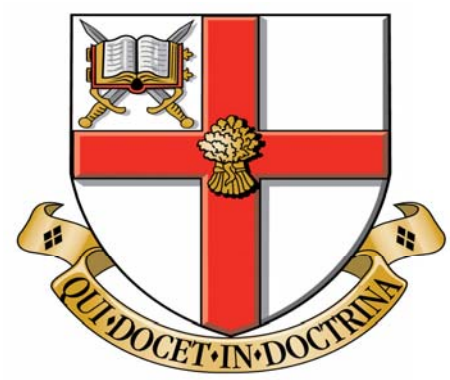


University of Chester

UNIVERSITY OF CHESTER

ABSTRACT

"An investigation into internet use by 45-54 year olds"
by Keith Richardson

Supervisor: Dr Linda Rayner. Department of Computer Science & Information Systems, Faculty of Applied and Health Sciences

This research set out to determine how frequently, and for what purpose, members of the 45-54 year old generation used the internet, specifically whether they used it to socialise and for domestic purposes more frequently than they did for educational and work related purposes. This area of research is particularly fascinating because members of that generation grew up in a world with no internet, to one in 2009 where there were an estimated 1.56 billion world-wide internet users. A non-experimental research design was chosen using a questionnaire issued by email. Participants had a choice of completing the questionnaire and posting it back or completing it online. . To minimise the risk of unsuitable recruits, and given the specific age related nature of the pre-defined research sample, non-probability purposive sampling techniques were used to arrive at the sampling frame of convenience.

The main findings were that respondents stated that they used the internet for socialising and domestic purposes more frequently than they did for work and educational purposes. Therefore the null hypothesis was rejected (that: "45-54 year olds do not use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities"). A weak relationship was found between gender and internet usage. Males, on average, used the internet more frequently than females for both social & domestic and work & educational purposes. This finding was similar to that of other recent UK based research. No statistically significant differences in internet use were found between the main roles or professions of respondents. However internet use was found to increase as the level of educational qualification increased broadly in line with the findings of other research. Those with higher educational qualifications in this study used the internet significantly more for work and educational purposes. In addition those who lived in rural areas used the internet significantly more for work & educational purposes, but no statistically significant difference in frequency of internet uses was found for domestic & social purposes. Those from Greater Manchester were the most frequent users of the internet for domestic & social purposes and N. Wales were the lowest.

Finally, respondents from married households with children were the most active internet users, but no significant differences were detected when exploring that and other household types. Other studies had found significant differences between household types with internet use increasing as the number of household members increased because their internet use was driven by their need to maintain and coordinate multiple relationships.

"AN INVESTIGATION INTO INTERNET USE BY 45-54 YEAR OLDS".

by

Keith Richardson

A dissertation submitted in partial fulfilment of the requirements for the degree of

Master of Science

University of Chester

2009

DISCLAIMER

This work is original and has not been previously submitted in support of any other course or qualification.

Signed by _____

Keith Richardson, Lead Researcher

Date Wednesday, 23 September 2009

_____

DEDICATION

To my parents, James and Margery Richardson.

ACKNOWLEDGMENTS

The author wishes to express sincere appreciation to Dr Linda Rayner for her assistance in the preparation of this manuscript. In addition, special thanks to his wife, Elaine, for supporting and encouraging him throughout. Finally thanks to all of the participants who completed the primary research instrument, the questionnaire, on which the main conclusions of this dissertation are founded.

TABLE OF CONTENT

LIST OF ILLUSTRATIONS

LIST OF TABLES

1. INTRODUCTION

1.1. Introduction

The main purpose of the research was to determine why members of the 45-54 year old generation used the internet , specifically examining whether they used it to socialise and for domestic purposes more frequently than they did for educational and work related purposes.

1.2. Hypothesis

The hypothesis being tested was that "45-54 year olds use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities".

Therefore the null hypothesis was the opposite of that: "45-54 year olds do not use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities".

1.3. Scope

Information Communication Technology (ICT) tools, used to access the internet ,that were defined as within scope included PCs, Apple Macs, Laptops, mobile phones, web browsers, email, instant messaging, social networking sites and blogs.

So the extent to which they used these tools to access the internet for socialising and domestic purposes was compared to the extent to which they

used for work, or for educational study purposes. This was established by gathering data from participants, who confirmed that they satisfied the age selection criteria, using a questionnaire based research instrument. The data was collected and analysed using a statistical analysis package and subjected to a range of tests to determine whether the hypothesis was correct or not.

1.4. Historical Context

1.4.1 A NEW WORLD

This research area is especially fascinating because the 45-54 year old generation grew up between 1955 and 1975 in a different world from the one in which they find themselves today. In light of this the 45-54 year old generation has been recognised as a defined group among several by other researchers examining patterns of internet usage. For example the *PEW Internet & American Life Project* (Jones & Fox, 2009) described them as the "Younger Baby Boomer Generation" within the context of a wider classification of the generations as shown below:-

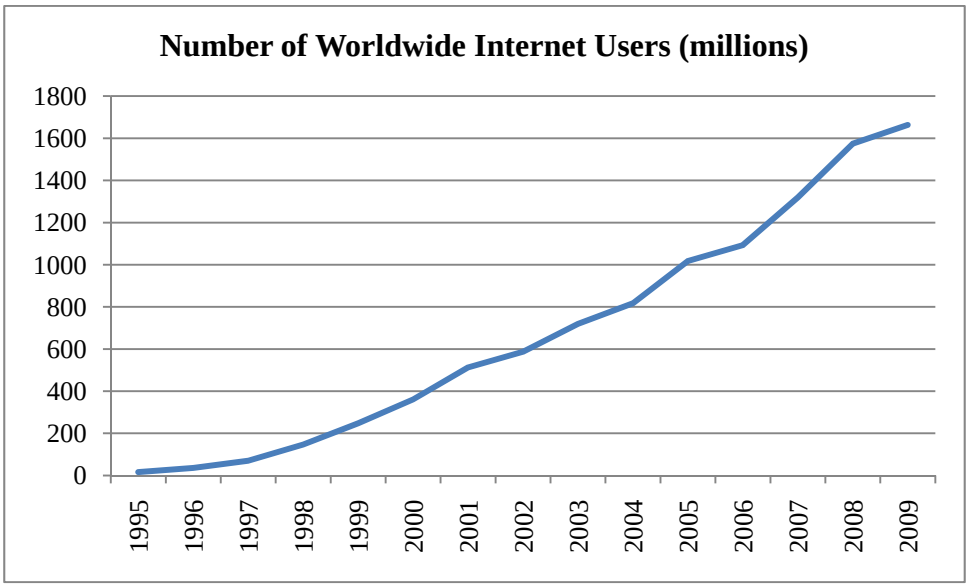
1. PEW Internet & American Life Project Generation Classification

Generation name	**Birth Years**	**2009 Age**
Gen Y (Millennials)	1977-90	18-32
Gen X	1965-76	33-44
Younger Baby Boomers (YBB's)	1955-64	45-54
Older Baby Boomer	1946-54	55-63
Silent Generation	1937-45	64-72
G.I Generation	19xx - 1936	73+

The Human Race has been developing new tools to enhance our ability to communicate interactively with each other throughout all of known history (Heath & Bryant, 2000). Others have asserted that this was more so in the 21st Century because civilisation is now in an "Information Age" where the

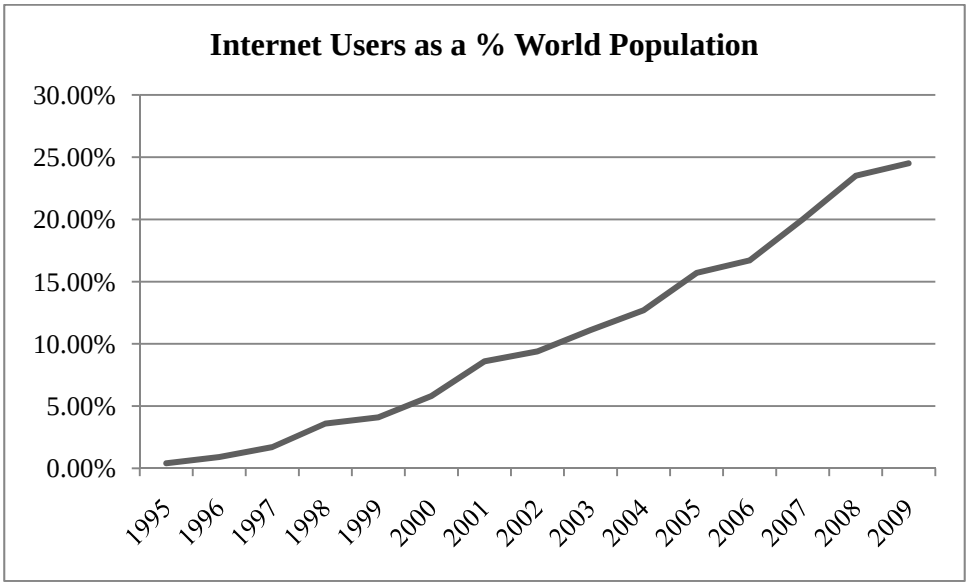
range of tools available to communicate continues to expand as innovators develop new internet based ways to communicate over, and across, time (Thussu, 2000). As this dissertation is being written the number of internet users continues to grow. It has already exceeded the 1 billion mark in 2005, from very much a minority activity in 1995, when the youngest members of the 45-54 year old generation of today were aged between 31 and 40 years of age (Miniwatts Marketing Group, 2009), as illustrated in the following graph :-

1. NUMBER OF WORLDWIDE INTERNET USERS



The same source also compared the number of users against the total world population showing that, as of 2009, one quarter had access to the internet:-

2. INTERNET USERS AS A % OF WORLD POPULATION



1.4.2. EARLY FORMS OF COMMUNICATION

Known developments in methods of human communications began very slowly in pre-history when, for example, carved animal bones used to convey messages (the earliest found so far date from circa 47,000 years ago), cave painting (30,000-47,000 years ago) smoke or horn transmitted signals, wall paintings as well as verbal communication and the transfer of knowledge via story telling (BBC, 2009). These methods stayed the same over many generations, until forms of writing developed such as early pictography (Egyptian hieroglyphs and Mesopotamian cuneiform) in circa 3000-4000 BC, with those surviving today seen mainly on tomb or temple walls, and on baked clay tablets, or parchment scrolls. The Phoenicians developed the first 22 character abstract system of writing in around 1,000 BC. This was probably the first version of what became our modern alphabet after the Romans added a further 5 characters (Y, Z, J, U and W) to make our present day 26 character based alphabet which is the foundation of most of western civilisation based communications today.

(BBC, 2009) (Natural History Museum, 2009) (The Heritage Community Foundation, 2009).

1.4.3. THE AGE OF BOOKS

The communication media used has similarly evolved. Parchment evolved into mass produced fibre based paper. Early scrolls or books were painstakingly scribed and copied a page at a time. The invention of printing in the west during the Renaissance and then the exploitation of the printing press led to an explosion of communication as the cost of dissemination of information became more affordable thanks to mass production. As a result books became more widely available as did access to newspapers, magazines, pamphlets and photocopying. (The Heritage Community Foundation, 2009) (About.com, 2009).

1.4.4. THE TELEGRAPH AGE

Early methods of relatively rapid communication over distances included smoke signals (beacons), semaphore, sun and fire light based signals, and flag signals, the latter typically between ships. A major evolutionary step began in the 1830's when Samuel Morse in the USA and Cooke and Wheatstone in the UK were major players in the evolution of the telegraph (Encyclopædia Britannica Online, 2009). (Munro, 1997) The first public services began to become available from 8 years later. The telegraph system eventually spanned the continents, via overland and under seas copper wire links. This brought the world together in near real time by allowing messages to be sent across large distances almost instantly. As an example of how rapidly this technology became part of the communication toolset the number of telegraphic transmissions in the world increased from 29 million in 1868 to 329 million by 1900. (Thussu, 2000). Over similar

timescales other non-interactive, one-way, mass communication media evolved to include record players, phonographs or gramophones playing cylinders, 78rpm, 45rpm, or 33rpm records, with the first working commercial version developed by Thomas Edison in 1877 (Dyer & Martin, 2006).

1.4.5. THE TELEPHONE AGE

Spoken two way communications began with early telephones patented in 1876 by Alexander Graham Bell, (BBC, 2009) and evolved over time to include wireless speech, transmitted, patented by Marconi in 1901 and radio (Innovations Learning, 2009) and then lately mobile telephones. The lead researcher is a member of the 45-54 year old generation. Like many of those within that generation they grew up in a world familiar with this older telephone based communication technology and also typically used, logarithms, slide rules, long hand calculations and watched black and white, two channel, television. Many would have seen their parents buy their first television, their first phone, perhaps saw central heating being installed and their parents obtaining their first second-hand, but unreliable car. As school children the 45-54 year old generation may have obtained information for their homework from the equivalent of the internet, which was their local school and town libraries and may have replied heavily on the Encyclopaedia Britannica, and those of similar ilk, as a highly limited form of physical search engine along side library index cards. Music was bought in shops on vinyl, and card and board games were played sitting around a table with friends and family. Their parents probably gave them their first taste of electronics when they bought them their first (expensive) electronic calculator in their late teens to take to university, or when they started work.

1.4.6. THE COMPUTER AGE

Many of the 45-54 year old generation didn't personally sit in front of any type of computer screen until the 1970's or early 1980's, if they worked that is for an organisation with pockets deep enough to buy one. For some, they had to wait until the 1990's, or even the year 2000 plus, for their first taste of computing with say access via a work based or home PC (About.com, 2009).

For those of the 45-54 year old generation involved in computer programming though in the 1970 and early 1980's they probably wrote their first programs on paper sheets, had them punched onto cards, "submitted" and run overnight on a water cooled mainframe computer in a room the size of several tennis courts. If they were lucky, they obtained the results the following day, or more likely wrote several fixes over several days before they could use the output. (About.com, 2009)

1.4.7. THE INTERNET AGE

Of course the internet did not materialise overnight and went through several stages of evolution (Rowe, 2000). When these are compared to the corresponding age of the 45-54 year generation that are the subject of this research it was possible to see chronologically how the internet mapped against their ages:-

2. Evolution of the Internet mapped against the 45-54 Generation

Year	Event	45-54 year generations age then (from 2009)
1955	Oldest members of the generation are born	
Pre-1956 -	Simple data communication were via hard wired devices such as telex machines and telephone exchanges;	1 or less or not born
1956-1969 -	Closed computer networks emerged usually for a specific purpose such as military defence, banking, or airline reservations;	1956 Age 1 1969 age 5-14
1964	Youngest members of the generation are born	
1969--1975	The US Department of Defence introduced packet switching technology across different institutions (ARAPANET);	1969 age 5-14 1975 age 11-20
1974-1982	Proliferation of packet switched networks mainly in academic / research areas with limited standardisation;	1975 age 10-19
1978-1985	Adoption of common standards –TCP/IP Domain names;	1978 age 14-23 1985 age 21 to 30
1985-1995	World wide internet adoption by the general public begins very slowly via dial up telephone connections to internet service provider;	1985 age 21 to 30 1995 age 31 to 40
1995+	Internet adoption by the general public picks up a pace and commercialisation of the internet with e-business increases;	1995+ age 31 to 40
2000	The number of "always on" Broadband internet connections increases bringing with it increasing ubiquitous, pervasive computing.	2000 age 36 to 45

This shows that by the time the internet began to grow significantly, commencing in around 1995, the 45-54 year old generation were at least 31 years of age and some had just passed their 40th birthday and rapidly approaching middle age. The purpose of showing this was to demonstrate that the internet was not something the subjects of this study grew up with and therefore it was unfamiliar to them and required a degree of change on their part to adopt and use the technology as a communication tool.

Within the historical context therefore the internet can be seen as yet another addition to the choices available to facilitate human communications. What is coming next? It is difficult to predict, but some would argue that a convergence of technology is now possible facilitated by the adoption of

digital based communications, so that the telephone, mobile phone, PC, music players and TV may merge into one communication centre or tool accessed wirelessly around the home or elsewhere via, for example, an "Internet Television" in an "Age of Digital Convergence" (Zhou, 2004) (University of Hong Kong, 2009). . Digital convergence has been defined already as "the ability of different network platforms to carry essentially similar kinds of services" or "the coming together of consumer devices such as the telephone, television and personal computer" (European Commission, 1997). As such an "Internet TV" could effectively be one of the focal points of that made up of components whose equivalent at present would include a broadband connected PC, music centre, traditional TV, effectively a "communications and media centre" with high definition TV screen and attached peripherals. It could be showing programmes, enabling video-conferencing (supplementing as well as facilitating simple phone calls) providing internet access, content on demand, online social networking, and running software applications and providing access to educational content.

This is being enabled because advances in digital telecommunication technology and intense competition may be reducing the cost of communicating and as a result "*It used to be expensive to move information, but now it is cheap. It is possible to do old things in new ways, new things in old ways, and new things in new ways*". (Noam, Groebel, & Gerbarg, 2004).

Unlike 45-54 year olds therefore, the next generation will, more than likely, mostly grow up in a digital age, an "Information Society". Some would argue that the UK Government have recognised this and have set out a way forward to deliver this new age as described in their new "Digital Britain" strategy report, published in June 2009. This seeks to fund a commitment to investment in new "super fast" broadband infrastructure from a tax of existing telephone lines (Department for Business Innovation & Skills. Department of Culture Media and Sport., 2009).

No doubt time will tell.

1.5. Structure

This Dissertation now proceeds as follows:-

- Chapter 2, Literature Research, summarises and describes the main findings of the literature review;
- Chapter 3 Methodology, explains the methodology used to conduct this research and the rationale behind that;
- Chapter 4, Results, sets out the results of the research;
- Chapter 5, Discussion, compares the results of the literature review with the findings of this research;
- Chapter 6 Conclusion, draws the high level main themes together and draws overall conclusions
- Appendix 1, Questionnaire, contains a copy of the questionnaire as used to collect the data;
- Appendix 2, Participant Information Sheet, includes a copy of the information as given to those who were invited to complete the questionnaire.
- Appendix 3, Methodology, contains further considerations, at a more detailed level, on the methodology used and the reasons for that;
- Appendix 4 Detailed Results, contains further detailed analysis of the data, as collected in support of the findings, as set out in the main body of the dissertation.

Appendix 3 and 4 can be found on CD. These have not been bound with the main dissertation.

2. LITERATURE REVIEW

2.1. Introduction

The Literature Review examined evidence from a range of sources including-

- Published government statistics and strategic policy publications and reports;
- Academic research publications, reports, conference papers and general papers,
- Books and other reference sources; and
- Internet web site based content.

The focus of the Review was to find sources relating to internet usage overall, and also sources relating to the main themes of this topic, specifically:-

- Overall Internet usage to see how this research sits with the wider context (UK internet usage and how that has changed over time; European Union internet usage; Worldwide internet usage);
- Internet usage by independent variable (Gender; Main Role; Profession; Educational Qualifications; Type of Area, Home Location; Type of Household);
- Internet usage by dependent variable:-

- Method of accessing the intent (such as PC, mobile phone, web browser, email, instant messaging, social networking sites, blogging);

- Reason for accessing the internet specifically socialising and domestic purposes and work and educational purposes.

The findings are set out below.

2.2. Overall Internet usage

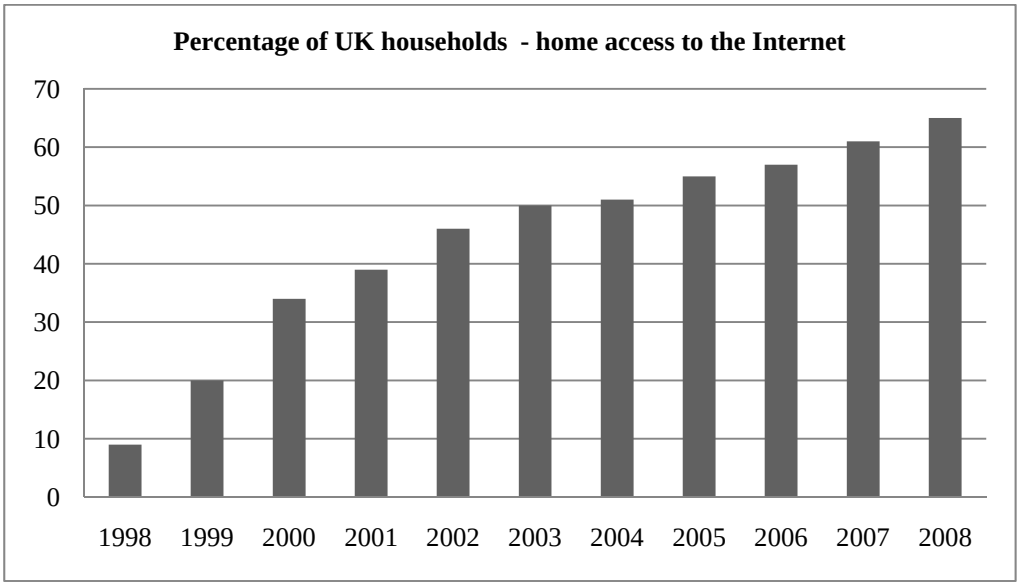
When researching internet usage among members of the 45-54 year old generation, as is the case here, it was felt important to set the scene for the topic within the context of the population as a whole to see how this research sat within the wider context. So this aspect was examined from three perspectives:-

- UK internet usage;
- European Union internet usage;
- Worldwide internet usage.

2.2.1. UK INTERNET USAGE

The percentage of households in the UK that have home access to the Internet has grown significantly over the last decade (National Statistics, 2008):-

3. PERCENTAGE OF UK HOUSEHOLDS WITH INTERNET ACCESS



The above serves to illustrate that the last decade has seen a significant increase in usage, turning from very much a minority activity in 1998 with less than 10% of households accessing the internet, to a majority household activity within 5 years, then continuing to grow to include two thirds of all UK households by 2008.

In another more recent study the percentage of households that accessed the internet via broadband, as opposed to via dial up connections, had increased significantly again over that shown above to now exceed 95% (Dutton, Helsper, & Gerber, 2009).

2.2.2. EUROPEAN UNION INTERNET USAGE

Looking at internet usage in the 27 member states of the European Union, as at March 2009, 300 million out of a population of 489 million had access to the internet (61%). There were wide variations in usage by country. Finland,

in first position, had 83%, the UK, in sixth position, had 72%, and Malta was last, with 23% (Miniwatts Marketing Group, 2009).

2.2.3. WORLDWIDE INTERNET USAGE

World wide, the top 20 countries using the internet accounted for 77% of an estimated 1.59 billion total internet users (June 2009), with the UK ranked seventh. China was first with 298 million users out of a population of 1.33 billion (22%), the USA with 228 million users out of a population of 304 million (75%) and Japan was third, followed then by India, Brazil, Germany, then the UK, with 44 million out of 64 million (72%) (Miniwatts Marketing Group, 2009).

2.3. Internet usage by independent variable

The Literature Review then examined internet usage differences by generation and then by each of the independent variables (Gender; Main Role; Profession; Educational qualifications; Type of Area; Home location; and Type of Household).

2.3.1. DIFFERENCES BY GENERATION

The percentage of each generation that accessed the internet, up to and including 2008, had been steadily increasing since 2000, as shown in the table below (National Statistics, 2008) :-

3. UK Internet usage by Generation

Age Group	2000	2002	2004	2006	2008
16 to 24 years	70	85	90	83	93
25 to 44 years	53	73	79	79	87
45 to 54 years	**46**	**59**	**67**	**68**	**75**
55 to 64 years	24	41	48	55	59
65 years and over	*	*	*	15	26

In the case of the 45-54 year old generation those using the internet reached 75% in 2008, up from 46% in 2000. Usage can clearly be seen to be linked to age with only 26% of those aged over 65 using the internet, compared to 93% of 16-24 year olds.

Looking specifically at the 45-54 year generation in the UK, (in 2008), 65% accessed the internet every day, or almost every day (up from 62% in 2006). Those of the 45-54 year generation who accessed the internet at least once a week, but not daily, was 27% (up from 24% in 2006). Finally, those who accessed the internet once a month, or less, fell to 8% from 14% in 2006 (National Statistics, 2008).

In the UK the Oxford Internet Institute (OxIS) carried out surveys of internet use in Britain in 2005 (Dutton, Gennaro, & Hargrave, 2005) and 2007, (Dutton & Helsper, 2007). Unlike Jones and Fox (2009) the OxIS Surveys reported their results mainly by major "life stage" of "student, employed, retired", and did not specifically analyse the majority of their data relating to 45-54 year olds. Dutton, et al (2005) reported a limited amount of 45-54 year old related information. For example, they found that 65% of those aged between 45 and 54 in 2005 used the internet. By 2007 this had increased to 78%. Overall, they found that 75% of respondents in 2005 (across all generations) used the internet to communicate, for various reasons, using email, to collect information, via surfing, about products,

travel and factual and news related information, as well as to entertain, socialise, learn and buy. Over all age groups they found that the internet played "an important role in maintaining social relationships and supplementing other forms of sociability". Many felt it had made it easier to maintain relationships (75%). In addition 20% of respondents had met and made new friends whilst online.

In the UK in 2009 the way that people use the internet differed by generation (Dutton, Helsper, & Gerber, 2009) :-.

- Retired people are less likely to look for any types of information, when compared to the employed and students.
- Students were more likely to use the Internet for instant messaging, chatting, blogging and social networking, as well as for entertainment and leisure, than were older individuals, whether employed or retired;
- Those who were employed 86% had access to the internet, and of those up from 67% in 2003. A total of 61% accessed the internet from home, up from 34% in 2003. On average the employed had had access to the internet for 7.4 years.

So having examined internet usage differences by generation over time, the following sections will do so for each of the independent variables (Gender; Main Role; Profession; Educational qualifications; Type of Area; Home location; and Type of Household).

2.3.2. GENDER

Previous research has found that internet usage in the UK varied by gender, with more men using the internet than women, as shown in the table below (National Statistics, 2008) :-

4. UK Internet usage % 2000-08, by Gender

Gender	2000	2001	2002	2003	2004	2005	2006	2007	2008
Men	47	50	60	60	64	66	65	71	75
Women	33	43	51	55	58	61	55	62	66
Total	40	46	55	58	61	64	60	67	71

Whilst 75% of men and 66% of women were found to be using the internet in 2008, going back slightly further in time to 1994-98, the internet then was mainly used by men using slow dial up connections (Kehoe, Pitkow, Sutton, & Aggarwal, 1999). However the proportion of women using the internet was rapidly growing at that time, having risen from only 5% in 1994, to 34% in 1997 (Pitkow, 1997):-

5. USA Internet usage 1994-97, by Gender

Gender	1994	1995	1996	1997
Women	5%	15%	31%	34%
Men	95%	85%	69%	66%

Of the 66% of internet users that were males in 1997 87% of those had some college experience. No breakdown was located relating to internet usage by gender solely within the 45-54 age group.

In the UK the way that people use the internet varied by gender (Dutton, Helsper, & Gerber, 2009):-.

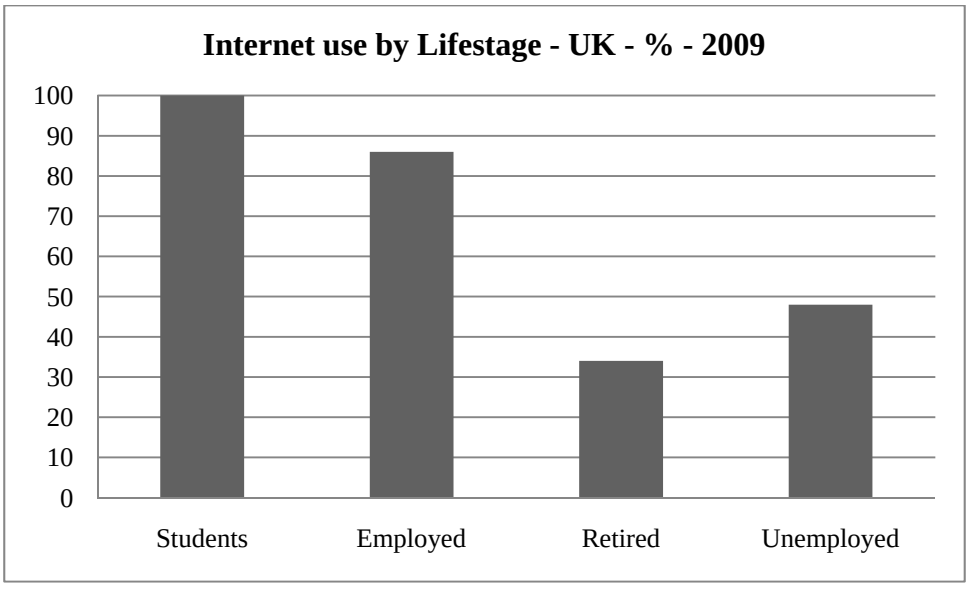
- Men are more likely to search for news;
- Women are more likely to search for health information.

In the USA men were found to predominate in the "high tech" internet technology usage (in some cases on a scale of 2 to 1) and most of the "low tech" groups had a majority of women in them) (Horrigan, 2007). However this male dominance was not across the board with a majority of women (55%), for example, in the "connector" group (using the internet to connect to others, form and develop relationships).

2.3.3. MAIN ROLE

Main role within the context of this research was broken down into a number of roles, including employed, unemployed, student, and retired. In the UK the percentage of users by major life stage that used the internet was shown to vary by group (Dutton, Helsper, & Gerber, 2009):-

4. PERCENTAGE OF UK INTERNET USERS BY LIFESTAGE



The same study found that, for the "employed", the percentage of internet users grew steadily from 67% in 2003, 68% in 2005, 81% in 2007, to 86% in 2009. In terms of what the "employed", used the internet for:-

- 77% for sending attachments via email; and
- 63% for instant messaging.
- 48% used the internet for social networking,
- 42% for reading a blog,
- 26% to participate in chat rooms;
- 24% for phone calls;
- 21% writing a blog.

The last activity, writing a blog, is one of the newest arrivals in the internet based communications toolset and yet 21% have started to use it as a means of conveying their "message".

2.3.4. PROFESSION

Prior research data was reviewed relating to use of the internet by "profession", or "occupation", or "socio-economic status". In the UK, data categorized by socio-economic status (Hitwise UK Ltd, 2009) based on the occupation of the chief income earner within a household showed that those in higher groups used the internet the most (Dutton, Helsper, & Gerber, 2009):-

6. Internet Use by Social Grade of Household

Social Grade	Members	Description	%of UK Population	Internet Use %
AB	Upper Middle Class Middle Class	Professional people, senior & intermediate managers & administrative, doctors, lawyers.	17%	88%
C1	Lower Middle Class	Small business owners, junior/middle managers, supervisors, bank clerks	26%	77%
C2	Skilled Working Class	Skilled manual workers, agricultural workers, carpenters, plumbers painters	25%	
DE	Working Class, unemployed and dependants	Semi and unskilled manual workers, pensioners, state dependant, trainees, apprentices and unemployed	32%	46%

The above illustrated that those who belonged to higher AB social grades were almost twice as likely to use the Internet (88%) as people from the lowest social grades (DE) (46%).

Abroad a 2008 Internet usage survey from Hong Kong (by occupation) provided some insight into the differences that existed between professions, albeit in Hong Kong (City University of Hong Kong, 2009):-

7. Internet use by Occupation

Type of Occupation – Hong Kong 2008	Internet use %
Students	100%
Managerial & professional	95%
Self employed	91%
Civil servants	86%
Worker and Shop assistant	77%
Retired and unemployed	41%

Hong Kong's "Worker & Shop assistant" and "Retired and unemployed" appear to be similar to the UK "DE" category(46%), but the Hong Kong category have a higher (77%) and lower (41%) internet use percentage.

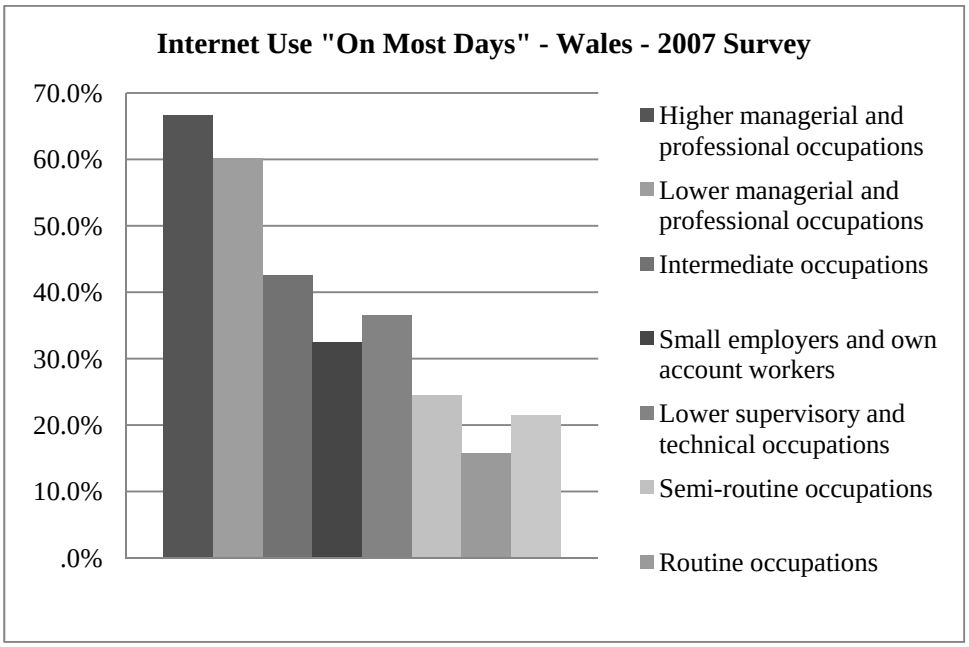
A closer to home Welsh Assembly Internet Survey of 2007 found that those working in "higher managerial and professional occupations" in Wales were nearly twice as likely to use a computer at home 'everyday' (65%) as those working in 'routine occupations' (33%) (National Statistics, 2008). The detailed findings from that study, showing the frequency of Internet access at home, work or elsewhere, by National Statistics socio-economic status have been reproduced below:-

8. Wales - Internet access by National Statistics socio-economic status

Wales 2007 Survey	**On most days**	**At least once a week**	**Less often than once a week**	**Never**	**Total**
Higher managerial and professional occupations	66.6%	13.2%	4.1%	16.2%	100.0%
Lower managerial and professional occupations	60.2%	13.0%	7.1%	19.7%	100.0%
Intermediate occupations	42.6%	13.5%	9.3%	34.5%	100.0%
Small employers and own account workers	32.4%	10.6%	10.0%	46.9%	100.0%
Lower supervisory and technical occupations	36.6%	13.9%	9.9%	39.6%	100.0%
Semi-routine occupations	24.4%	11.9%	9.4%	54.4%	100.0%
Routine occupations	15.7%	8.5%	8.4%	67.3%	100.0%
Not classified (8 to 9 combined)	21.5%	8.9%	5.6%	64.0%	100.0%
Total	38.0%	11.8%	8.1%	42.2%	100.0%

So it is clear from the above that those with "higher" socio-economic status tended to use the internet more frequently. This is illustrated by the following graph which shows frequency of usage on most days:-

5. FREQUENCY OF INTERNET USAGE BY SOCIO-ECONOMIC GROUP – WALES - 2007



2.3.5. EDUCATIONAL QUALIFICATIONS

The UK "Internet Access 2008: Households and Individuals Survey" found that qualifications were an indicator of internet usage (National Statistics, 2008):-

9. UK Household Internet access and Educational qualifications

2008	Per cent
Degree level or higher	93
Higher educational qualification	86
A Level	89
GCE / GCSE (A-C grade)	82
GCSE (D-G grade)	74
No formal qualification	56

This showed that 93% of people with a degree level education accessed the internet compared 56% of those without.

2.3.6. TYPE OF AREA

This research asked respondents to state whether they lived in rural, semi-rural or urban locations. Similar research conducted in Wales for the Welsh Assembly found that more respondents living in rural areas had access to the internet than those in urban areas (in both a 2004 and 2007 survey), but that those from urban areas were more likely to access the internet via broadband (National Statistics, 2008):-

10. Households' access to and type of Internet access at home by location

Wales 2007 Households' access to and type of Internet access **Survey**	2004		2007	
	Household internet access	Internet access via broadband	Household internet access	Internet access via broadband
Urban >10k	40.6%	37.9%	52.2%	88.0%
Town and Fringe	39.6%	18.1%	53.2%	83.1%
Village	50.7%	10.6%	60.0%	77.0%
Hamlet & Isolated Dwellings	56.2%	5.7%	66.0%	69.8%
Total	42.8%	27.7%	54.4%	84.0%

2.3.7. HOME LOCATION

In the UK the South East (66%) and London (63%) were found to have more households with internet access than elsewhere. The North West had 56% (National Statistics, 2008):-

11. Households with Internet access

Per cent	2006	2007	2008
South East	66%	65%	74%
London	63%	69%	73%
North West	54%	56%	56%
North East	54%	52%	54%
UK	57%	61%	65%

Most of the participants in this research lived in the North West of England.

2.3.8. TYPE OF HOUSEHOLD

In terms of UK households, 68% were found to have access to the internet in 2008, up from just over 45% in 2002 (National Statistics, 2009). No UK level breakdown was found by type of household. However, in Wales, a 2007 survey showed that in most cases those households that had a personal computer at home were more likely to have a child or dependent with them that those that did not (National Statistics, 2008):-

12. Welsh Households with a PC - 2007

Household Type	With a PC
Other	92.9%
2 adults, 1 or 2 dependent children	91.6%
Other 2 adult household - (2 adults, at least 1 dependent and 1 non-dependent child)	91.3%
2 adults, 3 or more dependent children	89.1%
2 adults, 1 or more non-dependent children	81.6%
Two adults but not married couple pensioner	75.3%
Other 1 parent household - (single adult, at least 1 dependent and 1 non-dependent child)	74.9%
Other household without dependent children	74.6%
1 parent household - dependent children	68.2%
1 parent household- non-dependent children	58.6%
Single person, not a pensioner	56.5%
Married couple pensioner	40.2%
Single pensioner	18.2%
Total	63.1%

The above shows that those least likely to have a PC at home were found to be singles under retirement age, and married and single pensioners.

One study also found that married couples with children living with them in their households owned the most technology and gadgets (Kennedy, Smith, Wells, & Wellman, 2008). They concluded that this was because there were more members in those households, and therefore there were more relationships to coordinate. Family members used ICT technology to help facilitate that coordination (a four member household has 12 relationships to co-ordinate in total, whereas a two member one only has two relationships to coordinate). They found that married couples with children were the most active internet users. 93% had a lap top, or PC, and 58% had two or more devices. They also found that 66% had a broadband connection. One third also felt the internet had significantly improved their ability to maintain connections with friends.

2.4. Internet usage by dependent variable

2.4.1. ICT TOOLS USED TO ACCESS THE INTERNET

Research relating to the ICT tools that people use to access the internet was investigated to find out which were the most popular (ICT tools included PC's, mobile phones, web browsers, email and instant messaging.)

PC

The number of households in the UK that owned a PC had risen to 70% by 2007 up from 49% in 2001 (National Statistics, 2008): The same study also found that PC ownership was not spread evenly across the socio-economic groups –

- 97% of highest income households owned a PC (with 95% having internet access).
- 35% of lowest income groups owned a PC (24% had internet access).

In 2008 a further study found that a majority of households (71%) in the UK had access to the internet (European Commission, 2009).

Mobile Phone

By 2008 a USA based study found that both the mobile phone and the internet were fully embedded into American family life, to the extent that it had become a "central feature" (Kennedy, Smith, Wells, & Wellman, 2008). In the UK the number of mobile phones in use was found to have been steadily increasing to the point where there were nearly 70 million in 2006. This, surprisingly, meant that there were more subscriptions than members of the population (115 subscriptions per 100 members of the population), (European Commission, 2009):-

However it appears that not all households have mobile phones. In the UK the number of households that had a mobile phone stood at 89% in 2009, up slightly from 85% in 2005 (Dutton, Helsper, & Gerber, 2009). Comparing that to the EU research indicated that some people must have two or more mobile phone subscriptions (perhaps one for personal use and one for work use). They also found that the number of people that used their mobile phone (more than "never") to access the internet, or email, had risen sharply to 24% up from 11% in 2005. No breakdown could be found by generation.

Web browser

Virtually all PCs have a web browser installed, usually Microsoft's Internet Explorer or Firefox (W3Schools, 2009) (Awio Web Services LLC. , 2009) (Wikipedia, 2009). No research was found that identified the main purposes and frequency of web browser use by generation.

Email

In 2008 email was found to still be a popular communication tool across the generations (National Statistics, 2008). The younger 16-24, and older 65 plus generations, were the highest users, with 85% of 45-54 years olds using it, marginally lower than for any of the other generations.

Instant messaging

In the UK, 31% of men and 26% of women used instant messaging to communicate over the internet in 2008 (National Statistics, 2008). No further breakdown could be located by age group. This was slightly less than the 28% who were found to using instant messaging in the USA (Jones & Fox, 2009). The same study found that there was a relationship between age and the extent to which people used instant messaging (the younger the person, the higher the usage, from teenagers upwards).

2.4.2. REASONS FOR ACCESSING THE INTERNET

Reasons why people use various ICT tools to access the internet has been subject to some research. In the UK 45-54 year olds most frequently used tools were email, (85%), and their web browser to find information, (86%), (National Statistics, 2008). This study also found that there were big differences between teenagers and the 45-54 year old generation, with teenagers downloading software and looking for work more frequently, and 45-54 year olds using it more frequently for finding information about goods and services and travel and accommodation.

Similar findings were found in research in the USA (Jones & Fox, 2009). Activities carried out by the 45-54 year generation included emailing (90%), instant messaging (28%), social networking (20%), and creating a blog (6%).

