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THE RISE AND IMPACT OF DIGITAL AMNESIA

Why we need to protect what we no longer remember

EXECUTIVE SUMMARY

The Internet and Internet-enabled devices have transformed our everyday lives and relationships. We entrust them with our precious personal information including contacts and images and rely on them to connect us to a vast repository of knowledge, anytime, anywhere.

As part of its commitment to help people protect what matters most in their online-enabled world, Kaspersky Lab wanted to better understand how digital devices and the Internet affect the way consumers recall and use information today – and what, if anything, they are doing to protect it.

We commissioned research firm Opinion Matters to survey 1,000 consumers in the United States, aged between 16 and 55+, split equally between male and female.

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Key findings from the study include:

- **Across the United States, the study shows that an overwhelming number of consumers can easily admit their dependency on the Internet and devices as a tool for remembering.** Almost all (91.2%) of those surveyed agreed that they use the Internet as an online extension of their brain. Almost half (44.0%) also admit that their smartphone serves as their memory–everything they need to recall and want to have easy access to is all on it.

- **In addition, many consumers are happy to forget, or risk forgetting information they can easily find–or find again-online.** When faced with a question, half of U.S. consumers would turn to the Internet before trying to remember and 28.9% would forget an online fact as soon as they had used it.

- **Although dependence on devices appears high,** when asked, most participants could phone the house they lived in at 15 (67.4%) as well as their partners (69.7%), children (34.5%), and place of work (45.4%). They could not however call their siblings (44.2%), friends (51.4%), or neighbors (70.0%) without first looking up the number.

- Contrary to general assumptions, **Digital Amnesia is not only affecting younger digital natives**–the study found that it was equally and some times more prevalent in older age groups.

- **The loss or compromise of data stored on digital devices, and smartphones in particular, would cause immense distress, particularly among women and people under 35. More than half of women (51.0%)** and almost the same number of 25 to 34 year-olds (48.6%) say it would fill them with sadness, since there are memories stored on their connected devices that they would never get back. However, it caused the even younger participants the most fear. One in four women (27.1%) and 35.0% of respondents age 16 to 24 say they would panic: their devices are the only place they store images and contact information.

- **Worryingly, despite this growing reliance on connected devices, the study found that consumers across America are failing to adequately protect them with IT security.** Just one in three (30.5%) installs extra IT security, such as an anti-virus software solution on their smartphone and one in five (20.7%) adds any security to their tablet. 28.0% doesn't protect any of their devices with additional security.

Connected devices enrich our lives but they have also given rise to the potentially risky phenomenon of Digital Amnesia. Many people underestimate just how exposed their externally-stored memories can be, rarely thinking about the need to protect them with IT security, such as anti-virus software. Kaspersky Lab is committed to helping people understand the risks their data could be exposed to, and empowering them to tackle those risks.

ACKNOWLEDGEMENTS

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Introduction

Digital technologies are not just transforming the way we live and work; they are changing the way we think, learn, behave – and remember.

The long term effects of digital device and Internet use are being actively investigated by cognitive neuroscientists, psychologists and many others. Large-scale studies are still in their infancy (10), results can be contradictory, and their interpretation contentious (4) (8). Considerable attention is currently focused on the potential effect of technologies, such as gaming, on brain development, behavior and cognitive skills (6) (7) , particularly among young people (1) (2).

Other studies have looked at the impact on brain functionality of always-on access to the Internet's vast repository of information. A seminal paper published in Science in 2011 (12) detailed research by Harvard and the Universities of Columbia and Wisconsin into memory and Internet use. The study showed that the way young people in the U.S. remembered information was changing as a result of being able to find information online: they retained fewer facts but could readily recall where the information was stored. The researchers called this 'the Google effect.'

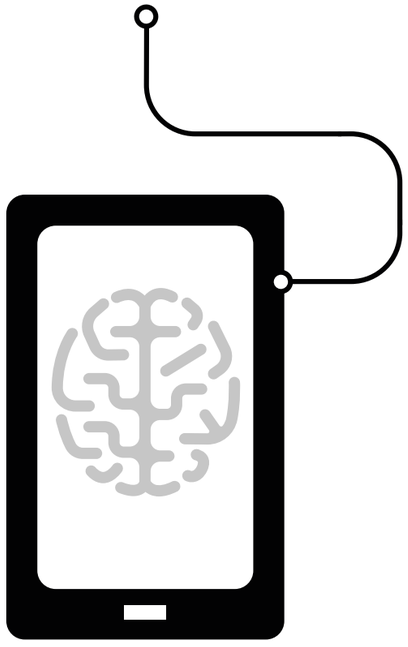
Using this as a starting point, Kaspersky Lab wanted to better understand how digital devices and the Internet affect the way ordinary people of all ages recall and use information today – and what, if anything, they are doing to protect the most critical information and ensure they and their families can enjoy the best of the Internet's intelligence without risk.

