use of SMS. Many used letters/cards, but only occasionally (a few times a year, probably birthdays, Christmas, etc.). Use of e-mail was also infrequent; of those who used a networked computer, and were familiar with sending e-mails, only about one-third used e-mails with grandchildren. Other forms (faxes, e-cards, e-mail pictures, internet chat) were restricted in use to a handful of grandparents.

Table 5 Prediction of new and traditional forms of communication (categorical regression analyses)

Predictors	Dependent variables							
	Traditional, spoken communication		New, written communication		Use of e-mail		Use of SMS	
	Beta	Significance level	Beta	Significance level	Beta	Significance level	Beta	Significance level
Country	0.156	0.000	0.147	0.000	−0.170	0.000	−0.318	0.011
Age of grandparent	0.047	0.272	−0.081	0.072	0.072	0.144	−0.015	0.936
Sex of grandparent	0.005	0.898	0.012	0.811	0.098	0.050	0.018	0.912
Distance to grandchild	−0.592	0.000	0.483	0.000	0.212	0.000	−0.208	0.122
Age of grandchild	−0.184	0.000	0.189	0.000	0.062	0.208	−0.500	0.022
Education	0.080	0.065	0.106	0.037	0.101	0.043	0.024	0.868
R^2	0.47		0.28		0.09		0.32	

The factor analysis confirmed a two-factor structure among the different forms of contact: a traditional spoken one including face-to-face, landline telephone and, interestingly, mobile telephone, and a new written technology one including SMS and e-mail. Correlating the different forms of contact, we found that traditional forms of contact accumulate to each other, as do new forms of contact (SMS and e-mail). When grandparents see grandchildren often, they also contact them often via landline or mobile telephone but not via text or e-mail. However, when they text often they also e-mail them often.

Traditional and new forms of contact instead do not generally compensate for each other as hypothesized. According to the Theory of Niche and Gratification Opportunities, this might be due to their provision of different gratification opportunities. Only face-to-face contact correlates negatively with e-mail contact; a strong effect of distance on the gratification opportunities that e-mail can provide to grandparents living far from their grandchildren can explain this result.

We sought to understand why new technologies were still rather rarely used by grandparents in communicating with grandchildren—only by about 12–13% of the sample. A variety of factors seem to be at work. The factor analysis suggested that use of new technologies was one major factor differentiating grandparents. This could have its impact first by ownership or availability: mobile phones and networked computers were only available on average, to 75% and 44% respectively (Figs. 1, 2). A second factor could be familiarity of use of specific new communication technologies. In this respect, we expect strong cohort effects in the future with forthcoming older people being more familiar with ICT. However, how user-friendly these new technologies are for older people needs also to be taken into account. For those with mobile phones, less than half were familiar with SMS, which can be an awkward procedure for older persons given the small size of buttons and of the visual appearance of the text. E-mail texting, however, did not seem to pose additional hurdles given familiarity with a networked computer.

In addition, not all grandparents familiar with SMS and e-mailing used them with grandchildren (Figs. 1, 2). This was quite strongly mediated by distance and by the gratification that each form of contact provide to grandparents; when grandparents live close to their grandchildren they can get more satisfaction by hearing their grandchildren' voices or by seeing them, other than texting or e-mailing; when their grandchildren live far away, however, writing an e-mail is certainly cheaper than travelling to see them or speaking over the phone, and better than having no contact at all. This may be influenced by the quality of the grandparent–grandchild relationship; a close relationship might be a stronger stimulus to adopt ICT when other forms of contact are not available, than a distant one. However other factors also play a part. Interestingly, and in contrast with previous findings regarding uptake of ICT, we found that the age of grandparent does not predict the use of new forms of contact with grandchildren. Predictably, new written technologies were used more with grandchildren old enough to read and write, but SMS were preferred as a form of contact with younger grandchildren. The usual male advantage in use of ICT did not find support in this research were grandmothers made more use of e-mail than grandfathers to contact their grandchildren.

Overall, our findings suggest a take-up of new communication modes between grandparents and grandchildren by a minority of grandparents—about 1 in 8—that is less than might be expected in terms of technological availability. Grandparents usually enjoy communicating with grandchildren, and generally employ various modes, although e-mail can be especially attractive for low-cost distance communication. But their use of these new technologies is much less than their availability, or even familiarity with them. We hypothesize that educational experiences as well as strong incentives are still important factors, for older people especially. Such issues deserve further study on more representative samples, and particularly by investigating the attitudes of older people to new technologies, and the gratification opportunities they may find in their use, generally, and with those grandchildren old enough to use them and who have grown up with these opportunities.

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