Dutton and Helsper's (2007) study used "life stages" of "student, employed, retired" to classify their data. Participants were asked, for example, to state the reasons (specifically the purpose and extent) they used a particular ICT tools or services, like email, against a Likert scale of "several times a day, daily, weekly, monthly, less than monthly, or never". They found that the Internet in the UK was being used more for "information, creative and social activities" than before and that email was still the most popular activity and was used at least weekly by all life stages. Only 20% of respondents now had a social networking profile. They also found that the Internet was helping people to increase contact with others, especially among those living further apart. They also found that the:-

- Popularity of social networking sites had increased significantly, since 2005, among students and younger people;
- Blogs, chat rooms and instant messaging were activities used primarily by students;
- only 15% of the employed group had created a profile on a social networking site such as YouTube, MySpace or Facebook compared to 42% of students.

Socialising and domestic purposes

The number of internet users in the USA, from both sexes, that had a profile on social networking sites increased from 8% to 35% in three years to 2008, an increase of over 400% (Lehart, 2009) However the same study found that the recent rapid growth of internet use, especially for socialising, had been led by teenagers and students to develop their social networks and acquire friends, not by the older generations.

A number of other studies have been carried out by the PEW Internet & American Life Project. In 2009 they reported that "older generations use the internet less for socialising and entertainment, and more as a tool for information searches, emailing and buying products" in the USA (Jones & Fox, 2009).

Kennedy, et al (2008) also broke the data down into age groups and found that, of those who said the internet had improved their connections with others "a lot", 93% were aged 18-29, 59% were aged 30-49, 58% were aged 50-64 and 66% were aged 65+.

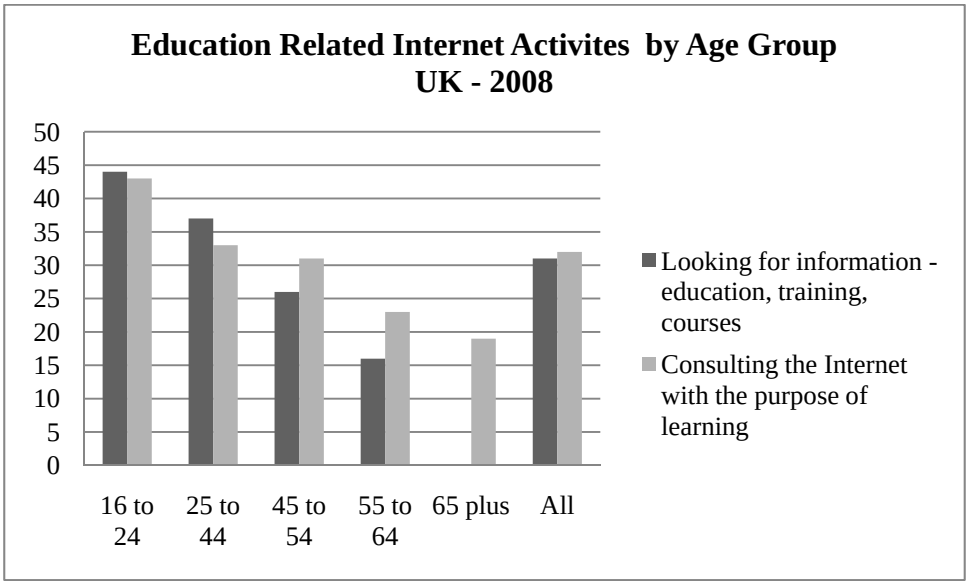
Work purposes

In terms of people using the internet for work related purposes the percentage of employees doing so grew by about a third from 26% in 2002 to 34% in 2008 (European Commission, 2009). In terms of working from home the UK compared favourably within the context of the European Union in 2006, with 79% of those working for large companies employing 250 or more persons doing so (European Commission, 2009).

Educational purposes

The following shows internet access percentages related to educational activities by age group (National Statistics, 2008):-

6. EDUCATIONAL ACTIVITIES BY GENERATION – UK - 2008

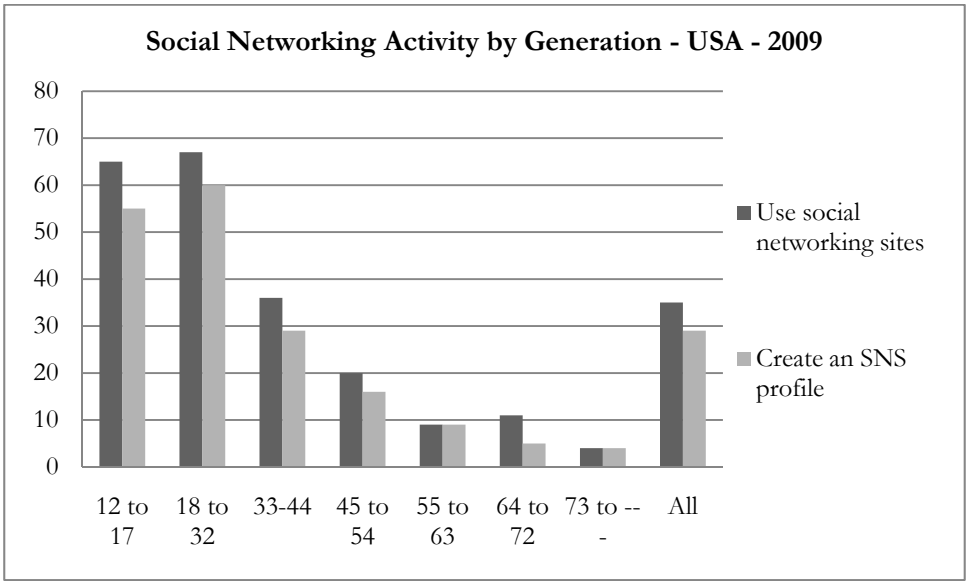


This showed that there was a negative relationship between age and the extent to which people access the internet for educational purpose and that between a quarter and third of the 45-54 year old generation used the internet for educational purposes.

Social networking sites

Jones and Fox (2009) found that American 45-54 year olds were changing the range of ICT tools that they used to access the internet. They found that 16% of 45-54 year olds had a social network site (SNS) profile. However this was still low compared to the 75% of 18-24 year olds who had a profile. They also found that use of social networking sites, such as Facebook and MySpace, had, for many members of the younger generations, become essential parts of their daily lives:-

7. SOCIAL NETWORKING BY GENERATION – USA - 2008



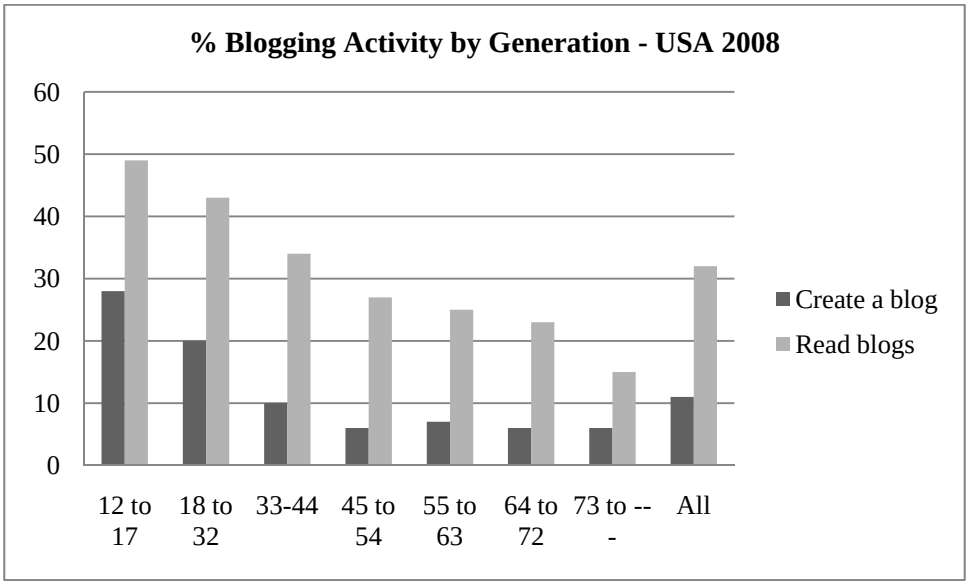
The above graph shows a negative relationship between age and social networking site activity. In the UK in 2009, more internet users (49%) than in the USA were found to have created or updated a social networking profile in the last year (Dutton, Helsper, & Gerber, 2009). No breakdown by generation was located.

Blogging

In 1999 there were only 23 Blogs in existence, but by 2007, this had grown to 90 million (Jones & Alony, 2008). The same study also stated that 75% of "bloggers" were aged 16-24, but that those aged 45 to 57 only accounted for 0.5% of them.

In the USA a negative relationship was found between generations and blogging activity (Jones & Fox, 2009) :-

8. BLOGGING BY GENERATION – USA - 2008



The above American study found that blogging was still a minority activity across all generations. Writing and reading blogs was more prevalent among the youngest generations. Some 27% of 45-54 year olds were found to be reading blogs and 6% creating them. No similar recent UK based data was found broken down by generation, but some was available by gender:-

9. BLOGGING BY GENDER – UK- 2008

Per cent	Male	Female	All
Reading weblogs (or blogs)	26	16	21
Creating or maintaining own weblog (or blog)	6	8	7

This showed that more men than women read blogs, but slightly more women created them.

2.5. Summary

This Literature Review has examined a range of sources in order to identify relevant material relating to internet usage in the UK, and other parts of the

world, both historically over time, and up to the present day. It also sought out material that would provide comparative data for later discussion and analysis against each of the independent variables (Gender; Main Role; Profession; Educational Qualifications; Type of Area, Home Location; Type of Household) and dependent variables, looking for evidence relating to methods of internet access, and reasons for doing so whether it be for socialising and domestic purposes or work and educational purposes.

The Literature Review showed that the rate of growth in internet use has been very rapid over the last ten years to 2009. During that time the world internet user population grew to circa 1,596 million and about 75% of the 45-54 year old generation in the UK were using the internet.

Students, or employed persons, were also found to be more likely to access the internet that those who were retired or unemployed. The most popular use of the internet among the employed was email and instant messaging, along with social networking.

With the exception of students, who held first place for frequency of internet usage, available research indicated that there was a relationship between profession and frequency of internet usage, with those in "higher" socio-economic groups (managerial, professionals) using the internet more frequently than those in "lower" groups (workers, shop assistants, retired and unemployed).

A similar picture emerged with educational qualifications, with those with higher qualifications such as degrees using the internet more than those with lesser qualifications.

In terms of type of area (rural, semi-rural and urban) based on Welsh survey data, those in rural areas were more likely to have internet access than those in urban areas, but those that did have access in urban areas were more likely to have broadband rather than dial up access.

Where people lived in the UK also had an influence on levels of internet access with more people in the SE and London having access than elsewhere, including the NW.

Type of household was also found to be a factor influencing the levels of internet access, with those containing children and dependents being more likely to have internet access than those without, due to a need to maintain more social relationships. Retired person households were the least likely to have internet access.

PC based methods of accessing the internet were being supplemented by the addition of mobile phone based access at a fast pace. Mobile phone based access had increased from 11% in the UK in 2005 to 24% in 2009, an increase of over nearly 120% in 4 years. Email, one of the first ICT communication tools remained a very popular method of communication with 85% of 45-54 year olds using it. However Instant messaging was found to be a minority activity with between 20-30% of 45-54 year olds utilising it.

The literature search also examined the reasons why people access the internet. The 45-54 year old generation were found to use the internet for learning and downloading software. Looking for a job or sending a job application, instant messaging, blogging, gaming, downloading music and videos and social networking were activities mainly carried out by the younger generations.

Finally the 45-54 year old generation, and other older generations, were found to use the internet less for socialising and entertainment, and more as a tool for information searches, emailing and buying products.

Chapter 3, Methodology, which follows, sets out the approach taken during the undertaking of this research.

3. METHODOLOGY

3.1. Introduction

The purpose of this research was to test the hypothesis that "45-54 year olds use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities". Further discussion relating to formulation of this hypothesis can be found in Appendix 3.1, "Hypothesis Formulation". It was not seeking to determine why they did that (qualitative research). It was seeking to determine h**ow** frequently they did it (quantitative research).

To be included in this research sample participants needed to be aged 45-54 inclusive. The only independent variable included in this hypothesis was the overall group "45-54 years olds". Within that data was collected that allowed participants to be divided into sub-groups based on their responses to questions relating to independent variables such as their gender, main role, education, professions, main home location, and type of household they lived in. Any of these could have a bearing on the frequency of internet use. To gather the data needed to test this a number of research questions were included within scope. The aim of the questions was to determine whether there is a relationship (correlation) between several independent variables and the reasons why 45-54 year olds use the internet (to keep in touch (socialise) with friends and family, for work, for other domestic purposes and for educational study purposes). The questions sought to ascertain how frequently 45-54 year olds used the internet and when they did, which ICT tools they used (PCs, Apple Macs, Laptops, mobile phones, web browsers, email, instant messaging, social networking sites and blogs).

So this research was seeking to determine whether there were any correlations between any of the independent and dependent variables. For example, between gender and internet use. If a correlation between these variables proved to be strong enough, knowing about one variable should allow predictions about the other variable to be made. A correlation between two variables does not necessarily mean that one thing caused the other. To draw a cause-and-effect conclusion, a true experimental research methodology would be required, which is not feasible in this case (Marczyk, DeMatteo, & Festinger, 2005).

3.2. Method Selection

Testing the hypothesis required data relating to the frequency of internet use to be formally and systematically defined and counted, categorised and analysed, using various statistical methods, to determine whether the independent variables had any correlation with the dependent variables. This research adopted a non-experimental quantitative research methodology. Further more detailed considerations regarding that choice can be found in Appendix 3, Section 3.4., "Methodology Selection". The next step was to select an appropriate research instrument.

3.2.1. SELECTION OF AN APPROPRIATE RESEARCH INSTRUMENT

Instruments that were considered included use of one or more of the following:- (Morgan, Clay, Jensen, & Quick, 2004) (Dawson, 2002) (Schwartz, 1997) (Marczyk, DeMatteo, & Festinger, 2005):-

- Questionnaires;
    - Online;
    - Traditional paper based;
- Structured Interviews;

- Observations.

An analysis showed that the research questions and hypothesis that were the topic of this research should be satisfied via a questionnaire and, or, structured interviews, more so than observations, because the aim was to:-.

- get a sample of participants to "self report" their positions with regard to both the independent and dependent variables, to quantify their internet behaviour;
- obtain sufficient quantities of descriptive statistics, such that it would be statistically possible to examine relationships between variables;
- Avoid direct manipulation of the dependent and independent variables as the aim was simply to start by counting what "is".

3.2.2. DATA COLLECTION METHODS USED BY OTHER STUDIES

Finally other similar studies were analysed to determine how others had approached their research. The findings are summarised in the table below:-

13. Research Methods Used by Other Similar Studies

Research	Topic	Data Collection Methods	Comments
(Boase, Horrigan, Wellman, & Raine, 2006)	Internet, email and social networks usage	"Survey"	Method of data collection not precisely stated
(Dutton, Gennaro, & Hargrave, 2005) (Dutton & Helsper, 2007)	Internet use in Britain	Postal Survey of ICT tool s and services usage, like email, - "several times a day, daily, weekly, monthly, less than monthly, or never".	Two stage sampling design. Phase 1 - random sample survey. Phase 2 – small number of addresses selected for interviews.
(Jones & Alony, 2008)	Motivation to use Bloggs	Review and analysis of content of actual Bloggs on the internet	Qualitative research.
(Jones & Fox, 2009)	"*Generations Online in 2009"*	Structured Telephone interviews	Participants randomly selected from telephone directories. Prepared list of questions
(Kehoe, Pitkow, Sutton, & Aggarwal, 1999))	World Wide Web User Survey	"Survey"	Participants asked to respond a range of questions.. – precise data collection method not stated
(Kennedy, Smith, Wells, & Wellman, 2008)	Networked families -.Use of internet to connect.	Structured Telephone interviews	Random digit sample of telephone numbers USA
(Lehart, 2009)	*Adult use of social network web sites*	Structured Telephone interviews	Prepared list of questions. Selection method not stated.
(Murnan, 2006)	Use of a range of internet communication mechanisms	Survey of college students and staff face to face	Selected from three age groups
(White, 2007)	Popularity and use of Web 2.0 services for e-learning	Web site advert. Respondents completed Survey Monkey questionnaire using checkbox model.	Two stage, stage 1 fact gathering, stage 2 respondents subset – discovery of their motivation
(Peng & Zhu, 2008)	Internet Usage and the Methods of measuring Internet usage	Series of annual Structured Telephone interviews	Surveys conducted at the end of every year from 2003 to 2005. The study population of annual surveys is those regular residents between 6 to 84 years old

Of the examples listed above all but one ((Jones & Alony, 2008)) used a form of structured data collection using a pre-prepared set of questions with data being collected face-to-face, by telephone, by post or online. Typical response rates have been found to vary by data collection method, with

80% plus, for face-to-face and phone based surveys, down to 30% for purely online surveys (Surveymonkey.com, 2008).

Based on the above the most appropriate data collection method to choose to acquire the best response rate would have been in the top down order listed above, with face-to-face being first, and so on. However a total of 4 weeks of part time activity was allocated in the research schedule to obtain and collate results from the selected sample population. Under those circumstances time was of the essence. In the end a compromise was made based on consideration of response rate versus resources, time available, cost and time and a questionnaire based data collection approach was selected. Within that further efficiencies were sought by supplementing questionnaires issued via email and by also choosing an online web based collection approach (Surveymonkey) with invitations being issued to participants who therefore had a choice of either:-

- Printing out the questionnaire emailed to them, filling it in the traditional way with a then and posting it back to the address given; or
- Completing the same questionnaire online.

The above approach was felt to be quicker than interviews and telephone based approaches and less costly than posting questionnaires out to participants.

So a non-experimental research design was chosen using a questionnaire issued by email with a choice for participants to complete and post back or complete online. To minimise the risk of unsuitable recruits, and given the specific age related nature of the pre-defined research sample, purposive sampling techniques were used to arrive at the sampling frame.

3.3. Sample Size & Selection

3.3.1. APPROACH OF SELECTION

In order to reduce the risk of people taking part that were not 45-54 years of age, many of the participants were specifically selected from known family, friends and past and present school, college and work colleagues of the lead researcher. In other words this research used non-probability sampling techniques to arrive at a sample of convenience.

3.3.2. EXPECTED RESPONSE RATES

First of all an estimate was made of the number of 45-54 year olds that the lead researcher knew could be contacted and asked to participate. Based on that a sample size was initially forecast to be around 150-180 out of an invitation list of circa 360, a circa "40%-50%" response rate based on previous studies (Torgerson & Bland, 2004) (Nakash, Hutton, & Jørstad, 2006) (Iglesia & Torgerson, 2000). Further considerations relating to response rates can be found in Appendix 3.3., "Response Rates by Type of Instrument".

3.3.3. CRITICALITY OF RESPONSE RATES

Response rates are important because the aim of much quantitative research is to ensure whether the results are statistically significant within the context of the wider population (Dohia, 2007). So it was important to ensure that enough data was collected. This is sometimes known as probability sampling where the participants are randomly selected (Dawson, 2002). A Sample Size Analysis is often deemed to be important to ensure that it is possible to state that statistical analysis supported conclusions with confidence level of 95%.

This level of confidence is a recognised benchmark for statistical significance among academic researchers. It means that if the research was carried out many more times there would be a 95% confidence level that it would draw the same conclusions about 95 times out of a 100.

However the aim in this case was to gain an insight into what might be happening in the 45-54 year old age group, so ensuring that enough data was collected was less important. (Hutchinson, 2004). This is also known as purposive sampling (Dawson, 2002) where the researcher samples with a purpose in mind and it is also known as non-probability sampling (Trochim W. M., 2006) where the participants are selected by the researcher subjectively. In this case the sample had to be populated with participants who were only aged between 45 and 54.

3.3.4. SAMPLE FRAME

The participants, who were invited to complete the questionnaire via email, fell into the following groups:-

- Friends, colleagues and family members;
- Those known to the lead researcher whose age was not accurately known but appeared to be in the correct age range of 45-54;
- Those previously attending the same educational establishments as the lead researcher and so were known to be in the correct age range;
- Finally a small number were invited to participate who were members of the Friends Reunited Over 40's and over 50's Groups.

See Appendix 2 Participant Invitation Email, for an example of the typical email that was issued, and Appendix 4, Detailed Results, Section 4.1, for

details of the final sample frame. No compensation was offered or paid to participants. The population of the sample was not representative of the wider population.

3.4. Ethics

No persons were put at risk, came to any harm, or were subject to any hazards, including emotional and mental distress, and possible damage to financial and social standing, as well as physical harm, during the course of this research.

All persons invited to participate in this research were asked to do so on the basis of their informed consent. The Consent and Participant Information forms made this clear (Appendix 1 and 2 contain copies of the Questionnaire and Participant Information). Participants gave their consent online by taking a conscious action (a mouse click) which was recorded along with their other repsonses . They were also told that they would be able to withdraw at any time by letting the lead researcher know in writing (no withdrawals were received).

All participants had the opportunity to leave their contact details if they chose to do so. They were assured that their identity would be kept confidential and their anonymity guaranteed. All information they submitted and used for the research has been anonymised. Finally the research complied with the Data Protection Act.

3.5. Validity

The term "validity" is commonly used to describe whether a research project's findings can be believed (Lapan, 2004). It refers to the "conceptual and scientific soundness of a research study" (Marczyk, DeMatteo, & Festinger, 2005). The primary purpose of all forms of research is to produce valid conclusions. So it is important to eliminate or minimize the effects of "extraneous influences, variables, and explanations that might detract from a study's ultimate findings" (Marczyk, DeMatteo, & Festinger, 2005). Therefore the purpose of looking at validity was to increase the usefulness and accuracy of this research by identifying and hopefully minimizing or eliminating as many confounding variables as possible.

Four types of validity were considered (Marczyk, DeMatteo, & Festinger, 2005) (Trochim W. M., 2006):-

- Conclusion validity, which is also known as 'statistical' validity and 'statistical' conclusion validity (Marczyk, DeMatteo, & Festinger, 2005) Appendix 3.6.1. contains further more in-depth discussion on this;
- Internal validity, which asks if there is a relationship between an independent variable and a dependent variable, is the relationship a causal one (Trochim W. M., 2006). See Appendix 3.6.2. for further discussion;
- Construct validity; assumes that there is a relationship and that relationship is causal (Trochim W. M., 2006). In this context this means does the scale of measurement designed to measure frequency of internet use, for this, or that purpose, actually do that in a way that allows the hypothesis to be tested correctly. Appendix 3.6.3. for further discussion; and
- External validity, which relates to "the degree to which research results generalize to other conditions, participants, times, and places"

(Marczyk, DeMatteo, & Festinger, 2005). Again see Appendix 3.6.4. for further discussion.

3.6. Reliability

An approach to measurement is reliable if it assesses the "characteristics of interest in a consistent fashion" (Marczyk, DeMatteo, & Festinger, 2005). The design in this case was based upon similar studies where participants were asked to state the purpose and extent they used a particular ICT tool or service, like email, against a similar scale of "several times a day, daily, weekly, monthly, less than monthly, or never" (akin to Dutton & Helsper, 2007). This was similar is many respects to that study, but that their main "life stage" categories were "student, employed, retired" which were of course different, in that they did not split out each generation. However this study did adopt the generation classification used by a similar study conducted by the PEW Internet & American Life Project (Jones & Fox, 2009).

The key question that was addressed in relation to reliability was whether the research, as designed, would be consistent across time or with equivalent tests and designs. In other words if participants were asked the questions today and tomorrow would the answers be the same? (Kanengoni, 2005). This is difficult to comment upon because the instrument as designed has only been applied once to date. Participants were asked to assess the extent they used PCs, Apple Macs, Laptops, mobile phones, web browsers, email, instant messaging, social networking sites and blogs to access the internet against a common scale for each of daily, 2-3 times a weekly, 2-3 times a month, infrequently (less than monthly) and never. Their responses were hopefully given honestly and accurately at that time (to be read in the context of the commentary on validity). However, if the same sample of participants were asked the same again, in the same way, in several months time, whilst some of their answers may well be the same, others may have changed, perhaps

significantly either way. This may be because patterns of internet usage are changing, in some cases, rapidly over time. The tools available to access the internet are also evolving with new ones coming into play as time goes by. Therefore a new tool, a perhaps a wirelessly connected lounge TV, may supersede the PC, and failure to amend the methodology to measure the new tool's usage may well lead to inaccurate conclusions being drawn.

The reliability of the scales used was tested using the Cronbach alpha coefficient to see whether the coefficient for the scales fell close to a recommended value of 0.7 (Pallant, 2007). All 28 scales were tested. Each used the same measures to assess internet usage ("Daily", "2-3 times per week", etc) In this case the alpha was 0.86 suggesting a very good internal consistency and reliability for the scale used:-

14. Scales Reliability Check - Cronbach's Alpha

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.860	0.864	28

Dutton & Helsper's 2007 study used very similar scales, but unfortunately did not report their Cronbach's alpha coefficient. If they had it would have been possible to compare them.

3.7. Data Collection Method

A subscription was funded by the lead researcher with an organisation called Surveymonkey (Surveymonkey.com, 2009) who provided a web-based system that enabled researchers to develop well formatted questionnaires online (SurveyMonkey.com, 2009). The service also included a data download facility that allowed cases to be exported into a statistical analysis package, in this

case, SPSS and Microsoft Excel, (Surveymonkey.com, 2008). Whilst this approach offered advantages relating to ease of data acquisition once the email had been issued it was recognised that subsequent verification of their identity of the actual persons who completed questionnaires depended, in part, on whether they opted to leave their contact details (Department of Psychology, University of Maryland , 2009). A copy of the questionnaire can be found in Appendix 1. Further more detailed discussion relating to the construction of the questionnaire can be found in Appendix 3.7, "Question Types and Variable Classifications", and Appendix 3.8, "Classification of Question Types".

3.8. Analysis

A descriptive analysis of the data was undertaken. Further discussion on how the data was prepared for testing and the rationale behind the selection of specific tests can be found in Appendix 3.9. "Data Preparation and Statistical Testing". The data was checked to see if it is normally distributed using a series of One-Sample Kologorov-Smirnov Tests, using SPSS (Leadbeater, 2006) (Pallant, 2007) (SPSS, 2007). A series of graphs was also produced to carry out a visual check. Copies of these can be found in Appendix 4.20 "Normal Distribution Testing". The SPSS Descriptive function was also then used to identify:-

- The mean of the sample;
- Its standard deviation,(to be normal 68% of a sample should be within one standard deviation from the mean);
- Skewness (measures the degree and direction of a sample's asymmetry, such that a left skewed sample has a positive skewness value and a right one a positive value); and
- Kurtosis (a measure of how heavy the tales are).

To save unnecessary repetition here of Appendix 4.20 "Normal Distribution Testing", the results showed that the data was not normally distributed. There was therefore a case for using non-parametric tests, where available, for statistical analysis purposes. One of the key criteria for test selection, or not, was whether the data was normally distributed (Howitt & Cramer, 2008) (Cannon, 1999) (Field, 2005). More in-depth discussion on the rationale behind test selection can be found in Appendix 3.9.2. "Parametric versus Non-Parametric sample distribution", and Appendix 3.9.3. "Exploring Differences between Groups"

Inferential data analysis was carried out using non-parametric tests (see Appendix 4.3. "Statistical Test Selection Rationale" for further explanation as to the reasons for this test type choice). The tests looked for relationships between independent variables and each of the ICT Tools (looking at which ones were being used and the extent to which they were used). This was done across all methods of internet communication in total, and also broken down for each type (socialising, work, other domestic purposes and educational study purposes) to determine whether socializing predominates or not (proving or disproving the hypothesis). .

Parametric and non-parametric inferential statistics analysis assumes that data is collected from a population that has been randomly selected from the wider population. This is not the case in this study given that the respondents were invited to participate. This implies that care needs to be taken when drawing wider conclusions from the results and applying them to a wider population. If a similar participant selection technique was used in other studies then the characteristics and profile of that sample may well be very different.

3.9. Questionnaire

A questionnaire was developed (SurveyMonkey.com, 2009) (Surveymonkey.com, 2008) (Surveymonkey.com, 2008) (University of Bolton, 2008) and subjects were invited to complete this via email. A copy can be found in Appendix 1. The email contained the participant information sheet and a copy of the questionnaire was attached (as a PDF file). The email made it clear that participants had an option to print out a copy and complete it using a pen, before posting to the return address given on the invitation email. They also had a second option to complete an online version hosted by Surveymonkey. The invitation email contained a link to the online questionnaire. Both the attachment and the online version were in the same format and contained the same content and questions. The online Consent Form, as part of the questionnaire, included a function for the participants to signal (click) their consent, having had their attention drawn to the participant information and consent form screen. The online Consent Form also included the required participant information sent out via email. This was to guard against the possibility that a person emailed directly by the lead researcher may forward only part of the email to others.

A recognised potential disadvantage of an online questionnaire approach was that the participants must already have access to the internet and be sufficiently computer literate and culturally assimilated to online questionnaires to complete one online. There was also a possibility that some may have declined to participate because of the use of Surveymonkey. They may have been unfamiliar with Surveymonkey, or may have had insufficient trust that their data would actually be kept confidential by the Surveymonkey service provider (despite their assurances that it would be). That is the reason why a PDF file "print" of the online questionnaire was included as an attachment to the invitation email with the Surveymonkey option on offer as an alternative.

All emails were issued over a three week period. The expected duration of participation per person, using a small sample of volunteers was between 4 to 7 minutes to complete all aspects, including reading the Consent Form, reading the Participant Information, consenting and completing all questions in all sections of the Questionnaire.

3.10. Questions

First of all participants were asked to respond to a number of demographic questions to gather the data needed for the independent variables against which the hypothesis and research question test would be based. The purpose of these questions was to determine whether there was any relationship, across all participants, between these responses and their use of the internet.

They were then asked a number of questions to identify which ICT tools they used to access the internet, what for and how frequently. The purpose was to determine whether there was any relationship, between the range of variables above, and their use of the internet. A full list of questions can be found in Appendix 1.

Chapter 4, Results, which follows, sets out the main results of the research.

4. RESULTS

4.1. Introduction

A total of 608 emails were issued. A detailed breakdown of the make up of the final sample frame can be found in Appendix 4.1. "Final Sample Frame" Of the 256 responses that were received, 27 were not sufficiently completed and were excluded. The remaining 228, largely complete questionnaires, were then subjected to further analysis.

4.2. Descriptive Statistics

4.2.1. OVERVIEW

To re-cap, participants were asked a number of questions to identify which ICT tools they used to access the internet, what for, and how frequently. The purpose was to determine whether there was any relationship between the range of independent variables, and their reasons for using the internet. So they were asked how often (daily, 2-3 times per week, 2-3 times per month, infrequently, less than monthly, never) they used the following ICT tools to access the internet:-

- PC, lap top, or Apple Mac;
- Mobile phone;
- Web browsers;
- Email;
- Instant messaging;
- Social networking sites;
- Blogs.

Appendix 4, Results, contains detailed analysis of the responses received. These will not be replicated within this section. Only a summary has been included here.

In this sample, out of 228 respondents only 1 stated that they never used the internet for any purpose. Therefore 99.6% of the sample consisted of internet users in one or more forms. Of the rest:-

- 3 stated they never used it for socialising or domestic purposes, but two of those used it for work related purposes;
- 7 stated they never used it for socialising purposes;
- 7 stated they never used it for domestic purposes;
- 12 stated that they never used the internet for work related purposes;
- 24 stated that they never used the internet for educational purposes.

4.2.2. GENDER

In total there were 99 males and 129 females in the analysis sample:-

15. Participant Gender Breakdown

Male	Female	Total
99	129	228
43%	57%	100%

4.2.3. MAIN ROLE

Over 85% (195) of the participants stated they were employees.

16. Main Role of Participants

Employee	Unemployed	Housewife/ Housekeeper	Full time carer	Voluntary Sector / Charity worker
195	**3**	**6**	**4**	**0**
85.5%	1.3%	2.6%	1.8%	0.0%

Retired	Student	Employer	Rather not say	Other
3	**0**	**8**	**0**	9
1.3%	0.0%	3.5%	0.0%	3.9%

Of the 9 who chose "Other", 8 noted in the comments box that they were "self employed", so a category of "Self Employed" was added for analysis purposes. The total number of participants "in paid work" (total including employees, employers, self employed) was therefore 211 (92.5%).

4.2.4. PROFESSION

Respondents could record that they had more than one professional qualification and a minority did so (249 responses from 228 participants). The totals were as follows:-

17. Professions

Professional Qualifications	Total	%
Medicine & Health professions	50	20.1%
Other	53	21.3%
Computing / IT	45	18.1%
General Management	24	9.6%
Science	19	7.6%
Teaching / training	18	7.2%
Accountancy	15	6.0%
Social care	5	2.0%
Engineering	5	2.0%
Human Resources	4	1.6%
Legal	3	1.2%
Rather not say	3	1.2%
Marketing	3	1.2%
Construction	1	0.4%
Media, The Arts, Entertainment, Hospitality	1	0.4%
Total	**249**	**100%**

A total of 172 responses (79%) were recorded against "Medicine & Health professions, Other Computing / IT and General Management" professions.

A total of 77.5% had a profession that matched one of those listed and 21.3% chose "Other" with the difference (1.2%) stating that they would "Rather not say".

4.2.5. EDUCATIONAL QUALIFICATIONS

The totals are shown below:-

18. Educational Qualifications

Highest level of educational qualification	**Male**	**Female**	**Total**	**%**
GCSE / O Level	12	9	21	9%
A Level	5	13	18	8%
HND / HNC / DIPLOMA / City & Guilds	6	16	22	10%
Pre-University Sub-Total	**23**	**38**	**61**	**27%**
Degree	42	46	88	39%
Post Graduate Certificate / Diploma	1	11	12	5%
Masters	24	21	45	20%
Doctorate	5	7	12	5%
University Sub-total	**72**	**85**	**157**	**69%**
Other	1	4	5	2%
Rather not say	3	2	5	2%
Total	**99**	**129**	**228**	**100%**

So the majority of the sample (69%) had a university education and 30% had a post graduate qualification.

4.2.6. TYPE OF AREA

Participants were then asked to state what type of area they lived in (rural, semi-rural or urban):-

19. Type of area lived in by Gender

	Male	% of Males	Female	% of Females	Total	%
Urban	38	38%	68	54%	106	47%
Semi-rural	45	45%	51	40%	96	42%
Rural	16	16%	8	6%	24	11%
Total	99	100%	127	100%	226	100%

2 participants did not answer the question (both females).

A total of 89% lived in urban or semi-rural areas.

4.2.7. WHERE PARTICIPANTS LIVE

A total of 71% lived in the North West of England, or North Wales, with 25% living in other parts of the UK, and 4% outside of the UK (of the latter 2 were from Ireland, 1 from the USA, 4 from Australia and 1 from New Zealand). The following table shows the results:-

20. Where Participants live

	Male	Female	Total	%
Cheshire	20	32	52	23%
Merseyside	15	24	39	17%
Cumbria	14	14	28	12%
Lancashire	7	13	20	9%
Greater Manchester	4	11	15	7%
North Wales	4	5	9	4%
NW/ N Wales Sub-total	**64**	**99**	**163**	**71%**
Rest of UK	32	25	57	25%
None UK	3	5	8	4%
Total	**99**	**129**	**228**	100%

This broadly matches the "known person" footprint of the lead researcher.

4.2.8. TYPE OF HOUSEHOLD

A total of 83% of respondents were married. A total of 3 participants did not answer the question and their total was added to the "Other" category for analysis purposes.

21. Type of Household

+	**Male**	**Female**	**Total**	**%**
Single - no children or dependents in household	4	13	17	7%
Single - children or dependents in household	5	14	19	8%
Single sub-total	**9**	**27**	**36**	**16%**
Married or living with partner - children or dependents in household	61	72	133	58%
Married or living with partner - no children or dependents in household	27	29	56	25%
Married sub-total	**88**	**101**	**189**	**83%**
Other	2	1	3	1%
Total	**99**	**129**	**228**	**100%**

More single females responded than single males.

4.2.9. FREQUENCY OF DIFFERENT INTERNET ACTIVITIES

The total number of responses to "How often do you access the internet for each of the following purposes?", across all seven types of ICT Tools, is shown below (*note that this is an aggregated total of all responses to each ICT tool used, specifically: PC; mobile phone; web browsers; Email; Instant messaging; Social networking sites; and Blogs = 7 x 228 = 1596 responses in total*):-

22. Aggregated Results- all ICT Tools – all categories of internet use

How often do you access the internet for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	**Total Internet usage**	**Never**	Total responses
To keep in touch (socialise) with friends and family?	271	288	142	145	846	750	1596
Frequency Weighted	90450	33120	4260	1450	129280		
For other domestic purposes?	221	323	127	98	769	827	1596
Frequency Weighted	74035	37145	3810	980	115970		
Socialising and Domestic Sub-total	**492**	**611**	**269**	**243**	**1615**	**1577**	**3192**
Frequency Weight	**335**	**115**	**30**	**10**		**0**	
Annual estimated usage - Socialising and Domestic Sub-total - Frequency Score	**164820**	**70265**	**8070**	**2430**	**245585**	**0**	
For work?	590	88	45	67	790	806	1596
Frequency Weighted	135700	10120	1350	670	147840		
For educational study purposes?	72	164	162	203	601	995	1596
Frequency Weighted	16560	18860	4860	2030	42310		
Work and Educational Sub-total	**662**	**252**	**207**	**270**	**1391**	**1801**	**3192**
Frequency Weight	230	115	30	10		0	
Work and Educational Sub-total - Frequency Score	**152260**	**28980**	**6210**	**2700**	**190150**	**0**	
Total responses	**1154**	**863**	**476**	**513**	**3006**	**0**	**6384**

This shows that the total annual estimated frequency of use by applying the weights as stated above. For example the annual estimated usage of the

internet for "Social and Domestic Purposes" was 245,585 in total compared to "Work and Education Purposes" accounted for 190,150.

23. Frequency of internet access - percentages

How often do you access the internet for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	**Total Internet usage**
To keep in touch (socialise) with friends and family? Percentage	29%	33%	30%	28%	30%
For other domestic purposes? Percentage	23%	37%	27%	19%	27%
Socialising and Domestic Percentage	52%	71%	57%	47%	56%
For work? Percentage	43%	10%	9%	13%	34%
For educational study purposes? Percentage	5%	19%	34%	40%	10%
Work and Educational Percentage	48%	29%	43%	53%	44%

In terms of frequency of use respondents accessed the internet slightly more frequently for socialising and domestic purposes (56%) than they did for educational and work related purposes (44%) for the following use frequencies:-

- Daily (52% : 48%);
- 2-3 times per week 71% : 29%);
- 2-3 times a month (57% :43%).

However frequency of use for work and educational purposes exceeded that for socialising and domestic purposes for infrequent use (less than monthly).

In terms of the number of respondents who replied that they used the internet for each purpose compared to "Never" the results were close. For:-

- Socialising and domestic purposes overall use (1615 responses) exceeded "Never" (1577) by 38, which equates to 50.6%, compared to 49.4%.

- Socialising uses alone use (846, 53%) exceeded "Never" (750, 47%.);

- Domestic uses alone "Never" (827, 51.8%) exceeded use (769, 48.2%.);

- Socialising was the most frequently chosen category of use (846)

- Educational and work related purposes "Never" (1801, 56.4%) exceeded use (1391, 43.6%). This was largely due to Educational use;

- Educational use (601, 37.7%) being significantly lower than "Never" (995, 62.3%). Only a minority (72) stated that they accessed the internet for educational purposes on a daily basis.

- Work use by itself (790, 49.5%) was close to, but did not exceed "Never" (806, 50.5%). More respondents stated that they accessed the internet daily for work (590) than for any other category.

4.2.10. FREQUENCY OF USE OF DIFFERENT ICT TOOLS

The following table illustrates that there were significant variations in how frequently respondents used different ICT tools to access the internet:-

24. Internet access by ICT Tools type - Totals

Internet access by ICT Tools type - Totals	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	**Total Internet usage**	**Never**	Total responses
Majority Use ICT Tools							
PC / Lap top / Apple Mac	401 44.0%	239 26.2%	113 12.4%	89 9.8%	**842** **92.3%**	**70** **7.7%**	912
Email	314 34.4%	226 24.8%	134 14.7%	127 13.9%	**801** **87.8%**	**111** **12.2%**	912
Web Browser	315 34.5%	239 26.2%	103 11.3%	81 8.9%	**738** **80.9%**	**174** **18.1%**	912
Minority Use ICT Tools							
Instant messaging	43 4.7%	66 7.2%	40 4.4%	80 8.8%	**229** **25.1%**	**683** **74.9%**	912
Social Networking Sites	26 2.9%	39 4.3%	40 4.4%	75 8.2%	**180** **19.7%**	**732** **80.3%**	912
Mobile Phone	53 5.8%	47 5.2%	30 3.3%	47 5.2%	**177** **19.4%**	**735** **80.6%**	912
Blogs	2 0.2%	7 0.8%	16 1.8%	14 1.5%	**39** **4.3%**	**873** **95.7%**	912
TOTAL	1154 18.1%	863 13.5%	476 7.5%	513 8.0%	**3006** **47.1%**	**3378** **52.9%**	6384

The above shows that PC's, email and web browsers were used by the majority of respondents, whereas instant messaging, social networking, mobile phones and blogs were very much a minority activity. 92.3% of respondents stated that they accessed the internet via their PC, whilst only 19.4% stated that they used their mobile phone to do so. Web browser and email based access was also high with 80.9% stating that they used a web browser to access the internet compared to 19.1% that stated they never used that tool. Instant messaging was not as popular though with 74.9% stating that they never used that tool to access the internet. Similar social networking sites and blogs rated poorly with 80.3% and 95.7% respectively never using those tools to access the internet.

It should be noted that whilst the questionnaire asked about how often each ICT tool was used (PC, lap top, or Apple Mac; mobile phone; web browsers; email; instant messaging; social networking sites; blogs), it did not seek to weight each by duration of use. Therefore it should be not assumed that each had equal "duration" weight in the eyes of the respondents. For example a respondent may have recorded that they accessed the internet "Daily" for socialising and work purposes, but they may have typically spent 6 hours on work and 30 minutes on socialising activity.

4.3. Hypothesis Test

To re-cap, the hypothesis being tested was that "45-54 year olds use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities". Therefore the null hypothesis was the opposite of that: "45-54 year olds do not use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities".

