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Children and the mobile internet

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This chapter aims to explore some of the processes behind the early adoption of smartphones by children. But first this needs to be contextualised with a pre-smartphone history of children's access to the internet by mobile phone and how an internet research agenda is increasingly shaping how we research children's use of mobile phones, including smartphones.

One of the most significant innovations introduced by smartphones is, arguably, the ease of internet access. It is obviously not the only innovation packaged in these devices, with some variation depending on the brand. The increasingly haptic interface since the iPhone, the in part related larger screens on many of these devices, the GPS and of course the Apps are of course all important, for example, for enhancing such devices as mobile media. But the internet dimension raised a new set of research questions related to the internet 'going mobile', also through other handheld portable devices, such as tablet computers like the iPad. This was captured in the 2011 UK the report based on the biannual Oxford Internet Institute's survey that argued that the greatest transition since the move to broadband was the 'Next Generation Users' who accessed the internet via portable and multiple devices.¹

Of relevance here, the mobile internet aspect has certainly influenced the research agenda in relation to children. There is now a substantial number of studies relating to areas perceived as potential online risks, such as cyberbullying, viewing pornography and meeting strangers.² In Europe part of the European Commission, the Safer Internet Programme, has for some years funded research, especially through the *EU Kids Online* project³ in which the authors have been involved. This is an example where academics had engaged with policy makers urging them to promote evidence based policy, with the result that the EC paid for research that otherwise would not have taken place - this is a different history from that of mobile phone research, where there has been little policy interest. Originally all this research focused on PC access to the internet, but by the mid-2000s the policy makers and related stakeholders raised the question of what happens when children can access the internet by mobile phone, beyond the surveillance of parents. Hence the Safer Internet Programme had meetings with the mobile phone operators to discuss this at a point in time before children had even started to acquire smartphones. This in turn led the industry to commission a literature review⁴ and research on children's general use of mobile phones but with a particular interest in their internet access through these devices.⁵

In fact, in that 2006 British study, conducted by one of the authors, children were very wary about going online via their mobiles because of the cost, given that children's telecoms expenditure, when financed by parents, can give rise to domestic tensions. Indeed, this has been an issue for decades. Even by 2009 a UK survey showed that only 9% of children used their mobiles to go online.⁶ The 2006 study also showed that children could also be as critical consumers as some adults, pointing to the limitations of the screen size especially when compared to the PC, which might mean the mobile phone was less suitable for achieving some goals.

Accepting that children's mobile internet use was limited, policy makers took no further action at that time. The *EU Kids Online* survey in 2010 asked about mobile phone and hand held device access to the internet, since by this time smartphones had started to be adopted more. By then around a third (33%) of 9-16 year olds who used the internet said that they used a mobile phone *or* a handheld device to go online. Some 12% specifically used a handheld device to go online.⁷ Fast forward a few more years to 2013 and smartphones had experienced a rapid take up among children: in the UK they were now owned by 66% of 11-16 year olds⁸ (and in another survey 62% of 12-15 year olds⁹). Arguably of no coincidence, in 2012 the EC Safer Internet Programme put out a call for research to look specifically at children and mobile internet risks – leading to the *Net Children Go Mobile* project¹⁰ in which the authors are participants.

But that project, and related research just starting to appear, has to account for this sudden adoption of smartphones, since while it may seem like an automatic progression to use ever more sophisticated mobile phones to go online the 2006 research suggests this is not necessarily so straightforward. Many children may have smartphones, but do cost considerations still limit their internet use? Or have costs changed? And has the design of smartphones ameliorated some of limitations noted by children a few years early? Or do they still only use them for some online activities, but use larger screens for others?

Specifically, the internet risk agenda - does mobile internet access increase or ameliorate the risks previously identified, or indeed create new risks - is new to mobile phone research. There had been some media coverage coverage, and concern, about developments such as cyberbullying, sexting and 'happy slapping'¹¹, but even some of these were partly related to internet use - as in the case of happy slapping when videos of violence were recorded on the mobile phone but then posted online.

In addition, we can see other areas of interest migrating from the internet research field as in one study that builds on children's engagement with social networking sites to ask what happens when they have mobile access to them: it turns out that they contact friends more frequently via SNS and have a greater sense of belonging to that community.¹² Another internet issue, to be addressed in *Net Children Go Mobile*, is about digital divides among children. These had not previously been a concern in mobile phone studies about inequalities but this had been discussed in relation to the children and the internet¹³. Does mobile access advantage some children compared to others?