Previous Kaspersky Lab studies[i] have shown that many people underestimate just how exposed their externally-stored memories can be. They don't consider themselves a target and rarely think about the need to protect their memories with IT security, such as anti-virus software.

As part of its commitment to help people protect what matters most in their online-enabled world, Kaspersky Lab commissioned research to explore these issues across the United States.

Research methodology

The quantitative research was undertaken by research firm Opinion Matters, which surveyed 1,000 United States consumers, aged between 16 and 55+, split equally between male and female[ii]. The survey was undertaken online in May 2015.



The research findings

The results reveal that the 'Google Effect' likely extends beyond online facts to include important personal information.

For many people, particularly younger consumers, connected devices have become not just the primary source of knowledge, but the default storage space for their most important personal information, including contacts and images[iii]. Around half of smartphone-owning 16 to 44 year olds surveyed for the study admit that their phone holds almost everything they need to know or recall.

The study findings show that the majority of these digital consumers strongly depend on devices and the Internet as an extension of their brain; **and suggest a direct link between data available at the click of a button and a failure to commit that data to memory.**

Kaspersky Lab has termed this phenomenon **Digital Amnesia: the experience of forgetting information that you trust a digital device to store and remember for you.**

The study found evidence of Digital Amnesia equally among both men and women and across all age groups. **Contrary to general perception, it is surprisingly prevalent among older respondents.** For example, respondents aged 45 and older are more likely to head straight for the Internet for the answer to a question, and write the fact down or choose to forget an online fact once they've used it on the assumption that it will always be out there somewhere. The data is discussed in more detail below.

"The overall trend seems worrying to some degree. In contrast to general knowledge that will always be retrievable from the Internet, personal information seems indeed very vulnerable if it is stored solely on one electronic device, and if this device is used as a replacement for our autobiographical memory." **Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham**

"One of the reasons consumers might be less worried about remembering information is because they have connected devices that they trust. In many societies, having access to the Internet feels as stable as having access to electricity or running water. It would be interesting to explore further whether individuals in places where the Internet is unreliable (for instance, in cities where there are information or electricity blackouts or in very remote areas) feel greater need to remember contact details or facts, or have a different perspective on information access." **Dr Kathryn Mills, UCL Institute of Cognitive Neuroscience, University College London**

The results fall broadly into two categories: the recall of personal information and the recall of knowledge and insight.

Mind my memories

The study found that, across the U.S., an overwhelming number of consumers can easily admit their dependency on the Internet and devices as a tool for remembering.

The results show that almost all (91.2%) of those surveyed agreed that they use the Internet as an online extension of their brain, with little variation across genders and age groups studied (for example: 89.9% of men and 92.6% of women). Almost half (44.0%) also admitted that their smartphone serves as their memory and everything they need to know or recall is on it.

This was especially true for those ages 16-44; more than half in each age group agreed with this notion. Only a small portion of those 55+ (26.2%) said that their smartphone served as their memory.

Further, an overwhelming 85.5% of those surveyed say that in our increasingly hyper-connected world people simply have too many numbers, email addresses, social media accounts etc. to remember even if you wanted to.

"Reliance on digital devices, and the trust we place in them, can resemble a human relationship. The feelings are established in the same way-through experience. Repeated experience with a reliable individual builds a 'schema[iv] or association for that individual in our memory, telling us that this person can be depended on. If a digital device is continually reliable then we will build that into our schema of that device." **Dr Kathryn Mills, UCL Institute of Cognitive Neuroscience, University College London**

Not surprisingly, the study found that the loss or compromise of data stored on digital devices, and smartphones in particular, would cause immense distress, particularly among women and younger people.