The types of statistical tests used to find answers to the above research questions were chosen following a literature review.. In summary non-parametric tests were selected because the data was not normally distributed (Andrews, Klem, & Davidson, 1981), (Trochim W. , 2009), (SPSS, 2007), (Pezzullo, 2009), (Motulsky, 1995), (University of Chester, 2004), (Leadbeater, 2006), (Griffith, 2007), (Becker, 1999), (Cannon, 1999), (Howitt & Cramer, 2008), (Morgan, Clay, Jensen, & Quick, 2004), (Pallant, 2007), (SPSS, 2007) and (StatSoft, Inc, 2008). Further details and citations relating to the rationale behind statistical test selections can be found in Appendix 4.3 "Statistical Test Selection Rationale".

The annual estimated frequency of internet use results showed that "45-54 year olds used the internet to socialise and for domestic purposes (usage = 57%), more frequently than they did for educational and work related activities (usage = 43%)". Therefore the null hypothesis was rejected. A detailed breakdown of the results can be found in Appendix 4.19, "Relationship between Time Online & Purpose".

What follows is an assessment of each of the research questions within the context of each of the independent variables.

4.4. Relationship between Gender and Internet Use

Analysis of the frequency of internet use for the two groups that are the subject of the hypothesis, namely "Social and domestic" and "Work and Educational" purposes, showed that, in both cases, men also used the internet more frequently on average for both purposes than females. In conclusion therefore it appears that, on average men in this sample did use the internet more frequently than females (mean scores for frequency of internet use - Females 1762. Mean - Males 2237). The conclusion applied to all types of internet use related to gender, viewed separately (socialising, domestic purposes, work and educational use) or in groups, such as the two groups that are the subject of the hypothesis, namely "Social and domestic" and "Work and Educational" purposes. Men used the internet more frequently on average than women. Further details and supporting calculations can be found in Appendix 4.4 "Gender".

To test whether there was a relationship between gender and what 45-54 year olds do online Spearman's Rho was used (the non-parametric version of the Pearson product-moment correlation coefficient).

The correlation between being male and internet use was found to be present, but weak, across the whole range of types of ICT Tools and internet uses, ranging from r=0.131, for using the internet to blog for domestic purposes to r=0.360, for using their web browser for work related purposes (in all cases n=228, $p<0.01$). This test showed that there was a very slight weak relationship). Further details can be found in Appendix 4. 4.1. "Gender Relationship Test (Spearman's Rho)".

This slight relationship may not be causal however. Note that there may be other variables that are responsible for this slight correlation.

Gender - Coefficient of determination

It is possible to see how much variance two variables that correlate share by calculating their coefficient of determination (Pallant, 2007). The results for the lowest and highest correlations within this sample are as follows:-

- r=0.131 for males using the internet to blog for domestic purposes - coefficient of determination = 2%;
- r=0.360 for males using their web browser for work related purposes - coefficient of determination = 13%

This means that males using the internet to blog for domestic purposes share only 2% of their variance (very little overlap) and males using their web browser for work related purposes share 13% (again not much overlap).

The Mann-Whitney U test (Pallant, 2007) the non-parametric version of the independent samples t-test, was used to test for differences between gender. Again the rationale and citations behind the selection of this test can be found in Appendix 4.

The Z value was 3.717 and the significance level was 0.000 which is less than probability value of p=0.05, so the result was significant. The mean rank, direction of difference (which group was higher) result was male =133.04 and female = 100.28. By carrying out a further procedure to determine the medians (Pallant, 2007) the median values were determined to be males, 2130, and females, 1555, as shown below:-

25. Gender - Medians - All purposes - Frequency of Internet Use

Gender	N	Median
Female	129	1555.00
Male	99	2130.00
Total	228	1885.00

This confirmed that males do have a higher frequency of internet use than females.

The strength of the relationship (r) can be calculated by talking the z value and dividing it by the square root of the sample size:-

R = 3.717 / square root of 228 = 3.717 / 15.1 = 0.25.

The question being posed was " is there a relationship between gender and what 45-54 year olds do online and how frequently they do it?" The answer is that yes there was a small correlational relationship between gender and frequency of internet use, with males in this sample being slightly more likely to use the internet across a range of purposes than females, but the strength of the relationship (r=0.25) was small, as explained earlier.

A Mann-Whitney U test also supported this conclusion revealed a significant difference between the total frequency of internet use across all ICT tools and type of usage of males (Md = 2130, n = 99) and females (Md = 1555, N = 129) U = 4550.5, Z = 3.717, p = 0.00, r = 0.62).

However it is not possible to conclude with certainly that there is a causal relationship between gender and frequency of internet use. There could be a third confounding variable that explains ("causes") why there is a relationship between gender and internet use (Pallant, 2007). It is possible to explore this using a statistical technique known as partial correlation. This assumes that the three variables are continuous scale based (Pallant, 2007). However, whilst the dependent variables relating to frequency of internet use are scale based, all of the independent variables are nominal, with the exception of "Qualifications", which is ordinal. Therefore this test cannot be used.

4.5. Relationship between Main Role and Internet Use

The top three users of the internet on average within this sample were those who were retired, unemployed or employed. A transformed variable of "in paid work / not in paid work" was introduced to explore the frequency of use. This showed that the internet was being used more by those in paid work than those who were not.

Following that the total frequency of use for each of the different purposes was analyzed using a boxplot for each. Details can be found in Appendix 4.5. "Main Role", but in summary:-

- Full time carers, employers and the self employed used the internet the least on average for social purposes. Retired persons used it the most, followed by housewives. Employees and the unemployed were similar, but employees had the biggest range of scores of any group;
- Retired participants stated that they used the internet the most for domestic purposes, with an almost complete reversal of the order of the social purposes responses given that the self employed and

employers were the next highest. Employees had the greatest variation again followed by the unemployed;

- The self employed, employers and employees were the most frequent users of the internet for work related purposes;
- Those in paid work used the internet more frequently on average than those that were not.
- Although the sample size was small, the unemployed showed the highest average frequency of internet use for educational purposes. Perhaps they were seeking to improve their chances of gaining employment? Other than that the use of the internet for educational purposes was relatively low on average compared to other categories;
- Those who were retired had the highest average frequency of internet use followed by the unemployed. Full time carers had the lowest frequency of use on average;
- Looking at "Work & Education" together those who were housewives, or housekeepers, used the internet the least overall for this purpose. The self employed, employers and employees where the top three users on average.

A Kruskal Wallis Test revealed no statistically significant differences between the main roles, across the eight types of role within that (Grp:, n=195 Employee, Grp2: n= 4, Unemployed, Grp 3: n=5, Housewife / Housekeeper, Grp 4: n=4, Full Time Carer, Grp 6: n= 3 Retired, Grp 7: n=8, Employer, Grp 8: n=8, Self Employed, Grp 9: n=1, Other. The Retired group recorded the highest median score (Md=2035) (excluding "Other" with only one respondent falling into that category), closely followed by "Employees" (Md=2010) and the lowest was "Full Time Carers" (Md=1168). The significance level (Asymp. Sig), at 0.310, was more than 0.05. Therefore it is possible to conclude that there is no statistical difference in "main role" across all the groups. Appendix 4.5.4. contains

details of the rationale and further citations behind Kruskal Wallis Test selection for Main Role.

4.6. Relationship between Profession and Internet Use

The data collected relating to profession required more preparation for testing than any other independent variable (see Appendix 4.6.1. "Profession Data Preparation Requirements" for further details).

The two professions that had the most respondents were selected to test the impact of profession on internet use, namely "Medical & Health Profession" (n=50) Computing IT (n=45). Further details relating to this choice and the analysis relating to these can be found in Appendix 4.6. "Professions", sub-sections 4.6.2 "Medical & Health professions" and 4.6.3 "Computing / IT Professions".

Within each, differentiation was also made between gender and type of internet use (total frequency of use for social and domestic compared to work and educational proposes). These illustrated that there were no major differences in frequency for "All internet uses", "Domestic & Social", and "Work and Educational" internet use purposes.

A series of Mann-Whitney U tests also revealed no significant difference in the frequency of overall internet use:-

- For those from the health and medical professions there was no significant difference in the frequency for:-
    - Social and domestic internet use for health and medical professionals (Md = 930, n=55), compared to others (Md = 960, n=1735), u = 4172, z= -0.675, p=0.50, r=-0.04.

- Work and educational internet use for health and medical professionals (Md = 805, n=55), compared to others (Md = 920, n=173), u = 3932, z= -1.256, p=0.209, r=-0.04.

- For those from Computing / IT professions there was no significant difference in the frequency of overall internet use for
  - Computing / IT professionals (Md =1880, n=45), compared to others (Md =1890, n=183), u =3967, z=-0.380, p=0.704, r=-0.02.
  - Domestic & Social internet use by Computing / IT professionals (Md =910, n=45), compared to others (Md =980, n=183), u =4001, z=-0.294, p=0.769, r=-0.02.
  - Work and educational internet use for Computing / IT professionals (Md =930, n=45), compared to others (Md =895, n=183), u =3386, z=-1.844, p=0.065, r=0.12.

4.7. Relationship between Education and Internet Use

An upward trend in average internet use was found as the level of educational qualification increased (with the exception of those with GCSE/O Levels). Those with doctorates used the internet more frequently on average for domestic and social purposes than others and those who had A levels used it the least. Those with doctorates also used the internet more frequently on average for work and educational purposes than others and, again, those who responded who had A levels used it the least. Appendix 4.7 "Qualifications" contains a detailed breakdown of these results. A Kruskal-Wallis Test revealed:-

- no statistically significant difference in overall frequency of internet use across the different level of educational qualification (Grp1, n=21:

GCSE / O Level, Grp2, n=18: A Level, Grp3, n=22: HND, HNC, Diploma, City & Guilds, Grp4, n=88: Degree, Grp5, n=12: Post Grad Certificate, Grp6, n=88: Doctorate, Grp7, n=5: Other, Grp8, n=4: Rather not say) X2 (8, n=228) = 10.656, p=0.222. The Mean Ranks suggest that those with Doctorates used the internet more on average and had a higher median score (Md=2645), with those with A levels using it the least (Md=1515).

- no statistically significant difference in overall frequency of domestic and social internet use across the different level of educational qualification (Grp1, n=21: GCSE / O Level, Grp2, n=18: A Level, Grp3, n=22: HND, HNC, Diploma, City & Guilds, Grp4, n=88: Degree, Grp5, n=12: Post Grad Certificate, Grp6, n=88: Doctorate, Grp7, n=5: Other, Grp8, n=4: Rather not say) X2 (8, n=228) = 5.344, p=0.720. The Mean Ranks suggest that those with Doctorates used the internet more on average, (Md=1470), with those with A levels using it the least (Md=640).
- a statistically significant difference in overall frequency of work and educational internet use across the different level of educational qualification (Grp1, n=21: GCSE / O Level, Grp2, n=18: A Level, Grp3, n=22: HND, HNC, Diploma, City & Guilds, Grp4, n=88: Degree, Grp5, n=12: Post Grad Certificate, Grp6, n=88: Doctorate, Grp7, n=5: Other, Grp8, n=4: Rather not say) X2 (8, n=228) = 19.403, p=0.013. The Mean Ranks suggest that those with Doctorates (Md=1247) used the internet more on average, with those with A levels using it the least (Md=755).

4.8. Relationship between Type of Area and Internet use

Males in the sample used the internet more frequently than females with by far the biggest difference being between males and females in living in rural areas. See Appendix 4.8 "Type of Area" for a more detailed breakdown the results. A Kruskal-Wallis Test across the three types of area used in the study revealed:-

- a statistically significant difference in overall frequency of internet use (Grp 1, n24: Rural, Grp 2, n96: Semi-Rural, Grp 3, n=106: Urban) X2 (2, n=228) = 7.86, p= 0.02. The mean ranking showed that those that lived in "Rural" areas had the highest overall ranking (Md=2465) with "Urban" next (Md=2033), and "Semi-rural" lowest of the three (Md=1783);

- no statistically significant difference in overall frequency of internet use for "Domestic & Social" purposes (Grp 1, n24: Rural, Grp 2, n96: Semi-Rural, Grp 3, n=106: Urban) X2 (2, n=228) = 5.368, p= 0. 068. The mean ranking showed that those who indicated that they lived in "Rural" areas had the highest overall ranking (Md=1200) with "Urban" next (Md=920), and "Semi-rural" lowest of the three (Md=825);

- a statistically significant difference in overall frequency of internet use for "Work & Educational" purposes (Grp 1, n24: Rural, Grp 2, n96: Semi-Rural, Grp 3, n=106: Urban) X2 (2, n=228) = 13.428, p= 0. 001. The mean ranking showed that those who indicated that they lived in "Rural" areas had the highest overall ranking (Md=1200) with "Urban" next (Md=920), and "Semi-rural" lowest of the three (Md=825).

4.9. Relationship between where participants live and Internet Usage

Those from Greater Manchester had the highest rate of internet usage on average, and those from North Wales, the lowest, followed by those from Lancashire.

Repeating the above with a further breakdown by "Gender" revealed that those that were from Cumbria were the only group where females used the internet slightly more than males. All of the others followed a similar pattern where the position was reversed with the most gender difference being in Greater Manchester. Those within the sample who recorded their home location as "Greater Manchester" were the most frequent users of the internet for "Domestic & Social" purposes and N. Wales were the lowest.

The Kruskal-Wallis Test revealed that a statistically significant difference in frequency of internet use across all the home location groups:-

- a statistically significant difference in frequency of internet use across all the home location groups (Grp1, n=52: Cheshire, Grp2, n=39: Merseyside, Grp3, n=15: Grt Manchester, Grp4, n=9: N Wales, Grp5, n=20: Lancs, Grp6, n=28: Cumbria, Grp7, n=57: Other – UK, Grp8, n=8: Other-None UK), X2 (7, n=228) = 16.777, p=0.019.;

- a statistically significant difference in frequency of internet use for Domestic & Social Purposes across all the home location groups (Grp1, n=52: Cheshire, Grp2, n=39: Merseyside, Grp3, n=15: Grt Manchester, Grp4, n=9: N Wales, Grp5, n=20: Lancs, Grp6, n=28: Cumbria, Grp7, n=57: Other – UK, Grp8, n=8: Other-None UK), X2 (7, n=228) = 15.008, p=0.036;

- a statistically significant difference in frequency of internet use for Work & Educational purposes across all the home location groups (Grp1, n=52: Cheshire, Grp2, n=39: Merseyside, Grp3, n=15: Grt Manchester, Grp4, n=9: N Wales, Grp5, n=20: Lancs, Grp6, n=28: Cumbria, Grp7, n=57: Other – UK, Grp8, n=8: Other-None UK), X2 (7, n=228) = 15.977, p=0. 025.

Therefore it is possible to conclude that, for this sample, there was a relationship between where respondents lived and what those 45-54 year olds do online and how frequently they do it. Appendix 4.10., "Location", contains a more detailed description of these results.

4.10. Relationship between Type of Household and Internet Use

Noting that "Other (n=-3) represents a small proportion of the sample, each of the types of household did not appear to be significantly different in terms of internet usage from the others. A Kruskal-Wallis Test found that there was no statistically significant difference in frequency of internet use for:-

- All the type of household groups overall (Grp1, n=56: Married/partner - no children/dependents, Grp2, n=133: Married/partner - children/dependents, Grp3, n=19: Single - children/dependents, Grp4, n=17: Single - no children/dependents, Grp5, n=3: Other), X2 (4, n=228) = 3.388, p=0. 495.

- Domestic & Social internet use across all the type of household groups (Grp1, n=56: Married/partner - no children/dependents, Grp2, n=133: Married/partner - children/dependents, Grp3, n=19: Single - children/dependents, Grp4, n=17: Single - no

children/dependents, Grp5, n=3: Other), X2 (4, n=228) = 4.426, p=0. 351

- Work and Educational internet use across all the type of household groups (Grp1, n=56: Married/partner - no children/dependents, Grp2, n=133: Married/partner - children/dependents, Grp3, n=19: Single - children/dependents, Grp4, n=17: Single - no children/dependents, Grp5, n=3: Other), X2 (4, n=228) = 6.049, p=0. 196

Appendix 4.11. "Type of Household" contains the detailed calculations.

4.11. Frequency of Internet Use

The research was seeking to ascertain whether there was a relationship between the amount of time spent online and what the 45-54 year olds who responded did online and how frequently they did it.

The following table shows each of the reasons respondents were asked to record their internet activity levels against:-

26. Total Frequency of Internet Use

Total Frequency of Internet Use	Sum	Mean
Domestic & Social Purposes -	245585	1077.13
Work and Educational Purposes -	203125	890.90
Work Purposes -	147820	648.33
Social Purposes -	129615	568.49
Domestic Purposes -	115970	508.64
Educational Purposes -	55305	242.57

This shows that respondents used the internet more frequently on average for domestic and social purposes (mean=1077) than they did for work and educational purposes (mean=891). However when viewed individually use of

the internet for work related purposes (mean = 648) was greater than social (mean=568) or educational (mean=508) purposes. This was because average frequency of use of the internet for educational purposes (mean=243) brought the average down for work and educational purposes.

Looking at the types of ICT tools used to undertake the above, a majority (96%) stated that they used a PC for socialising or domestic purposes and 89% for work and educational purposes. A similar result was found for use of email with 94% stating that they used it for socialising and domestic purposes and 92% for work.

Blogging was the least used ICT Tool to access the internet with 96% of respondents overall noting that they never used this method.

Further details of the calculations can be found in Appendix 4.12 to 4.18 (for each of the ICT Tools within scope).

4.12. Summary

Participants were asked a number of questions to identify which ICT tools they used to access the internet, what for, and how frequently.

The annual estimated frequency of internet use results showed that "45-54 year olds used the internet to socialise and for domestic purposes (mean=1077, usage = 57%), more frequently than they did for educational and work related activities (mean=891, usage = 43%)". Therefore the null hypothesis was rejected.

However when viewed individually use of the internet for work related purposes (mean = 648) was greater than social (mean=568) or educational (mean=508) purposes. This was because average frequency of use of the

internet for educational purposes (mean=243) brought the average down for work and educational purposes.

A majority (96%) stated that they used a PC for socialising or domestic purposes and 89% for work and educational purposes. A similar result was found for use of email with 94% stating that they used it for socialising and domestic purposes and 92% for work. Blogging was the least used ICT Tool to communicate via the internet, with 96% of respondents overall noting that they never used this method.

Men were found to use the internet more frequently on average than women. A correlation between being male and frequency of internet use was found to be present, but weak, across the whole range of types of ICT Tools and internet uses, ranging from $r=0.131$, for using the internet to blog for domestic purposes to $r=0.360$, for using their web browser for work related purposes (in all cases $n=228$, $p<0.01$).

Others findings were as follows:-

- The internet was being used more by those in paid work than those who were not;
- No significant difference in the frequency of overall internet use by profession;
- A statistically significant difference was found in overall frequency of work and educational internet use across the different levels of educational qualification;
- Those that lived in "Rural" areas had the highest overall frequency of internet use for "Work & Educational" purposes;
- Those from Greater Manchester had the highest rate of internet usage on average, and those from North Wales, the lowest, followed by those from Lancashire. Those that responded from Cumbria

were the only group where females used the internet slightly more than males. All of the others followed a similar pattern where the position was reversed with the most difference being in Greater Manchester (who were also the most frequent users of the internet for "Domestic & Social" purposes). A statistically significant difference in frequency of internet use by home location was found; and

- There was no statistically significant difference in frequency of internet use: all the types of household groups.

Chapter 5, Discussion, now follows. This takes the results of the Literature Search set out in Chapter 2, and compares that to the main findings within that section to see what similarities and differences exist.

5. DISCUSSION

5.1. Introduction

Chapter 2, Literature Search, showed that the last decade has seen a significant increase in internet usage, turning from very much a minority activity in 1998, to a majority activity within 5 years, to a position where two thirds of all UK households were accessing the internet by 2008 (National Statistics, 2008). In the case of the 45-54 year old generation internet usage in the UK had reached 75% in 2008 (National Statistics, 2008).

Of those who participated in this research, a much higher percentage (99.6%) stated they were internet users in one or more forms. Only one respondent stated that they never used the internet at all. Only 3 stated they never used it for socialising or domestic purposes (but two of those used it for work related purposes).

So the profile of this sample population did not match that of the wider population. This was a sample of convenience drawn from known associates of the lead researcher the majority were from professions normally associated with social classes A and B and some from C1. So caution should be exercised when comparing the results of this research with other studies which may have been based on a sample drawn from the 45-54 year old generation as a whole .

.

In addition, in such a rapidly changing environment patterns of internet usage may well be evolving at a pace. This suggests that more recent research and data should be given greater weight when comparing the

results of this research and that of others. As already asserted the findings set out in Chapter 4, Results, reject the null the hypothesis that "45-54 year olds do not use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities". Dutton, et al (2009) found a similar picture, albeit for a wider age group of "employed". Within this category of "employed" their findings also indicated a greater percentage that used the internet for social and domestic internet purposes than for work related purposes (there was no separate "educational" catgory broken down by lifestage):-

- For work related activities, 61% accessed the internet at work and 53% used the internet to obtain information for work;

- For social and domestic purposes, 92% to plan travel, 87% for comparing products and pricing, 84% to obtain information on local events, 70% for health and medical information, 64% for online banking; and 48% that used it for social networking.

Jones & Fox, (2009) also found that in the USA 79% of the 45-54 year generation were online in 2008. Of those 90% used the internet to send and receive emails, 74% to obtain health information, and 68% to buy online. Unfortunalely they did not publish data showing how many were using the internet for work or educational purposes to allow a more direct comparison to be made between that and socialising and domestic purposes and see whether their data supported the hypothesis or not.

For example looking specifically at the 45-54 year generation in the UK (National Statistics, 2008):-

- 65% accessed the internet every day, or almost every day (up from 62% in 2006);

- 27% accessed the internet at least once a week, but not daily (up from 24% in 2006).

- 8% accessed the internet once a month, or less (down from 14% in 2006).

A similar situation was found in the USA where the percentage of Americans online aged 45-49 was 80%, and those aged 50 to 54 was 78% in 2008 (Jones & Fox, 2009).

Comparing this with the results of this research the percentage of respondents who stated that they accessed the internet every day, or almost every day was at least on a par with that found nationally within a range of 64% to 91% as shown below (using the use of a PC to illustrate):-

27. Use of a PC / Lap top / Apple Mac – Totals

How often do you use a PC / Lap top / Apple Mac to access the internet for each of the following purposes?	Daily	2-3 times per week	accessed the internet every day, or almost every day	Percentage who access the internet Daily or 2-3 times per week	Total responses
To keep in touch (socialise) with friends and family?	86	74	160	70%	228
For other domestic purposes?	93	93	186	82%	228
Socialising and Domestic Sub-total	**179**	**167**	**346**	**76%**	**456**
For work? -	192	15	207	91%	228
For educational study purposes?	30	57	87	38%	228
Work and Educational Sub-total	**222**	**72**	**294**	**64%**	**456**
TOTAL	**401**	**239**	**640**	**70%**	**912**

Further similar supporting data can be found in Appendix 4.

5.2. Gender

This research found that overall, males, on average, used the internet more frequently than females. The same conclusion applied to all types of internet use related to gender when viewed separately (socialising, domestic purposes, work and educational use) or in groups relating to "Social and domestic" and "Work and Educational" usage purposes. However the correlation was found to be weak across the whole range of types of ICT Tools and internet uses.

These findings have been supported by other research. For example Dutton, Helsper, & Gerber, (2009) also found that males undertook almost all online activities more frequently than females, but the differences were not large. Data from National Statistics, (2008) also showed that men used the internet more than women (75% of men and 65% of women in 2008). Horrigan,

(2007) found that men predominated in use of "high tech" internet technology (in some cases on a scale of 2 to 1) whilst most of the "low tech" groups had a majority of women in them. However this male dominance was not across the board with more women (55%), for example, in Horrigan's "connector" group using the internet to "connect" than men (a "connector" group is one that is using the ICT to connect to others, to form and develop relationships).

Historically the different levels of internet usage by males and females have been changing. The proportion of women using the internet was initially very low (5% in 1994) growing to 34% in 1997 in the USA (Pitkow, 1997).

Given that the correlation was found to weak perhaps, in the not too distant future, the proportions may equalise and converge closer to the overall gender profile in the wider population.

5.3. Main Role

Over 85% (195) of the participants within this research stated they were employees, and 100% of those stated that they used the internet. The total number "in paid work" (total including employees, employers, self employed) was 211 (92.5%). That is perhaps not surprising given that to participate they had to be aged 45-54. Therefore the sample was not spread out between roles and the comparisons stated here should be viewed within that context.

Dutton, Helsper, & Gerber, (2009) found that the percentage of "employed", internet users in the UK (across all generations) grew steadily from 67% in 2003, 68% in 2005, 81% in 2007, to 86% in 2009. However in this sample group, 100%, of those who were "employed" stated that they used the internet. Dutton et al also found usage rates of 34% for those who were retired and 48% for the unemployed. Dutton et al also found that those from

social grades DE "working Class, unemployed and dependants" had internet usage rates of 46%.

These findings were not replicated within this research. All the "Unemployed" (n=3) used the internet as did the all the "Retired" (n=3).

5.4. Profession

For those in the two largest named groups within this research, those from "Health and medical professions", and also "Computing / IT", there was no significant difference found in the frequency of overall internet use between them and other groups. Also 100% of both groups stated that they used the internet.

This is greater than the usage rates reported in other recent studies which for equivalent, but not exactly the same definitions of professions, returned a rate of:-

- 95% usage rate for "Managerial & Professional" (City University of Hong Kong, 2009),
- 88% usage rate for a UK based "Social Grade AB, Upper Middle Class, Middle Class" classification (Dutton, Helsper, & Gerber, 2009) and
- 80% and 84% usage rate for a two year old Welsh study showing usage rate for "Managerial and Professional Occupations" (National Statistics, 2008).

5.5. Educational Qualifications

In this sample 27% had a pre-university education and 69% had at least a university education. A total of 25% had a post graduate qualification

(diploma, masters, and doctorate). An upward trend in average internet use was found as the level of educational qualification increases. Those with doctorates used the internet more frequently on average for domestic and social purposes than others and that those who responded who had A levels used it the least. Those with doctorates on average also used the internet more frequently for work and educational purposes more than others on average.

A statistically significant difference was found in overall frequency of work and educational internet use across the different level of educational qualification. Those with Doctorates (Md=1247)used the internet more on average, with those with A levels using it the least (Md=755).

These finding are similar to that of other research. Education was a key determinant of whether or not a household had internet access with 93% of people with a degree level education accessed the internet compared 56% of those with a lower qualification (National Statistics, 2008).

Therefore it appears that educational qualifications are an indicator of level of internet usage.

5.6. Type of Area

This study found that the type of area that respondents lived in was significant. Those who indicated that they lived in "Rural" areas had the highest overall usage on average, with those from "Urban" areas next, and then "Semi-rural" lowest of the three.

This was the exact reversal of order based on data found from a study in Wales (National Statistics, 2008).

5.7. Location

Most of the participants in this research lived in the North West of England. This study found that those from Greater Manchester had the highest rate of internet usage on average, and those from North Wales, the lowest, followed by those from Lancashire. A similar classification by National Statistics, (2008) found that 56% of those living in the North West used the internet, but all but one person in this study overall did use the internet. The one participant that did not use the internet was from North Wales.

5.8. Type of household

In terms of UK households, 68% had access to the internet in 2008, up from just over 45% in 2002 (National Statistics, 2009). Those households that had a personal computer at home were more likely to have a child or dependent with them that those that did not (National Statistics, 2008). Least likely to have a PC at home were singles under retirement age, and married and single pensioners. One other study also found that married couples with children living with them in their households owned the most technology and gadgets (Kennedy, Smith, Wells, & Wellman, 2008). They concluded that this was because there were more members in those households, and therefore there were more relationships to coordinate. Married couples with children were the most active internet users.

Unlike the above this study found that there was no statistically significant difference in frequency of internet use across all the type of household groups.

5.9. Frequency of Internet Use

Out of 228 respondents 3 stated that they did not use a PC to access the internet for social or domestic purposes. One of those did not access the internet at all for any reason and the other stated that they used a PC at work. Whilst the question did not precisely indicate that this was from home this indicates that virtually all respondents probably had a PC at home. This compares well with a Welsh study that found that 97% of highest income households owned a PC compared to 70% on average (National Statistics, 2008).

In the UK the number of households that had a mobile phone stood at 89% in 2009, up slightly from 85% in 2005 (Dutton, Helsper, & Gerber, 2009). Of those 24% were using it to access email or the internet. This research found similar results, in that that a total of 21% respondents (not households) used their mobile phone to access email or the internet for "Socialising and Domestic purposes" and 18% for "Work and Educational purposes".

Respondents used the internet more frequently on average for domestic and social purposes than they did for work and educational purposes. However when viewed individually use of the internet for work related purposes was greater than social or educational purposes. This was because average frequency of use of the internet for educational purposes has brought the average down for work and educational purposes.

Looking at the types of ICT tools used to undertake the above only a majority (96%) stated that they used a PC for socialising or domestic purposes and 89% for work and educational purposes. A similar result was found for use of email with 94% stating that they used it for socialising and domestic purposes and 92% for work.

Finally blogging was the least used ICT Tool to access the internet with 96% of respondents overall noting that they never used this method. In the USA 27% of 45-54 year olds stated that they read blogs and 6% created them (Jones & Fox, 2009). So the results of this research are showing lesser numbers than in the USA.

6. CONCLUSION

6.1. Introduction

This research set out to determine how frequently, and for what purpose, members of the 45-54 year old generation used the internet. Data was collected using a questionnaire based instrument administered to a sample frame of convenience. This research area is especially fascinating because the 45-54 year old generation grew up in a different world (1955 and 1975) from the one in which they find themselves today. At that time there was no internet available and therefore when the internet did become available to them it was unfamiliar and required a degree of change on their part to adopt and use it as another communication tool (among the many choices available to facilitate human communications). How things have changed. By 2009 it was estimated that there were 1.56 billion world-wide internet users, with 77% of those coming from 20 countries, with China ranked first, then the USA, with the UK ranked seventh.

6.2. Findings

The aim was to examine whether the 45-54 year old generation use the internet to socialise and for domestic purposes more frequently than they do for educational and work related purposes. The main findings were that 56% of respondents stated that they used the internet for socialising and domestic purposes, more so than they did for work and educational purposes (44%). However educational use was lowest (only 10%) so work related internet activity when viewed on its own, (34%), was the most frequent reason for use. Socialising was next with 30%, followed by domestic use at 27%. Therefore the null hypothesis was rejected, which was that: "45-54 year olds do not use the internet to socialise and for domestic

purposes more frequently than they do for educational and work related activities".

In terms of which ICT tools were found to be used to access the internet, PC's, email and web browsers were used by the majority of respondents, whereas instant messaging, social networking, mobile phones and Blogs were very much a minority activity.

This research also sought answers to a number of research questions. The first related to whether there was a relationship between gender and internet usage. Back in 1994 (in the USA) women accounted for only 5% of those who used the internet. By 1997 the percentage of women users had increased to 34%. By 2008 this had changed with 66% of women and 75% accessing the internet in the UK. This research found that overall, males, on average, used the internet more frequently than females for both "Social and domestic" and "Work and Educational" purposes. However the correlation was found to be weak, but significant difference across the whole range of types of ICT Tools and internet uses, ranging from $r=0.131$, for using the internet to blog for domestic purposes to $r=0.360$, for using their web browser for work related purposes (in all cases $n=228$, $p<0.01$). This seems to reflect the trend evident in other research that the differences in internet use by gender are diminishing over time.

The second research question related to whether there was a relationship between main role of the respondents and internet usage. The self employed, employers and employees were the most frequent users of the internet for work related purposes Those in paid work used the internet more frequently on average than those that were not. However no statistically significant differences between the main roles was found to exist based on this research. These findings were similar to those found by others in that the

employed were found to use the internet more frequently than the unemployed.

The next question related to whether there was a relationship between profession of the respondents and internet usage. The two largest professional groups namely "Medical & Health Profession" (n=50) Computing IT (n=45). No major differences apparent and there was no significant difference in the frequency of overall internet use. Data relating to socio-economic status was not collected directly but given that this was a sample of convenience and that many of the respondents were known to the lead researcher most were from social groups AB (upper middle class, middle class) whose internet usage in the wider population was found to be 88% in 2008 it is perhaps not unexpected that there was a consistent level of usage across professions.

Following that this research also explored whether there appeared to be a relationship between highest level of educational qualification held by each of the respondents and their internet usage. The results confirmed that internet use increased as the level of educational qualification increased broadly in line with the findings of other research. Those with doctorates used the internet more frequently on average for domestic and social purposes and for work and educational purposes than those with lesser qualifications. However these differences in this study were only found to be statistically significant for work and educational internet use.

An assessment was also made to determine whether the type of area respondents lived in affected their level of internet usage (rural, semi-rural, or urban). What was found was that those who lived in rural areas used the internet significantly for "Work & Educational" purposes more than those in urban or semi- rural areas. There was no statistically significant difference in frequency of internet usage for "Domestic & Social" purposes. Finally rural males in the sample used the internet more frequently than rural females.

These results were different from a study conducted in Wales in 2008 (National Statistics, 2008) which found that those from Welsh urban areas used the internet more than those from rural areas.

The relationship between where respondents lived and their internet usage was also explored. An analysis found that those from Greater Manchester were the most frequent users of the internet for "Domestic & Social" purposes and N. Wales were the lowest. Most of the participants in this research lived in the North West of England. In the UK, the South East and London had the most households that had internet access and the North East the least with the North West being only marginally higher at 56% (National Statistics, 2008).

Finally, no significant differences were detected when exploring the relationship between type of household and internet usage. Other studies had found that households with more members in them used the internet more frequently because there were more members in those households, and therefore there were more relationships to coordinate. Married couples with children were the most active internet users

6.3 Strengths & Weaknesses

Whether something is a strength or a weakness, can depend on the background of the researcher, their education, culture, experiences, political views and self interest. There are different "viewpoints" at play, and depending on where the observer is viewing from could influence whether they see aspects of this research as a strength or a weakness.

6.3.1 SINGLE VERSUS MULTIPLE HYPOTHESIS TESTS

For example this research set out to determine whether a hypothesis was true or not. However a hypothesis itself could be viewed as a source of potential weakness by some, or strength by others, because it is:-

- A conjecture or a hunch about the relationship between two variables usually limited to the independent and dependent variables (Cross & Belli, 2004);
- An educated, and testable, guess about the answer to a research question. It is a prediction (Dawson, 2002) (Trochim W. M., 2006);
- An attempt to explain the phenomenon of interest (Dawson, 2002) (Marczyk, DeMatteo, & Festinger, 2005).

How was it possible to "know" enough to prove, or otherwise, the hypothesis that was being tested? Was enough data collected? Was the sample frame correctly constructed and so on? There are two major philosophical schools of thought on that, one known as positivism and the other as post-positivism (Trochim W. M., 2006):-

- "Positivism", is a traditional view of science, and the one basically taken during the course of this research, believes that it may well be possible to prove or otherwise a hypothesis, because the world reacts to and operates by the laws of cause and effect and experiments can be used to determine "the truth". The outcome can then be used to deduce (deductive reasoning) what might happen in the future among other groups of people;
- "Post-positivism" could be described as "realistic", because it recognizes that all experimental observations are potentially subject to error, and therefore it will not be possible to "prove" the hypothesis. This is because it is not possible to know "reality" with "certainty".

"Post-positive" leaning researchers tend to try and mitigate against threats to validity by obtaining multiple observations via repeated experiments, via a process of "triangulation" to come closer to that truth (but never getting entirely to it) to understand what's happening in reality (Trochim W. M., 2006). A post-positivist reader would probably tend to see this research as being weakened because it was based on one sample frame that was not repeated several times to achieve something approximating to "triangulation". However, time constraints meant that this was not possible, with the literature review being the closest "approximation" to that in the time available.

6.3.2 DEDUCTIVE VERSUS INDUCTIVE REASONING

Others might argue that this research is weak because its starting point is a hypothesis, whilst others may say that is its strength depending on whether they feel that a deductive or inductive reasoning approach is "better" (Trochim, 2006).-

- Deductive reasoning, or a "top down" approach, typically starts with a theory and then leads to testing or confirming of hypothesis, observations leading to confirmation (or otherwise of the hypothesis and theory);
- Inductive reasoning, or a "bottom up" approach, is the opposite of that and starts with observations to detect patterns, leading to broad generalisations and tentative hypothesis for testing, and then the development of a theory. This is therefore more exploratory and open-ended.

Given that the starting point for this research was the development of a hypothesis it took a deductive approach. Was this the right approach?.

6.3.3 QUANTITATIVE VERSUS QUALITATIVE RESEARCH

Would the hypothesis have been better tested using a different research methodology? This was a fundamental choice as it underpinned the philosophy or general principles on which the research would be founded (Dawson, 2002). Quantitative research methodologies were originally developed by the scientific community to study and explain natural phenomena (Rayner, 2009) (Marczyk, DeMatteo, & Festinger, 2005). Methods used to undertake this type of research include:-

- Survey methods, such as questionnaires (as in this case);
- Laboratory experiments, and
- Statistical modelling.

Qualitative research methodologies were largely developed by the social sciences to study cultural and social phenomena. They do not normally attempt to quantify their results through statistical summary or analysis (Marczyk, DeMatteo, & Festinger, 2005). Within that there are a number of different methods available to the researcher aimed largely at exploring attitudes, behaviour and experiences such as (Dawson, 2002) (Marczyk, DeMatteo, & Festinger, 2005) Action research and Case study research:-
So would a different approach based on, say case study research, have delivered a better hypothesis test? The main characteristics of each, as they apply to the topic under test here, were evaluated and compared to determine which methodology was more appropriate, within the context of the hypothesis being tested. It was concluded that the hypothesis would be better tested using a quantitative research (quasi-experimental) methodology. Detailed reasoning behind this can be found in Appendix 3.2 "Methodology Selection". It is the view of the researcher that the approach taken was correct and was a strength of the research.

6.3.4 QUESTIONNAIRES VERSUS STRUCTURED INTERVIEWS

Would the hypothesis have been better tested by using a different research instrument such as structured interviews to gather the data, as opposed to a questionnaire completed remotely? Did the use of a questionnaire weaken the research? Information gathered from questionnaires and structured interviews is more typically used in this type of research (Hutchinson, 2004):-

- To collect data by getting the participants to "self-report" as a means of understanding their behaviour,
- Either for purely descriptive statistics, or for examining correlations (relationships) between variables; and
- As a method of data collection where direct manipulation of the dependent and independent variables is unfeasible or unethical.

Other factors to consider when choosing an instrument included:-

- Budget (there was no budget as such and any costs would have to be met by the lead researcher);
- Completion deadlines. The dissertation had to be completed by September 2009 to comply with University timescales;
- Availability of time and resources. All activity had to be carried out by the lead researcher supported by the University tutor.

An analysis of response rates by type of instrument can be found in Appendix 3.3 (Schonlau, Fricker, & Elliott, 2002) (Hutchinson, 2004). Their analysis suggests that structured interviews (plus telephone interviews) should have produced better results. However time constraints, budget and completion

deadlines were overriding considerations in this case. Whilst the weakness of a remotely completed questionnaire was recognised it was the pragmatic choice.

Other considerations around the choice of instrument can be found in Appendix 3.7, "Independence of Observations". In brief there was no evidence that those that were invited to participate in the study colluded with each other in terms that affected the responses they gave. If they were aware that others they knew had been invited to participate there is no evidence that this influenced their answers to the questions that were posed. If the observations were not independent, as described above, then this increases the chances of making a:-

- Type I error (also known as α error, or false positive error of the first kind) when the null hypothesis H0, is rejected when it is in fact true, and

- Type II error (also known as β error, or a false negative, or an error of the second kind) when the null hypothesis H0, is not rejected when it is in fact false.

6.3.5 PRESENCE OF BIAS

Bias can be introduced into a research project from a variety of sources including from the (Marczyk, DeMatteo, & Festinger, 2005):-

- Researcher;
- Participants;
- Procedures used;
- Way the study is communicated to participants; and
- Way the instrument (questionnaire) is designed or constructed.

Researchers may have either a conscious or unconscious desire to prove their hypothesis, and may manipulate, or selectively interpret the data in a way that supports that view. In this case the lead researcher was not at all sure whether the hypothesis would be supported, or not, and had no desire either way to achieve a set outcome, content to let the data dictate the results.

The way the invitation email to participate was issued, its timing and the wording of that, can also have an effect on the participants. Participants' behaviours may be inadvertently affected, and as a result, their answers may be not as accurate as they should be, or they may decide not to respond at all, weakening the results. In this case a strength was that the participants were not told what the hypothesis was, so hopefully that meant that they would be much less likely to change their responses to the questions to support that out of, say, a desire to be "helpful".

However, not all those who were invited elected to participate. Of the 608 emails issued, a total of 258 (42%) were returned. This could be viewed as a significant weakness. Of those, some were too incomplete, leaving 228 largely complete questionnaires for analysis. However this research was based on a sample of convenience. So the ability to generalize across the wider population with a high degree of certainly was not the goal. (Dawson, 2002)

The procedures used can also introduce bias. The questionnaire was issued by email as a PDF copy together with a link to the Surveymonkey online version. Bias may have been introduced here by using email. On the one hand this was the fastest and least costly route to the participants, but it may have lost or discouraged some, because they either are infrequent email users, did not have the required Adobe software package on their computer to enable them to open and print out the PDF questionnaire, or they were disinclined to use a previously unknown online questionnaire based

approach. On the other hand the approach and associated participant information was consistent across all participants to avoid bias being introduced by for example using different methods of approaching participants.

Issues with the way the measurements (in this case the questions via which the data was gathered) are constructed can also introduce bias (Dawson, 2002). Explanatory text was added to most questions where it was felt to be potentially useful to try to minimize bias caused by ambiguity, lack of understanding or clarity. One participant may find a term easy to understand, because they have assimilated it into their every day vocabulary, e.g. "blogging", whilst another may still not know what that means, and so it is seen, at best, as jargon.