Against this backdrop point we can turn to the empirical focus of this chapter. As a preliminary step before this digital divide line of inquiry, we need to appreciate the extent to which children's smartphone adoption is uneven and try to understand why. There are many claims about children's relation to ICTs in general, as captured in Presnky's discussions of whether a whole generation of children are 'digital natives'.¹⁴ However, it is important to differentiate between children, just as we differentiate between adults when considering their varying engagement with technologies, including their adoption of new practices.

Hence, using the *EU Kids Online* data noted earlier, this chapter next examines the question of which children were using smartphones to go online at that moment in 2010 when the technology was first being adopted. The diffusion of innovations literature, discussed below, emphasises socio-demographics when explaining early adoption of technologies, but here we also ask what kinds of internet users these children are in other respects, partly in order to understand their motivations. And part of that processes involves differentiating by country – the *EU Kids Online* survey covered 25 countries and rather than assuming a universal youth culture, as discussed from the 1960s, we need to ask to what extent and in what senses there are national differences in children’s willingness to use smartphones to access the internet.

While children’s motivations provide one part of the picture, they are not free agents, as indicated in the discussion of costs noted above. Parents’ role in adoption needs to be considered, not only in terms of whether they are willing to finance expensive smartphones, but also whether they are willing to allow their children to have them. And here, in the later part of this chapter, it is important to take into account that wider context of debates about various risks children face online and the pressures on parents to mediate their children’s experiences of the internet. While one mediation strategy sometimes encouraged in policy discussions is for parents to monitor their children’s behaviour online, it was noted earlier that access to the internet via a mobile or smartphone actually facilitates children’s ability to avoid such surveillance.¹⁵ In fact, the *EU Kids Online* survey collected data on parents’ strategies to mediate their children’s internet experiences, as well as their children’s evaluations of such interventions. Hence we also address that other part of the picture and explore in some detail how different forms of parental mediation relate to the adoption of smartphones.

Frameworks and research questions: why children’s use of smartphones to go online?

One of the potentially relevant bodies of literature is Roger’s diffusion of innovation framework.¹⁶ This profiled the earlier adult adopters of many ICTs: male and middle-class. But, one can imagine that the pattern may not be identical when looking at children’s patterns of adoption because they are acting in the context of parent-child relations, with their own dynamic and constraints. In fact, looking at the *EU Kids Online* data on earlier child users of the internet per se one interesting result here is that, unlike in the case of adults, there were no significant gender differences (for example, for 15-16 year olds the average age for boys’ adoption was 10.5 years and for girls it was 10.6 years). The same pattern is true for the adoption of smartphones (13% of boys use them vs. 11% of girls, which is not a statistically significant difference). Later we will examine how socio-economic status (SES) is still a factor.

In contrast to the diffusion of innovations approach, domestication analysis emphasises ways in which people are not just individual agents when making decisions to adopt technologies or take up new practices.¹⁷ Especially when living in households with others, they are negotiating with and are constrained by their commitments to others. Of relevance here, children may be even more constrained than adult partners in any such negotiation.

This is the framework from which we can appreciate the decades-old tension between parents and children over the cost of children's communications. This was shown in relation to the phone in the 1990s in qualitative and quantitative research¹⁸ and more recently in relation to the mobile phone.¹⁹ Therefore, when considering parents' reservations about the costs of smartphones, or indeed the reservations of children, one area to examine is whether we can find evidence in the *EU Kids Online* dataset that financial constraints are a factor shaping smartphone take-up.

If we focus first on the children's motivations for adoption, money may not be the only consideration. It is possible to generate a number of further hypotheses about who the early smartphone adopters are in relation to their possible motivations for adoption – ones which go beyond socio-demographics. For example, social networking sites (SNSs) have become fashionable, so does their existence have any bearing upon children's interest in smartphones – whereby the smartphone has enabled more access to SNS profiles and has enabled child users to receive communications made via SNSs? Or should we be looking beyond the more contemporary phenomenon of SNSs to consider the role of the smartphone in relation to online communication in general? In the early days of the internet the communications dimension, especially its role in motivating people to go online, was often underestimated as many academics focused on accessing information on the world wide web or using services online. So is it the more general communications potential of the smartphone that has played a role in its early adoption, because it enables the user to be connected all the time for online communications?