Of those surveyed more than half of women (51.0%) and almost the same number of 25 to 34 year-olds (48.6%) say it would fill them with sadness, since there are memories stored on their connected devices that they would never get back. However, it caused the even younger participants the most fear. One in four women (27.1%) and 35.0% of respondents age 16 to 24 say they would panic: their devices are the only place they store images and contact information.

Figure 2A: The emotional impact of losing data or access to data based on age

		Age				
	Base	**16-24**	**25-34**	**35-44**	**45-54**	**55+**
Sad–there are memories stored on those devices that I could never get back	45.1%	40.3%	48.6%	47.7%	43.6%	44.8%
Panic–it's the only place I have my images and contact information	24.9%	35.0%	25.7%	27.1%	23.3%	13.3%
Calm–I have memorized the things that matter and keep hard copies of pictures	22.7%	18.0%	21.6%	20.1%	25.2%	28.6%
Other	3.9%	3.4%	2.3%	3.7%	4.5%	5.7%
I do not have any connected devices to store information on	3.5%	3.4%	1.8%	1.4%	3.5%	7.6%

Figure 2B: The emotional impact of losing data or access to data based on gender

		Gender	
	Base	**Male**	**Female**
Sad–there are memories stored on those devices that I could never get back	45.1%	39.1%	51.0%
Panic–it's the only place I have my images and contact information	24.9%	22.6%	27.1%
Calm–I have memorized the things that matter and keep hard copies of pictures	22.7%	29.0%	16.3%
Other	3.9%	5.1%	2.7%
I do not have any connected devices to store information on	3.5%	4,2%	2.8%

In addition, an interesting finding was that more than half of American adult consumers could phone the house they lived in aged 15, but not their siblings, friends or neighbors–without first looking up the number. They could, however, recall their partners (69.7%), children (34%), and place of work (45.4%).

The results show that 44.2% couldn't call their siblings, 51.4% couldn't reach their friends and 70% couldn't get hold of their neighbors. Yet up to 67.4% have perfect recollection of their home phone numbers at age 15–often reflecting the needs of an age when connected devices were not the ubiquitous companions they are now, if they existed at all.

Contrary to general assumptions, **Digital Amnesia is not only affecting younger digital natives**–the study found that it was equally and some times more prevalent in older age groups. When it came to owning devices, 53.4% of 16-24 year olds and 44.8% of 55+ said they owned a tablet (such as an iPad or Samsung Galaxy Note) and used it to connect to the Internet. When they need to find an answer to a question, slightly more people 55+ admitted to searching online first (52.9%) compared to younger people, 16-24 years old (44.7%). This trend was also apparent when participants agreed that they didn't need to remember facts they found online – only remember where they found them. 68.5% of 55+ participants compared to 58.7% of 16-24 year olds agreed or strongly agreed with this notion. Despite this, all age groups were just as likely to feel sad over the loss of information stored on a device: 40.3% of those 16-24, 43.6% of those 45-54 and 44.8% of those 55+ all responded the same.

Numbers respondents can remember without looking up:

Figure 1A: is of the number to the house they lived in at 15

		Age				
	Base	**16-24**	**25-34**	**35-44**	**45-54**	**55+**
Yes–the whole number	67.4%	75.2%	73.0%	72.9%	59.9%	55.2%
No	22.0%	13.1%	17.1%	20.6%	29.2%	30.5%
Yes–part of the number	8.3%	7.3%	9.0%	6.1%	9.4%	9.5%
I did not live in a house with a phone when I was 15	2.4%	4.4%	0.09%	0.5%	1.5%	4.8%

Figure 1B: % of respondents who can recall the number of the following

Base	1054	Percentage
Partner or spouse	Yes	69.70%
	No	10.90%
Child/children	Yes	34.50%
	No	22.40%
Parents	Yes	68.40%
	No	16.00%
Sibling/s	Yes	43.00%
	No	44.20%
Neighbors	Yes	15.90%
	No	70.00%
Friends	Yes	43.30%
	No	51.40%
Your child's/children's schools	Yes	12.90%
	No	44.40%
Your place of work	Yes	45.40%
	No	28.90%
Doctor	Yes	21.90%
	No	69.40%
Dentist	Yes	10.60%
	No	77.50%

"One aspect that seems to be a trend in the age of smartphones is to externally store personal memories in the form of pictures. Pictures are a very powerful reminder, and have the potential to reawaken memories that we would otherwise have forgotten. However, they also carry the risk of dictating which aspects of our past we remember, and the more often people remember the same events, the more likely they forget other relevant memories that are not captured in pictures. There also seems to be a risk that the constant recording of information on digital devices makes us less likely to commit this information to long term memory, and might even distract us from properly encoding an event as it happens." **Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham**

Information online

The study shows that only one in three U.S. consumers always memorizes or notes down something they consider important. Also, most are happy to risk forgetting information they can easily find–or find again–online, reinforcing other studies that show how the Internet is transforming the way we search for and remember facts.