Previous similar research studies were also consulted to try to replicate their approach both to the types of questions asked and their construction (Dutton & Helsper, 2007) (Dutton, Gennaro, & Hargrave, 2005) (Jones & Fox, 2009). However their approach to sample selection was more random than the purposive approach taken here. In this case therefore the sample frame in itself introduces bias, because it is limited, not to a proportionate cross section of people in the 45-54 age bracket, but to those in that bracket known to, or associated with, the lead researcher whose characteristics are "middle class", ICT literate, educated to degree level, and, not surprisingly, many of the friends and associates known to them possess similar attributes and hence introduces recognized bias (University of Illinois, 2009). So it was recognised that this research was based on a sample of convenience. As a result the ability to generalize across the wider population was limited (Dawson, 2002)

When designing the questionnaire, questions were avoided that could have caused embarrassment (plus offence or frustration). This is sometimes

known as "prestige bias" (Dawson, 2002). This was to avoid making the participants feel uncomfortable and potentially leading them to decline to respond, or answer questions inaccurately and introduce bias as a result. One question that could be argued may be of this type that was included related to highest level of educational qualification, and another relating to profession. Confidentiality and anonymity were promised as a means of trying to address this, but it is a possibility that some may have declined to complete the questionnaire as a result.

In addition all possible answers to each question were covered, in some cases by the catchall "other" category (together with a comments box), e.g. profession. The "other" category was an attempt to avoid collecting inaccurate data, and therefore bias, by simply missing out possible answers from a section of participants or forcing them to answer inaccurately.

Finally bias may be introduced by data errors flowing out of incorrect data capture, faulty use of statistical methods such that the results are simply wrong. Care was taken during data capture to double check that the data had been entered correctly and various cross check sums were used to total columns and rows to try to spot and correct any errors. Later sections deal with the statistical analysis more fully but, suffice it to say at this point, it is believed that the correct statistical methods were used to analyse the data. So when drawing a conclusion relating to independent variables the lead researcher was aware of the bias that may have been inherent in the data (Dawson, 2002). To put it another way bias could be viewed in terms of how far the average statistic, e.g. average internet usage by, say, males, lies from that for the population as a whole if it were known. Errors from chance should cancel each other out in the long run, those from bias will not.

6.3.6 RANDOM VERSUS PURPOSIVE SAMPLING TECHNIQUES

"Type III" error, or problem bias, can also weaken research. As participants were selected from, or via, contacts known to the lead researcher, or were fellow ex-pupils of educational establishments attended by the lead researcher, a check was made to determine how representative a sample this was compared to the 45-54 age group population as a whole. To do this a UK population profile and population "social grade" classification was analysed (Chapman, 2009). Details of this analysis can be found in Appendix 3.8 "Bias". This showed that the profile of those that completed the questionnaires was different from the wider population:-

- 85% of those that participated in this research recorded themselves as belonging to one of the professional occupation groups normally classified within the A-B-C1 group, compared to 55% in the population as a whole;
- Only 9% recorded their highest level of qualification as being "O Level/GCSE"
- 211 stated they were in paid work and only 11 were not (4 of which were male);
- 43% were male and 57% were female, compared to 49% male and 51% female in the normal population.

It is probably reasonable to conclude that these dissimilarities represent a weakness in the research design and as a result caution should be exercised if attempts are made to draw conclusions from the research across a wider 45-54 year old population (who made up 13.2% of the population at in 2001 in the UK (Office of National Statistics (UK), 2009) .

On the other hand purposive sampling meant that the risk of a non 45-54 year old completing the questionnaire was reduced.

6.4 Possible Improvements if Repeated

Many independent and dependent variables were included in the scope of this research. Whilst this led to some very interesting work analysing the data, including fewer variables, if repeated, should allow more time to delve deeper into specific aspects within the same time frame.

The approach used to measure frequency of internet use could be improved to reduce the number of measures taken by type of ICT tool, and to make the measurement options a true scale, avoiding the need to transform the data to a scale to meet the underlying assumptions behind the statistical tests used.

The research instrument used, the questionnaire, could be improved to reduce the number of questions used to gather data on the independent and dependent variables. This would focus precisely on the hypothesis. So in this case four questions, instead of twenty-eight, could be included to ask "How frequently do you use the internet to socialise", "…. for domestic purposes", "… for educational purposes", and "…. for work" with responses recorded on a scale where the distances between the responses are equal and based on a set time period, say "… days per month".

6.5 Main Learning Points

The three main learning points from this research were:-

- The need to focus the literature research on the topic in question and limit the exploration of interesting avenues that inevitably arise during searches to those that are promising (because this can lead to added time pressure);

- The need to set aside sufficient additional time to acquire base skills needed to undertake the research. There was an early realisation that statistical analysis theory and techniques including how to select appropriate tests was an area outside of the normal "comfort zone" of the lead researcher. It would (and did) require significant research, learning, time, thought and preparation (the lead researcher did not have a statistical background). This included the need to learn how to use SPSS, the statistical analysis package;

- The need to be more precise with the scope of the research instrument. Greater care should have been taken to limit the number of independent and dependent variables and research questions posed to those needed precisely to test the hypothesis, no matter how interesting finding out might be.

6.6 Suggestions for Future Research

The hypothesis (that "45-54 year olds use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities") could be refined. For example, including a further independent variable, such as say "gender", would allow a greater degree of focus on that aspect. So the hypothesis could be adjusted to "45-54 year old males use the internet to socialise more than females" and the research could "drill" more deeply into that aspect.

The research could be refined to examine specifically one of the newer internet based communication methods, such as "blogging" and seek to ascertain the frequency of use for that purpose, but collecting more independent variables to try to ascertain the characteristics of those who blog, and those that do not. For example, "45-54 year males working in Computing / IT professions blog more frequently than females in the same profession".

With a usable response rate of 38% perhaps a further email "round 2" or telephone follow up could be undertaken to ascertain why 62% declined to participate and try to obtain their input. Those that responded to this further "round" may clarify whether the bias introduced by non-responders, once adjusted for, alters the conclusions (or not). To speculate, were the ones that did not respond less IT literate than those that did? Were they the most "distant" in terms of their relationship links to the lead researcher? Were they averse to completing questionnaires on the grounds of invasion of privacy (although giving contacts' details was optional to try to alleviate this source of bias)? Or were they just not sufficiently motivated to participate and what does this say about the type of research instrument used or the selection criteria? Whatever the reasons, adopting a more direct personal approach, time permitting, may produce higher response rates and better quality data.

This research was confined to members of the 45-54 year old generation. Future research may broaden this out to all of the other generations perhaps narrowing the scope to say blogging, or using their mobile to access the internet, or usage of a specific social networking site.

Finally this research was conducted as a one pass piece of research. Given time it would be interesting to carry out a time series to see how participants' internet habits change over time as the world moves towards 2 billion plus internet users (Miniwatts Marketing Group, 2009) and try to ascertain the key causes of that change.

REFERENCES

About.com. (2009). *Chronological Timetable of Book History*. Retrieved June 20th, 2009, from Book Information Website : http://historymedren.about.com/gi/dynamic/offsite.htm?zi=1/XJ/Ya&sdn=historymedren&zu=http%3A%2F%2Fwww.xs4all.nl%2F%7Eknops%2Ftimetab.html

About.com. (2009). *The History of Computers* . Retrieved June 10th, 2009, from About.com: http://inventors.about.com/library/blcoindex.htm

Andrews, F. M., Klem, L., & Davidson, T. N. (1981). *Somers' d - One dependent ordinal variable, one two-point nominal variable.* Retrieved June 15th, 2009, from The Decision Tree for Statistics. A Guide for Selecting Statistical Techniques for Analyzing Social Science Data. Institute for Social Research, The University of Michigan.: http://www.microsiris.com/Statistical%20Decision%20Tree/somers_d2.htm

Awio Web Services LLC. . (2009). *Global Web Stats*. Retrieved August 29th, 2009, from W3 Counter: http://www.w3counter.com/globalstats.php

BBC. (2009, May 5th). *Alexander Graham Bell (1847 - 1922)*. Retrieved May 5th, 2009, from BBC Historic Figures: http://www.bbc.co.uk/history/historic_figures/bell_alexander.shtml

BBC. (2009). *The Evolution of Man*. Retrieved May 17th, 2009, from BBC: http://www.bbc.co.uk/sn/prehistoric_life/human/human_evolution/first_europeans1.shtml

Becker, L. A. (1999). *SPSS Course*. Retrieved May 19th, 2009, from University of Colorado : http://web.uccs.edu/lbecker/SPSS/content.htm

Bennett, L. (2009). *Social Work Research - Research Bias*. Retrieved June 21st, 2009, from University of Illinois: http://tigger.uic.edu/~lwbenn/jacswcourses/socw360/week14.htm

Boase, J., Horrigan, J. B., Wellman, B., & Raine, L. (2006). *The Strength of Internet Ties. The internet and email aid users in maintaining their social networks and provide pathways to help when people face big decisions.* Retrieved February 23rd , 2009, from PEW Internet & American Life Project.: http://www.pewinternet.org

Booth, C. (2009). *Sample Library / Technology Survey*. Retrieved April 5th, 2009, from Informing Innovation: http://www.ala.org/ala/mgrps/divs/acrl/publications/digital/ins-booth.pdf

Cannon, D. (1999). *SPSSx Statistical Procedures*. Retrieved July 14th, 2009, from Research Methods: http://academic.uofs.edu/department/psych/methods/stattut.html#anova-manova

Chapman, A. (2009). *National Readership Survey (NRS Ltd). Estimates of uk population by social grade*. Retrieved June 15th, 2009, from Businessballs: http://www.businessballs.com/demographicsclassifications.htm

City University of Hong Kong. (2009). *Internet Use in Hong Kong: The 2008 Annual Survey Report*. Retrieved August 10th, 2009, from HK Internet Project: http://newmedia.cityu.edu.hk/hkip/HKIP2008en.pdf

Cletheroe, J. (2005). *http://www.johncletheroe.org/usa_can/cult/lang.htm*. Retrieved July 25th, 2009, from Words, Phrases And Abbreviations With Different Meanings : http://www.johncletheroe.org/usa_can/cult/lang.htm

Cross, L. C., & Belli, G. M. (2004). Experimental Research to Inform Educational Policy. In K. deMarrais, & S. D. Lapan, *Foundations for research*. Mahwah: Lawrence Erlbaum Associates.

Dawson, C. (2002). *Practical Research Methods*. Oxford: How To Books.

Department for Business Innovation & Skills. Department of Culture Media and Sport. (2009). *Digital Britain*. London: UK Goverment. .

Department of Psychology, University of Maryland . (2009). *Guidelines: Web-based Questionaires*. Retrieved February 27th, 2009, from Online Survey Design Guide: http://lap.umd.edu/survey_design/index.html

Dohia, R. M. (2007). *Sample Size Calculations*. Retrieved February 21st, 2009, from Raven Analytics: http://www.ravenanalytics.com/articles.php

Dutton, W. H., & Helsper, E. J. (2007). *The Internet in Britain: 2007*. Retrieved February 2009, from Oxford Internet Surveys: http://www.oii.ox.ac.uk/microsites/oxis/

Dutton, W. H., Gennaro, D. D., & Hargrave, A. M. (2005). *The Internet in Britain: 2005*. Retrieved February 24th, 2009, from Oxford Internet Surveys: http://www.oii.ox.ac.uk/microsites/oxis/

Dutton, W. H., Helsper, E. J., & Gerber, M. M. (2009). *The Internet in Britain, 2009*. Oxford: Oxford Internet Institute, Oxford University.

Dutton, W. H., Helsper, E. J., & Gerber, M. M. (2009). *The Internet in Britain, 2009*. Retrieved July 25th, 2009, from Oxford University: www.oii.ox.ac.uk/research/oxis/OxIS2009_Report.pdf

Dyer, F. L., & Martin, T. C. (2006). *Edison, His Life and Inventions*. Champaign, Ill.: Project Gutenberg.

Easton, V. J., & McColl, J. H. (2004). *Statistics Glossary*. Retrieved June 18th, 2009, from University of Glasgow STEPS (STatistical Education through Problem Solving): http://www.stats.gla.ac.uk/steps/glossary/index.html

Encyclopædia Britannica Online. (2009). *Cooke and Wheatstone telegraph*. Retrieved August 16th, 2009, from Encyclopædia Britannica Online: http://www.britannica.com/EBchecked/topic/136098/Cooke-and-Wheatstone-telegraph

European Commission. (1997). *Green paper on the convergence of the Telecommunications, Media and Information Technology Sectors, and its Implications for Regulation. Towards an Information Society Approach*. Brussels: European Commission.

European Commission. (2009). *Information Society Statistics*. Retrieved August 20th, 2009, from Eurostats:

http://epp.eurostat.ec.europa.eu/portal/page/portal/information_society/data/main_tables
Field, A. (2005). *Discovering Statistics Using SPSS, 2nd edition.* London: Sage.
Griffith, A. (2007). *SPSS for dummies.* Hoboken, NJ: Wiley Publishing, Inc.
Heath, R. L., & Bryant, J. (2000). *Human Communication Theory and Research : Concepts, Contexts, and Challenges.* Mahwah: Lawrence Erlbaum Associates, Inc.
Hitwise UK Ltd. (2009). *UK Demographics & Lifestyle FAQs.* Retrieved August 20th, 2009, from Business Improvement Package : http://www.bip.rcoe.gov.uk/rce/aio/38504
Horrigan, J. (2007). *A Typology of Information and Communication Technology Users.* Retrieved August 29th, 2009, from PEW Internet & American Life Project: http://www.pewinternet.org/Reports/2007/A-Typology-of-Information-and-Communication-Technology-Users/14-Demographic-Differences-Across-Groups/1-Overview.aspx?r=1
Howitt, D., & Cramer, D. (2008). *Introduction to SPSS in Psychology, 4th Edition.* Harlow: Pearson Education Ltd.
Hutchinson, S. R. (2004). Survey Research. In K. deMarrais, & S. D. Lapan, *Foundations for Research. Methods of Inquiry in Education and Social Sciences.* Mahwah: Lawrence Erlbaum Associates.
Iglesia, C., & Torgerson, D. (2000). *Does length of questionnaire matter? A randomised trial of response rates to a mailed questionnaire.* Retrieved June 10th, 2009, from PubMed: http://www.ncbi.nlm.nih.gov/pubmed/11184958
Innovations Learning. (2009, May 5th). *Victorian Inventions - The Radio - Guglielmo Marconi* . Retrieved May 5th, 2009, from Innovations Learning: http://www.innovationslearning.co.uk/subjects/history/information/victorians/inventions/inventions/radio.htm
Johnson, B. (2001). *Toward a New Classification of Nonexperimental Quantitative Research (from Educational Researcher, Vol. 30. No. 2, pp. 3–13).* Retrieved May 27th, 2009, from aera.net: http://www.aera.net/uploadedFiles/Journals_and_Publications/Journals/Educational_Researcher/3002/AERA3002_Johnson.pdf
Jones, M., & Alony, I. (2008). *Blogs – the New Source of Data Analysis. Issues in Informing Science and Information Technology, Volume 5, 2008*. Retrieved February 25th, 2009, from http://proceedings.informingscience.org/InSITE2008/IISITv5p433-446Jones530.pdf
Jones, S., & Fox, S. (2009, February 23rd). *Generations Online in 2009. Data Memo.* Retrieved February 23rd, 2009, from PEW Internet & American Life Project: http://www.pewinternet.org/pdfs/PIP_Generations_2009.pdf
Kanengoni, N. (2005). Research Methods Presentation. *COM015 Research Methods Course Module Week 3* .
Kehoe, C., Pitkow, J., Sutton, K., & Aggarwal, G. (1999). *Results of the Graphics Visualisation and Usability Center Tenth World Wide Web User Survey.* Retrieved February 27th, 2009, from Graphics Visualisation and Usability Center: http://www.gvu.gatech.edu/user_surveys

Kennedy, T. L., Smith, A., Wells, A. T., & Wellman, B. (2008). *Networked families. Parents and spouses are using the internet and cell phones to create a "new connectedness" that builds on remote connections and shared internet experiences.* Retrieved February 24th, 2009, from PEW Internet & American Life Project: http://www.pewinternet.org/

Lapan, S. D. (2004). Evaluation Studies. In K. deMarrais, & S. D. Lapan, *Foundation for Research* (p. 235). Mahwah: Lawrence ErlBaum Associates.

Leadbeater, J. (2006). *A Guide to Using SPSS.* University of Chester.

Lehart, A. (2009). *Adult and social network web sites. Data Memo.* Retrieved March 4t, 2009, from PEW Internet & American Life Project: http://www.pewinternet.org/pdfs/PIP_Adult_social_networking_data_memo_FINAL.pdf

Marczyk, G., DeMatteo, D., & Festinger, D. (2005). *Essentials of Research Design & Methodology.* Hoboken: John Wiley & Sons, Inc.

Miniwatts Marketing Group. (2009). *Internet Growth Statistics.* Retrieved July 28th, 2009, from Internet World Stats: http://www.internetworldstats.com/emarketing.htm

Miniwatts Marketing Group. (2009, March 31st). *Internet Usage in European Union.* Retrieved August 18th, 2009, from Internet World Stats: http://www.internetworldstats.com/stats9.htm

Miniwatts Marketing Group. (2009, March 31st). *Top 20 Countries with the highest number of Internet Users.* Retrieved August 17th, 2009, from Internet World Stats: http://www.internetworldstats.com/top20.htm

Morgan, G. A., Clay, J. N., Jensen, L., & Quick, D. (2004). *SPSS for introductory statistics [electronic book] : use and interpretation.* Mahwah, N.J.: Lawrence Erlbaum.

Motulsky, H. (1995). *Intuitive Biostatistics.* Oxford University Press.

Munro, J. (1997). *Heroes of the Telegraph.* Champaign, Ill.: Project Gutenberg.

Murnan, C. A. (2006). *Expanding Communication Mechanisms: They not just emailing anymore. Pages: 267 – 272.* Retrieved March 4th, 2009, from Proceedings of the 34th Annual ACM SIGUCCS Conference on User Services.: http://portal.acm.org/citation.cfm?id=1181216.1181275

Nakash, R. A., Hutton, J. L., & Jørstad, E. C. (2006). *Maximising response to postal questionnaires – A systematic review.* Retrieved May 25th, 2009, from Warwick University: http://wrap.warwick.ac.uk/587/1/WRAP_Lamb_Maximising_Response.pdf

National Statistics. (2008, August 28th). *Educated people more likely to have Internet.* Retrieved July 26th, 2009, from Office of National Statistics: http://www.statistics.gov.uk/pdfdir/intnr0808.pdf

National Statistics. (2008, August 28th). *Internet Access 2008 - Households and Individuals.* Retrieved August 17th, 2009, from National Statistics Online: http://www.statistics.gov.uk/pdfdir/iahi0808.pdf

National Statistics. (2008). *Internet Usage in Wales - Results from the Living in Wales Survey 2007.* Retrieved August 7th, 2009, from Welsh Assembly Government:

http://wales.gov.uk/topics/statistics/headlines/social2008/hdw20081210 1/?lang=en
National Statistics. (2009, August 26th). *National Statistics Omnibus Survey - Internet Access*. Retrieved June 14th, 2009, from National Statistics Online: http://www.statistics.gov.uk/CCI/nugget.asp?ID=8
Natural History Museum. (2009). *Human origins*. Retrieved March 27th, 2009, from Natural History Museum: http://www.nhm.ac.uk/nature-online/life/human-origins/index.html
Neill, J. (2007). *Qualitative versus Quantitative Research@: Key Points in a Classic Debate*. Retrieved February 28th, 2009, from Wilderdom.com: http://wilderdom.com/reseach/QualitativeVersusQuantitativeReearch.html
Noam, E. M., Groebel, J., & Gerbarg, D. (2004). *Internet Television*. Mahwah: Lawrence Erlbaum Associates, Inc.
Office of National Statistics (UK). (2009). *Census 2001*. Retrieved June 28th, 2009, from Office of National Statistics (UK): http://www.statistics.gov.uk/census2001/pyramids/pages/uk.asp
Pallant, J. (2007). *SPSS Survival Manual, 3rd Editon*. Sydney: McGraw-Hill.
Pempek, T. A., Yermolayeva, Y. A., & Calvert, S. L. (2008). *College Students' Social Networking Experiences on Facebook*. Retrieved June 7th, 2009, from Georgetown University: http://cdmc.georgetown.edu/papers/College_Students'_Social_networking_Experiences_on_Facebook.pdf
Peng, T., & Zhu, J. (2008). "Sophistication of Internet Usage: Application of Confirmatory Factor Analysis to the Measurement of Internet Usage. *International Communication Association*. Montreal, Quebec, Canada: All Academic, Inc.
Peters, M., & Pikkemaat, B. (n.d.). *Innovation in hospitality and tourism*. Retrieved from http://books.google.co.uk/books?id=d_kWDVIEHsUC&pg=PA171&lpg=PA171&dq=internet+Likert+scale++Daily,+times+per+week,++times+per+month,+Infrequently+or+Never.+scale&source=bl&ots=xbWuWkyS1y&sig=-1wLUL99FbL5sQM9MZwBJToUurQ&hl=en&ei=qoRjSp_qIdzLjAfRt5z5Dw&sa=
Pezzullo, J. C. (2009). *Web Pages that Perform Statistical Calculations*. Retrieved June 10th, 2009, from Interactive Statistical Calculation Pages: http://statpages.org/
Pitkow, J. (1997). *The WWW User Population: Emerging Trends*. Retrieved July 19th, 2009, from GVU's WWW User Surveys: http://www.cc.gatech.edu/gvu/user_surveys/
Price, I. (2000). *Chapter 5: Analysing the Data. Part II : Inferential Statistics. Independence of Observations*. Retrieved July 10th, 2009, from University of New England: http://www.une.edu.au/WebStat/unit_materials/c5_inferential_statistics/independ_observe.html
Rayner, L. (2009). Choosing your research method. Chester.

Rowe, D. (2000). *Evolution of the Internet.* Retrieved May 5th, 2009, from University of Plymouth: http://www.tech.plym.ac.uk/see/research/CDMA/Presentations/Rowe%20Internet.pdf

Schonlau, M., Fricker, R. D., & Elliott, M. N. (2002). *Conducting Research Surveys Via E-mail and the Web.* Santa Monica: CA RAND.

Schwartz, K. L. (1997). *Step by Step Research and Writing.* Retrieved November 6th, 2005, from The Internet Public Library: http://www.ipl.org/

SPSS. (2007). SPSS 16.0 for Windows.

StatSoft, Inc. (2008). *Nonparametric Statistics.* Retrieved July 28th, 2009, from StatSoft Electronic Textbook: http://www.statsoft.com/textbook/stnonpar.html

Surveymonkey.com. (2008). *Response Rates & Surveying Techniques.* Retrieved February 23rd, 2009, from Surveymonkey.com: http://s3.amazonaws.com/SurveyMonkeyFiles/Response_Rates.pdf

Surveymonkey.com. (2008). *Smart Survey Design.* Retrieved February 22nd, 2009, from Surveymonkey.com: http://s3.amazonaws.com/SurveyMonkeyFiles/SmartSurvey.pdf

Surveymonkey.com. (2009). *Surveymonkey Home Page.* Retrieved February 28th, 2009, from Surveymonkey: http://www.surveymonkey.com/

SurveyMonkey.com. (2009). *SurveyMonkey User Manual.* Retrieved February 22nd, 2009, from SurveyMonkey.com: http://s3.amazonaws.com/SurveyMonkeyFiles/UserManual.pdf

The Heritage Community Foundation. (2009, 05 04). *Early Communications - Worldwide.* Retrieved 05 04, 2009, from Alberta Online Encyclopedia: http://www.abheritage.ca/telephone/communications/early_worldwide.html

The National Statistics Omnibus Survey. (2009). *Internet Access - Households and Individuals.* Retrieved August 17th, 2009, from National Statistics Online: http://www.statistics.gov.uk/StatBase/Product.asp?vlnk=5672

Thussu, D. K. (2000). *International Communication : Continuity and Change.* New York: Edward Arnold Ltd.

Torgerson, D., & Bland, M. (2004). *Increasing Response Rates to Postal Questionnaires.* Retrieved April 17th, 2009, from University of York, Department of Health Sciences: http://www-users.york.ac.uk/~mb55/msc/clinimet/week6/response_text.pdf

Trochim, W. M. (2006). *Correlation.* Retrieved July 17th, 2009, from Research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/statcorr.php

Trochim, W. M. (2006). *Hypothesis.* Retrieved July 7th, 2009, from Research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/hypothes.php

Trochim, W. M. (2006). *Introduction to Validity.* Retrieved July 20th, 2009, from Research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/introval.php

Trochim, W. M. (2006). *Nonprobability Sampling*. Retrieved May 12th, 2009, from research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/sampnon.php

Trochim, W. M. (2006). *Philosophy of Research - Deductive and Inductive Reasoning*. Retrieved July 12th, 2009, from Social Research Methods: http://www.socialresearchmethods.net/kb/dedind.php

Trochim, W. M. (2006). *Positivism & Post-Positivism*. Retrieved March 18th, 2009, from Research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/positvsm.php

Trochim, W. M. (2006). *Regression to the Mean*. Retrieved July 25th, 2009, from Research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/regrmean.php

Trochim, W. M. (2006). *Reliability & Validity*. Retrieved July 21st, 2009, from Research Methods Knowledge Base.: http://www.socialresearchmethods.net/kb/relandval.php

Trochim, W. M. (2006). *Statistical Power*. Retrieved July 21st, 2009, from Research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/power.php

Trochim, W. M. (2006). *Statistical Power*. Retrieved July 21st, 2009, from Research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/power.php

Trochim, W. M. (2006). *The T-Test*. Retrieved July 10th, 2009, from Research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/stat_t.php

Trochim, W. M. (2006). *Types of Relationships*. Retrieved July 9th, 2009, from Research Methods Knowledge Base: http://www.socialresearchmethods.net/kb/relation.php

Trochim, W. (2009). *Selecting Statistics*. Retrieved June 11th, 2009, from Social Research Methods - Cornell University.: http://www.socialresearchmethods.net/selstat/ssstart.htm

University of Bolton. (2008). *Creating surveys with Surveymonkey*. Retrieved February 22nd, 2009, from University of Bolton: http://www.bolton.ac.uk/AME/eLearning/eResources/SurveyMonkeyGuide.pdf

University of Chester. (2004). *A Guide to SPSS*. Chester: University of Chester.

University of Hong Kong. (2009). *The Age of Digital Convergance*. Retrieved August 14th, 2009, from The Age of Digital Convergance: http://jmsc.hku.hk/adcc/

University of Illinois. (2009). *Research Bias*. Retrieved July 9th, 2009, from Social Work Course week 14: http://tigger.uic.edu/~lwbenn/jacswcourses/socw360/week14.htm

W3Schools. (2009). *Web Statistics and Trends*. Retrieved August 21st, 2009, from W3Schools.com: http://www.w3schools.com/browsers/browsers_stats.asp

White, D. (2007). *Results and analysis of the Web 2.0 services survey*. Retrieved February 24th, 2009, from SPIRE project: http://spire.conted.ox.ac.uk/trac_images/spire/SPIRESurvey.pdf
Wikipedia. (2009). *Construct validity*. Retrieved July 21st, 2009, from Wikipedia: http://en.wikipedia.org/wiki/Construct_validity
Wikipedia. (2009, May 5th). *History of radio*. Retrieved May 5th, 2009, from Wikipedia: http://en.wikipedia.org/wiki/History_of_radio
Wikipedia. (2009, May 4th). *Invention of radio*. Retrieved May 4th, 2009, from Wikipedia: http://en.wikipedia.org/wiki/Invention_of_radio
Wikipedia. (2009, May 5th). *Phonograph*. Retrieved May 5th, 2009, from Wikipedia: http://en.wikipedia.org/wiki/Phonograph
Wikipedia. (2009, May 5th). *Samuel Morse*. Retrieved May 5th, 2009, from Wikipedia: http://en.wikipedia.org/wiki/Samuel_F.B._Morse
Wikipedia. (2009, August 18th). *Usage share of web browsers*. Retrieved August 18th, 2009, from Wikipedia: http://en.wikipedia.org/wiki/Usage_share_of_web_browsers
Zhou, L. (2004). Digital Convergence and Intellectual Property Rights in the Information Age—A Review of Major Issues. *International Communication Association*. New York: All Academin Inc.

APPENDIX 1 QUESTIONNAIRE

An investigation into internet use by 45-54 year olds. V2 print

Consent

Faculty of Applied and Health Sciences. Department of Computer Science & Information Systems, University of Chester.

Title of Research Project: An investigation into internet use by 45-54 year olds.

Name of Researcher: Keith Richardson

YOUR CONSENT:-

I confirm that I have read and understood the Participant Information contained in the invitation email (and replicated overleaf), and have had the opportunity to ask the lead researcher any questions.

◯ YES ◯ NO

I confirm that my participation is voluntary, and that I understand I am free to withdraw from participating in the study at any time, without giving any reason and without my rights being affected.

◯ YES ◯ NO

I confirm that I am aged between 45 to 54 inclusive (if you cannot confirm this, thank you, but please do not proceed further).

◯ YES ◯ NO

I have read and comply with the above Terms of Consent and I agree to take part in the study.

◯ YES ◯ NO

To indicate your consent please complete the following:-

Your Name

Your signature

Date

An investigation into internet use by 45-54 year olds. V2 print

PARTICIPANT INFORMATION

An investigation into internet use by 45-54 year olds

You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully, and discuss it with others if you wish. Ask the researcher if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

Thank you for reading this.

What is the purpose of the study?
The aim of the research is to determine why people aged between 45 and 54, use the internet.

Why have I been chosen?
To be included in this research you will need to be from that generation. This means you will need to be aged between 45 and 54 years of age.

You have been chosen because the researcher believes you are a member of that generation, and therefore meet the selection criteria. If that is not the case, please do not proceed further.

Do I have to take part?
It is up to you to decide whether or not to take part. If you decide to take part you are still free to withdraw at any time before completing and submitting the survey online, and without giving a reason. If you have submitted the survey online and decide afterwards to withdraw please email the researcher asking for your response to be removed from the database

What will happen to me if I take part?
If you decide to take part, you will be able to print this information sheet to keep. You will be asked to indicate your approval to participate in the survey by clicking the consent button on the first page of the survey form. This will record your consent. No-one will be personally identifiable in the final report.

What are the possible disadvantages and risks of taking part?
There are no disadvantages or risks foreseen in taking part in the study.
What are the possible benefits of taking part?
It will hopefully help you to think about why you are using the internet. As such, it should stimulate that most basic of human behaviours - curiosity. By taking part, you will also be contributing to the knowledge base generally.

What if something goes wrong?
If you wish to complain or have any concerns about any aspect of the way you have been approached or treated during the course of this study, please contact: Professor Sarah Andrew, Dean of the Faculty of Applied and Health Sciences, University of Chester, Parkgate Road, Chester, CH1 4BJ. Tel: 01244 513055.

Will my taking part in the study be kept confidential?
All information which is collected about you during the course of the research will be kept strictly confidential so that only the researcher carrying out the research and their Supervisor will have access to such information.

What will happen to the results of the research study?
The results will be written up into a MSc Research Dissertation and submitted as the final element leading to the award of an MSc in Information Systems. A copy will be lodged in the University Library and will be available for review by members of that library. Individuals who participate will not be identified in any subsequent report or publication.

Who is organising and funding the research?
The research is being funded by the researcher. The University of Chester will be overseeing the study.

Who may I contact for further information?
If you would like more information about the research before you decide whether or not you would be willing to take part, please contact:

Keith Richardson, [lead researcher],
c/o Department of Computer Science & Information Systems
Faculty of Applied and Health Sciences
University of Chester
Parkgate Road
Chester CH1 4BJ

Telephone: 01244 511000

An investigation into internet use by 45-54 year olds. V2 print

Tel [direct]:- 01244 332075 or 07732 864 354 or via email 0310928@chester.ac.uk

Thank you for your interest in this research.

General Questions

The purpose of these questions is to determine whether there is any relationship, across all participants, between these responses and their use of the internet :-

What is your gender?

- ◯ Male
- ◯ Female

This will be used to see if there are any significant differences between men and women's use of the internet.

Which one of the following do you think best describes your current main role?

- ◯ Employee
- ◯ Full time carer
- ◯ Student
- ◯ Unemployed
- ◯ Voluntary Sector / Charity worker
- ◯ Employer
- ◯ Housewife/Housekeeper
- ◯ Retired
- ◯ Rather not say
- ◯ Other (please state)

This will be used to see if there are any significant differences between the roles that people have and their use of the internet.

Are you professionally qualified in any of the following?

- ◯ General Management
- ◯ Teaching
- ◯ Legal
- ◯ Human Resources
- ◯ Medicine
- ◯ Science
- ◯ Computing / IT
- ◯ Social care
- ◯ None of these
- ◯ Accountancy
- ◯ Media, The Arts, Entertainment, Hospitality
- ◯ Rather not say
- ◯ Other (please state)

This will be used to see if there are any significant differences between the way various professions use of the internet.

What is your highest level of educational qualification?

- ◯ GCSE / O Level
- ◯ Degree
- ◯ Doctorate
- ◯ A Level
- ◯ Masters
- ◯ Rather not say
- ◯ Other (please specify)

This will be used to see if there are any significant differences between educational qualifications and use of the internet.

What type of area do you live in?

- ◯ Rural
- ◯ Semi-rural
- ◯ Urban

This will be used to see if there are any significant differences between the type of area people live in and their use of the internet.

An investigation into internet use by 45-54 year olds. V2 print

Where do you live?

- ◯ Cheshire
- ◯ Merseyside
- ◯ Greater Manchester
- ◯ North Wales
- ◯ Lancashire
- ◯ Cumbria
- ◯ Staffordshire
- ◯ Rest of UK
- ◯ Rather not say
- ◯ Other (please state country)

This will be used to see if there are any significant differences between the county/country people live in and their use of the internet.

What type of household do you live in?

- ◯ Married or living with partner - no children or dependants in household
- ◯ Married or living with partner - children or dependants in household
- ◯ Single - children or dependents in household
- ◯ Single - no children or dependants in household
- ◯ Rather not say
- ◯ Other (please state)

This will be used to see if there are any significant differences between the type of household people live in and their use of the internet.

Uses of the internet

Data collected will be used to determine if there are any significant differences between reasons for use, frequency of use and other data items such as gender, type of household people live in, where they live, etc.

(Note "For other domestic purposes" includes, for example, online banking, shopping, information searching and retrieval).

How often do you use a PC / Lap top / Apple Mac to access the internet for each of the following purposes?

	Daily	2-3 times per week	2-3 times a month	Infrequently - less than monthly	Never
To keep in touch (socialise) with friends and family?	◯	◯	◯	◯	◯
For work?	◯	◯	◯	◯	◯
For other domestic purposes?	◯	◯	◯	◯	◯
For educational study purposes?	◯	◯	◯	◯	◯

How often do you use your MOBILE PHONE to access the INTERNET for each of the following purposes?

	Daily	2-3 times per week	2-3 times a month	Infrequently - less than monthly	Never
To keep in touch (socialise) with friends and family?	◯	◯	◯	◯	◯
For work?	◯	◯	◯	◯	◯
For other domestic purposes?	◯	◯	◯	◯	◯
For educational study purposes?	◯	◯	◯	◯	◯

For example: to browse web sites and access email. Please note - does NOT include sending and receiving voice calls, text messages or picture messages.

An investigation into internet use by 45-54 year olds. V2 print

How often do you use your web browser for each of the following purposes?

	Daily	2-3 times per week	2-3 times a month	Infrequently - less than monthly	Never
To keep in touch (socialise) with friends and family?	○	○	○	○	○
For work?	○	○	○	○	○
For other domestic purposes?	○	○	○	○	○
For educational study purposes?	○	○	○	○	○

Types of web browser include Microsoft Internet Explorer, Netscape Navigator, Mozilla Firefox, Opera, Mosaic, Apple Safari, Google Chrome, AOL Explorer.

How often do you use email for each of the following purposes?

	Daily	2-3 times per week	2-3 times a month	Infrequently - less than monthly	Never
To keep in touch (socialise) with friends and family?	○	○	○	○	○
For work?	○	○	○	○	○
For other domestic purposes?	○	○	○	○	○
For educational study purposes?	○	○	○	○	○

Examples include - Microsoft Outlook Express, Microsoft Outlook, Eudora, Yahoo Mail, Googlemail, Hotmail

How often do you use instant messaging for each of the following purposes?

	Daily	2-3 times per week	2-3 times a month	Infrequently - less than monthly	Never
To keep in touch (socialise) with friends and family?	○	○	○	○	○
For work?	○	○	○	○	○
For other domestic purposes?	○	○	○	○	○
For educational study purposes?	○	○	○	○	○

Examples include - MSN Messenger, Yahoo Messenger, AIM, Meebo.

How often do you use Social Networking Sites for the following purposes?

	Daily	2-3 times per week	Weekly 2-3 times a month	Infrequently - less than monthly	Never
To keep in touch (socialise) with friends and family?	○	○	○	○	○
For work?	○	○	○	○	○
For other domestic purposes?	○	○	○	○	○
For educational study purposes?	○	○	○	○	○

Examples include - MySpace, Facebook, LinkedIn.com, Yahoo Groups, Youtube, Online dating sites, GenesReunited, Ancestry, Geneology.com, FriendsReunited, Bebo.

An investigation into internet use by 45-54 year olds. V2 print

How often do you Blog for the following purposes?

	Daily	2-3 times per week	Weekly 2-3 times a month	Infrequently - less than monthly	Never
To keep in touch (socialise) with friends and family?	◯	◯	◯	◯	◯
For work?	◯	◯	◯	◯	◯
For other domestic purposes?	◯	◯	◯	◯	◯
For educational study purposes?	◯	◯	◯	◯	◯

Examples -

Blog hosting services include - Twittar, Blogger (Google), Technorati.
Blog search engines include - Bloglines, BlogScope, Technorati.

General Comments

Thank you for completing this questionnaire.

It may prove useful to contact a small number of participants by phone or email. Are you happy to assist if needed to clarify any points arising?

◯ Yes that's fine, if you need to, please contact me to clarify any points as needed.

◯ No thanks. No offence, but I've filled the survey in and I would like to leave it at that.

Your contact details (OPTIONAL)

Email address

Telephone number

Return Address for completed questionnaires

Keith Richardson

Tel [direct]:-

My contact email addresses:

APPENDIX 2 PARTICIPANT INVITATION EMAIL

The participants, who were invited to complete the questionnaire via email, fell into the following groups:-

- Friends, colleagues and family members known to the lead researcher and known to be in the correct 45-54 age group. Their contact details obtained from home email address books. They were from both genders and from a range of social and professional backgrounds, mainly living in the North West of England, with a small number from overseas countries (Commonwealth and USA);

- Those known to the lead researcher whose age was not accurately known but appeared to be in the correct age range of 45-54. The email emphasised the need to be within the required age 45-54 age range. In some cases those that fell slightly below the age of 45 responded in a rather hurt fashion to being asked to participate, despite the careful wording, and some of those slightly over 54 were delighted that they had been asked at all, but declined to participate, or offered to do so but were politely declined. . Given the nature of the business the lead researcher is in (ICT consultancy across a wide range of National Health Service (NHS) clients and ICT suppliers) those invited from within this category tended to be employed by the NHS) or were suppliers of ICT services to the NHS;

- Those previously attending the same educational establishments as the lead researcher and so were known to be in the correct age range. They were contacted using email via the Friends Reunited social networking web site where they had all registered their details. The lead researcher

was registered with Friends Reunited. These establishments included schools and colleges attended by the lead researcher;

- Finally a small number were invited to participate who were members of the Friends Reunited Over 40's and over 50's Groups.

Text of the email as issued was as follows:-

From: Keith Richardson [0310928@chester.ac.uk]
Sent: dd/mm/yyyy
To: [email address]
Subject: "An investigation into internet use by 45-54 year olds"

This is about a totally different topic from the one you would normally see emails from me about. I am hoping you can help me by completing a short questionnaire. I am currently carrying out a research study at the University of Chester as the final module of an MSc Information Systems (which I am studying for as a part time, evening course). The aim of the research is to determine why people **aged between 45 and 54 inclusive**, use the internet. As you fall within that age group I have attached a copy of the questionnaire for you to complete and return if you wish. My postal address is given at the end of the email. I have also included a link to the same questionnaire online below: if you would like to complete it that way-

LINK TO QUESTIONNAIRE – CLICK ON LINK BELOW TO PROCEED

http://www.surveymonkey.com/s.aspx?sm=6OP

When you click on the above link it will take you to a web site hosted by Surveymonkey (who specialise in hosting similar questionnaires).

If you know of other friends, family or colleagues who might be willing to participate, or know of people aged between 45 and 54 inclusive, feel free to forward this email to them.

Before you decide to complete the questionnaire, it is important that you understand why the research is being done and what it will involve. This is more fully explained in the **Participant Information** section below. When you open the attached questionnaire you will see the Consent section. If you complete the online version you record your consent by clicking on the appropriate places on the screen (a "yes" button) you will then be able to complete the questionnaire itself. If you complete the questionnaire on paper please sign it to indicate consent. Completing the questionnaire typically takes about 4 minutes.

I can assure you that no-one will be personally identifiable in the final report and you have an option to remain anonymous when submitting your response if you so wish.

PARTICIPANT INFORMATION

Faculty of Applied and Health Sciences. Department of Computer Science & Information Systems, University of Chester.

Title of Research Project: "“An investigation into internet use by 45-54 year olds”

Name of Lead Researcher: Keith Richardson

You are being invited to take part in a research study. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully, and discuss it with others if you wish. Ask the researcher if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

What is the purpose of the study? - The aim is to determine why people aged between 45 and 54 inclusive use the internet.

Why have I been chosen? - To be included in this research you will need to be from that generation. This means you will need to be aged between 45 and 54 years of age inclusive. You have been chosen because the researcher believes you are a member of that generation, and therefore meet the selection criteria. If that is not the case, please do not proceed further.