Looking even more widely than communication practices, we can consider the degree of usage of the internet – i.e. are those who use the internet more, perhaps more sophisticated users, also in general more likely to have a smartphone on the grounds that their greater engagement with the online world gives them more incentive to be able to do these things when other modes of accessing the internet are not possible – e.g. when moving around.

Turning now to a consideration of parents' potential role in adoption, in writings on recent historical trends there have been discussions of what Giddens has called the 'de-traditionalization' of the family²⁰, a development whereby parents are taking even more of an interest in their children's activities, discussing these, negotiating more than in the past, giving their children some more 'democratic' rights²¹. This could have particular implications for smartphone adoption.

We saw that the concern is that mobile devices like the mobile phone and smartphones would enable children to access the internet and do things online beyond the supervision of their parents. In other words, it can make some parental mediation strategies more difficult, such as physically monitoring what children are doing. Thus one question is whether it is the parents who rely less on this form of mediation, who rely more, for example, on talking to children about what they do online, and who may trust them more – in other words, parents who are moving more towards de-traditionalization - who are the ones more willing to allow their children to have these devices. Or course, causality may work the other way. If children have these devices, are parents forced to rely more on the 'active' mediation strategy of talking with their children?

Method

A random stratified sample of approximately 1000 internet-using children aged 9-16 years was interviewed in each of 25 European countries (Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Lithuania, the Netherlands, Norway, Poland, Portugal, Romania, Slovenia, Spain, Sweden, Turkey and the UK). These countries were selected to represent the economic, geographic and cultural diversity of European countries (including all large and most small countries in the European Union) plus Norway (the earliest adopter of the internet in Europe) and Turkey (a culturally diverse, late-adopting, aspiring member of the EU).²²

The total sample size for children was 25,142. Additionally, one parent (whichever knew most about the child's internet use) was interviewed. Interviews took place during spring and summer 2010 in children's homes, conducted face-to-face but with private questionnaire completion (computer-assisted or pen-and-paper) for sensitive questions related to risk. The average interview time per child was 45 minutes.

The actual question in the *EU Kids Online* survey asked whether children accessed the internet by 'handheld devices' (followed by examples of smartphones - iPhone and Blackberry - but also the iPod). However, we suspect that children who answered this are mostly referring to smartphones - and we will assume this in the analysis that follows, referring to 'handhelds' as 'smartphones'.

Findings

Before commencing the analysis of early adopters, we need to add some background information about smartphone adoption. One question of interest for digital divide discussions is whether those using mobile phones, and especially smartphones, to go online have no other means of accessing the internet. In which case these devices would be providing an alternative platform to PCs. In fact, for the most part mobile access is simply adding to children's existing means of going online: only 9 out of over 2,755 child who used a handheld device to go online said that they only accessed the internet via this device, while the figure is still lower for using an 'ordinary' mobile to go online (only 85 children in the whole sample did this).

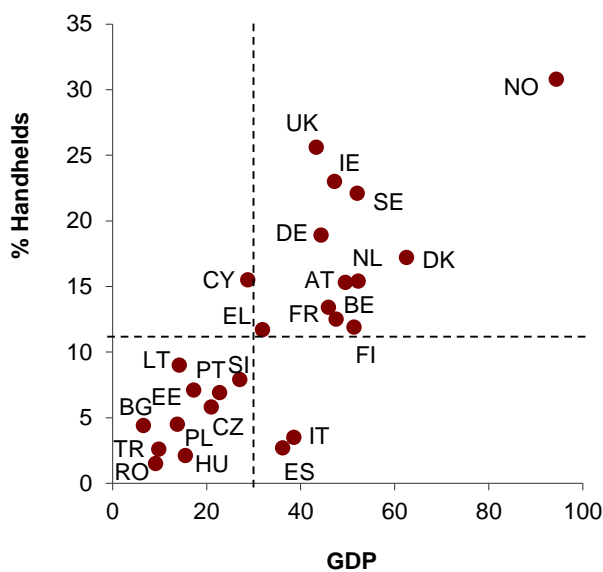
Economic factors

The previous research noted above means that children's current adoption of smartphone, associated with higher costs than normal mobile phones, is not straightforward. Hence, one aspect that we need to consider is whether economic factors in any way appear to shape whether children use smartphones. The *EU Kids Online* study does not have measures of a household's income or children's funds per se, but two measures are suggestive. The older the child the more likely they were to use a smartphone (9-10 years olds 5%, 11-12 years olds 8%, 13-14 years old 13% and 15-16 years olds 19%). Now there are many non-economic reasons why age may be a factor, such as a greater desire to communicate with peers the older the child. But it is also likely that older children have more of their own money or their parents may be willing to spend more money on presents or funding these phones. The other