The study shows that only 26.3% of American consumers say they always memorize information they consider important, or that they note it down somewhere–typically a smartphone.

When faced with a question, about half of consumers across all age groups would head online before trying anything else. However, it is reassuring to note that almost 40% of consumers will also try to remember first. It would be interesting to track this trend over time.

Similarly, while 43.9% of consumers say they would sometimes make a note of something they had found online, (28.9%) would forget an online fact as soon as it had been used, rising to 35.5% of those aged 35 to 44.

"There seems to be some evidence that older individuals have trouble retrieving information because they have more information to sort through. In theory, this could mean that 'offloading' some of our information to a digital device could make it easier to recall the information we have retained." **Dr Kathryn Mills, UCL Institute of Cognitive Neuroscience, University College London**

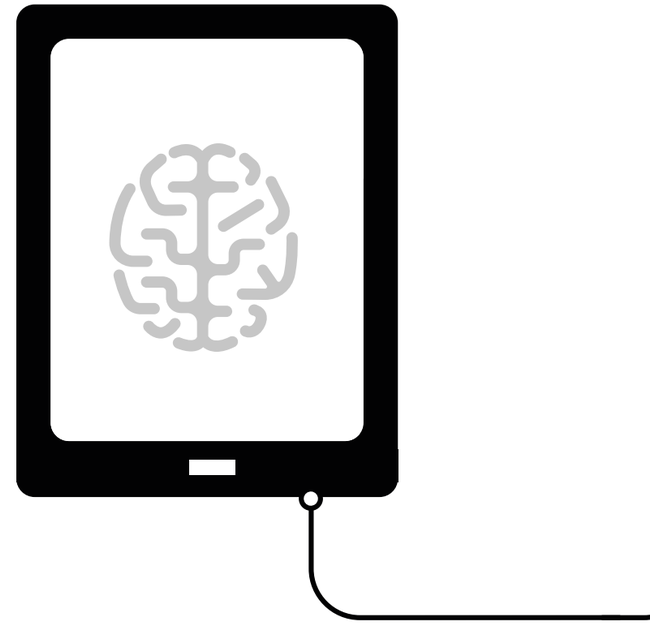
Figure 3: Behaviour related to Internet searches

		Age				
	Base	**16-24**	**25-34**	**35-44**	**45-54**	**55+**
Search online	50.0%	44.7%	45.5%	52.3%	55.0%	52.9%
Try to remember	39.3%	42.2%	44.1%	38.8%	33.7%	37.1%
Ask a friend who knows about the subject	6.5%	7.3%	6.3%	4.7%	7.4%	6.7%
Look it up in a book	3.5%	4.4%	3.6%	4.2%	2.5%	2.9%
Other	0.80%	1.5%	0.50%	0%	1.5%	0.50%

There are also indications that the Internet is changing the kind of things we do consider worth remembering. For example, 61.0% believe that it's not necessary to remember facts they've found online, but they do need to remember where they found them.

This growing dependence on the Internet as a source of information we might previously have memorized or looked for elsewhere can reflect impatience or the need for speed in a fast-moving world: 67.9% say they need answers quickly and simply don't have the time for libraries or books. This is consistent across gender, age groups and regions studied.

"There is an argument to be made that looking up information online, instead of trying to recall it ourselves, makes us shallower thinkers. Past research (9) has repeatedly demonstrated that actively recalling information is a very efficient way to create a permanent memory. In contrast, passively repeating information (e.g. by repeatedly looking it up on the Internet) does not create a solid, lasting memory trace in the same way. Based on this research, it can be argued that the trend to look up information before even trying to recall it prevents the build-up of long-term memories, and thus makes us process information merely on a shallow, moment-to-moment basis." **Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham**



Unprotected treasures

Worryingly, despite this growing reliance on connected devices as the keepers of our memories and knowledge, the study found that consumers across the United States are failing to adequately protect them with IT security. Smartphones and tablets are particularly poorly secured and women secure everything less than men, a finding consistent with previous Kaspersky lab studies.[v]

The use of digital devices is widespread in America. Around two-thirds of all participants (69.4%) have connected smartphones–with younger people far more likely to own one than older age groups: 77.7% of 16-24 year olds compared to 42.9% of those aged 55+; slightly more than half of those surveyed (58.8%) have connected tablets – which spikes to 72.4% of 35-44 year olds ; three-quarters (75.6%) have connected laptops–which increases slightly when looking at 16-24 year olds (82%), and more than half (61.1%) of all ages have connected PCs.