Do I have to take part? - It is up to you to decide whether or not to take part. If you decide to take part you are still free to withdraw at any time before completing and submitting the survey online, and without giving a reason. If you have submitted the survey online and decide afterwards to withdraw please email the researcher asking for your response to be removed from the database.

What will happen to me if I take part? - If you decide to take part, you will be able to print this information sheet to keep. You will be asked to indicate your approval to participate in the survey by clicking the consent button on the first page of the survey form. This will record your consent. If you complete the questionnaire on paper please sign it to indicate consent. No-one will be personally identifiable in the final report.

What are the possible disadvantages and risks of taking part? - There are no disadvantages or risks foreseen in taking part in the study.

What are the possible benefits of taking part? - It will hopefully help you to think about why you are using the internet. As such, it should stimulate that most basic of human behaviours - curiosity. By taking part, you will also be contributing to the knowledge base generally.

What if something goes wrong? - If you wish to complain or have any concerns about any aspect of the way you have been approached or treated during the course of this study, please contact: Professor Sarah Andrew, Dean of the Faculty of Applied and Health Sciences, University of Chester, Parkgate Road, Chester, CH1 4BJ. Tel: 01244 513055.

Will my taking part in the study be kept confidential? - All information which is collected about you during the course of the research will be kept strictly confidential so that only the researcher carrying out the research and their Supervisor will have access to such information.

What will happen to the results of the research study? - The results will be written up into a MSc Research Dissertation and submitted as the final element leading to the award of an MSc in Information Systems. A copy will be lodged in the University Library and will be available for review by members of that library. Individuals who participate will not be identified in any subsequent report or publication.

Who is organising and funding the research? - The research is being funded by the researcher. The University of Chester will be overseeing the study.

Please note that the questionnaire will be available for completion from now and mid-May 2009. This is to ensure that there will be sufficient time available to analyse the results and meet the submission deadline for this module. Many thanks.

If you have any questions please call or email me.

Regards

Keith Richardson, [lead researcher],
c/o Department of Computer Science & Information Systems
Faculty of Applied and Health Sciences, University of Chester, Parkgate Road, Chester CH1 4BJ

Web Site -
http://www.chester.ac.uk/postgraduate/information_systems.html
My University email address: 0310928@chester.ac.uk
Tel [direct]:- 01244 9999999

UNIVERSITY OF CHESTER

APPENDICES 3 & 4

CD Copy

"An investigation into internet use by 45-54 year olds"
by Keith Richardson

Supervisor: Dr Linda Rayner,. Department of Computer Science & Information Systems, Faculty of Applied and Health Sciences

Part of a dissertation submitted in partial
fulfilment of the requirements for the
degree of Master of Science

2009

APPENDIX 3 & 4 TABLE OF CONTENT

LIST OF ILLUSTRATIONS

LIST OF TABLES

APPENDIX 3 METHODOLOGY

3.1. Hypothesis Formulation

In this research there was a need to formulate two hypotheses, (Trochim W. M., 2006):-

- A null hypothesis (Ho), stating that there was no relationship between specified independent and dependent variables; and
- An alternative hypothesis (H1) that states that there was a relationship.

The null hypothesis needed to be mutually exclusive of the alternative hypothesis and incorporate all possible alternative outcomes (Trochim W. M., 2006). So in this case the alternative hypothesis was that "45-54 year olds use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities".

Therefore the null hypothesis was the opposite of the alternative hypothesis that: "45-54 year olds do not use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities".

The alternative hypothesis could be accepted, if, or when, the null hypothesis was rejected. It is the null hypothesis that was being tested. So the outcome of a hypothesis test is (Easton & McColl, 2004):-

- "Reject the null hypothesis (H0) in favour of alternative hypothesis (H1)" ;or
- "Do not reject the null hypothesis (H0)"

This was a one-tailed hypothesis because it specified a direction ("more frequently"). If it used the word "differently", instead of "more frequently", it would have been a two tailed hypothesis, because that would not have said more of less, just differently, not stating which direction that was (Trochim W. M., 2006).

A relationship seeks to define the degree of correspondence between two variables (Trochim W. M., 2006). Within the context of this research the following types of relationship between variables were assessed:-

- No visible relationship at all. The value of one variable gives no clues as to what the value of the other would be. There is no link;
- Correlation relationship, where two variables perform in a synchronised manner. If the high values from one variable are associated with high from the other, or low from one, with low from the other, then this is a positive relationship. If they move in opposing directions this is a negative relationship (or inverse relationship). There are also curvilinear relationships where one may be positive for a while and then switch to negative, e.g. increasing a drug dose may alleviate an illness but there may come a tipping point where the dose actually begins to make a patient more ill (Trochim W. M., 2006). One may not cause the other. There might be a third variable that is causing both to change. So it is not possible to assume that the relationship is always causal. ; and
- A causal relationship where one variable does in fact cause changes in the value of the variable of the other.

3.2. Methodology Selection

Ways of collecting data using qualitative research methodologies include participant observation, interviews and questionnaires, review of documents and other texts, and impressions and reactions gathered by the researcher themselves. Typically there are usually fewer people that take part in this type of research, but the contact with them tends to last a lot longer (Dawson, 2002).

Quantitative research on the other hand involves studies that make use of statistical analyses to obtain their findings. Key features can include formal and systematic measurement and the use of statistics (Marczyk, DeMatteo, & Festinger, 2005).

The main characteristics of each, as they apply to the topic under test here, were evaluated and compared to determine which methodology was more appropriate, within the context of the hypothesis being tested.

Further considerations regarding the choice between quantitative and qualitative research can also be made on the basis of the strength of the design's experimental control (Marczyk, DeMatteo, & Festinger, 2005). They suggest a series of checks or tests as shown below:-

- First, a check was made to see if the design would involve random assignment of participants to different experimental conditions. If random assignment was to be used, then research of this nature would normally be considered to be truly quantitative (experimental) in design. In this case participants were effectively assigning themselves to different

groups based on their gender, role, level of education, profession etc. Therefore this was not random and so this test was not met;

- Secondly, as the above did not apply, a further check was carried out to determine whether the design used either multiple groups, or multiple waves of measurement. If the answer was yes, the design would usually be considered to be quasi-experimental and if no, the design would be normally be considered non-experimental.

On the basis of this second check it was also concluded that the hypothesis would be better tested using non-quantitative research methodologies because:-

- There was no need to use random assignment to different experimental condition to test the hypothesis;

- Only one group of participants (45-54 years olds) was being used with on wave of measurement. The design would need to ensure that participants from a known population were "self" assigned to multiple groups based on their independent variable characteristics (to see whether those would cause any changes in the dependent variables).

A third check was carried out to determine whether quantitative or qualitative research would be better. This also concluded that the hypothesis would be better tested using quantitative research (quasi-experimental) methodologies. The reasons for drawing this conclusion are shown in the table below (Neill, 2007):-

1. Comparison of Qualitative & Quantitative Research Characteristics

Qualitative Research	Quantitative Research	Qualitative	Quantitative	Comparison against the 45-54 year old internet use Hypothesis
The aim is a complete, detailed description.	The aim is to classify features, count them, and construct statistical models in an attempt to explain what is observed.	No	Yes	On these criteria the research will need to be quantitative. This is because, to test the hypothesis, there is a need classify the data collected to correspond to the different ways 45-54 year olds use the internet (socialise, domestic purposes, educational and work related activities). Then there was also a need to count "frequency of use" to determine whether the data supports the hypothesis or not.
Researcher may only know roughly in advance what he/she is looking for.	Researcher knows clearly in advance what he/she is looking for.	No	Yes	The aim of this research was clearly stated in the hypothesis, so it was known clearly in advance what was being looking for. So again on this criteria the research was classified as quantitative.
Recommended during earlier phases of research projects.	Recommended during latter phases of research projects.	No	Yes	The research is being conducted end to end ion one go as one project.
The design emerges as the study unfolds.	All aspects of the study are carefully designed before data is collected.	No	Yes	In order to be as certain as possible that the data collected will address the hypothesis it was necessary to ensure that the design was in place before the data collection commenced.
Researcher is the data gathering instrument.	Researcher uses tools, such as questionnaires or equipment to collect numerical data.	No	Yes	As will be shown in a latter section the approach taken was to gather data from the 45-54 year old age group using a questionnaire to collect the numerical data needed to measure frequency of use.
Data is in the form of words, pictures or objects.	Data is in the form of numbers and statistics.	No	Yes	In order to test the hypothesis the data collected needed to be expressed as numbers (although the respondents did have limited opportunities to note a small number of explanatory comments down for a limited number of questions).
Subjective - individuals' interpretation of events is important ,e.g., uses participant observation, in-depth interviews etc.	Objective – seeks precise measurement & analysis of target concepts, e.g., uses surveys, questionnaires etc.	No	Yes	Again, as above, in order to test the hypothesis the data collected needed to be expressed as numbers
Qualitative data is more 'rich', time consuming, and less able to be generalized.	Quantitative data is more efficient, able to test hypotheses, but may miss contextual detail.	No	Yes	Time was a key consideration during this assignment given that the research had to be completed by an immovable date. Therefore structuring the research in such a way that set times were allocated for different activities meant that the chances of reaching a firm conclusion on the validity of hypothesis or otherwise was increased by taking a quantitative based approach.
Researcher tends to become subjectively immersed in the subject matter.	Researcher tends to remain objectively separated from the subject matter.	No	Yes	The lead researcher was not aware of any preconceived notions as to what the end conclusions would be at the start of the research aware as they were from literature reviews that the pace of change in internet usage was increasing and fluid.

All of the above checks resulted in a selection of quantitative research methodologies.

3.3. Response rates by type of instrument

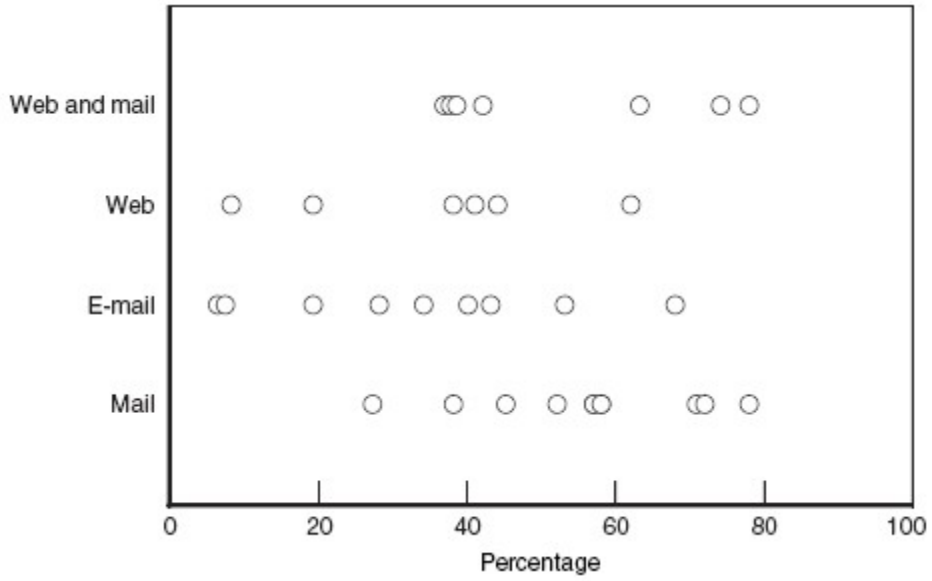
The following shows different response rates by type of instrument: (Hutchinson, 2004) -

2. Response Rates by Instrument Type

Type	Response rates	Advantages	Disadvantages
Face-to-face:	80-85%	High response rate. Opportunity to obtain in-depth understanding through clarification – useful for qualitative research	Large commitment –money, planning, time and resources. Manual data capture and input by researcher
Phone	80%	Similar to above and lie the above have the opportunity to clarify accuracy of responses to questions posed.	Not as a large a commitment but still significant in all of the both aspects. Manual data capture and input by researcher
Postal:	50% - 70%	Good response rate. Possibility of electronic reading of returns.	More difficult than above to be sure those participants that respond are the same as issued. Costs of postage and administration high. Manual data capture and input by researcher.
Email:	40% - 60%	Reasonable response rate. No issuing costs – low money, time and resources required. Possibility of electronic reading of returns.	Less difficult to be sure those participants that respond are the same as issued as they should be returned by email address of recipient or posted back in their name
Online:	30%	Low cost. Automatic data capture by online service with download capability for import into statistical analysis system.	Need access to online service – will cost money. Need to be able to set up online survey – need technical expertise to do so. Poor response rate

The above findings were similar to those reported by (Schonlau, Fricker, & Elliott, 2002) in a literature review they carried out:-

3. Response Rates for Internet Surveys in the Literature, by Survey Mode



Response rate considerations gleaned from previous studies were as follows (Torgerson & Bland, 2004) (Nakash, Hutton, & Jørstad, 2006) (Iglesia & Torgerson, 2000):-

- Questionnaire length has an influence with long ones decreasing response rate. A single page questionnaire will produce a response rate of 67% compared with 50% for a 3 page questionnaire. Questionnaire response rates were as follows:-
    - Short (4 pages) 48.9%;
    - Medium (5 pages) 48.7%;
    - Long (7 pages) 40.5%;
- Offering an incentive (as opposed to not offering one) has also been found to be a factor influencing response rates. Promising to be entered

into a lottery or being given a payment for completing the questionnaire also had an effect pa (Roberts *et al.* 2000)

  - Payment 67.6%. No payment 56.1%
  - Lottery 58.6%. No lottery 53.7%

- Other response enhancing factors included:-
  - Questionnaire design (layout, interesting, user friendly);
  - University sponsorship;
  - Pre-contact and follow up for non-responders by telephone.

3.4. Independence of Observations

"Observations" refers to the data collected from the participants via the questionnaire. There are two ways of considering independence of observations (Price, 2000):-

- Firstly, in terms of how frequently the participants were measured (in this case that meant, were the participants asked to complete the same questionnaire more than once?):- :
  - if once only, this meant that this research was following a "between" or "independent" groups design;
  - if several times this meant that this research was following a "within" or "repeated measures" design;
- Secondly, in terms of the independence of observations within any particular group.

On the first point participants were asked to complete the questionnaire once only, so this was an "independent" groups design (by deliberate choice). There

simply wasn't the time to ask them to complete the questionnaire again, after a period of time had elapsed say, to see if there had been any significant shifts in internet usage.

On the second point, independence of observations within any particular group, as far as can be known the risk to validity of the data from accidentally including the same subject several times and capturing the same questionnaire data into Surveymonkey more than once were controlled as much as could reasonably be done by:-

- Initially inviting specific known persons to participate, whilst recognising that they may forward the invitation onto others not directly known by the lead researcher;

- maintaining careful lists of invitation emails as they were issued, not just to record the number sent and who to, but also to avoid the same email being sent to the same person more than once;

Capturing the same questionnaire data into Surveymonkey more than once was controlled in two ways:-

- Those questionnaires returned in paper form, were input into Surveymonkey by the lead researcher and no-one else, marked up as having been input and a brief comment was added into the last comments section to state that they were captured from paper copies. The dataset as a whole was then examined at the end of the process as a cross-check. No duplicates were seen. Where the participant had left an email address a brief email was sent to them thanking them for completing the questionnaire (or via a phone call). This was a fail safe device to protect validity, because, if they had not completed a

questionnaire, they would hopefully have sent a message back querying that. No such messages were received;

- For those questionnaires input directly by the participants into Surveymonkey themselves via the internet the Surveymonkey system itself has a built in feature that captured unique IP addresses for each participant's computer. This safeguard worked well for participants who completed the questionnaire at home, coupled to names, if added, (indicating, say, man and wife), but less well for corporate returns where an organisation may well have one outward facing IP address. In the latter case their data was checked to see if the name of the person had been left more than once. There were none of these in the dataset. Therefore unless participants deliberately set out to deceive, and it is unclear what their motivation would be to do that, it is reasonable to conclude that the dataset was as clean as could be expected.

- The emails were issued to named persons on an individual basis. This was to avoid accidentally including the same person several times

Finally there was no evidence that those that were invited to participate in the study colluded with each other in terms that affected the responses they gave. If they were aware that others they knew had been invited to participate there is no evidence that this influenced their answers to the questions that were posed.

If the observations were not independent, as described above, then this increases the chances of making a:-

- Type I error (also known as α error, or false positive error of the first kind) when the null hypothesis H0, is rejected when it is in fact true, and

- Type II error (also known as β error, or a false negative, or an error of the second kind) when the null hypothesis H0, is not rejected when it is in fact false.

The level of significance of a statistical hypothesis test is a fixed probability of wrongly rejecting the null hypothesis H0, if it is in fact true due to a Type I error. Usually, the significance level is chosen to be 0.05 (or equivalently, 5%). The following table gives a summary of possible results of any hypothesis test (Easton & McColl, 2004):

4. Type I and Type II Errors

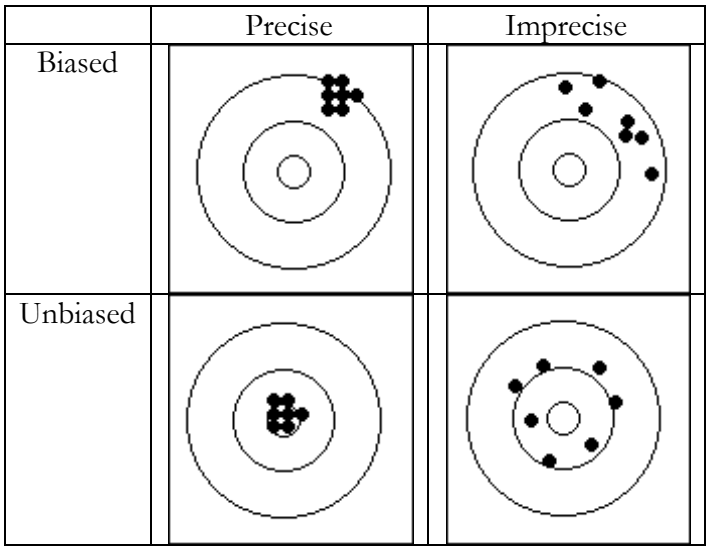
		Decision	
		Reject H0	**Don't reject H0**
Truth	**H0** null hypothesis	Type I Error	Right decision
	H1 Alternate Hypothesis	Right decision	Type II Error

A Type II error can be due to sample sizes being too small

3.5. Bias

The following illustrates bias and precision, where the target value is the bullseye: (Easton & McColl, 2004):

1. ILLUSTRATION OF BIAS AND PRECISION



"Type III" error or problem bias.

As participants were selected from, or via, contacts known to the lead researcher, or were fellow ex-pupils of educational establishments attended by the lead researcher, a check was made to determine how representative a sample this was compared to the 45-54 age group population as a whole. To do this a UK population profile and population "social grade" classification was selected as shown the table below (Chapman, 2009)

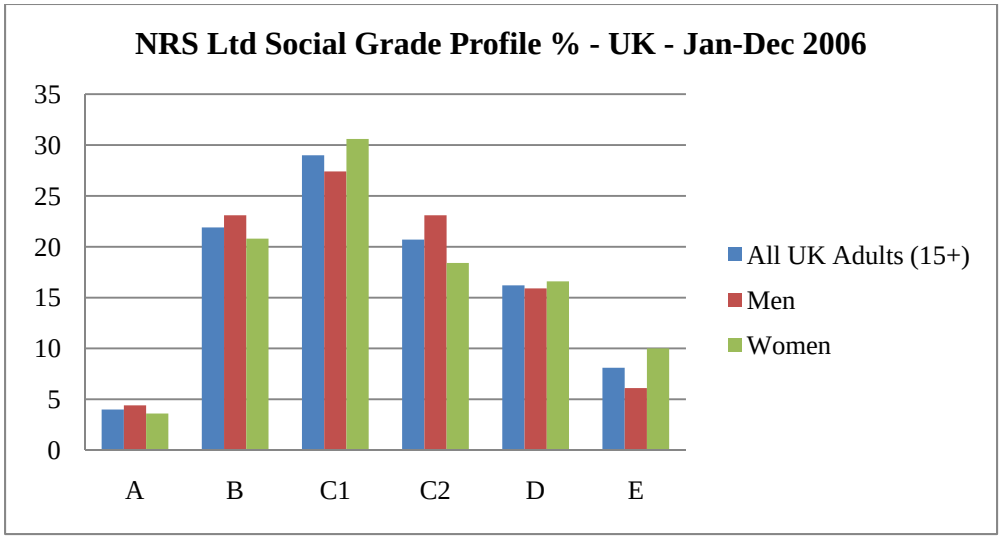
5. NRS estimates of UK population

Social Grade			Total	Men	Women
		Estimated 000s	48,186	23,378	24,808
		% profile	100	100	100
A	Upper Middle Class - Higher managerial, administrative or professional	**Estimated 000s**	1,932	1,032	900
		% profile	4.0	4.4	3.6
B	Middle Class - Intermediate managerial, administrative or professional	**Estimated 000s**	10,573	5,404	5,169
		% profile	21.9	23.1	20.8
C1	Lower Middle Class - Supervisory or clerical and junior managerial, administrative or professional	**Estimated 000s**	13,982	6,400	7,581
		% profile	29.0	27.4	30.6
C2	Skilled Working Class - Skilled manual workers	**Estimated 000s**	9,964	5,395	4,570
		% profile	20.7	23.1	18.4
D	Working Class - Semi and unskilled manual workers	**Estimated 000s**	7,819	3,712	4,107
		% profile	16.2	15.9	16.6
E	Those at the lowest levels of subsistence - Entirely dependent on state for long-term income	**Estimated 000s**	3,916	1,435	2,481
		% profile	8.1	6.1	10.0

Source: National Readership Survey, (Adults 15+), by social grade (Jan-Dec 2006) With acknowledgments to NRS Ltd. Reproduced with permission.

When represented graphically the above looks like the following

2. UK "SOCIAL GRADE" PROFILE



Looking at the 2001 Census data for the UK (Office of National Statistics (UK), 2009) it can be seen that the 45-54 year old age group in th UK only makes up 13.2% of the population:-

6. UK 2001 Census - UK population

Age Range	Total	%
0-15	11104852	18.9%
15-24	7209766	12.3%
25-34	8360547	14.2%
35-44	8777390	14.9%
45-54	**7776562**	**13.2%**
55-64	6219078	10.6%
65-74	4936258	8.4%
75-84	3280680	5.6%
85 and over	1124061	1.9%
Totals	58789194	100.0%

3.6. Validity

3.6.1. CONCLUSION VALIDITY

Conclusion validity is also known as 'statistical' validity and 'statistical' conclusion validity (Marczyk, DeMatteo, & Festinger, 2005). This relates to the degree to which conclusions reached about relationships between variables, based on data collected, are reasonable,, credible or believable. Two types of threats to conclusion validity are possible, the first would be concluding that there is a relationship when there isn't, and the second would be the opposite that, that there is no relationship when there is (like "missing the needle in the haystack" (Trochim W. M., 2006)).

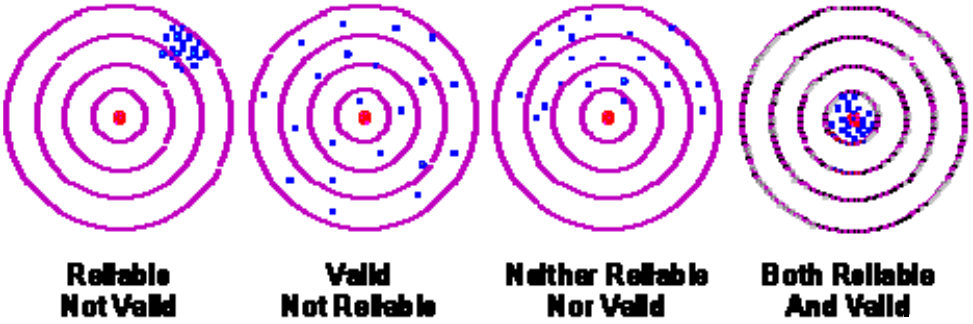
Two threats to conclusion validity were considered, the first was concluding that there was a relationship say between gender and frequency of internet use,

when there wasn't, and the second as the opposite that, that there was no relationship when there was (Trochim W. M., 2006).

Similarly, if this study concluded, say, that there was a relationship, and that it was positive, between education and work & educational internet use, then it would be reasonable to conclude that it is likely that the more education participants had, the more frequently the internet would be used by other with similar educational qualifications for that purpose. The question would be, was this conclusion credible or believable (valid and reliable)? This is a statistical inference issue in that there is either a relationship between variables or there isn't. There may appear to be a relationship because they both move in the same direction, or in opposite directions, but there might be some other causal relationship.

One of the threats to conclusion validity that was considered was low reliability of measures **(**the quality of the responses to the questions posed). If, say, the questions were not phrased, or constructed, in a way that reliably produced the sought after data then the validity of the conclusions drawn would be in question. In this example illustration below it is possible to visualise the relationship between reliability and validity, with the centre of the target as the concept that is being measured, in this case internet usage (Trochim W. M., 2006):-

3. RELATIONSHIP BETWEEN RELIABILITY AND VALIDITY



As an example to illustrate the above one of the research questions used on the questionnaire sought to find an answer as to whether there was a correlation (relationship) between education and internet usage, and if there was, was it a positive or negative correlation.

The first target on the left shows that the questions posed to collect data on either educational qualifications and, or, internet usage produced consistent answers, but these were consistently and systematically measuring the wrong values for all participants (because the participants read the question consistently differently from the way intended due to say ambiguity in wording, inappropriate use of jargon). This measure is reliable, but not valid (that is, it's consistent, but wrong) (Trochim W. M., 2006).

The second target shows quite a spread, but the answer on average is valid for the group (but poor for individuals and therefore inconsistent). Here reliability is directly related to the variability of the data. In this case this might have happened if the questions on internet usage were less precise. So instead of "Daily", 2-3 times a week" etc the measure was "very frequently" frequently" etc. One persons interpretation of frequently may be very different from another.

The third target illustrates a scenario where the measures are neither reliable nor valid, never hitting the target at all.

Finally on the firth target the measure is both reliable and valid and is ideal from a research point of view.

3.6.2. INTERNAL VALIDITY

Internal validity picks up where conclusion validity ends, because it asks if there is a relationship between an independent variable and a dependent variable, is the relationship a causal one (Trochim W. M., 2006). For example a conclusion might be drawn that there is a positive correlation (relationship) between education and frequency of internet usage. However this might not be caused education but by something else that might not even be measured at all, such as social grade or wealth (this is not hinting or indicating that this is the case, just using this to illustrate the point). In other words it refers to "the ability of a research design to rule out or make implausible alternative explanations of the results, or plausible rival hypotheses" (Marczyk, DeMatteo, & Festinger, 2005).

There are threats to internal validity that need to be recognized. For example a major anxiety-provoking catastrophic national event may have an effect on the frequency of some to access the internet. Supposing the data collection phase of this research coincided with a Swine Influenza epidemic where a primary source of news and information was government advice posted on the internet. As a result some participant's frequency of internet usage may surge above typical historical levels. Other examples could be coinciding the data collection phase with other major events such as a General Election, the Football World Cup or Cricket Tests. In this case the data collection phase did not coincide

with any known major anxiety-provoking catastrophic national events as far as the lead researcher is aware.

Another threat to internal validity is inappropriate measurement (in this case whether the approach used to measure internet usage actually did measure that). In this case previous similar studies were used to develop an instrument from to try to ensure than it was reliable and valid (Dutton & Helsper, 2007) (Dutton, Gennaro, & Hargrave, 2005).

Statistical Regression can also be a threat to internal validity (Marczyk, DeMatteo, & Festinger, 2005). This can also be referred to as the "regression artefact" or "regression to the mean" (Trochim W. M., 2006). This is usually associated with research based on more than one data collection stage (pre and post-test). If say a sub-group of this sample frame were selected for being, say, in the "25% low internet usage group", and then the same people were tested again in a few months, there is no guarantee that they should still be in the same group. Some may have significantly increased their usage of the internet, having had their curiosity about social networking and blogging excited by being asked about it in the questionnaire. Therefore the mean usage of the group would be closer to (regress towards) the population mean as a result. This does not apply in this case because the data was collected once only.

3.6.3. CONSTRUCT VALIDITY

A construct is an "ideal object", that only exists in the mind, as in a person has had to think of it to bring it into existence. Examples include concepts, theories, ideologies and classifications. As opposed to a real objects like a man,

a car, a PC, a mobile phone, a box of chocolates or a biscuit. If a correlation is found between an independent variable, such as, say, gender, and a dependent variable, such as using the internet to socialise, in several research studies, when measured using the same or similar instruments, then that provides a body of evidence that suggests that the construct is valid (Wikipedia, 2009). Construct validity starts from where internal validity ends and assumes that there a relationship and that relationship is causal (Trochim W. M., 2006). This can be defined as " the congruence between the study's results and the theoretical underpinnings guiding the research" and "whether the theory supported by the findings provides the best available explanation of the results" (Marczyk, DeMatteo, & Festinger, 2005). In this context this means does the scale of measurement designed to measure frequency of internet use, for this, or that purpose, actually do that in a way that allows the hypothesis to be tested correctly.

3.6.4. EXTERNAL VALIDITY

External validity relates to "the degree to which research results generalize to other conditions, participants, times, and places" (Marczyk, DeMatteo, & Festinger, 2005). This is similar to "temporal validity" where the results of a study can be generalized across time as a result of other cycles, seasons, changes in cost of participation or inventions (such as in this case the introduction of low cost, always on broadband as a replacement for dial up connections). External validity can be threatened by sample characteristic. In this case a sample of convenience was used to gather the data. Therefore the findings from the data collected should be applied to the wider population with much caution.

External validity can also be threatened by the very fact that participants know they are taking part by actually changing on their attitudes and behaviour whilst

doing so (Marczyk, DeMatteo, & Festinger, 2005). This is more an issue with research that takes place over a periods of time as opposed to this type of one off data collection project

What might be more relevant here is a threat to external validity known as Reactivity of Assessment. This threat might occur is participants alter their responses to the questions posed from what they should have been. A proportion of participants might feel uncomfortable or self-conscious about what they perceive as their very low or high levels of internet usage and so deliberately over or under record their frequency of internet use (it is unknown whether this occurred as no separate verification checks were made).

Using a questionnaire based approach (described in a later section) was based on an assumption (or hope) that the participants would answer the questions truthfully and that they therefore reflected the "world" of those that responded) at a point in time (Hutchinson, 2004). There is also an implicit assumption that each participants understands the questions in the same way, i.e. that their meaning is the same to all and to not reflect differences in interpretation. This might be caused by time pressures, cultural differences, political views, social taboos, ambiguous wording, their level of interest in the internet, or simply the participant's attitude towards research generally, their willingness to help others, and their level of intelligence. All of these can compromise the validity of answers given by the participants and could lead to invalid conclusions. Attempts were made to address this via what was hopefully a well constructed and comprehensive explanatory participant information sheet (email) and logically laid out questionnaire, avoidance of overly complicated questions and added explanatory texts for the questions, where this was deemed to be helpful.

3.7. Question Types & Variable Classifications

3.7.1. REASONS FOR CLASSIFICATION OF VARIABLES

The type of questions asked in a study (and therefore the type of variable behind those) can have a major influence on the types of statistical tests used when analysing the data (Morgan, Clay, Jensen, & Quick, 2004) (SPSS, 2007). This is because they are key to determining:-

- the nature of the relationships between those variables;
- whether there are any significant relationships; and
- whether they co-vary, or not

3.7.2. "INDEPENDENT" OR "DEPENDENT" VARIABLES

Firstly, variables were classified by whether they were collecting data relating to "independent" or "dependent" variables. In this case :-

- Independent variables were those within the "General Questions" section of the Questionnaire, which asked, for example, about each respondent's "pre-existing attributes or their ongoing environment" (Morgan, Clay, Jensen, & Quick, 2004), such as gender, professional qualifications, main role etc;
- Dependent variables were those that fell within the "Uses of the Internet" section of questions, which ask about the types of tools respondents used to access the internet and the frequency and reasons for doing so;

3.7.3. NOMINAL, ORDINAL OR SCALE VARIABLES

Secondly, variables were classified by whether they were nominal, ordinal or scale variables (SPSS, 2007) (Becker, 1999) (Leadbeater, 2006) (Morgan, Clay, Jensen, & Quick, 2004):-

- Nominal, where a variable's values represent categories with no intrinsic ranking, e.g male or female. These are also known as categorical variables (Becker, 1999)
- Ordinal; where the values represent categories with some intrinsic ranking or order, e.g. different levels of educational qualification;
- Scale. These are also known as interval (e.g. personality measures) and ratio (e.g. annual income) variables (Becker, 1999). A scale variable is defined as one, "when its values represent ordered categories with a meaningful metric, so that distance comparisons between values are appropriate." (SPSS, 2007). Examples e.g. age in years, income, days per year spent accessing the internet.

That means that all of the "General Questions", the independent variables, apart from one, were nominal variables. The odd one out was "Educational Qualifications", which is an ordinal variable. This is because this ranks or categories each respondent's education from lowest to highest levels of qualification.

The dependent variables relating to internet usage were more difficult to categorise correctly. The key question was "are they ordinal or scale variables?". The responses to the questions were ranked ("Daily; 2-3 times per week; 2-3 times per month; Infrequently [less than monthly]; or Never."). This is a Likert

Scale, examples of which can be found in other similar studies (Booth, 2009) (Pempek, Yermolayeva, & Calvert, 2008) where respondents are asked to score their responses against such a scale. However to be a true scale variable the variable must pass the following test (Leadbeater, 2006) " Data values are numeric values on an interval or ratio scale (e.g., age, income). Scale variables must be numeric. That is the measurements are 'real' in the sense that they tell you not only which item is bigger than another, but also by how much".

The intervals between each category of internet usage is not equal so the "how much" test is not passed. The distance between "Daily;" "2-3 times per week" and "2-3 times per month" is not the same when measured in days. Therefore they were categorised as ordinal.

3.7.4. TRANSFORMATION OF DEPENDENT VARIABLES

However it is possible to transform responses with SPSS, using a set of assumptions, into values that, not only indicate order or ranking, but also where the differences between each point on the scale is numeric and measureable statistically.

This was especially important in this case in order to find an answer to the research question "How much time they spend online in – Is there a relationship between the amount of time spent online and what 45-54 year olds do online and how frequently they do it?".

The key word is "frequently". The scale used in the questionnaire did not provide frequency information directly. Therefore in order to transform the results to measure frequency, and allow comparisons to be made between total use and none use of the internet, the following weights were applied to the 5 point Lickert

Scale values to transform them into "number of days per year" when the internet was used, noting that these were annual estimates of use expressed in the same "currency" (days).:-.

7. Weightings used to calculate Frequency of Internet Use

	Frequency Weight applied to give "number of days used per year".:-.				
How often do you access the internet for each of the following purposes?	Daily - 5	2-3 times per week - 4	2-3 times a month - 3	Infrequently – less than monthly - 2	Never - 1
To keep in touch (socialise) with friends and family?	335	115	30	10	335
For other domestic purposes?	335	115	30	10	335
For work? -	230	115	30	10	230
For educational study purposes?	230	115	30	10	230

Additional variables were created in SPSS into which the frequency weight for each was input corresponding to the answers given for each case. The assumptions made to arrive at the frequency weightings were as follows:-

- "Daily" was given a weighting to reflect the number of days in a year adjusted according to the following:-
    - For the categories "To keep in touch (socialise) with friends and family?" and " For other domestic purposes?" it was assumed that respondents did so 365 days a year, less an allowance for holidays (365 per year less 30 days holiday) so a weight of 335 was applied to both of these;
    - .For the categories "For work?" and "For educational study purposes?" it was assumed that respondents did so during a typical working 5 day week, (less say 30 days holiday per year), which would be equal to a weight of 230 (52 x 5 – 30).

- "2.-3 times a week" was given a weight of 115 by multiplying the number of weeks in a year less 6 weeks holiday (46 weeks) by the mid point of the two (2.5 x 46). No differentiate was assumed for type of use;
- "2-3 times a month" was given a weight of 30 by multiplying the number of months in a year by the mid point (2.5 x 12). Again, no differentiation was assumed for type of use;
- "Infrequently" was given a weight of 10 to indicate a usage frequency of less than monthly. Again, no differentiation was assumed for type of use; and
- Finally the response category of "Never" (respondents never accessed the internet at all) was weighted based on the assumption that respondents never did so at the same rate as those who did so daily to allow reasonable cross comparisons between usage and none usage):-
    - For the categories "To keep in touch (socialise) with friends and family?" and " For other domestic purposes?" a weight of 335 was applied to both;
    - .For the categories "For work?" and "For educational study purposes?" a weight of 230 was applied.

Numeric values are better than alphanumeric values when using SPSS as this package as the tests applied during this study required numeric values. Numeric values were easier to store to represent the whole response). The codes for those values (e.g., daily, weekly etc) are called the *value labels*.. (Becker, 1999)

3.8. Classification of Question Types

Having completed the above the final results of the classification were as follows:-

8. Independent Variable Question Types Classification

Question Asked	**Variable Type**	**Comments**
<u>General Questions- Independent Variable</u>		
What is your gender?	Nominal	One answer per respondent
Which one of the following do you think best describes your current main role?	Nominal	One answer per respondent
Are you professionally qualified in any of the following?	Nominal	More than one answer could be provided per respondent
What is your highest level of educational qualification?	Ordinal	One answer per respondent
What type of area do you live in?	Nominal	One answer per respondent.
Where do you live?	Nominal	One answer per respondent.
What type of household do you live in?	Nominal	One answer per respondent.

9. Dependent Variable Question Types Classification

Question Asked	**Variable Type**	**Comments**
<u>Uses of the internet – Dependent Variables -</u> Internet Usage by Type of Usage		
How often do you use a PC / Lap top / Apple Mac to access the internet for each of the following purposes? • Keeping in touch (socialise) with friends; • For work; • For other domestic purposes, and • For educational study purposes.	Ordinal	5 point Lickert Scale with the following choices . (1) Never. (2) Infrequently [less than monthly]; (3) 2-3 times per month; (4) 2 -3 times per week; or (5) Daily;
How often do you use your MOBILE PHONE to access the INTERNET for each of the following purposes? • Same responses as previous question	Ordinal	Ditto above.
How often do you use your web browser for each of the following purposes? • Same responses as previous question	Ordinal	Ditto above.
How often do you use email for each of the following purposes? • Same responses as previous question	Ordinal	Ditto above.
How often do you use instant messaging for each of the following purposes? • Same responses as previous question	Ordinal	Ditto above.
How often do you use Social Networking Sites for the following purposes? • Same responses as previous question	Ordinal	Ditto above.
How often do you Blog for the following purposes? • Same responses as previous question	Ordinal	Ditto above.

10. Transformed Dependent Variable Question Types Classification

Question Asked	Variable Type	Comments
Calculated Variables - Frequency Weight applied to give "number of days used per year":-		
Use of a [ICT Tool} to access the internet • Keeping in touch (socialise) with friends; • For work; • For other domestic purposes, and • For educational study purposes.	Scale	5 point Lickert Scale converted to an estimated frequency measure of days per year.
Use of a PC / Lap top / Apple Mac to access the internet	Scale	5 point Lickert Scale converted to an estimated frequency measure of days per year.
Use of a MOBILE PHONE to access the INTERNET for each of the following purposes?	Scale	Ditto above.
Use of a web browser	Scale	Ditto above.
Use of email	Scale	Ditto above.
Use of instant messaging	Scale	Ditto above.
Use of Social Networking Sites	Scale	Ditto above.
Use of Blogging	Scale	Ditto above.

Given that the research aim was to ascertain whether any of the independent variables have an influence or not on the dependent variables the types of variable combinations the research was aiming to test were as follows:-

11. Variable Combinations

Independent Variable	Dependent Variable
Nominal – 2 point e.g. gender	Ordinal e.g How often do you Blog - Likert scale responses
Nominal - more than two point e.g. main role	Ordinal e.g How often do you Blog - Likert scale responses
Ordinal, e.g. highest level of educational qualification	Ordinal How often do you use Social Networking Sites- Likert scale responses
Nominal e.g. current main role?	Scale, e.g. How often do you use your web browser – transformed to estimate of days used per year
Ordinal, e.g. highest level of educational qualification	Scale, e.g. How often do you use your PC – transformed to estimate of days used per year

3.9. Data Preparation and Statistical Testing

3.9.1. OVERVIEW

The type of test used depends on the nature of the questions a research project is seeking to address (Pallant, 2007). In this case there are two types of questions:-

- Quantification of frequency questions (the key phrase in the alternate hypothesis is "… more frequently …"); and
- Relationship (correlation) questions (the key phrase in the research questions is "Is there a relationship …").

To recap:-

- The alternate hypothesis was that "45-54 year olds use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities";
- The null hypothesis was the opposite of the alternate hypothesis that: "45-54 year olds do not use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities".

- The research questions ask "is there a relationship between (independent variable x) and reasons (dependent variables) why 45-54 year olds use the internet (for each of the purposes stated, using ICT tools xy z)?.

So the hypothesis was tested by exploring differences between the two dependent variable groups and research questions were tested by exploring relationships between the various independent variables and dependent variables.

There are tests available that should be used if the data is normally distributed (parametric), and others that should be used when it is not normally distributed (non-parametric) (Griffith, 2007) (Becker, 1999) (Leadbeater, 2006) (Morgan, Clay, Jensen, & Quick, 2004) (Motulsky, 1995) (SPSS, 2007) (Trochim W. , 2009) (Pallant, 2007) . (Pallant, 2007).

However there is some evidence that using parametric tests on non-parametric data can be done if the sample is large enough (such as 100 or more observations) In this case n=228. This is due to the central limit theorem, (in large samples, the sample means will follow the normal distribution even if the respective variable is not normally distributed in the population, or is not measured very well) (StatSoft, Inc, 2008). So parametric methods, which are usually much more sensitive (i.e., have more statistical power) are in most cases appropriate for large samples. (StatSoft, Inc, 2008).

Parametric tests are also more powerful (Pallant, 2007) (Trochim W. M., 2006) and so should be used if possible (Pallant, 2007).

Other research in a similar areas was examined to help to decide the types of tests that should be used.