suggestive factor is that the higher the SES the more likely it is for children to use smartphones to go online (lower SES 9%, medium 11% and higher 17%) and although other factors may play a role, the higher affluence may again facilitate children's use of smartphones access the internet.

We can also look at national comparisons to see if financial considerations play a role in adoption. Figure 1 shows that since the countries approximately cluster around a diagonal line (with outliers to varying degrees) this implies that the use of handheld devices, which we believe means mostly smartphones, is more likely the wealthier, per head, the country

Figure 1: GDP and the use of handheld devices, by country

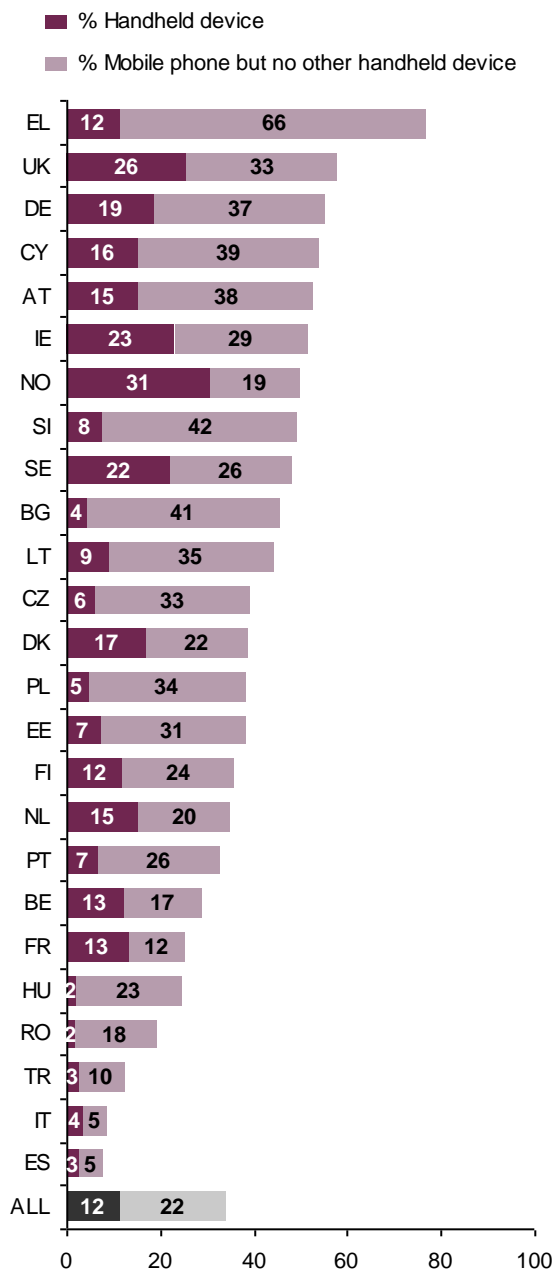


QC300h, e: Which of these devices do you use for the internet these days? GDP per capita in 2009 (in US\$), Source: ITU (see, www.itu.int)

Base: All children who use the internet.

In Figure 2 we see in more detail that handheld device to access the internet is most common in some of the wealthier northern countries of Norway (31%), the UK (26%), Ireland (23%) and Sweden (22%). Children in southern and eastern European countries are least likely to have internet access via a handheld device. However, it is worth noting that financial considerations may be complicated in that this pattern does not carry over into using an ordinary mobile phone to go online.— this is in fact most common in Greece, Slovenia, Bulgaria, Austria, Lithuania and Poland.

Figure 2: Child accesses the internet using a mobile phone or handheld device, by country



QC300h, e: Which of these devices do you use for the internet these days?

Base: All children who use the internet.

Early adopters among children

It would seem that having an interest in SNS might be a motivation for using smartphones. Some 16% of those children with an SNS profile had a smartphone as opposed to 6% who did not. Moreover this was true for all ages: 7% vs. 5% for 9-10 year olds ; 11% vs. 6% for 11-12 year olds; 15% vs. 8% for 13-14 year olds; and 21% vs. 9% for 15-16 year olds. The pattern was broadly similar for girls and boys.