However, just one in three (30.5%) installs extra IT security, such as an anti-malware software solution on their smartphone and only a quarter (20.7%) adds any security technology to their tablet. Almost one in four (28%) doesn't protect any of their devices with additional security.

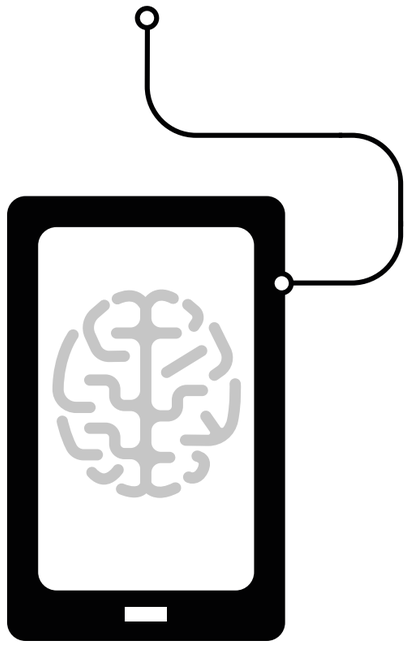


Figure 4: Consumers who install extra IT security on devices

		Gender	
	Base	**Male**	**Female**
Laptop computer	53.7%	54.4%	53.0%
PC	41.3%	46.0%	36.7%
Smartphone, such as an iPhone or Android phone	30.5%	32.1%	28.9%
None of these devices	28.0%	24.1%	31.9%
Tablet, such as an iPad or Samsung galaxy note	20.7%	20.9%	20.5%

		Age				
	Base	16-24	25-34	35-44	45-54	55+
Laptop computer	53.7%	50.5%	54.5%	55.6%	53.2%	54.5%
PC	41.3%	29.6%	38.7%	45.8%	42.3%	50.2%
Smartphone, such as an iPhone or Android phone	30.5%	29.6%	36.5%	36.0%	28.9%	21.1%
None of these devices	28.0%	32.5%	26.1%	23.8%	29.9%	28.2%
Tablet, such as an iPad or Samsung galaxy note	20.7%	17.0%	20.3%	22.9%	20.4%	23.0%

THE IMPACT OF DIGITAL DEVICES ON HOW WE REMEMBER

Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham

Our brains clearly have a capacity limit in terms of how much information is accessible. Old memories do fade and will eventually be forgotten, or overwritten by more relevant memories if we don't use (recall) them.

Given these capacity limitations, one could argue that smartphones can enhance our memory, because they store information externally, and thereby free up capacity in long-term memory. This might be particularly true in the case of elderly people, who seem to be more vulnerable to distraction from irrelevant or outdated information stored in memory, making it more difficult for them to access the relevant information (5).

Even in healthy young people, research shows that being able to forget currently irrelevant or outdated information makes us more efficient at encoding new information. This phenomenon is termed 'directed forgetting' (3), and it has recently been demonstrated that it is relevant with respect to using computerized aids.

For example, Storm and Stone (11) showed that saving previously learned information onto an external device enhanced the encoding and retention of subsequently learned information. Based on this and other research, it can be argued that if smartphones were used in this way–off-loading currently irrelevant data so we can access it again at a later time when required –we can reduce the degree to which this currently irrelevant information interferes with the learning of new information, indeed leaving more space in our brains.

However, storing information externally also carries the risk of forgetting this information. If people use their smartphones to store even the most relevant information (e.g. personal data, important contacts), as the research reported by Kaspersky Lab in this document suggests, this can cause them to not store this information in their own memory any more.

Conclusion

Connected devices enrich our lives but they have also given rise to the potentially risky phenomenon of Digital Amnesia. Many people underestimate just how exposed their externally-stored memories can be, rarely thinking about the need to protect them with IT security, such as anti-virus software.