3.9.2 PARAMETRIC VERSUS NON-PARAMETRIC SAMPLE DISTRIBUTION

Preparation of the sample data for analysis

Each of the responses to the questions relating to frequency of internet use was given a value, with, for example, "Daily" having the highest value of "5", and "Never" having the lowest value of "1" to produce the following ordinal scale:-.

12. Ordinal Rankings used to count Internet Use

	Ordinal Scale				
How often do you access the internet for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Never
To keep in touch (socialise) with friends and family?	5	4	3	2	1
For other domestic purposes?	5	4	3	2	1
For work? -	5	4	3	2	1
For educational study purposes?	5	4	3	2	1

In this case inferential data analysis was used to examine:-

- The nature of relationships between variables and each of the ICT communication methods;

- Frequency of use (looking at which ones are being used and the extent to which they used).

This was done across all methods of internet communication in total, and was also aggregated for each grouping ("socialising and other domestic purposes", "work and educational study purposes" and in total) to determine whether 45-54 years olds use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities. In addition each of the research questions had a frequency sub-question within them (for example "How much time they spend online in – Is there a relationship between the amount of time spent online and what 45-54 year olds do online and how frequently they do it?).

The questions against which respondents entered their choices relating to how frequently they used the internet (for this or that purpose) was couched in general terms and not a true scale, e.g. "Daily", "2.-3 times a week, "2-3 times a month". In addition the "distance" in frequency between "Daily", "2.-3 times a week, "2-3 times a month" "Infrequently" and "Never" was not the same. A number of statistical tests are based on the assumptions that the variables are scales where the distance between points is equal (Field, 2005) (Griffith, 2007). So each was allocated a time based score in SPSS as follows:-

13. Scores used to calculate Frequency of Internet Use

	Frequency Score				
How often do you access the internet for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Never
To keep in touch (socialise) with friends and family?	335	115	30	10	0
For other domestic purposes?	335	115	30	10	0
For work? -	230	115	30	10	0
For educational study purposes?	230	115	30	10	0

Application of the above scores converted the responses into a scale measure of equivalent to annual estimates of use. The rationale for the weightings was as follows:-

- "Daily" was given a weighting to reflect the number of days in a year adjusted according to the following:-
    - For the categories "To keep in touch (socialise) with friends and family?" and " For other domestic purposes?" it was assumed that respondents did so 365 days a year, less an allowance for

holidays (365 per year less 30 days holiday) so a weight of 335 was applied to both of these;

- .For the categories "For work?" and "For educational study purposes?" it was assumed that respondents did so during a typical working 5 day week, (less say 30 days holiday per year), which would be equal to a weight of 230 (52 x 5 – 30).

- "2.-3 times a week" was given a weight of 115 by multiplying the number of weeks in a year less 6 weeks holiday (46 weeks) by the mid point of the two (2.5 x 46). No differentiate was assumed for type of use;
- "2-3 times a month" was given a weight of 30 by multiplying the number of months in a year by the mid point (2.5 x 12). Again, no differentiation was assumed for type of use;
- "Infrequently" was given a weight of 10 to indicate a usage frequency of less than monthly. Again, no differentiation was assumed for type of use; and
- Finally the response category of "Never" (respondents never accessed the internet at all) was weighted as zero

Sample Distribution - Kolmogorov-Smirnov Test

The next step was to determine the distribution type of the sample data to see if it was normal or not (Field, 2005). The dependent variable data was tested to see if it was normally distributed using the SPSS statistical analysis package to perform the Kolmogorov-Smirnov Test. Other tests were also applied to determine whether the data was normally distributed:-

- Use of SPSS to produce histogram graphs of the dependent variable data, including a normal distribution overlay to perform a visual check of how "bell shaped" (normally distributed) the dependent variables were;
- Use of SPSS to look at the proximity of the dependent variable data's mean, standard deviation, skewness, and kurtosis to the values that would be present for a normal distribution.

Given that many of the statistical test make underlying assumptions about whether a sample is normally distributed or not a series of One-Sample Kologorov-Smirnov Tests, again using SPSS were carried out (Leadbeater, 2006) (Pallant, 2007) (SPSS, 2007). If the data was normally distributed the test would return a value of greater than p=0.05, meaning that there is no significant difference between the data collected and a normal distribution. If p is less than 0.05 then non-parametric tests should be considered (Leadbeater, 2006). Again, the results are in Chapter 4.

Mean, Standard Deviation, Skewness and Kurtosis Comparison

For the "Mean, Standard Deviation, Skewness and Kurtosis Comparison", the SPSS Descriptive function was used to identify:-

- The mean of each sample;
- Its standard deviation,(to be normal 68% of a sample should be within one standard deviation from the mean);
- Skewness (measures the degree and direction of a sample's asymmetry, such that a left skewed sample has a positive skewness value and a right one a positive value); and
- Kurtosis (a measure of how heavy the tales are).

If the data collected was normally distributed it would have the following values for each of these measures:-

14. Characteristics of a Normal Distribution

Descriptive Statistics	Mean	Std. Deviation	Skewness	Kurtosis
NORMAL DISTRIBUTION	2.5	1	0	0

The results are in Chapter 4..

Normal Distribution Graphs

SPSS was used to prepare a number of graphs showing the distribution of the dependent variables with a normal curve overlay. This was done to show how normal the data was distributed via a visual check.

3.9.3 EXPLORING DIFFERENCES BETWEEN GROUPS

As stated above there are various tests available and one of the key criteria for their selection, or not, is whether the data is normally distributed (Howitt & Cramer, 2008) (Cannon, 1999) (Field, 2005). To save unnecessary repetition here the results showed that the data was not normally distributed. There is therefore a case for using non-parametric tests, where available, for statistical analysis purposes.

The case for Use of Parametric Tests for abnormally distributed large samples

There is a caveat to this that leaves the door open to using parametric tests. That is that where there is a "large" sample size (n=228) where large is defined as

being greater than 100, there is the option to use parametric tests (StatSoft, Inc, 2008). There is also an option to transform the data so that it does become normally distributed (recognised as an option but not performed in this case).

Finally there is an option to use non-parametric test when an equivalent to a parametric one exists.

Parametric Tests

Bearing in mind the case for using parametric tests where data is not normally distributed where the sample size is large (>100) these test would normally be considered if the sample data was normally distributed (Pallant, 2007):-

- T-tests;
- One-way analysis of variance (ANOVA);
- Two-way analysis of variance (ANOVA);
- Multivariate analysis of variance; and
- Analysis of covariance.

T-tests

T-tests are used when there are two independent variable groups (say male and females) and there is a need to compare the means of a normally distributed continuous dependent variable (say frequency of internet use). This could be used to test whether the frequency of internet usage (the means) was significantly different. Within that there are:-

- Paired-sample t-tests (also known as "repeated measures tests") used to test changes in scores from, say, the same sample of people, collected twice, at different times (not relevant here as this was a one time sample);

- Independent sample t-tests, to compare the scores of two independent groups within one sample collected once)relevant here).

Of the independent variables gender (group 0 = female, group 1 = male) satisfies the criteria for selection of this test and the others could be made to satisfy them via transformation to see if their respective internet usage was significantly different (SPSS, 2007). For example:-

- "highest level of educational qualification" could be transformed into two independent variable groups via the creation of a new variable of, say "with a degree or higher qualification" and another "without a degree or higher qualification";
- Type f household could be transformed into two groups, thise with children or dependents and those with no children or dependents ion the household
- All 228 participants would be placed in one or the other.

One-way analysis of variance

One-way analysis of variance (also known as ANOVA) can be used when there are two or more groups within one independent variable and there is a need to compare their mean scores on one continuous dependent variable (hence why it is called one–way). It will show where the groups differ, but not which are statistically significant in terms of their differences from one another. "Post-hoc comparisons" need to be used to find out which are significantly different from one another (Pallant, 2007). This can be used to also test the differences between specific groups rather than comparing all the groups by using planned comparisons.. Like t-tests there are two types of one-way ANOVA to be used in the same circumstances:-

- Repeated measures ANOVA (not relevant in this context as this was a one time sample)
- Between-groups (or independent sample) ANOVA.

Two-way analysis of variance (ANOVA);

A Two-way analysis of variance (ANOVA) can be used to test the impact of two independent variable on a dependent variable and whether the one independent variable is influences by another (the interaction effect) and also main effects of each independent variable. As for t-tests there are two types:-

- Between groups ANOVA (also known as "Mixed Between-Within Groups");
- Repeated measures ANOVA (also known as "Split Plot");

Non-Parametric Tests

The non-parametric version of the t-test are known as the

- Mann-Whitney U test;
- Wilcoxon Signed Rank Test
- Chi-Square

Mann-Whitney U test

The Mann-Whitney U test, can be applied when the observations in a sample of data are ordinal data, rather than direct measurements. It is used to test the null hypothesis that two populations have identical distribution functions against the alternative hypothesis that the two distribution functions differ only with respect to location (median), if at all. (Easton & McColl, 2004);

Wilcoxon Signed Rank Test

This test can also be applied when the observations in a sample of data are ordinal data rather than direct measurements. (Easton & McColl, 2004).

The non-parametric versions of the one-way analysis of variance (also known as ANOVA) are the:-

- Kruskal-Wallis Test; (used during this study)
- Friedman Test.

3.10 Types of tests Used

The next step was to determine which types of tests should be applied to find answers to the research questions. This is important because many tests assume that the sample data is normally distributed and others do not. Therefore as the data was not normally distributed, non-parametric tests could be more appropriate. (Motulsky, 1995). However where the sample size is large (n=>100) parametric test can be used (StatSoft, Inc, 2008). As this sample has 228 cases the use of parametric test was therefore considered. The type of test is further affected by the type of variables (nominal, aka categorical, ordinal, and scale aka continuous). To re-cap:-

- The alternate hypothesis was that "45-54 year olds use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities";
- The null hypothesis was the opposite of the alternate hypothesis that: "45-54 year olds do not use the internet to socialise and for domestic purposes more frequently than they do for educational and work related activities".

- The research questions ask "is there a relationship between (independent variable x) and reasons (dependent variables) why 45-54 year olds use the internet (for each of the purposes stated, using ICT tools xy z)?.

So the hypothesis was tested by exploring differences between the two dependent variable groups (group 1 socialise and domestic purposes internet use, group 2, educational and work related usage) and research questions were tested by exploring relationships between the various independent variables and dependent variables.

3.10.1 EXPLORING RELATIONSHIPS

Strength of relationships among variables can be explored using a number of tests.

Multiple Regression Test

This test could be used to identify how much of the variance in frequency internet usage can be explained by two or more continuous independent variables (Pallant, 2007). It was possible to transform all of the internet usage ordinal variable responses (based on a scale or 1 to 5) into a continuous dependent variable called "frequency of use" by making a series of assumption about how many days per year each probably represented. This satisfied the first criteria for selection of this test. However the second criterion was not met, because none of the independent variables are continuous (scale based) variables. The closest one is "highest level of education qualification", but this is a ordinal variable and is therefore not continuous.

Chi Square Test for Relatedness or Independence

This test can be used to test relationships between one nominal (categorical) independent variable one nominal dependent variable (Pallant, 2007). Therefore in this case this test cannot be used because all the dependent variables are scales (also known as interval variables) (Becker, 1999).

3.10.2 T-TEST

One statistical test that can be used to test whether there are is the case is the t-test . This computes t-values and their corresponding significance levels of Independent samples (Cannon, 1999). The t-value computed for independent samples compares the means of 2 different groups. The average of the data for one group is compared with the average for the other group to determine if the difference is statistically significant. The value obtained is presented along with the degrees of freedom (df) and the two-tailed probability level (the direction of the relationship is not specified).

Paired sample tests (those relating to the same group "before and after " were not relevant here because the data was only sampled once.

3.10.3 ANOVA

Iin this case there were several independent variables and several dependent variables. Any one of these could work in conjunction with other to have an effect on others. Analysis of Variance provides a test of the effects of different levels of one or more nominal (categorical) variables (the "independent variables") on another continuous variable (the "dependent variable") (Cannon, 1999). This is done in the same general way that a t-test determines the

significance of the difference between groups. However, instead of two levels of one variable (as in the case of the t-test), ANOVA can simultaneously analyze the effects of up to five variables with two or more levels of each one. For example, one could determine how the size of a group (large, medium and small) and gender (male and female) affects verbal aggression in a group discussion. A major advantage of ANOVA is that along with the effects of the individual variables (main effects) it provides a test of the combined effects of two or more variables (i.e., interactive effects).

3.10.4 STATISTICAL TEST FOR CORRELATION

A Correlation is defined as:-

- A single number that describes the degree of relationship between two variables (Trochim W. M., 2006);
- A numerical index that indicates the strength and direction of a relationship between two variables (Howitt & Cramer, 2008)
- The strength and direction of a linear relationship between two variables (Pallant, 2007).

The symbol r is used stand for a correlation and r is always between -1 (negative correlation) and 1 (positive correlation).

There are various test available for checking correlation mainly depending on the types of measurements being tested (nominal, ordinal, scale (interval, or ratio)) including (Marczyk, DeMatteo, & Festinger, 2005):-

- Pearson Product Moment Correlation (also known as the Pearson Correlation Coefficient, or the Pearson) which ; examines correlations between two scale (ratio or interval) variables where the data is normally distributed (not the case for this research);
- Point-biserial (rpbi): This is used to examine the relationship between a variable measured on a naturally occurring dichotomous nominal scale and a variable measured on a scale (interval or ratio) such as a correlation between gender [dichotomous] and frequency of internet use;
- Spearman rank-order (rs): examines correlations between two variables where the data is not normally distributed, measured on ordinal scales (e.g., highest level of educational qualification and internet usage [ordinal]).
- Phi (Φ): This is used to examine the relationship between two variables that are naturally dichotomous (nominal-dichotomous; e.g., a correlation of gender [nominal] and marital status [nominal-dichotomous]).
- Gamma (γ): This is used to examine the relationship between one nominal variable and one variable measured on an ordinal scale (e.g., a correlation of ethnicity [nominal] and socioeconomic status [ordinal]).

The first task was to determine whether the data was normally distributed (also known as parametric data). If it was a test used to determine correlation is the Pearson Product Moment Correlation (also known as the Pearson Correlation Coefficient) especially for scale variables and where there is one continuous and one dichotomous variable such as gender (Pallant, 2007). For non-parametric data test that do not make assumptions about whether the data is normally distributed or not should be used (Motulsky, 1995). Spearman's Rho or Kendall

Rank Order Correlation should be used to determine whether there is a correlation between an independent variable such as gender and the dependent variables related to Internet Usage (SPSS, 2007) (Field, 2005) (Trochim W. M., 2006). Spearman's test is designed for use with ordinal level or ranked data e.g. level of education, and when the data is not normally distributed (Pallant, 2007) Kendall's should be used when there is a small data set with a large number of scores with the same ranks (Field, 2005). Page 131 *Note - unable to determine what "small" means – assume 228 cases is not small.* The purpose was to ascertain the following (Rayner, 2009):-

- Is there a relationship between the variables?
- What is the direction of the relationship?
- How statistically significant is the relationship?

With regard to the last point above, statistically significance tests whether the means of say two groups (in this case say the group or males and group of females) for how frequently they use an ICT tool to access the internet for purpose x or y. It tests the differences between their means (averages) relative to the spread, or variability, of their scores via a t-test (Trochim W. M., 2006) . The t-value will be:-

- Positive if the mean of the first group is large r than the second;
- Negative i if the mean of the second group is large r than the first

To determine whether the t-value is significant there was a need to define a level of risk (also known as the alpha level, p-value, significance level or the odds) that the observed result is due to chance (Trochim W. M., 2006). Significance testing estimates the likelihood that a correlation between variables may actually exists

in the population and is not simply the result of chance (Marczyk, DeMatteo, & Festinger, 2005). This is usually set at 0.5 (5 times out of 100 the difference between the means will be by chance or a fluke).

The strength of correlation was measured against the following (Rayner, 2009):-

- 0.20 to 0.35 very slight relationship
- 0.35 to 0.65 crude group predictions possible
- 0.65 to 0.85 accurate group predictions possible
- Over 0.85 extremely closely related

3.10.5 TEST TO USE

If the nominal variable is two-point (male , female) and the cases (e.g., people who responded and completed the questionnaire) in one category of the nominal variable do not match to the cases in the other category of that variable the appropriate statistics to use are shown the table below (Trochim W. , 2009):-

2- Two Variables - Point Nominal Independent Variable and Ordinal Dependent Variable Statistics

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Nominal – 2 point e.g. gender	Ordinal e.g. How often do you Blog - Likert scale responses	Somers' d and Critical Ratio of S: SPSS: CROSSTABS Median test: SPSS: NPAR Mann-Whitney U: SPSS: NPAR Kolmogorov -Smirnov: SPSS: NPAR Runs test: SPSS: NPAR (in SPSS, this test is called Wald-Wolfowitz)

If the nominal variable is multi-point (main role) and the cases (e.g., people who responded and completed the questionnaire) in one category of the nominal variable do not match to the cases in the other category of that variable the appropriate statistics to use are shown the table below (Trochim W. , 2009):-

Two Variables - Multi-Point Nominal Independent Variable and Ordinal Dependent Variable Statistics

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Multi-point Nominal - more than two point e.g. main role	Ordinal e.g. How often do you Blog - Likert scale responses	Statistical Test - Freeman's coefficient of differentiation Statistical Measure - • Kruskal-Wallis test • Median test (for more than 2 groups) SPSS: NPAR

Two Variables - Multi-Point Ordinal Independent Variable and Ordinal Dependent Variable Statistics

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Ordinal, e.g. highest level of educational qualification	Ordinal How often do you use Social Networking Sites- Likert scale responses	Statistical Test - Somers' d Statistical Measure For N greater than 10, refer the critical ratio of S to a table of the unit normal curve; for N less than or equal to 10, refer d to a table of critical values of S. Somer's d: SPSS: CROSSTABS Critical ratio of S: SPSS: CROSSTABS, NONPAR CORR

Is the interval variable dependent = yes

Do you want a measure of the strength of relationship between the variables or a test of the statistical significance of differences between groups?

Selecting "measure of the strength of relationship " leads to "Do you want to describe the relationship in your data or to estimate it in the population which you have sampled?"

Two Variables - Multi-Point Nominal Independent Variable and Scale Dependent Variable Statistics - To measure strength of relationship between the variables

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):- To measure strength of relationship between the variables
Multi-point Nominal e.g. main role?	Scale, e.g. How often do you use your web browser – transformed to estimate of days used peer year	To describe the relationship:- Statistical Test = Eta-Squared Statistical Measure = F test Notes - If the nominal variable is a two-point scale, the t-test is an alternative (because in such cases, F = t-squared). Eta-squared: Hays, W. L. Statistics for the Social Sciences. Second edition. New York: Holt, Rinehart, and Winston, 1973. p. 683 SPSS: BREAKDOWN, ANOVA
		To estimate it in the population which you have sampled:- Statistical Test = • Omega-Squared •Intraclass Correlation Coefficient • Kelley's epsilon Statistical Measure = F test Notes - If the nominal variable is a two-point scale, the t-test is an alternative (because in such cases, F = t-squared). F-test for omega squared, intraclass correlation and Kelley's epsilon: SPSS: BREAKDOWN, ANOVA

Two Variables - Multi-Point Nominal Independent Variable and Scale Dependent Variable Statistics - To test the statistical significance of differences between groups

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):- To test the statistical significance of differences between groups
Multi-point Nominal e.g. main role?	Scale, e.g. How often do you use your web browser – transformed to estimate of days used peer year	Are you willing to assume that the interval scaled variable is normally distributed in the population? = No Statistical Test = Analysis of Variance Statistical Measure = Bartlett's test SPSS: ANOVA, ONEWAY, BREAKDOWN, MANOVA

If the ordinal variable a not a two-point variable and the aim is to treat the ordinal variable as if it were based on an underlying normally distributed variable, and also not, appropriate tests are shown below:-

Two Variables - Multi-Point Ordinal Independent Variable and Scale Dependent Variable Statistics

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Ordinal, e.g. highest level of educational qualification	Scale, e.g. e.g. How often do you use your PC – transformed to estimate of days used peer year	Ordinal variable based on an underlying normally distributed variable:- Statistical Test = Jaspen's coefficient of multiserial correlation Statistical Measure - Do Fisher's r to Z transformation and refer the critical ratio of Z to a table of the unit normal curve Notes - This is a biased estimator. Jaspen's coefficient is the product moment correlation between the interval variable and a transformation of the ordinal variable. The magnitude of this statistic is sensitive to the assumption of normality.
		Ordinal variable NOT based on an underlying normally distributed variable:- Do you want to treat the ordinal variable as if it were a monotonic transformation of an underlying interval variable? Yes = Statistical Test = Mayer and Robinson's M Statistical Measure Do Fisher's r to Z transformation and refer critical ratio of Z to a table of the unit normal curve Notes This is a biased estimator.
		Ordinal variable NOT based on an underlying normally distributed variable:- Do you want to treat the ordinal variable as if it were a monotonic transformation of an underlying interval variable? No = Statistical Test = there is no known analysis for this case Statistical Measure = *(none)*

2- More than two Variables - Point Nominal Independent Variable and Ordinal Dependent Variable Statistics

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Nominal – 2 point e.g. gender	Ordinal e.g. How often do you do x and y and z etc	More than one dependent variable More than one independent variable Treat the relationships among the variables as additive Do not treat all the dependent and independent variables as scale = no tests available
		More than one dependent variable one independent variable Treat the independent variable as nominally scaled and all of the dependent variables as intervally scaled Test only whether the vectors of means are equal for all categories of the independent variables = Statistical Test = Multivariate analysis of variance Statistical Measure = • Wilks' lambda **• Roy's greatest root criterion** **• Pillai-Bartlett V** SPSS: MANOVA
		Test only whether the vectors of means are NOT equal for all categories of the independent variables Statistical Test = Profile analysis Statistical Measure • Wilks' lambda **• Roy's greatest root criterion** **• Pillai-Bartlett V** SPSS: MANOVA

More than two Variables - Multi-Point Nominal Independent Variable and Ordinal Dependent Variable Statistics

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Multi-point Nominal - more than two point e.g. main role	Ordinal e.g. How often do you do x and y and z etc	1. more than one dependent variable more than one independent variable treat the relationships among the variables as additive Do not treat all the dependent and independent variables as interval Statistical Test - Sorry, there is no known analysis for this case. Statistical Measure - *(none)* 2. more than one dependent variable more than one independent variable Do not treat the relationships among the variables as additive Treat all the dependent variables as interval Do you want to explore the relationships among a set of variables in two or more groups simultaneously or do you want to compare the similarity of the patterns of the relationships among a set of variables either (a) across two or more groups or (b) with a prespecified pattern? 2.1 Explore the relationships – Do you want to treat the variables as measured on interval scales and the relationships among them as linear? YES = Statistical Test Three-mode factor analysis Statistical Measure = *(none)* **NO** Statistical Test = Three-way non-metric multidimensional scaling techniques Statistical Measure = *(none)* 2.2 compare the similarity of the patterns of the relationships among a set of variables either (a) across two or more groups or (b) with a prespecified pattern? Do you want to preserve the metric units in which the variables were measured or to standardize them by the observed variance of each <u>Standardize</u> - Statistical Test Confirmatory factor analysis of standardized variance-covariance matrices Statistical Measure Maximum likelihood chi-square <u>Original metric</u> - Statistical Test Confirmatory factor analysis of variance-covariance matrices Statistical Measure Maximum likelihood chi-square

More than two Variables - Multi-Point Ordinal Independent Variable and Ordinal Dependent Variable Statistics

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Ordinal, e.g. highest level of educational qualification	Ordinal e.g. How often do you do x and y and z etc	

More than two Variables - - Multi-Point Nominal Independent Variable and Scale Dependent Variable Statistics - To measure strength of relationship between the variables

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Multi-point Nominal e.g. main role?	Scale, e.g. Ordinal e.g. How often do you do x and y and z etc – transformed to estimate of days used peer year	

More than two Variables - Multi-Point Nominal Independent Variable and Scale Dependent Variable Statistics - To test the statistical significance of differences between groups

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Multi-point Nominal e.g. main role?	Scale, e.g. Ordinal e.g. How often do you do x and y and z etc – transformed to estimate of days used peer year	

More than two Variables - Multi-Point Ordinal Independent Variable and Scale Dependent Variable Statistics

Independent Variable	Dependent Variable	Appropriate Statistics (Trochim W. , 2009):-
Ordinal, e.g. highest level of educational qualification	Scale, e.g. e.g. How often do you use your PC – transformed to estimate of days used peer year	

APPENDIX 4 DETAILED RESULTS

4.1 Final sample frame

The final sample frame was as follows:-

15. Actual Sample Frame

Source of participant selection	**Total number of emails issued**
Home email address book	103
Work email address book – mixture of clients and suppliers	97
Great Clifton Infants School, Cumbria (lead researcher is ex-pupil)	1
Moorclose Comprehensive School, Workington, Cumbria (lead researcher is ex-pupil)	32
Workington Grammar School, Workington, Cumbria (lead researcher is ex-pupil) by year of leaving - 1974	42
Workington Grammar School - year of leaving - 1975	38
Workington Grammar School - year of leaving - 1976	54
Workington Grammar School - year of leaving - 1977	45
Workington Grammar School - year of leaving - 1978	45
Workington Grammar School - year of leaving - 1979	76
Workington Grammar School - year of leaving - 1980	64
Liverpool Polytechnic (lead researcher was ex-student)	4
Members of Friends Reunited Over 40's Group (lead researcher was a member)	3
Members of Friends Reunited over 50's Group lead researcher was a member)	4
Total number of invitations to participate issued via email	**608**

4.2. Responses received

A total of 256 responses were received. One person went to the online questionnaire and did not give their consent. The logic of the questionnaire was constructed so that participants had to record their consent before they could access the remainder of the questionnaire. Of the remaining 255, 18 chose the complete and return printed versions (having printed the PDF file version included with the invitation email) and these were input into Surveymonkey by the lead researcher, and the rest chose to complete theirs online.

Initial data analysis highlighted that a total of 27 questionnaires were not fully completed with a range of between 18 to 28 incomplete responses each, and these were excluded from the sample frame. Of those 28, 8 "participants" were female, 4 male and the rest, 15, did not indicate their gender. None of the printed copies were incomplete. The remaining 228 largely complete questionnaires were then subjected to further analysis.

4.3. Statistical Test Selection Rationale

The dependent variable data was tested to see if it was normally distributed using the SPSS statistical analysis package. This was important because the outcome indicated whether it would be preferable to use parametric or non-parametric tests to evaluate the research questions. Data that is normally distributed should be tested using parametric test and data that is not normally distributed should be tested using non-parametric tests (Becker, 1999) (Griffith, 2007) (Leadbeater, 2006) (Morgan, Clay, Jensen, & Quick, 2004) (Motulsky, 1995) (SPSS, 2007) (Trochim W. , 2009) and (Pallant, 2007).

A check for normal distribution was carried out using a series of One-Sample Kologorov-Smirnov Tests, again using SPSS (Leadbeater, 2006) (Pallant, 2007). If the data was normally distributed the test would return a p value of greater than 0.05, meaning that there is no significant difference between the data collected and a normal distribution. All of the tests returned a p value of zero meaning that none at the dependent variable data was normally distributed. Detailed results can be found in Appendix 3.

Parametric test make a number of assumptions (Pallant, 2007) page 204:-

- Measures are on a continuous scales rather than discrete nominal or ordinal categories;
- That the data was collected using random sampling;.
- Each case is independent;
- The data is normally distributed.

In this case

- Dependent variable measures were not continuous scales. They were ordinal. With the benefit of greater knowledge there is a case for ensuring that dependent variables are designed to be continuous scales, rather an ordinal measures, because this opens up greater possibilities for testing. That is why the "internet use" variables of 1 "Never" to 5 "Daily", were transformed to a set of continuous variable to represent "frequency of use" using a set of "days used" assumptions;
- That the data was not collected using random sampling, (sample of convenience);

- Each case was thought to be independent. As far as is know the cases were participants acted independently of each other, many at different times, and were not affected by the answers given by other participants;

- The data was normally distributed.

Therefore the evidence was in favour of using non-parametric tests but bearing ion mind that due to the large sample size parametric tests can be used with caution (previously cited). Pallant, page 210, also states that non-parametric test are useful when the data is nominal or ordinal (ranked) scales as in this case.

The eight research questions that were chosen for further analysis are listed below together with a summary of the process via which tests were selected:-

16. Type of Statistical Tests Available to Probe the Research Questions.

Question	Independent Variables	Dependent Variable		Types of Test used for Non-parametric distributions
		Internet Usage by Type of Usage - 1 to 5	*Frequency of Internet Usage (days) by Type of Usage*	
Gender – is there a relationship between gender and what 45-54 year olds do online and how frequently they do it?	Two-point dichotomous Nominal	Ordinal	Scale	Total Frequencies – Descriptives and boxplots Relationship Test - Spearman's Rho – requires two variables – one dichotomous one continuous. To see how much variance two variables that correlate share - Coefficient of determination To test relationship between variables.- cross tabulation function Mann-Whitney U test – to test are males are more likely than females to use the internet. - test main gender against frequency of internet use. – requires one independent dichotomous nominal (categorical) variable, main role, and a dependent scale (continuous) variable, "Total Frequency of Internet Use".
Main role – is there a relationship between role and what 45-54 year olds do online and	Nominal, multi-point	Ordinal	Scale	Total Frequencies – Descriptives and boxplots Relationship Test - Spearman's Rho – requires two variables – one dichotomous one continuous. In this case Main Role is not dichotomous (it is nominal, multi-point), so this cannot be used.

Question	Independent Variables	Dependent Variable		Types of Test used for Non-parametric distributions
		Internet Usage by Type of Usage - 1 to 5	*Frequency of Internet Usage (days) by Type of Usage*	
how frequently they do it?				Kruskal – Wallis Test - test main role against frequency of internet use - similar to a Mann-Whitney U Test used for gender, but it allows testing to be carried out where a variable consists of for more than two groups, as in this case - requires one independent nominal (categorical) variable, main role, and a dependent scale (continuous) variable, "Total Frequency of Internet Use". Members of each sample must be unique, as in this case (participants could select only one "main role".
Profession – is there a relationship between profession and what 45-54 year olds do online and how frequently they do it?	Nominal, multi-point	Ordinal	Scale	Total Frequencies – Descriptives and boxplots Mann-Whitney U test – because participants could select more than one category of profession each, the nominal variable was not unique. This violated the assumptions behind the use of this test (Pallant, 2007). So the variable was made to comply so the Mann-Whitney U test could be used by taking the biggest sub-groups ("Medical & Health" and "Computing/IT") and testing each to see if members of each group were more likely to use the internet than members of all the other groups combined. That way the sample members in each group were unique and not overlapping. This is because this test requires one independent dichotomous nominal (categorical) variable, e.g. "Computing/IT" , or "Not Computing/IT", and a dependent scale (continuous) variable, "Total Frequency of Internet Use".
Qualifications - is there a relationship	Ordinal	Ordinal	Scale	Total Frequencies – Descriptive checks and boxplots.

Question	Independent Variables	Dependent Variable		Types of Test used for Non-parametric distributions
		Internet Usage by Type of Usage - 1 to 5	*Frequency of Internet Usage (days) by Type of Usage*	
between qualifications and what 45-54 year olds do online and how frequently they do it?				Kruskal – Wallis Test - test qualifications against frequency of internet use - Qualifications have been classified was Ordinal (ranked) because of a judgement being made that a doctorate, for example, is higher in rank than GCSE's etc. However in this case it was assumed they were nominal for this test to be used.
Type of area they live in (rural, semi-rural, urban) - Is there a relationship between area type and what 45-54 year olds do online and how frequently they do it?	Nominal, multi-point	Ordinal	Scale	Total Frequencies – Descriptive checks and boxplots. Kruskal – Wallis Test - test qualifications against dependent scale (continuous) variable, "Total Frequency of Internet Use".
Where they live - Is there a relationship between where they live and what 45-54 year olds do online and how frequently they do it?	Nominal, multi-point	Ordinal	Scale	Total Frequencies – Descriptive checks and boxplots. Kruskal – Wallis Test - test qualifications against dependent scale (continuous) variable, "Total Frequency of Internet Use".
Type of household	Nominal,	Ordinal	Scale	Total Frequencies – Descriptive checks and boxplots.

Question	Independent Variables	Dependent Variable		Types of Test used for Non-parametric distributions
		Internet Usage by Type of Usage - 1 to 5	*Frequency of Internet Usage (days) by Type of Usage*	
they live in - Is there a relationship between type of household and what 45-54 year olds do online and how frequently they do it?	multi-point			Kruskal – Wallis Test - test qualifications against dependent scale (continuous) variable, "Total Frequency of Internet Use".
How much time they spend online in – Is there a relationship between the amount of time spent online and what 45-54 year olds do online and how frequently they do it?	Calculated time from dependent variable responses	Ordinal	Scale	Total Frequencies – Descriptive checks and boxplots. Kruskal – Wallis Test - test qualifications against dependent scale (continuous) variable, "Total Frequency of Internet Use".

4.4 Gender

Gender – is there a relationship between gender and what 45-54 year olds do online and how frequently they do it?

"What is your gender?"

Analysis f the frequency of internet use for the two groups that are the subject of the hypothesis, namely "Social and domestic" and "Work and Educational" purposes, showed that, in both cases, men also used the internet more frequently on average for both purposes than females. In conclusion therefore it appears that, on average men in this sample did use the internet more frequently than females.

4.4.1 GENDER RELATIONSHIP TEST (SPEARMAN'S RHO)

To test whether there was a relationship between gender and what 45-54 year olds do online Spearman's Rho was used (the non-parametric version of the Pearson product-moment correlation coefficient). The correlation was found to be weak across the whole range of types of ICT Tools and internet uses, ranging from $r=0.131$, for using the internet to blog for domestic purposes to $r=0.360$, for using their web browser for work related purposes (in all cases $n=228$, $p<0.01$). The Results that were statistically significant (marked as **** in SPSS) are shown below:-

17. Spearman's Rho – Correlation of Gender and Internet Use

Spearman's rho	2 Tail	Gender	Statistical Significance	significantly different if < than 0.10
Correlations	N	228		
PC - work	Correlation Coefficient	0.213	**	
	Sig. (2-tailed)	0.001		YES
PC - domestic	Correlation Coefficient	0.242	**	
	Sig. (2-tailed)	0.000		YES
Mobile - socialise	Correlation Coefficient	0.235	**	
	Sig. (2-tailed)	0.000		YES
Mobile - work	Correlation Coefficient	0.222	**	
	Sig. (2-tailed)	0.001		YES
Mobile - domestic	Correlation Coefficient	0.264	**	
	Sig. (2-tailed)	0.000		YES
Mobile - education	Correlation Coefficient	0.210	**	
	Sig. (2-tailed)	0.001		YES
Web browser - work	Correlation Coefficient	0.360	**	
	Sig. (2-tailed)	0.000		YES
Web browser - domestic	Correlation Coefficient	0.340	**	
	Sig. (2-tailed)	0.000		YES
Web browser- education	Correlation Coefficient	0.148	*	
	Sig. (2-tailed)	0.025		YES
Email - work	Correlation Coefficient	0.255	**	
	Sig. (2-tailed)	0.000		YES
Email - domestic	Correlation Coefficient	0.180	**	
	Sig. (2-tailed)	0.006		YES
Instant msgs - work	Correlation Coefficient	0.206	**	
	Sig. (2-tailed)	0.002		YES
Instant msgs - domestic	Correlation Coefficient	0.137	*	
	Sig. (2-tailed)	0.038		YES
Blogging - domestic	Correlation Coefficient	0.131	*	
	Sig. (2-tailed)	0.048		YES

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Only statistically significant results have been listed above.

This means overall that there is a very slight relationship where the strength of correlation was measured against the following (both plus or minus values) (Rayner, 2009):-

- R=0.20 to 0.35 = very slight relationship

- 0.35 to 0.65 = crude group predictions possible;
- 0.65 to 0.85 = accurate group predictions possible;
- Over 0.85 = extremely closely related.

Cohen (1999) cited in (Pallant, 2007) put forward a similar classification:-

- R=0.10 to 0.29 = small relationship;
- 0.30 to 0.49 = medium relationship;
- 0.50 to 1.0 = large relationship.

Spearman's Rho can also be used where there is a scale based dependent variable and a dichotomous independent variable such as gender (Pallant, 2007) page 126.

These indicate the level of confidence associated with those results. In large samples, (n>100), very small correlations may reach statistical significance (Pallant, 2007) page 133. This is what appears to have happened here. All of the above statistically significant results are positively correlated. This means that they both "move" in the same direction (from 0 "female" towards 1 "male" and from 1 "Never "towards 5 "Daily"). This means that there is a correlation between males in this sample and the above uses of the internet.

However the correlation is weak, ranging from r=0.131, for males using the internet to blog for domestic purposes, to r=0.360, for males using their web browser for work related purposes.

This slight relationship may not be causal however. There may be other variables that are responsible for this slight correlation.

4.4.2 GENDER - COEFFICIENT OF DETERMINATION

To see how much variance two variables that correlate share it is possible to calculate the coefficient of determination (Pallant, 2007). This is done by calculating the square of r multiplying by 100 to give a percentage. The results for to lowest and highest correlations within this sample are as follows:-

- r=0.131 for males using the internet to blog for domestic purposes - coefficient of determination = 2%.
- r=0.360 for males using their web browser for work related purposes - coefficient of determination = 13%

This means that males using the internet to blog for domestic purposes share only 2% of their variance (very little overlap) and males using their web browser for work related purposes share 13% (again not much overlap).

4.4.3 MANN-WHITNEY U TEST

Are males are more likely than females to use the internet -
This can be tested using the Mann-Whitney U test (Pallant, 2007) page 220. This is the non-parametric version of the independent samples t-test. It can be used to test for differences between two independent groups (it compares medians). In this case gender was compared to the transformed variables relating to frequency of internet use. It requires:-

- One categorical variable with two groups e.g. gender;
- One continuous dependent variable .e.g. frequency of internet use.

The question it was being used to answer here was "Do males and females differ in terms of their frequency of internet use? Do males have higher frequency of internet usage than females?

18. Gender - Internet Usage Frequency - Mann-Whitney U Test Results

Test Statistics	
	All purposes - Total Frequency of Internet Use
Mann-Whitney U	4550.500
Wilcoxon W	12935.500
Z	-3.717
Asymp. Sig. (2-tailed)	.000
a. Grouping Variable: Gender	

Ranks				
	Gender	N	Mean Rank	Sum of Ranks
All purposes - Total Frequency of Internet Use	Female	129	100.28	12935.50
	Male	99	133.04	13170.50
	Total	228		

The Z value was 3.717 and the significance level was 0.000 which is less than probability value of p=0.05, so the result is significant. The mean rank, direction of difference (which group was higher) result was male =133.04 and female = 100.28. By carrying out a further procedure to determine the medians (Pallant page 222) the median values were determined to be males, 2130, and females, 1555, as shown below:-

19. Gender - Medians - All purposes - Total Frequency of Internet Use

Gender	N	Median
Female	129	1555.00
Male	99	2130.00
Total	228	1885.00

This confirmed that males do have a higher frequency of internet use than females.

The strength of the relationship (r) can be calculated by talking the z value and dividing it by the square root of the sample size:-

R = 3.717 / square root of 228 = 3.717 / 15.1 = 0.25.

The question being posed was " is there a relationship between gender and what 45-54 year olds do online and how frequently they do it? The answer is that yes there is a small correlational relationship between gender and frequency of internet use, with males in this sample being slightly more likely to use the internet across a range of purposes than females. but the strength of the relationship (r=0.25) is small, as explained earlier.

A Mann-Whitney U test also supported this conclusion revealed a significant difference between the total frequency of internet use across all ICT tools and type of usage of males (Md = 2130, n = 99) and females (Md = 1555, N = 129) U = 4550.5, Z = 3.717, p = 0.00, r = 0.62).

However it is not possible to conclude with certainly that there is a causal relationship between gender and frequency of internet use. There could be a third confounding variable that explains ("causes") why there is a relationship between gender and internet use (Pallant, 2007) page 122. It is possible to explore this using a statistical technique known as partial correlation. Thos assumes that the three variables are continuous scale based (Pallant, 2007) page 142. However, whilst the dependent variables relating to frequency of

internet use are scale based, all of the independent variables are nominal, with the exception of "Qualifications", which is ordinal. Therefore this test cannot be used.

4.5 Main Role

Main role – is there a relationship between role and what 45-54 year olds do online and how frequently they do it?

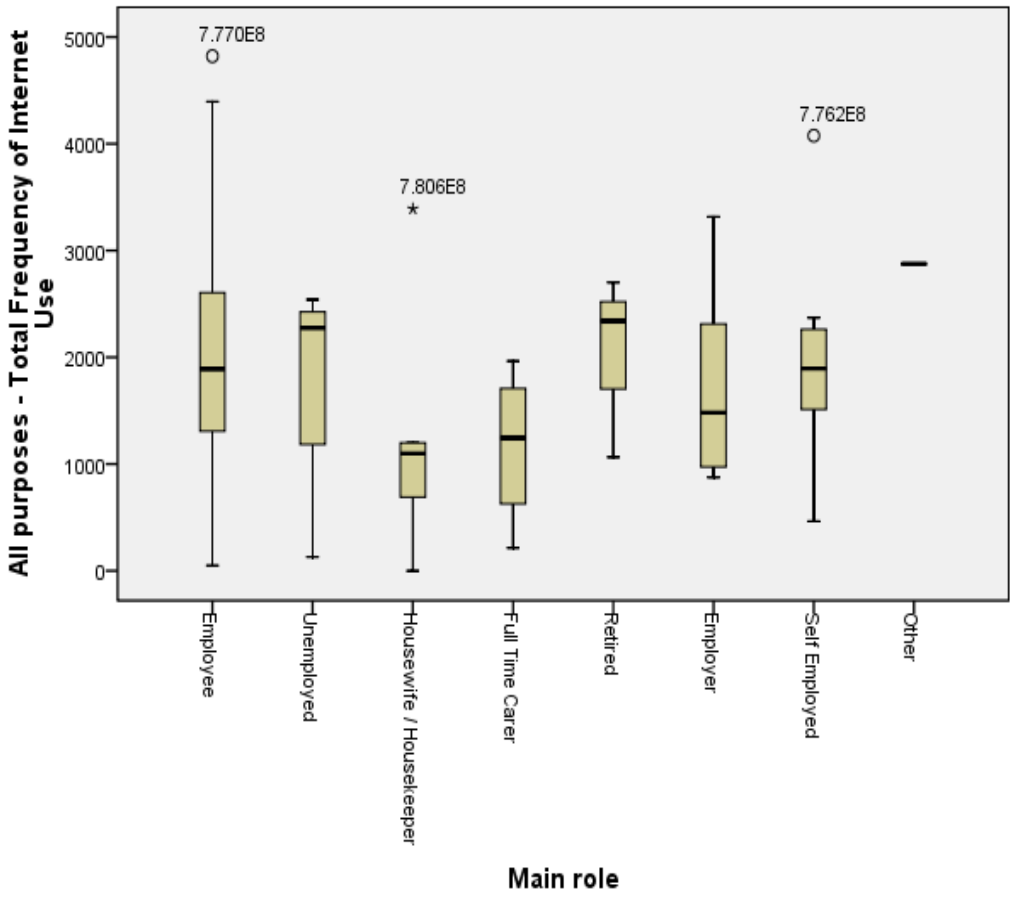
"Which one of the following do you think best describes your current main role?"