However, the related hypothesis is that having a more general interest in communications also has a bearing on the interest in using smartphones. Some 5% of

those who used email had a smartphone compared to 6% of non-email users. And 15% of those using IM had a smartphone compared to 7% who did not use IM. In fact, the figures are therefore broadly similar for all forms of communication

Although the relation between mobile internet access and the amount of use has been explored elsewhere²³, measures of the amount of time spent online would be a complicated predictor to assess. If children are using more forms of communication and have an SNS profile, this might well in itself give rise to greater time online. More significantly, having the smartphone might mean more chances to go online, producing greater use rather than predicting it. So let us consider instead another dimension of use, breadth of use, as measured by the number of activities. There would seem to be some relation in that smartphone owners engaged in an average of 9.3 activities compared to 6.9 activities for those without a smartphone. While having a smartphone could more obviously lead to an increase in some activities such as visiting an SNS profile, using IM or email, etc., it is less obvious why it should lead to more use of a webcam or creating an avatar. In Table 1, smartphone users do more of almost everything, suggesting that breadth of using has bearing on the interest in using smartphones.

Table 1: Online activities by whether child uses a handheld device to go online or not.

% who say they have...	Does not use handhelds	Uses a handheld device
Used the internet for school work	85	88
Played games on your own or against the computer	83	80
Watched video clips	75	90
Visited a social networking profile	59	82
Used instant messaging	59	78
Sent/received email	58	79
Read/watched the news on the internet	47	60
Played games with other people on the internet	43	51
Downloaded music or films	42	59
Put (or posted) photos, videos or music to share with others	37	58
Used a webcam	30	42
Put (or posted) a message on a website	28	55
Visited a chatroom	22	37
Used file sharing sites	17	30
Created a character, pet or avatar	17	24
Spent time in a virtual world	15	21
Written a blog or online diary	10	21
Average number of activities	6,9	9,3

QC102: How often have you played internet games in the past 12 months? QC306a-d, QC308a-f and QC311a-f: Which of the following things have you done in the past month on the internet?ⁱ (*Multiple responses allowed*) and QC300h, e: Which of these devices do you use for the internet these days?

Base: All children who use the internet.

Finally in Table 2, smartphone users are clearly more skilled in many ways, and taken together with Table 1, it seems more plausible that they were more sophisticated users before they got the smartphone, rather than subsequently learning this broad range of skills because of acquiring this device.

Table 2: Digital safety and literacy skills by whether child uses a handheld device to go online or not (children aged 11+).

	Does not use handhelds	Uses a handheld device
% who say they can...		
Compare different websites to decide if information is true	53	69
Change filter preferences	26	40
Bookmark a website	62	79
Block unwanted adverts or junk mail/spam	48	72
Delete the record of which sites you have visited	50	65
Change privacy settings on a social networking profile	53	75
Block messages from someone you don't want to hear from	61	81
Find information on how to use the internet safely	61	75
Average literacy and safety skills (out of 8)	3,5	5,2

QC320a-d and QC321a-d: Which of these things do you know how to do on the internet? Please say yes or no to each of the following... If you don't know what something is or what it means, don't worry, just say you don't know. and QC300h, e: Which of these devices do you use for the internet these days?

Base: All children aged 11-16 who use the internet.

The parental mediation strategies of parents of children with smartphones

It would appear that the parents of children with smartphones are noticeably different in terms of the way that they mediate their children's experience. One of the clearest differences, shown in Table 3, is that they are less likely to impose a range of rules about internet use (and although there is some variation in particular rules by age, in general this difference often existed for all age groups).

Table 3: Restrictive mediation strategies

	Does not use handhelds	Uses a handheld device
% who say they are never allowed to do the following		
Use instant messaging	21	10
Download music or films on the internet	33	21
Watch video clips on the internet	16	5
Have your own social networking profile	30	14
Give out personal information to others on the internet	66	59
Upload photos, videos or music to share with others	41	25

QC328: For each of these things, please tell me if your parents CURRENTLY let you do them whenever you want, or let you do them but only with your parent's permission or supervision, or NEVER let you do them. and QC300h, e: Which of these devices do you use for the internet these days?