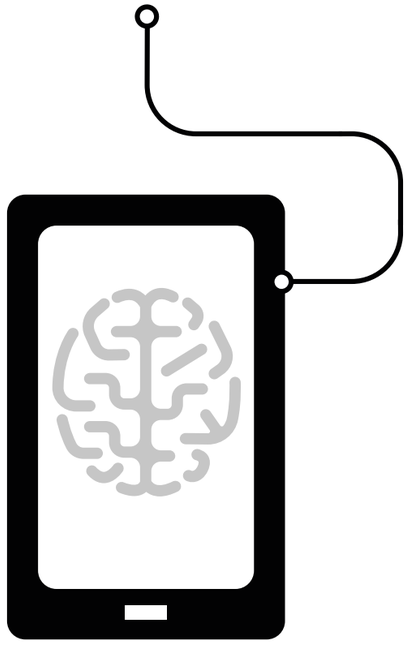
Increasingly relying on devices to store information as our memory leaves us immensely vulnerable should the device be lost or stolen or the data compromised – particularly if we are out and about. Secondly, while the Internet offers access to a wealth of insight and intelligence that can enhance every experience, it also leaves us open to unexpected threats and vulnerabilities.

A separate Kaspersky Lab consumer research survey[vi] found that while three quarters of women and two-thirds of men don't believe they could possibly be a target for cyber-attack or malware, 43% of them were hit by financial malware in 2014. In the same year, 24% of Mac users and 32% of PC users encountered a general virus/malware attack.

Further, there are dark corners of the Internet that contain inappropriate and even illegal information and they are surprisingly easy for unwary consumers to stumble into. The freedom to roam the Internet for knowledge requires–ironically–that we can block access to such sites for vulnerable audiences such as children.

Digital Amnesia is a growing trend among consumers of all ages, not just younger digital natives–and we need to better understand the direction and long term implications of this trend in order to protect the information we no longer store in our minds. Kaspersky Lab is committed to helping people understand the risks their data could be exposed to, and empowering them to tackle those risks. We look forward to a lively debate on the impact and future of Digital Amnesia.

Connected devices enrich our lives but they have also given rise to Digital Amnesia. We need to understand the long term implications of this for how we remember and how we protect those memories.



"The act of forgetting is not inherently a bad thing. We are beautifully adaptive creatures, and we don't remember everything because it is not to our advantage to do so! Forgetting becomes unhelpful when it involves losing information that we need to remember. The act of memorization is a skill, and its importance as one the tools in our cognitive toolkit is dependent on how relevant memorization is for us to effectively navigate our world. In other words: being able to memorize is an important skill to have only if we need it." **Dr Kathryn Mills, UCL Institute of Cognitive Neuroscience, University College London**

"Forgetting is in no way a bad thing! Quite the contrary, forgetting is a highly adaptive way to help our memory retain the information that is truly relevant, and get rid of information that is irrelevant. Our brain seems to work under the premise that the things that we frequently use and remember are the things that are truly valuable for us. Our brain appears to strengthen a memory each time we recall it, and at the same time forget irrelevant memories that are distracting us. This way, we might not be able to remember everything in the long term, but our memory system is adaptive in that it makes sure we remember the most relevant information. There are plenty of memories that have become outdated (e.g. our old bank details as soon as we open a new bank account), or memories we may wish to forget (e.g. traumatic or embarrassing events). In all those instances, our memory becomes more efficient and adaptive because humans are capable of forgetting." (13) **Dr Maria Wimber, Lecturer, School of Psychology, University of Birmingham**

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i The Consumer Security Risks Survey 2014 – multi-device threats in a multi-device world', Kaspersky Lab and B2B International, July 2014.

ii The sample was recruited, validated and surveyed through 'double opt-in' online panels to ensure respondents were representative and genuine.

iii 81% of the consumers surveyed own and use a smartphone, 66% a tablet and 84% a laptop.

iv In psychology and cognitive science, a schema (plural schemata or schemas) describes an organized pattern of thought or behaviour that organizes categories of information and the relationships among them.

v 'Consumer Security Risks Survey 2014 – multi-device threats in a multi-device world', Kaspersky Lab and B2B International, July 2014.

vi Digital Consumer Online Trends and Risks, Kaspersky Lab with B2B International, 2014.