The research question was :

- Main role – is there a relationship between role and what 45-54 year olds do online and how frequently they do it?

Firstly a boxplot was prepared to present a visual picture of the overall differences between roles (bearing in mind that some of the group's sizes was small):-

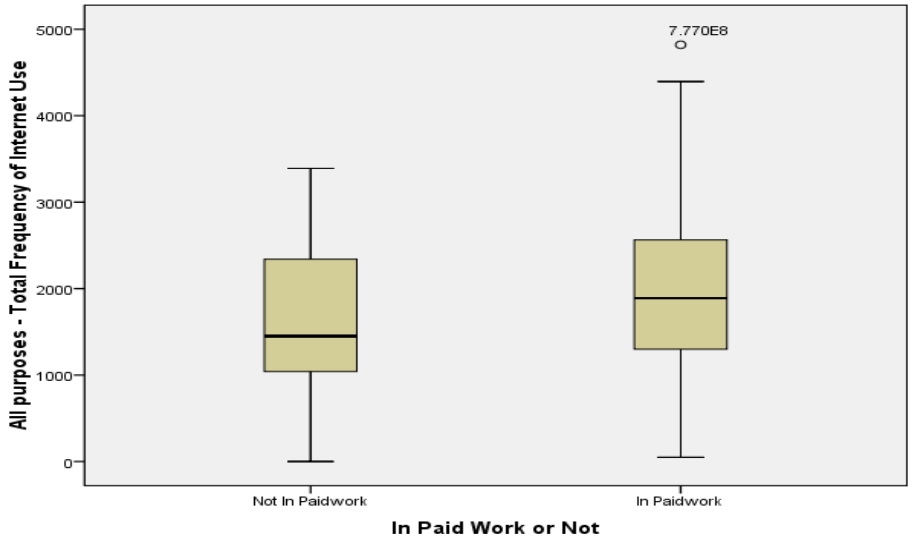
4. MAIN ROLES - INTERNET USE – ALL PURPOSES



The 6 housewives who responded had the lowest overall frequency of use on average followed by those who were full time carers (4), and then those who classified themselves as employers (8). The top three users of the internet were retired, unemployed and employed.

The variables in SPSS were transformed into a further variable "in paid work / not in paid work" to explore the frequency of use and relationship:-

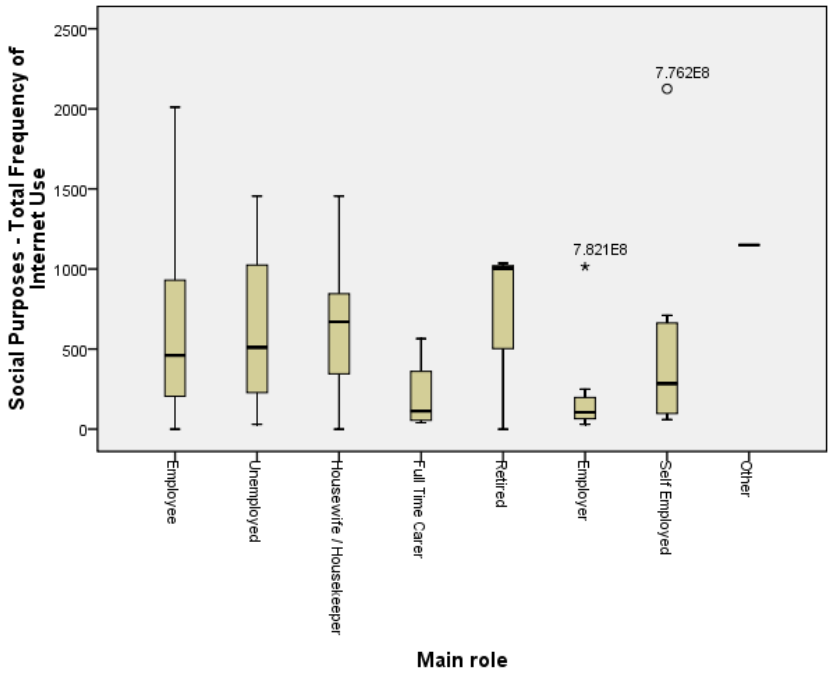
5. In Paid Work or Not- Internet Use – All Purposes



This showed that the internet was being used more by those in paid work than those who were not.

Following that the total frequency of use fro each of the different purposes was visually analyzed using a boxplot for each:-

6. MAIN ROLES - INTERNET USE - SOCIAL PURPOSES

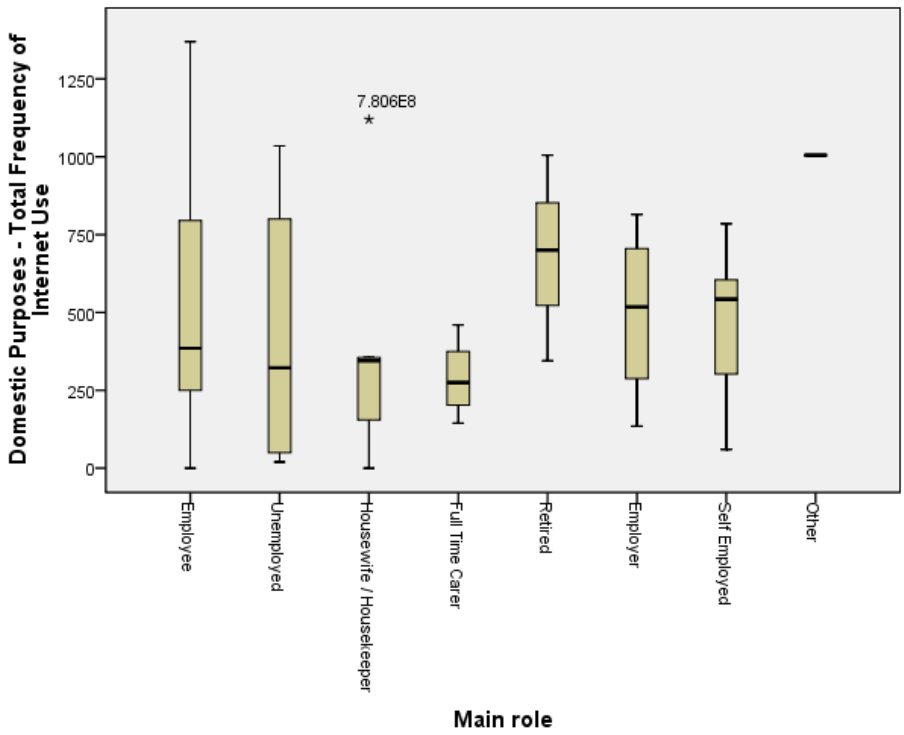


.

Bearing in mind the small sample sizes for all groups apart from employees, the above showed that full time carers, employers and the self employed used the internet the least on average for social purposes. Retired persons used it the most, followed by housewives. Employees and the unemployed were similar, but employees had the biggest range of scores of any group.

The same as the above was done for total internet usage for domestic purposes:-

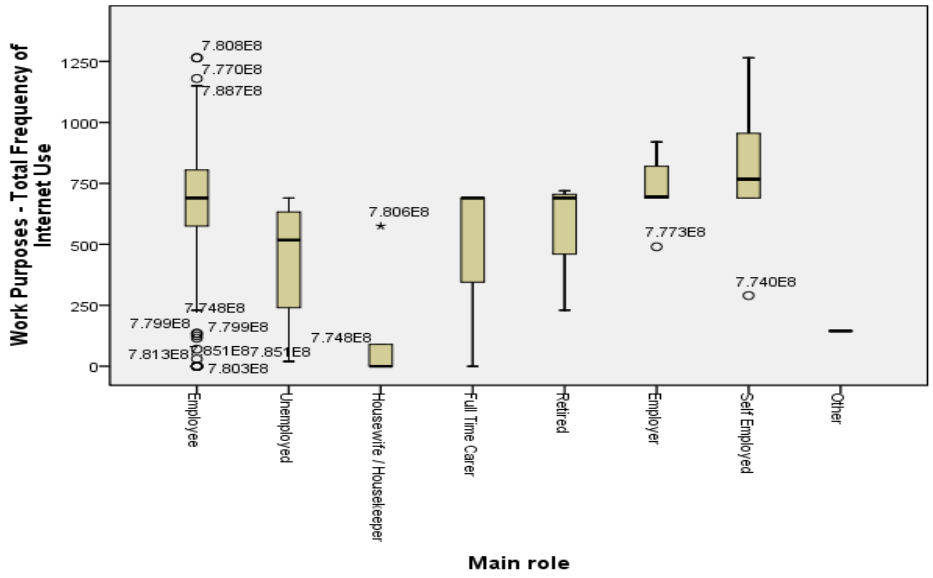
7. MAIN ROLE - INTERNET USE - DOMESTIC PURPOSES



Retired participants stated that they used the internet the most for domestic purposes (defined on the questionnaire as online banking, shopping, information searching and retrieval) with an almost complete reversal of the order of the social purposes responses given that the self employed and employers were the next highest. The employees had the greatest variation again followed by the unemployed.

Responses relating to work were then analyzed using the same approach:

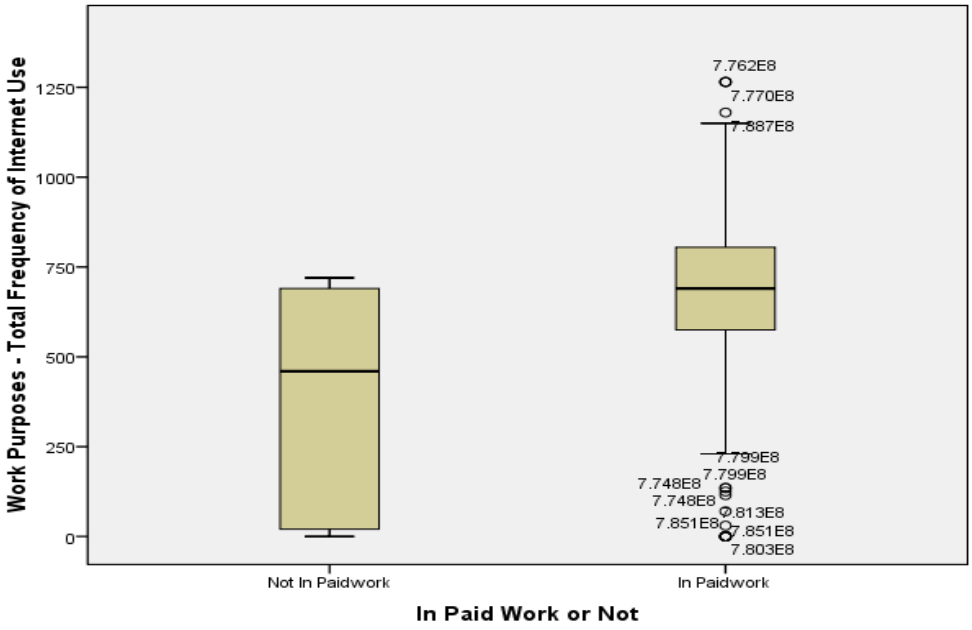
8. MAIN ROLE - INTERNET USE - WORK PURPOSES



The self employed, employers and employees are the most frequent users of the internet for work related purposes. It is a little surprising that the unemployed, retired and full time carers also indicated relatively high levels of the internet use. This perhaps is an indication that the definition of "work" in this context should have been better defined in the questionnaire. It was left for each participant to interpret its meaning.

A re-run of the boxplot using the transformed variable "Those in paid work/not in paid work" produced the following result:-

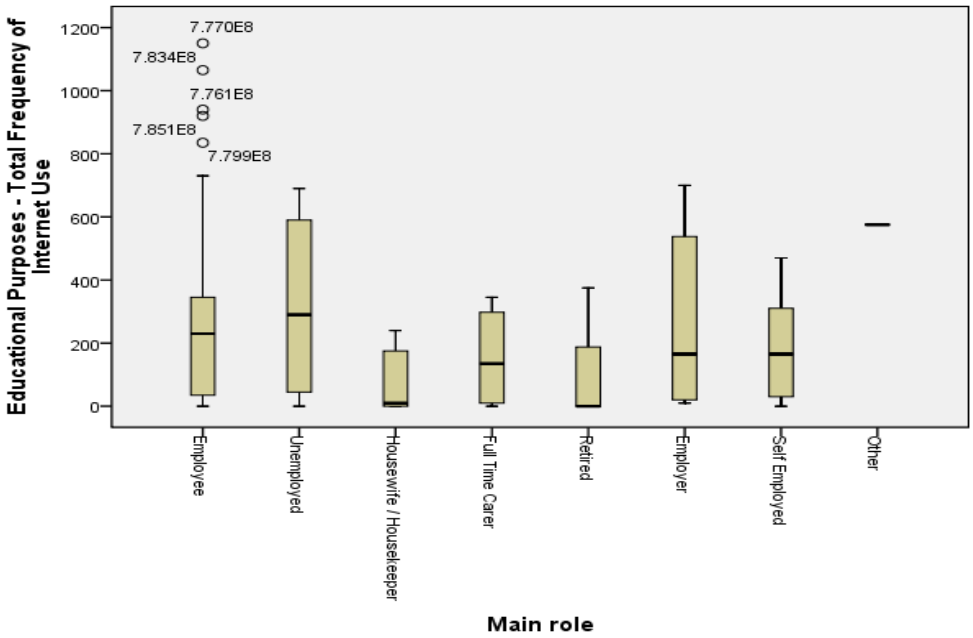
9. IN PAID WORK - INTERNET USE - WORK PURPOSES



This shows a more expected result with those in paid work using the internet more frequently on average than those that were not.

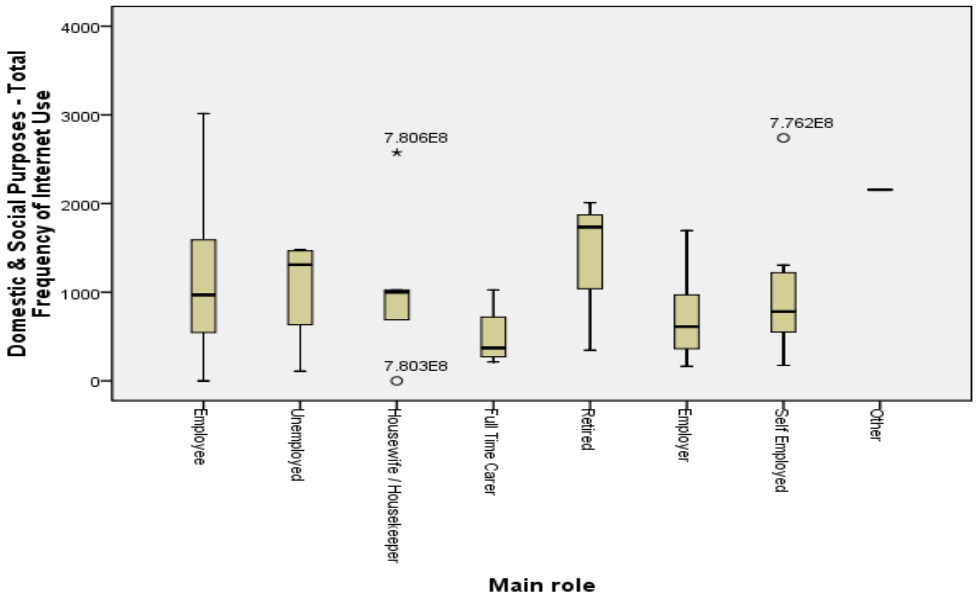
Following that the situation for educational purposes was analyzed;-

10. MAIN ROLE - INTERNET USE - EDUCATIONAL PURPOSES



Although the sample size was small, the unemployed showed the highest average frequency of internet use for educational purposes. Perhaps they were seeking to improve their chances of gaining employment? Other than that the use of the internet for educational purposes was relatively low on average compared to other categories

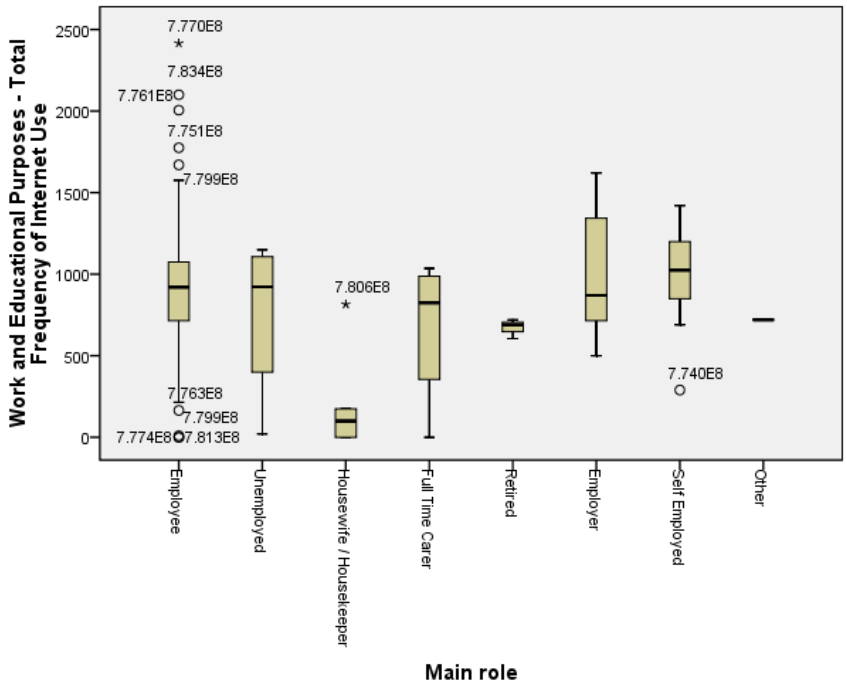
11. MAIN ROLE - INTERNET USE – DOMESTIC & SOCIAL PURPOSES



Those who were retired had the highest average frequency of internet use followed by the unemployed with fulltime carers having eh lowest frequency on average.

This was then compared with the boxplot for work and educational purposes:-

12. MAIN ROLE - INTERNET USE – WORK & EDUCATIONAL PURPOSES



Looking at "Work & Education" together not surprisingly those who were housewives, or housekeepers, used the internet the least overall for this purpose. The self employed employers and employees where the top three users on average but close to the unemployed and full time carers. Again this l;eads to the question about how respondents interpreted the word "*work*", and whether the responses can be viewed as reliable.

4.5.1 MAIN ROLE - RELATIONSHIP TEST - SPEARMAN'S RHO

This would requires two variables, one dichotomous and one continuous. In this case Main Role is not dichotomous, so this test cannot be used (Pallant, 2007) page 133.

4.5.2 MAIN ROLE - CHI-SQUARE TEST FOR INDEPENDENCE

Use of this test was considered to explore relationships and determine whether there is an association between "Main Role" and internet use. It requires two nominal (categorical) variables (Pallant, 2007) page 214. "Main Role" is nominal, but the "internet use" variables are ordinal (ranked) from 1 "Never" to 5 "Daily". Therefore this requirement for use was not met. One of the other main assumptions of the Chi-square test is that the minimum expected cell frequency should be 5 or more in at least 80% of cases (Pallant, 2007) page 216. When this assumption was tested by running the Chi-square test on "Main Role" and the dependent variable "Using a PC to Socialise" 87.5% of the cells had less than 5 counts each:-

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	36.522[a]	28	.130
Likelihood Ratio	35.747	28	.149
Linear-by-Linear Association	4.306	1	.038
N of Valid Cases	228		

a. 35 cells (87.5%) have expected count less than 5. The minimum expected count is .05.

Therefore this test was not used for both of these reasons. As it requires two nominal (categorical) variables replacing the above ordinal variable with frequency of internet use would not work either, because this is a scale variable

4.5.3 MAIN ROLE - COEFFICIENT OF DETERMINATION

To see how much variance two variables that correlate share - cannot be used for reasons stated for Spearman's Rho.

4.5.4 MAIN ROLE - KRUSKAL – WALLIS TEST

The non-parametric Kruskal – Wallis Test was used to test "Main Role" against frequency of internet use (Pallant, 2007) page 226. This is similar to a Mann-Whitney U Test used for "Gender", but it allows testing to be carried out where a variable consists of for more than two groups, as in this case ("Main Role" had 11 groups, of which 8 had values, as in participants marked themselves as falling into one of the categories). It requires one independent nominal (categorical) variable, "Main Role", and a dependent scale (continuous) variable, "Total Frequency of Internet Use". The parametric alternative to this is the "one-way between groups analysis of variance".

Results were as follows:-

20. Main Role of Participants - Kruskal Wallis Test

Ranks			
	Main role	N	Mean Rank
All purposes - Total Frequency of Internet Use	Employee	195	117.22
	Unemployed	4	115.38
	Housewife / Housekeeper	5	64.20
	Full Time Carer	4	58.38
	Retired	3	124.00
	Employer	8	93.81
	Self Employed	8	115.19
	Other	1	189.00
	Total	228	

Test Statistics[a,b]	
	All purposes - Total Frequency of Internet Use
Chi-Square	8.260
df	7
Asymp. Sig.	.310
a. Kruskal Wallis Test	
b. Grouping Variable: Main role	

The mean rankings are shown in the table below:-

21. Main Role - Medians - All purposes - Total Frequency of Internet Use

All purposes - Total Frequency of Internet Use				
Main role	N	Median	Std. Deviation	Mean
Employee	195	1890.00	952.622	2009.51
Unemployed	4	2275.00	1123.996	1805.00
Housewife / Housekeeper	5	1100.00	1272.529	1276.00
Full Time Carer	4	1245.00	739.217	1167.50
Retired	3	2340.00	859.113	2035.00
Employer	8	1482.50	871.687	1715.62
Self Employed	8	1895.00	1027.921	1985.00
Other	1	2875.00	.	2875.00
Total	228	1885.00	959.301	1968.03

4.6 Profession

4.6.1 PROFESSION DATA PREPARATION REQUIREMENTS

Profession – is there a relationship between profession and what 45-54 year olds do online and how frequently they do it?

"Are you professionally qualified in any of the following? (can have more than one)"

Respondents could record that they had more than one professional qualification and the following did so.

22. Participants qualified in more than one profession

Comments input by Participants	**Counted against the following categories for analysis purposes**
Computing, Accountancy, Biomedical Science (Clinical Chemistry)	Computing, Accountancy, and Science
Nurse Lecturer	Teaching, and Medicine & Health Professionals
Science and Marketing	Science and Other
General Management and Teaching	General Management and Teaching
Teaching, science, diving	Teaching, Science, Other
Science, Research, Computing/IT, Therapy/Medicine	Computing, Medicine & Health Professionals, Science
Medicine and General management	General Management and Medicine & Health Professionals,
Computing/IT, Social care	Computing and Social care
Medical, marketing	Medicine & Health Professionals and Other
Lecturer (radiographer)	Teaching and Medicine & Health Professionals
Radiology management	General Management and Medicine & Health Professionals,

A total of 31 respondents working in health service organisations chose "Other" rather than "Medicine". They noted their professions as "allied health professional", "profession allied to medicine", "nursing", "radiography", speech and language therapy", and "clinical psychology". For

analysis purposes these, and the 19 who selected "Medicine", were transformed into a revised category of "Medical & Health professions" making a revised category total of 50. The adjusted totals by profession are given below:-

23. Professional Qualification Frequencies

Professionally Qualifications	**Total**	**%**
General Management	24	9.6%
Human Resources	4	1.6%
Computing / IT	45	18.1%
Accountancy	15	6.0%
Teaching / training	18	7.2%
Medical & Health professions	50	20.1%
Social care	5	2.0%
Media, The Arts, Entertainment, Hospitality	1	0.4%
Legal	3	1.2%
Science	19	7.6%
Other	62	24.9%
Rather not say	3	1.2%
Total	**249**	**100%**

Of the 62 participants who chose "Other" a total of 9 recorded their professions as either marketing, construction or engineering:-

24. Breakdown of "Other" Professional Qualifications

Breakdown of Other:-	Total
Marketing	3
Construction	1
Engineering	5
Total	**9**

For analysis purposes the "Other" category was adjusted to exclude the above and as a result the professional qualification totals for use during analysis (following adjustment) were as follows

25. Professional Qualifications - adjusted

Professionally Qualifications	**Total**	**%**
General Management	24	9.6%
Human Resources	4	1.6%
Computing / IT	45	18.1%
Accountancy	15	6.0%
Teaching / training	18	7.2%
Medicine & Health professions	50	20.1%
Social care	5	2.0%
Media, The Arts, Entertainment, Hospitality	1	0.4%
Legal	3	1.2%
Science	19	7.6%
Marketing	3	1.2%
Construction	1	0.4%
Engineering	5	2.0%
Other – now as in "not indicated at all" / not known	53	21.3%
Rather not say	3	1.2%
Total	**249**	**100%**

There were some marked differences between genders. For example the most dispersed professional differences by gender with males predominating in computing and females in teaching and medicine. are shown below:-

26. Professional differences by gender

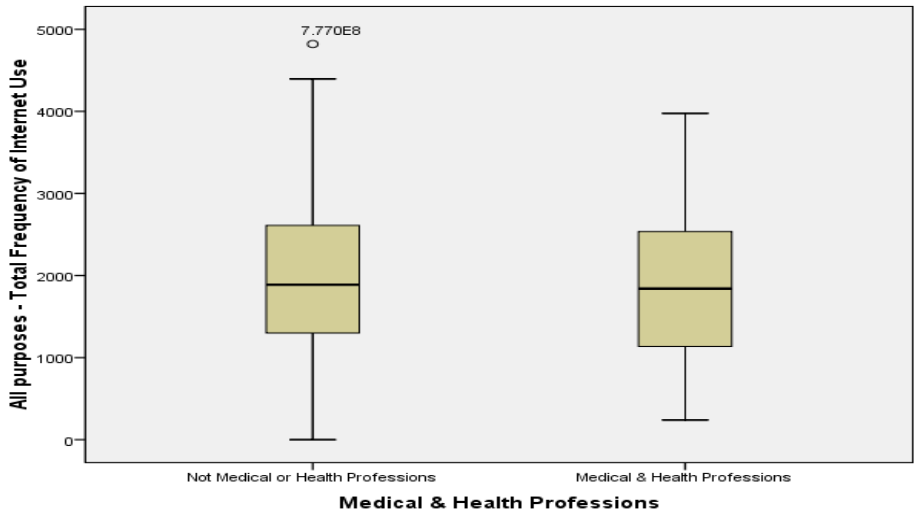
Examples - professional differences by gender	Computing / IT	Teaching / training	Medicine & Health professions
Males	71%	22%	14%
Females	29%	78%	86%

In this case, because a respondent could select (belong to) more than one group and therefore could be counted twice or more is a across comparison across professional groups the approach used was to compare each of the groups of professions against all the rest, e.g those in "Computing / IT" versus all other groups combined.

Boxplots were prepared showing "All internet uses", "Domestic & Social", and "Work and Educational" internet use purposes to see if a visual check identified any major difference.

4.6.2 MEDICAL & HEALTH PROFESSIONS

13. MEDICAL/HEALTH - INTERNET USE – ALL PURPOSES



A Mann-Whitney U test was also used to test for differences between those in the medical and health professionals group and those that were not:-

27. Mann-Whitney U Test – Medical & Health– All Internet Uses

Test Statistics[a]	**All purposes - Total Frequency of Internet Use**
Mann-Whitney U	4103.500
Wilcoxon W	5378.500
Z	-.841
Asymp. Sig. (2-tailed)	.400
a. Grouping Variable: Medical & Health Professions	

All purposes - Total Frequency of Internet Use				
Medicine, Health, Social care professionals	**Mean**	**N**	**Std. Deviation**	**Median**
Not Medicine, Health, Social care	2025.26	173	954.674	1895.00
Medicine, Health, Social care	1788.00	55	960.212	1760.00
Total	1968.03	228	959.301	1885.00

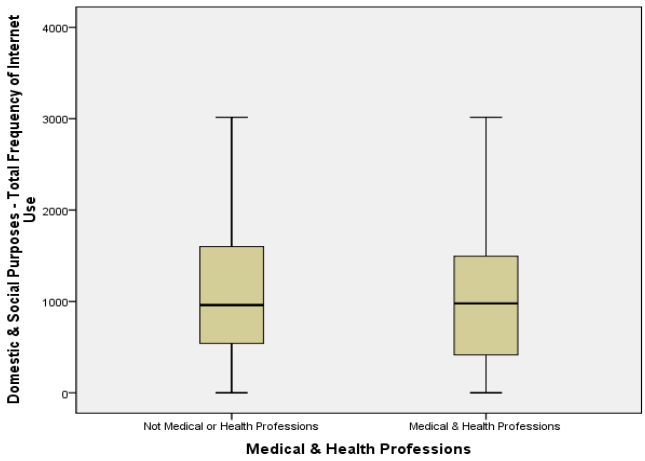
R = -1.227/sq root of n n=228. Sq root of 228=15.099668 So r= -1.227/15.099668

Therefore r=-0.08126 – little effect

A Mann-Whitney U test revealed no significant difference in the frequency of overall internet use for health and medical professional (Md = 1760, n=55), compared to others (Md = 1895, n=173), u = 4103, z= -0.84, p=0.40, r=-0.08.

This was repeated for use of the internet for social & domestic purposes:-

14. MEDICAL/HEALTH - INTERNET USE – SOCIAL & DOMESTIC PURPOSES



The above boxplot shows little difference visually between the two groups. A Man Whitney U test was carried out to test this..

28. Mann-Whitney U Test – Medical & Health– Domestic & Social Uses

Test Statistics[a]	Domestic & Social Purposes - Total Frequency of Internet Use
Mann-Whitney U	4172.000
Wilcoxon W	5447.000
Z	-.675
Asymp. Sig. (2-tailed)p	.500
a. Grouping Variable: Medical & Health Professions	

p = Not less than or equal to 0.05

Domestic & Social Purposes - Total Frequency of Internet Use				
Medicine, Health, Social care professionals - added column	Mean	N	Std. Deviation	Median
Not Medicine, Health, Social care	1106.76	173	712.280	960.00
Medicine, Health, Social care	983.91	55	709.524	930.00
Total	1077.13	228	712.005	960.00

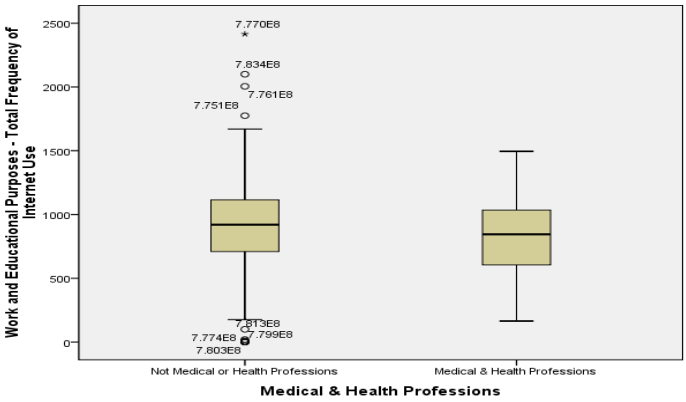
R = -0.675/sq root of n n=228. Sq root of 228=15.099668 So r= -0.675/15.099668

Therefore r=-0.04 = little effect

A Mann-Whitney U test revealed no significant difference in the frequency of social and domestic internet use for health and medical professionals (Md = 930, n=55), compared to others (Md = 960, n=1735), u = 4172, z= -0.675, p=0.50, r=-0.04.

A further test was carried out to see of there was any significant difference between medical and health professionals and other groups relating to the used of the internet for "Work and Educational" purposes by repeating the approach described above:-.

15. Medical/Health - Internet Use – Work & Educational Purposes



Again a visual inspection of the boxplot does not reveal any major differences. So again a Mann Whitney U test was carried out to test this:-

29. Mann-Whitney U Test – Medical & Health - Work & Educational Purposes

Test Statistics[a]	Work and Educational Purposes - Total Frequency of Internet Use
Mann-Whitney U	3932.500
Wilcoxon W	5207.500
Z	-1.256
Asymp. Sig. (2-tailed)	.209

a. Grouping Variable: Medical & Health Professions

Work and Educational Purposes - Total Frequency of Internet Use				
Medicine, Health, Social care professionals - added column	Mean	N	Std. Deviation	Median
Not Medicine, Health, Social care	918.50	173	376.132	920.00
Medicine, Health, Social care	804.09	55	377.471	805.00
Total	890.90	228	378.812	920.00

R = -1.256/sq root of n n=228. Sq root of 228=15.099668 So r= -1.256/15.099668

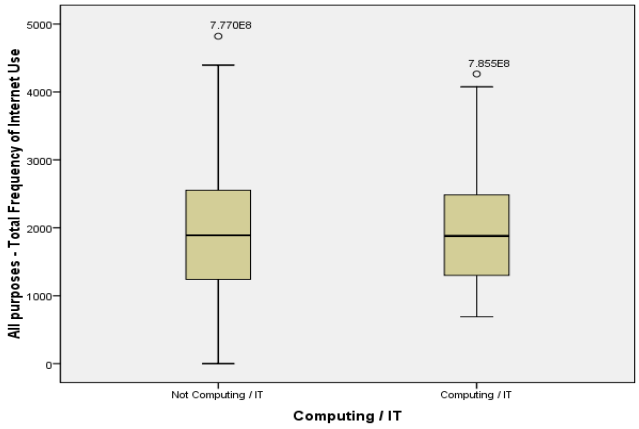
Therefore r=-0.08 = little effect

A Mann-Whitney U test revealed no significant difference in the frequency of work and educational internet use for health and medical professionals (Md = 805, n=55), compared to others (Md = 920, n=173), u = 3932, z= -1.256, p=0.209, r=-0.04.

4.6.3 COMPUTING / IT PROFESSIONS

Overall the boxplot of frequency of internet use by those who recorded their profession as "Computing/IT" , across all types of frequency of internet use, does not look too dissimilar between those in Computing / IT and those that are not:-

16. COMPUTING/IT - INTERNET USE – ALL PURPOSES



Again a Mann-Whitney U Test was used to test for differences between the groups to confirm this:-

30. Mann-Whitney U Test – Computing / IT - All Purposes

Test Statistics[a]	All purposes - Total Frequency of Internet Use
Mann-Whitney U	3967.000
Wilcoxon W	20803.000
Z	-.380
Asymp. Sig. (2-tailed)	.704
a. Grouping Variable: Computing / IT	

All purposes - Total Frequency of Internet Use				
Computing / IT	Mean	N	Std. Deviation	Median
Not Computing / IT	1950.49	183	972.938	1890.00
Computing / IT	2039.33	45	908.682	1880.00
Total	1968.03	228	959.301	1885.00

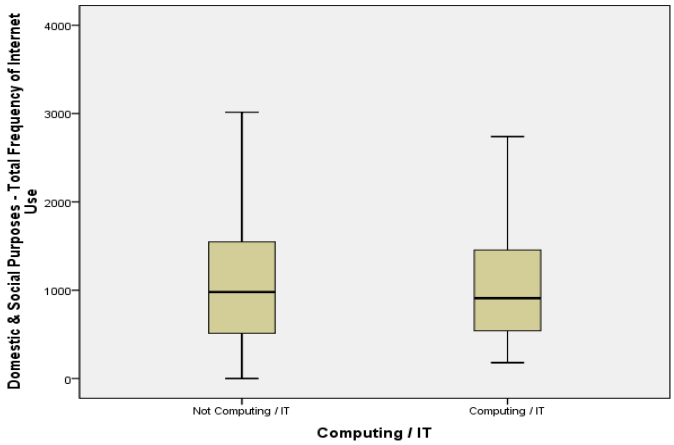
R = -0.380/sq root of n n=228. Sq root of 228=15.099668 So r= -0.380/15.099668

Therefore r=-0.02 = virtually *no effect*

A Mann-Whitney U test revealed no significant difference in the frequency of overall internet use for Computing / IT professionals (Md =1880, n=45), compared to others (Md =1890, n=183), u =3967, z=-0.380, p=0.704, r=-0.02.

The above was repeated for domestic and social purposes:-

17. COMPUTING/IT - INTERNET USE – DOMESTIC & SOCIAL PURPOSES



Again the boxplot did not look too dissimilar between groups, which was confirmed by the Mann-Whitney U Test:-

31. Mann-Whitney U Test – Computing / IT – Domestic & Social Purposes

Test Statistics[a]	Domestic & Social Purposes - Total Frequency of Internet Use
Mann-Whitney U	4001.000
Wilcoxon W	5036.000
Z	-.294
Asymp. Sig. (2-tailed)	.769
a. Grouping Variable: Computing / IT	

Domestic & Social Purposes - Total Frequency of Internet Use				
Computing / IT	Mean	N	Std. Deviation	Median
Not Computing / IT	1083.22	183	716.908	980.00
Computing / IT	1052.33	45	699.075	910.00
Total	1077.13	228	712.005	960.00

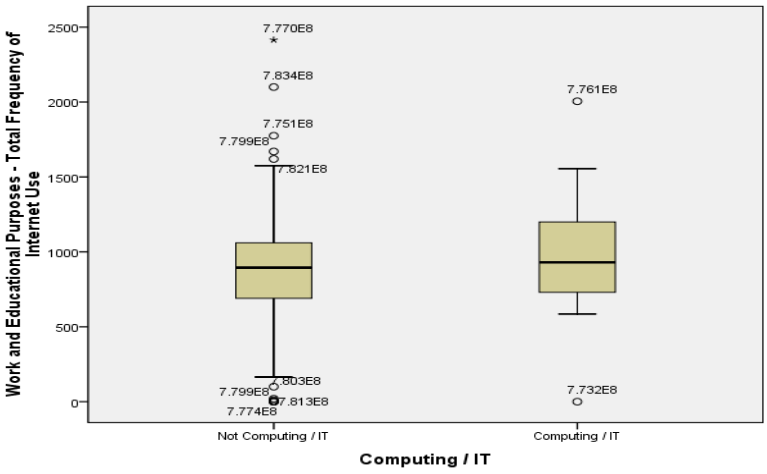
R = -0.294/sq root of n n=228. Sq root of 228=15.099668 So r= -0.294/15.099668

Therefore r= -0.02 = *virtually no effect*

Yet again the Mann-Whitney U test revealed no significant difference in the frequency of Domestic & Social internet use by Computing / IT professionals (Md =910, n=45), compared to others (Md =980, n=183), u =4001, z=-0.294, p=0.769, r=-0.02.

This was then repeated for work and educational internet use:-

18. COMPUTING/IT - INTERNET USE – WORK & EDUCATIONAL PURPOSES



32. Mann-Whitney U Test – Computing / IT - Work & Educational Purposes

Test Statistics[a]	Work and Educational Purposes - Total Frequency of Internet Use
Mann-Whitney U	3386.500
Wilcoxon W	20222.500
Z	-1.844
Asymp. Sig. (2-tailed)	.065
a. Grouping Variable: Computing / IT	

Work and Educational Purposes - Total Frequency of Internet Use				
Computing / IT	Mean	N	Std. Deviation	Median
Not Computing / IT	867.27	183	386.352	895.00
Computing / IT	987.00	45	333.357	930.00
Total	890.90	228	378.812	920.00

R = -1.844/sq root of n n=228. Sq root of 228=15.099668 So r= -1.844/15.099668.
Therefore r= 0.12 = *little effect*

Again, a Mann-Whitney U test revealed no significant difference in the frequency of work and educational internet use for Computing / IT professionals (Md =930, n=45), compared to others (Md =895, n=183), u =3386, z=-1.844, p=0.065, r=0.12.

4.7 Qualifications

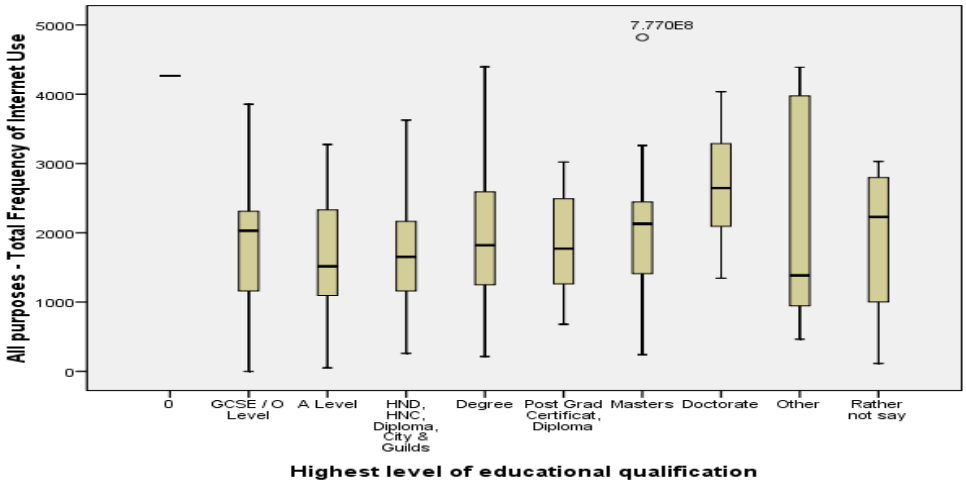
The question this dissertation is seeking to answer is as follows:-

- Qualifications - is there a relationship between qualifications and what 45-54 year olds do online and how frequently they do it?