Base: All children who use the internet.

We saw that one possible explanation, in line with claims about de-traditionalization, is that parents who wish to negotiate with their child would actually be less inclined to impose many blanket rules saying 'you are never allowed to do x', preferring instead to reach an understanding about children's appropriate online behaviour through other means. Part of that process may involve trusting them more, which we can further explore through questions asking whether parents check up on children. Table 4 shows that parents of children with smartphones do indeed appear to use electronic monitoring strategies less.

Table 4 Electronic monitoring strategies

% who say parents check...	Does not use handhelds	Uses a handheld device
Which websites you visited	47	40
The messages in your email or instant messaging account	26	21
Give out personal information to others on the internet	40	36
Upload photos, videos or music to share with others	37	32

QC330: Does your parent / do either of your parents sometimes check any of the following things? and QC300h, e: Which of these devices do you use for the internet these days?

Base: All children who use the internet at home.

Of course, as noted earlier, there is a question of causality: is it the smartphone that has led to a change in parent behaviour? For example, do parents give up the above strategies because of the sheer difficulty of monitoring children's activities, including whether rules are kept, once children use a smartphone? While parents still could look at electronic trail left on the main PC or laptop used by their children, the latter could always get around such surveillance using their smartphone for activities they do not want parents to see. And it may be difficult for parents to ask to look in detail at the potentially very personal and private device the child now possesses. Relating the two tables, it may also be less worthwhile to set rules if they cannot be so easily checked.

That said, given that we have seen that most children with smartphones also access the internet in other ways, including through PCs, parents could have at least retained some low key general physical monitoring, in terms of looking at what the children were doing on the large screen. But it seems that parents of children with smartphones also monitor their children less visually, in terms of sitting next to the children when they using the internet (36% vs. 45% for parents of children without smartphones) and staying nearby when children are using the internet (38%: 49%).

Taking the various tables together, this suggests the interpretation that it is the parenting style that is influencing the decision to allow children to have a smartphone: if certain parents impose less general rules in the first place, and those parents want to

trust their children more, being less concerned with surveillance, then the whole issue of smartphones hindering parents ability to monitor their children may be less of a worry when those parents are considering whether their child can acquire such a device. In other words, there is not such a concern acting as a barrier to allowing the child to have the phone.

By many other measures relating to parental mediation, parents of children with smartphones are not so different from those without. Children from both, roughly speaking, tend to be equally happy with their parents interventions, to think the parental interventions are not too onerous and to heed parental advice.²⁴ Meanwhile the parents themselves of both type of children seem equally confident in their ability to help their children. However, there is one further element, where there is a small difference potentially in keeping with de-traditionalization arguments about parental engagement with their children: although parents of children with smartphones do not talk with their children any more than those with these devices, they are a little more inclined to help them when something is difficult or when they want to find something on the internet (72%: 65%).

Conclusions

To set the scene for an empirical review of smartphone adoption by children, the chapter first provided some historical background to the mobile internet research agenda, especially related to online risks. Although there is as yet little research on children and smartphones, issues from the internet literature are in various ways affecting studies of how these phones are used.

The chapter next clarified why children's adoption of smartphones to go online would unlikely be a straightforward process in the light of previous research looking at children's early internet use via mobile phones and cost considerations more generally. This led to the more general point that children's adoption of innovation of ICTs is in general made complex, compared to adult adoption, because of the role of parents as gatekeepers and the process of negotiation highlighted in the domestication framework.

The first analysis of the *EU Kids Online* empirical data revealed several measures (age, SES and country differences) that suggest the cost considerations are indeed one factor influencing smartphone use by children. When we turn to children's motivations, perhaps unsurprisingly an interest in SNSs, a wider interest in online communications generally and broader online activities (and skills) appear to have a bearing on children's interest in using smartphones to go online - it is the more plausible reason for the correlations. But the other part of the picture is that taken as an ensemble the various findings suggest that parents' approach to mediating their children's online experience also plays a role. Those less inclined to be restrictive and monitor electronically what they children do, and adopt more 'active' mediation strategy - in keeping with claims about moves to de-traditionalised families - appear more willing to allow their children to have smartphones,

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¹ To be sure that children understood these questions, most options included national examples. For instance, in the UK questionnaire, option 14 was phrased: “Used file sharing sites (peer-to-peer) (e.g. Limewire, Kazaa).”