"What is your highest level of educational qualification?"

Firstly a boxplot was produced to provide a visual check of each of the groups:-

19. QUALIFICATIONS - INTERNET USE – ALL PURPOSES



A slight upward trend in average internet use can be seen as the level of educational qualification increases, with the exception of those with GCSE/O Levels.

To see whether this was significant the non-parametric Kruskal-Wallis test was used compare the scores of the different levels of educational groups for overall frequency of internet use across all types of use, social and domestic and work and educational purposes. Details can be found in Appendix 4.

33. Kruskal-Wallis Test – Education – Internet Use- All Purposes

Ranks	Highest level of educational qualification	N	Mean Rank
All purposes - Total Frequency of Internet Use	GCSE / O Level	21	104.48
	A Level	18	94.75
	HND, HNC, Diploma, City & Guilds	22	102.45
	Degree	88	115.22
	Post Grad Certificat, Diploma	12	106.42
	Masters	45	117.06
	Doctorate	12	166.29
	Other	5	110.50
	Rather not say	4	123.12
	Total	227	

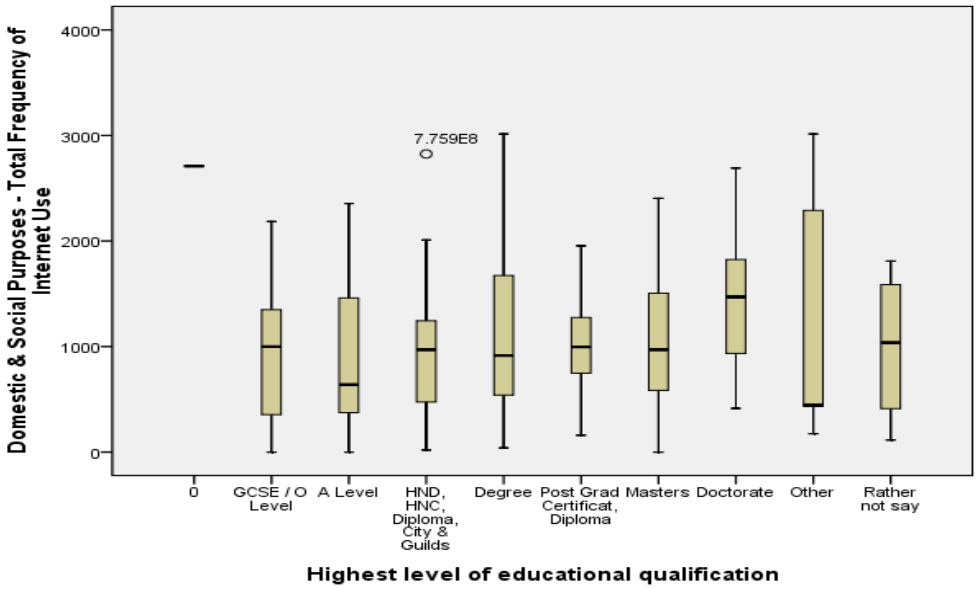
Test Statistics[a,b]	All purposes - Total Frequency of Internet Use
Chi-Square	10.656
df	8
Asymp. Sig.	.222
a. Kruskal Wallis Test	
b. Grouping Variable: Highest level of educational qualification	

All purposes - Total Frequency of Internet Use				
Highest level of educational qualification	Mean	N	Std. Deviation	Median
GCSE / O Level	1807.86	21	997.671	2030.00
A Level	1650.83	18	908.922	1515.00
HND, HNC, Diploma, City & Guilds	1759.09	22	834.437	1652.50
Degree	1997.84	88	966.889	1820.00
Post Grad Certificat, Diploma	1820.83	12	763.850	1770.00
Masters	1983.89	45	834.891	2130.00
Doctorate	2697.50	12	859.102	2645.00
Other	2232.00	5	1815.976	1385.00
Rather not say	1900.00	4	1278.730	2227.50
Total	1968.03	228	959.301	1885.00

A Kruskal-Wallis Test revealed no statistically significant difference in overall frequency of internet use across the different level of educational qualification (Grp1, n=21: GCSE / O Level, Grp2, n=18: A Level, Grp3, n=22: HND, HNC, Diploma, City & Guilds, Grp4, n=88: Degree, Grp5, n=12: Post Grad Certificate, Grp6, n=88: Doctorate, Grp7, n=5: Other, Grp8, n=4: Rather not say) X2 (8, n=228) = 10.656, p=0.222. The Mean Ranks suggest that those with Doctorates used the internet more on average and had a higher median score (Md=2645), with those with A levels using it the least (Md=1515).

Following that a boxplot was produced to give a visual view of the distribution of scores for educational and social purposes:-

20. QUALIFICATIONS - INTERNET USE – DOMESTIC & SOCIAL PURPOSES



This also showed that those with doctorates on average use the internet more frequently for this purpose than others and that those who responded who had A levels used it the least.

A Kruskal-Wallis Test was repeated for the Domestic and Social use of the internet to compare scores. The results are as follows:-

34. Kruskal-Wallis Test – Education – Internet Use- Domestic & Social

Ranks	Highest level of educational qualification	N	Mean Rank
Domestic & Social Purposes - Total Frequency of Internet Use	GCSE / O Level	21	106.90
	A Level	18	98.31
	HND, HNC, Diploma, City & Guilds	22	107.09
	Degree	88	115.27
	Post Grad Certificate, Diploma	12	112.96
	Masters	45	115.54
	Doctorate	12	150.71
	Other	5	111.00
	Rather not say	4	111.38
	Total	227	

Test Statistics[a,b]	Domestic & Social Purposes - Total Frequency of Internet Use
Chi-Square	5.344
df	8
Asymp. Sig.	.720
a. Kruskal Wallis Test	
b. Grouping Variable: Highest level of educational qualification	

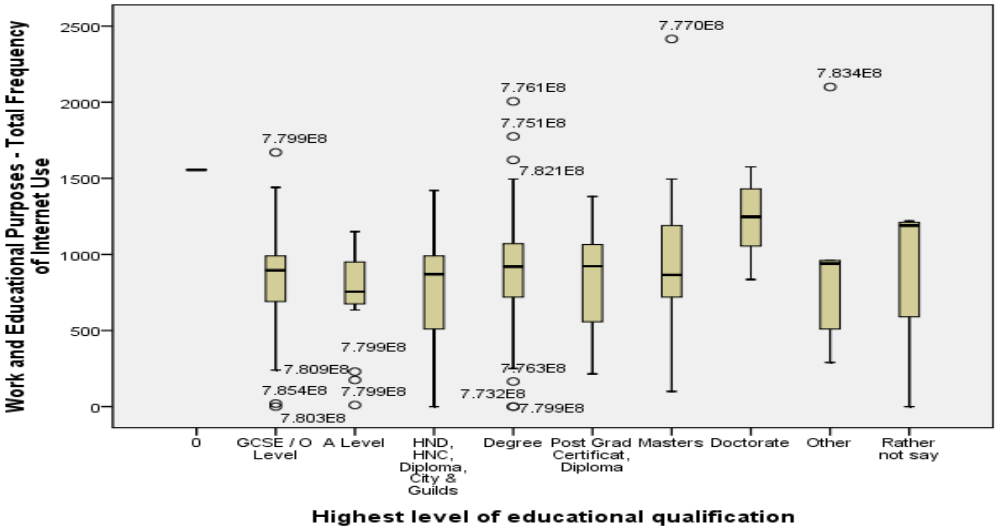
Domestic & Social Purposes - Total Frequency of Internet Use				
Highest level of educational qualification	Mean	N	Std. Deviation	Median
GCSE / O Level	981.43	21	704.633	1000.00
A Level	918.33	18	731.017	640.00
HND, HNC, Diploma, City & Guilds	991.82	22	688.633	970.00
Degree	1101.02	88	747.262	915.00
Post Grad Certificate, Diploma	997.92	12	520.159	997.50
Masters	1049.56	45	595.297	970.00
Doctorate	1455.00	12	679.338	1470.00
Other	1272.00	5	1290.570	445.00
Rather not say	1000.00	4	743.113	1037.50
Total	1077.13	228	712.005	960.00

- The Kruskal-Wallis Test again revealed no statistically significant difference in overall frequency of domestic and social internet use across the different level of educational qualification (Grp1, n=21: GCSE / O Level, Grp2, n=18: A Level, Grp3, n=22: HND, HNC, Diploma, City

& Guilds, Grp4, n=88: Degree, Grp5, n=12: Post Grad Certificate, Grp6, n=88: Doctorate, Grp7, n=5: Other, Grp8, n=4: Rather not say) X2 (8, n=228) = 5.344, p=0.720. The Mean Ranks suggest that those with Doctorates used the internet more on average, (Md=1470), with those with A levels using it the least (Md=640).

Finally this was repeated again for work and educational purposes:-

21. QUALIFICATIONS - INTERNET USE – WORK & EDUCATIONAL PURPOSES



This yet again showed that those with doctorates on average use the internet more frequently for this purpose than others and that those who responded who had A levels used it the least.

A Kruskal-Wallis Test was also repeated for the category Work & Educational use of the internet to compare scores. The results are as follows:-

35. Kruskal-Wallis Test – Education – Internet Use- Work & Education

Ranks	Highest level of educational qualification	N	Mean Rank
Work and Educational Purposes - Total Frequency of Internet Use	GCSE / O Level	21	103.79
	A Level	18	88.39
	HND, HNC, Diploma, City & Guilds	22	95.41
	Degree	88	114.88
	Post Grad Certificate, Diploma	12	106.75
	Masters	45	117.86
	Doctorate	12	183.17
	Other	5	109.60
	Rather not say	4	142.12
	Total	227	

Test Statistics[a,b]	Work and Educational Purposes - Total Frequency of Internet Use
Chi-Square	19.403
df	8
Asymp. Sig.	.013
a. Kruskal Wallis Test	
b. Grouping Variable: Highest level of educational qualification	

Work and Educational Purposes - Total Frequency of Internet Use				
Highest level of educational qualification	Mean	N	Std. Deviation	Median
GCSE / O Level	826.43	21	421.886	895.00
A Level	732.50	18	309.084	755.00
HND, HNC, Diploma, City & Guilds	767.27	22	335.530	870.00
Degree	896.82	88	349.529	920.00
Post Grad Certificat, Diploma	822.92	12	334.416	922.50
Masters	934.33	45	384.580	865.00
Doctorate	1242.50	12	244.944	1247.50
Other	960.00	5	698.463	940.00
Rather not say	900.00	4	600.222	1190.00
Total	890.90	228	378.812	920.00

This time the Kruskal-Wallis Test revealed a statistically significant difference in overall frequency of work and educational internet use across the different level of educational qualification (Grp1, n=21: GCSE / O Level, Grp2,

n=18: A Level, Grp3, n=22: HND, HNC, Diploma, City & Guilds, Grp4, n=88: Degree, Grp5, n=12: Post Grad Certificate, Grp6, n=88: Doctorate, Grp7, n=5: Other, Grp8, n=4: Rather not say) X2 (8, n=228) = 19.403, p=0.013. The Mean Ranks suggest that those with Doctorates (Md=1247)used the internet more on average, with those with A levels using it the least (Md=755).

A Kruskal-Wallis Test revealed:-

- no statistically significant difference in overall frequency of internet use across the different level of educational qualification (Grp1, n=21: GCSE / O Level, Grp2, n=18: A Level, Grp3, n=22: HND, HNC, Diploma, City & Guilds, Grp4, n=88: Degree, Grp5, n=12: Post Grad Certificate, Grp6, n=88: Doctorate, Grp7, n=5: Other, Grp8, n=4: Rather not say) X2 (8, n=228) = 10.656, p=0.222. The Mean Ranks suggest that those with Doctorates used the internet more on average and had a higher median score (Md=2645), with those with A levels using it the least (Md=1515).
- no statistically significant difference in overall frequency of domestic and social internet use across the different level of educational qualification (Grp1, n=21: GCSE / O Level, Grp2, n=18: A Level, Grp3, n=22: HND, HNC, Diploma, City & Guilds, Grp4, n=88: Degree, Grp5, n=12: Post Grad Certificate, Grp6, n=88: Doctorate, Grp7, n=5: Other, Grp8, n=4: Rather not say) X2 (8, n=228) = 5.344, p=0.720. The Mean Ranks suggest that those with Doctorates used the internet more on average, (Md=1470), with those with A levels using it the least (Md=640).
- a statistically significant difference in overall frequency of work and educational internet use across the different level of educational qualification (Grp1, n=21: GCSE / O Level, Grp2, n=18: A Level, Grp3, n=22: HND, HNC, Diploma, City & Guilds, Grp4, n=88:

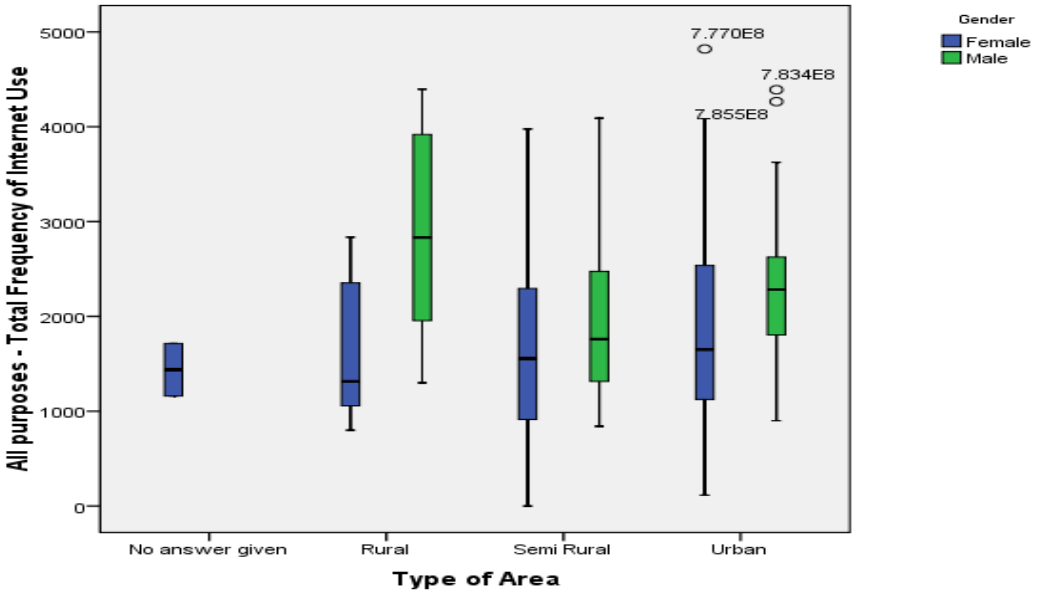
4.8 Type of Area

The research question was:-

- Is there a relationship between area type (rural, semi-rural, urban) and what 45-54 year olds do online and how frequently they do it?

A boxplot was prepared showing the above for total frequency of internet use by gender:-

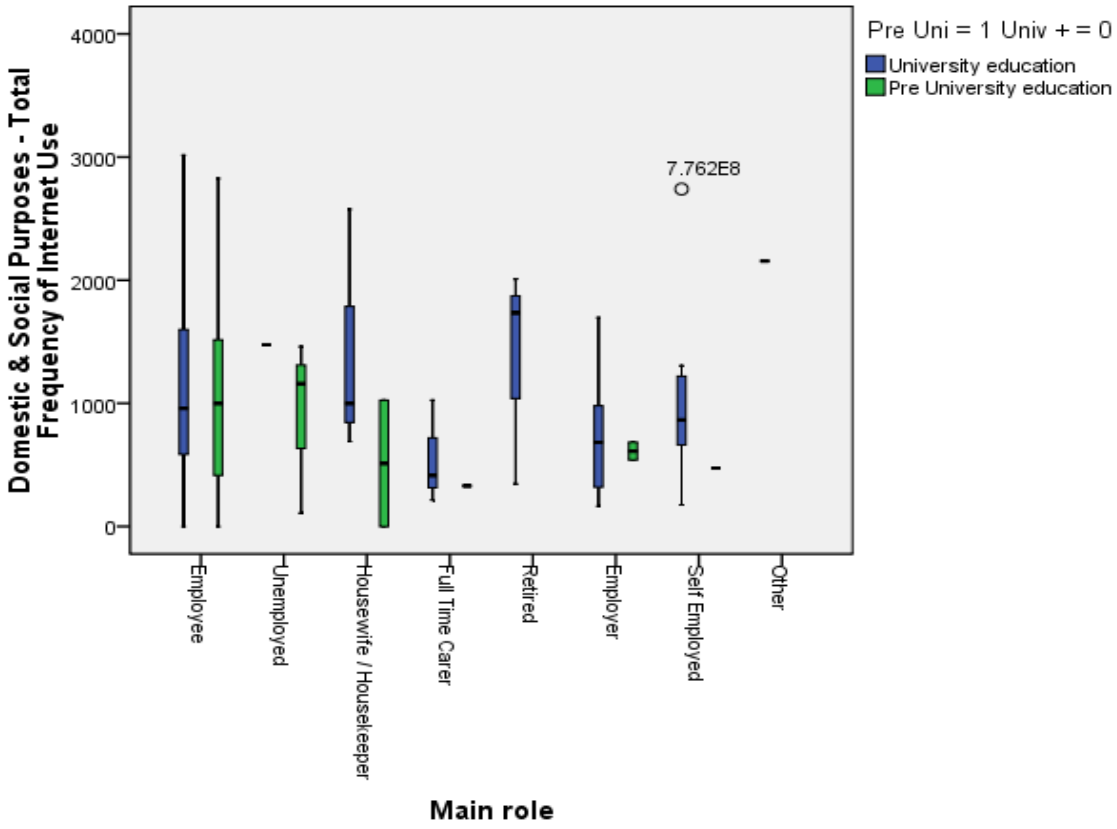
22. MAIN ROLE - INTERNET USE BY GENDER – ALL PURPOSES



This showed that is all three comparisons, males in the sample used the internet more frequently than females with by far the biggest difference being between male and females' in living in rural areas.

Repeating the above, but this time examining frequency of "Domestic & Social" internet use, by whether respondents had a university education or not, produced the following boxplot:-

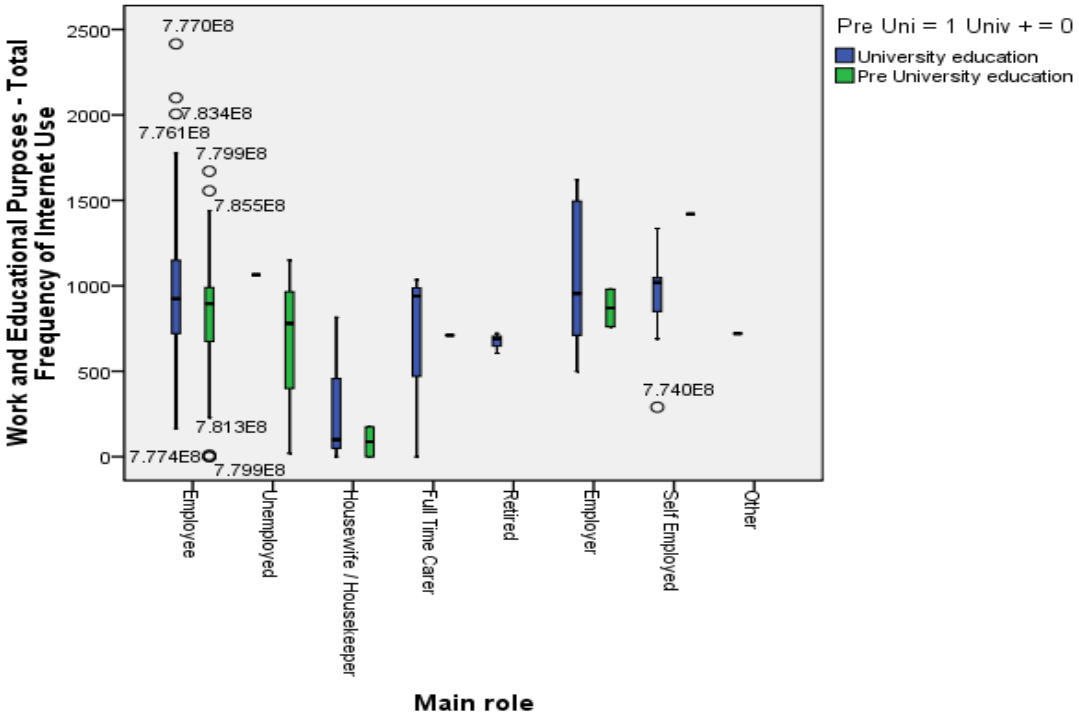
23. MAIN ROLE - INTERNET USE BY EDUCATION – DOMESTIC & SOCIAL PURPOSES



This showed, for example, that housekeepers in the sample with a university education, used of the internet for domestic and social purposes much more on average than those without a university education. This also illustrates that the sample sizes by educational qualification for each main role did not have similar number of pre-university and university members in each.

Doing the same as above for frequency of internet use relating to "Work & Education" produced the following boxplot:-

24. MAIN ROLE - INTERNET USE BY EDUCATION – WORK & EDUCATIONAL PURPOSES



The sample of employees with a university education used the internet slightly more on average than those without but the spread of score was greater.

Following the above Kruskal-Wallis test was used to compare frequency of internet use by main role.

36. Kruskal-Wallis Test – Type of Area – Internet Use- All Purposes

Ranks	Type of Area	N	Mean Rank
All purposes - Total Frequency of Internet Use	Rural	24	140.62
	Semi Rural	96	101.58
	Urban	106	118.15
	Total	226	

Test Statistics[a,b]	All purposes - Total Frequency of Internet Use
Chi-Square	7.856
df	2
Asymp. Sig.	.020
a. Kruskal Wallis Test	
b. Grouping Variable: Type of Area	

All purposes - Total Frequency of Internet Use			
Type of Area	Mean	N	Std. Deviation
Rural	2464.58	24	1105.595
Semi Rural	1783.18	96	887.622
Urban	2033.02	106	954.062
Total	1968.03	228	959.301

The above shows that the significance level is less than 0.05 (p=0.02) so there is a statistically significant difference in the frequency of intent use across the three groups.

A Kruskal-Wallis Test revealed a statistically significant difference in overall frequency of internet use across the three types of area used in the study (Grp 1, n24: Rural, Grp 2, n96: Semi-Rural, Grp 3, n=106: Urban) X2 (2, n=226) = 7.86, p= 0.02. The mean ranking showed that those who indicated that they lived in "Rural" areas had the highest overall ranking (Md=2465) with "Urban" next (Md=2033), and "Semi-rural" lowest of the three (Md=1783). Details can be found in Appendix 4.

This was then repeated for total frequency of internet use for "Domestic & Social" purposes:-

37. Kruskal-Wallis Test – Type of Area – Internet Use- Domestic & Social

Ranks	Type of Area	N	Mean Rank
Domestic & Social Purposes - Total Frequency of Internet Use	Rural	24	130.77
	Semi Rural	96	102.41
	Urban	106	119.63
	Total	226	

Test Statistics[a,b]	Domestic & Social Purposes - Total Frequency of Internet Use
Chi-Square	5.368
df	2
Asymp. Sig.	.068
a. Kruskal Wallis Test	
b. Grouping Variable: Type of Area	

Work and Educational Purposes - Total Frequency of Internet Use				
Type of Area	Mean	N	Std. Deviation	Median
No answer given	1017.50	2	137.886	1017.50
Rural	1134.38	24	327.073	1200.00
Semi Rural	823.65	96	353.242	825.00
Urban	894.29	106	394.611	920.00
Total	890.90	228	378.812	920.00

The above shows that the significance level is more than 0.05 (p=0.068) so there is no statistically significant difference in the frequency of intent use for domestic and social purposes across the three "Type of Area" groups.

A Kruskal-Wallis Test revealed no statistically significant difference in overall frequency of internet use for "Domestic & Social" purposes across the three types of area used in the study (Grp 1, n24: Rural, Grp 2, n96: Semi-Rural, Grp 3, n=106: Urban) X2 (2, n=228) = 5.368, p= 0. 068. The mean ranking showed that those who indicated that they lived in "Rural" areas had the highest overall ranking (Md=1200) with "Urban" next (Md=920), and "Semi-rural" lowest of the three (Md=825).

This was then repeated for total frequency of internet use for "Work 7 Educational" purposes:-

38. Kruskal-Wallis Test – Type of Area – Internet Use- Work & Education

Ranks	Type of Area	N	Mean Rank
Work and Educational Purposes - Total Frequency of Internet Use	Rural	24	156.75
	Semi Rural	96	102.11
	Urban	106	114.02
	Total	226	

Test Statistics[a,b]	Work and Educational Purposes - Total Frequency of Internet Use
Chi-Square	13.428
df	2
Asymp. Sig.	.001
a. Kruskal Wallis Test	
b. Grouping Variable: Type of Area	

Work and Educational Purposes - Total Frequency of Internet Use				
Type of Area	Mean	N	Std. Deviation	Median
No answer given	1017.50	2	137.886	1017.50
Rural	1134.38	24	327.073	1200.00
Semi Rural	823.65	96	353.242	825.00
Urban	894.29	106	394.611	920.00
Total	890.90	228	378.812	920.00

The above shows that the significance level is less than 0.05 (p=0.001) so there is a statistically significant difference in the frequency of intent use for "Work & Educational" purposes across the three "Type of Area" groups.

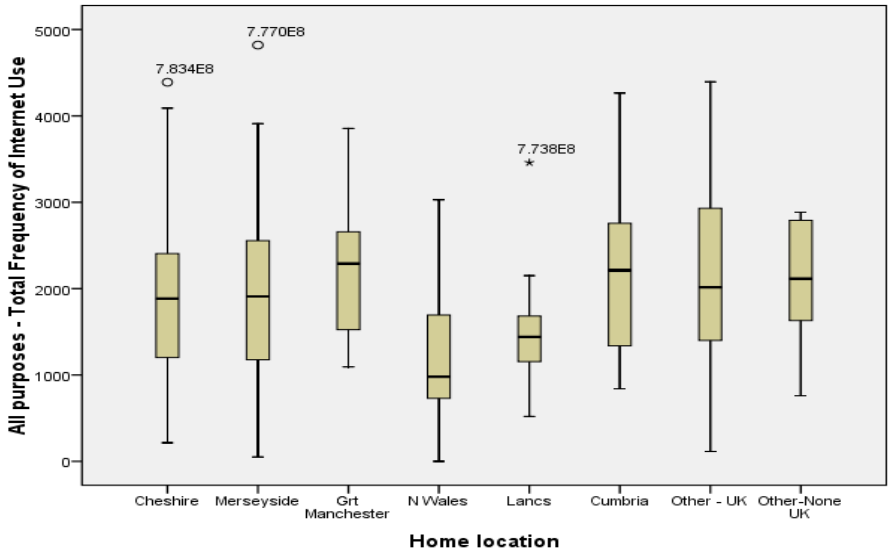
A Kruskal-Wallis Test revealed a statistically significant difference in overall frequency of internet use for "Work & Educational" purposes across the three types of area used in the study (Grp 1, n24: Rural, Grp 2, n96: Semi-Rural, Grp 3, n=106: Urban) X2 (2, n=228) = 13.428, p= 0. 001. The mean ranking showed that those who indicated that they lived in "Rural" areas had the highest overall ranking (Md=1200) with "Urban" next (Md=920), and "Semi-rural" lowest of the three (Md=825).

4.10 Location

- Where they live - Is there a relationship between where they live and what 45-54 year olds do online and how frequently they do it?

A boxplot was produced to see whether there were any visually apparent differences in the use of the internet between home locations:-

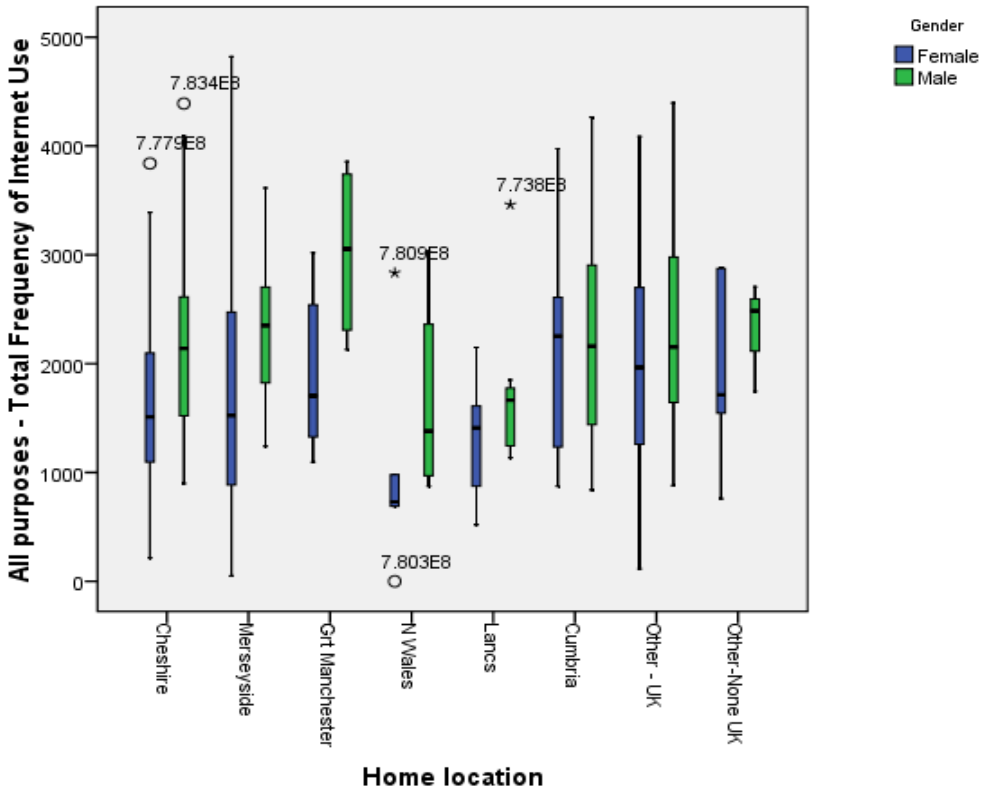
25. HOME LOCATION - INTERNET USE - ALL PURPOSES



This shows, at the extremes, that, for this sample, those from Greater Manchester had the highest rate of internet usage on average, and those from North Wales, the lowest, followed by those from Lancashire.

Repeating the above with a further breakdown by "Gender" revealed the following:-

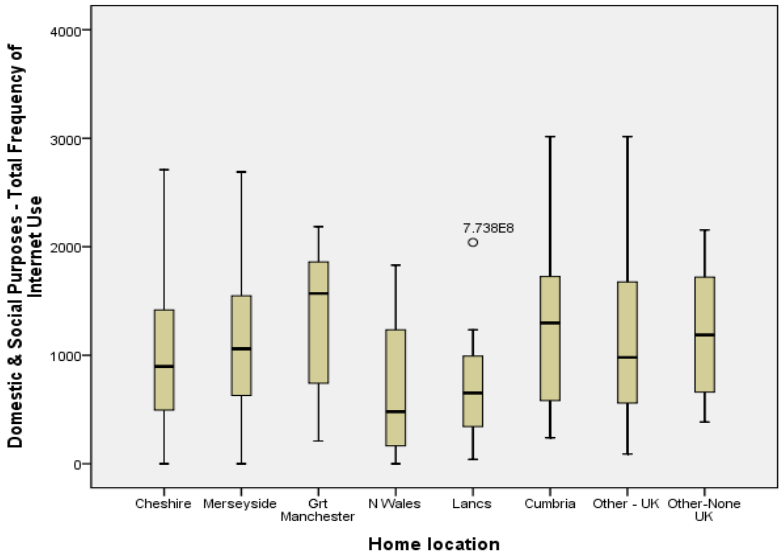
26. HOME LOCATION - INTERNET USE BY GENDER - ALL PURPOSES



This revealed that for those that responded from Cumbria were the only group where females used the internet slightly more than males. All of the other followed a similar pattern where the position was revered with the most difference being in Greater Manchester.

The position in relation to "Domestic and Social" internet use by home location was then assessed using a boxplot:-

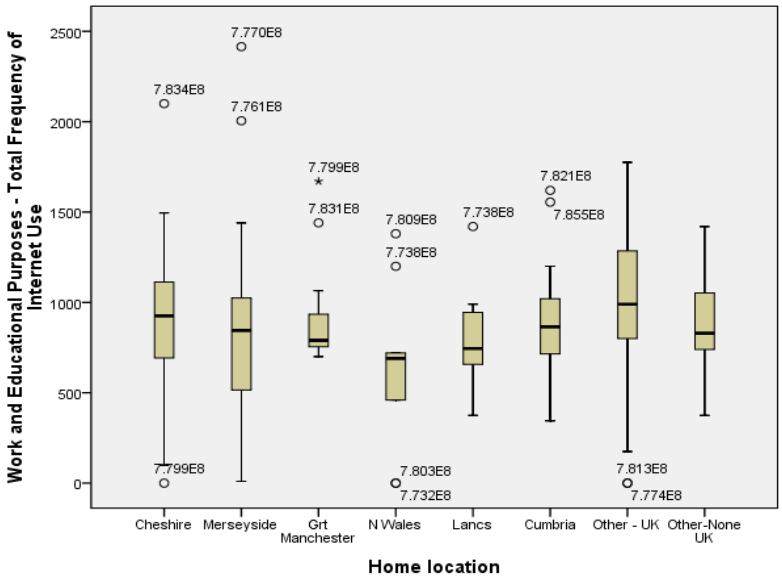
27. Home Location - Internet Use - Domestic & Social Purposes



Those within this sample who recorded their home location as "Greater Manchester" were the greatest user of the internet for "Domestic & Social" purposes and N. Wales were the lowest.

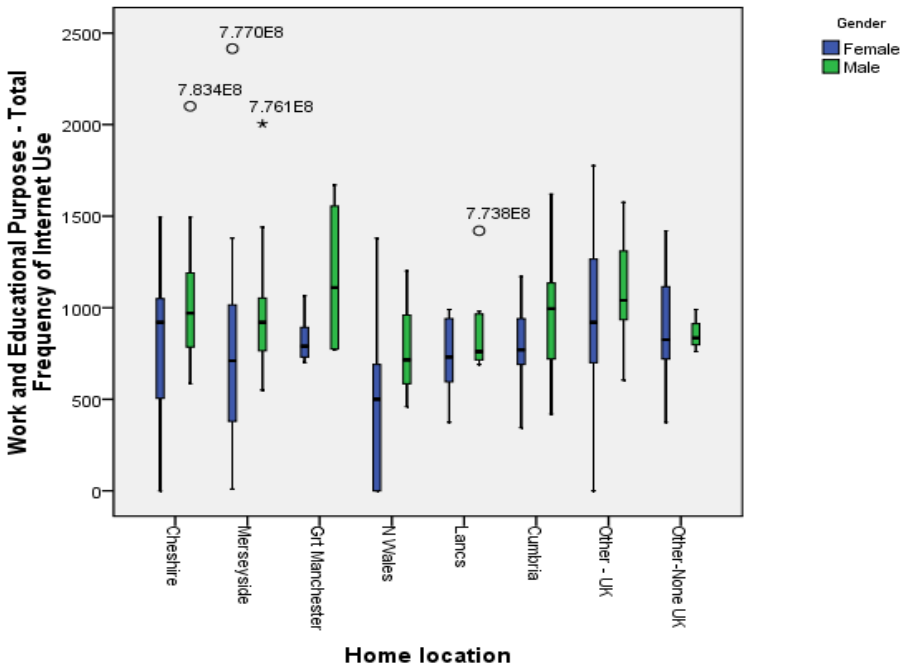
Reproducing the above for "Work and Educational" purposes produced the following:-

28. HOME LOCATION - INTERNET USE – WORK & EDUCATIONAL PURPOSES



The above indicates that those who responded from N. Wales were the lowest users on average. To see if gender was having an effect the following boxplot was produced:-

29. HOME LOCATION - INTERNET USE BY GENDER – WORK & EDUCATIONAL PURPOSES



The above may be explained by the relatively low level of internet usage by the females in that group.

Following that Kruskal-Wallis tests were performed to ranks the results:-

39. Kruskal-Wallis Test – Home Location – Internet Use- All Purposes

Ranks	Home location	N	Mean Rank
All purposes - Total Frequency of Internet Use	Cheshire	52	107.35
	Merseyside	39	114.35
	Grt Manchester	15	133.77
	N Wales	9	67.89
	Lancs	20	77.00
	Cumbria	28	127.00
	Other - UK	57	128.31
	Other-None UK	8	129.69
	Total	228	

Test Statistics[a,b]	All purposes - Total Frequency of Internet Use
Chi-Square	16.777
df	7
Asymp. Sig.	.019
a. Kruskal Wallis Test	
b. Grouping Variable: Home location	

All purposes - Total Frequency of Internet Use				
Home location	Mean	N	Std. Deviation	Median
Cheshire	1860.87	52	921.148	1885.00
Merseyside	1935.64	39	1048.699	1910.00
Grt Manchester	2228.33	15	871.070	2290.00
N Wales	1322.22	9	1014.024	980.00
Lancs	1480.25	20	629.614	1440.00
Cumbria	2159.11	28	926.851	2212.50
Other - UK	2181.67	57	1002.159	2015.00
Other-None UK	2089.38	8	766.073	2115.00
Total	1968.03	228	959.301	1885.00

The Kruskal-Wallis Test revealed that a statistically significant difference in frequency of internet use across all the home location groups (Grp1, n=52: Cheshire, Grp2, n=39: Merseyside, Grp3, n=15: Grt Manchester, Grp4, n=9:

N Wales, Grp5, n=20: Lancs, Grp6, n=28: Cumbria, Grp7, n=57: Other – UK, Grp8, n=8: Other-None UK), X2 (7, n=228) = 16.777, p=0.019.

The above was again repeated for use of the internet fro "Domestic & Social" proposes:-

40. Kruskal-Wallis Test – Home Location – Internet Use- Domestic & Social Purposes

Ranks	Home location	N	Mean Rank
Domestic & Social Purposes - Total Frequency of Internet Use	Cheshire	52	106.01
	Merseyside	39	118.55
	Grt Manchester	15	138.10
	N Wales	9	76.56
	Lancs	20	78.12
	Cumbria	28	131.82
	Other - UK	57	121.19
	Other-None UK	8	131.00
	Total	228	

Test Statistics[a,b]	Domestic & Social Purposes - Total Frequency of Internet Use
Chi-Square	15.008
df	7
Asymp. Sig.	.036
a. Kruskal Wallis Test	
b. Grouping Variable: Home location	

Domestic & Social Purposes - Total Frequency of Internet Use				
Home location	Mean	N	Std. Deviation	Median
Cheshire	986.15	52	685.024	897.50
Merseyside	1088.97	39	663.586	1060.00
Grt Manchester	1314.00	15	714.231	1570.00
N Wales	693.33	9	663.240	480.00
Lancs	689.50	20	480.616	652.50
Cumbria	1276.96	28	765.647	1297.50
Other - UK	1169.56	57	771.368	980.00
Other-None UK	1209.38	8	639.321	1187.50
Total	1077.13	228	712.005	960.00

The Kruskal-Wallis Test revealed that a statistically significant difference in frequency of internet use for Domestic & Social Purposes across all the home location groups (Grp1, n=52: Cheshire, Grp2, n=39: Merseyside, Grp3, n=15: Grt Manchester, Grp4, n=9: N Wales, Grp5, n=20: Lancs, Grp6, n=28: Cumbria, Grp7, n=57: Other – UK, Grp8, n=8: Other-None UK), X2 (7, n=228) = 15.008, p=0. 036.

This was again repeated for frequency of internet use for " Work & Educational" purposes:-

41. Kruskal-Wallis Test – Home Location – Internet Use- Work & Educational Purposes

Ranks	Home location	N	Mean Rank
Work and Educational Purposes - Total Frequency of Internet Use	Cheshire	52	115.58
	Merseyside	39	103.44
	Grt Manchester	15	111.83
	N Wales	9	69.78
	Lancs	20	90.48
	Cumbria	28	111.14
	Other - UK	57	139.16
	Other-None UK	8	112.88
	Total	228	

Test Statistics[a,b]	Work and Educational Purposes - Total Frequency of Internet Use
Chi-Square	15.977
df	7
Asymp. Sig.	.025
a. Kruskal Wallis Test	
b. Grouping Variable: Home location	

Work and Educational Purposes - Total Frequency of Internet Use				
Home location	Mean	N	Std. Deviation	Median
Cheshire	874.71	52	387.688	925.00
Merseyside	846.67	39	485.871	845.00
Grt Manchester	914.33	15	281.576	790.00
N Wales	628.89	9	467.050	690.00
Lancs	790.75	20	231.973	745.00
Cumbria	882.14	28	290.980	865.00
Other - UK	1012.11	57	362.491	990.00
Other-None UK	880.00	8	306.827	830.00
Total	890.90	228	378.812	920.00

The Kruskal-Wallis Test revealed that a statistically significant difference in frequency of internet use for Work & Educational purposes across all the home location groups (Grp1, n=52: Cheshire, Grp2, n=39: Merseyside, Grp3, n=15: Grt Manchester, Grp4, n=9: N Wales, Grp5, n=20: Lancs, Grp6, n=28: Cumbria, Grp7, n=57: Other – UK, Grp8, n=8: Other-None UK), X2 (7, n=228) = 15.977, p=0. 025.

4.11 Type of Household

Type of household they live in – The research question is "Is there a relationship between type of household and what 45-54 year olds do online and how frequently they do it?"

Participants were asked to select an answer to "What type of household do you live in?" from a list of options:-

- Married or living with partner, no children or dependents in household;
- . Married or living with partner, children or dependents in household;
- Single, children or dependents in household;
- Single, no children or dependents in household;
- Rather not say (none selected this);
- Other (comment box included to enable participants to clarify their response). Only three respondents did not record their status. *Hence why the total does not equal 228.*

A total of 3 participants did not answer the question and their total was added to the "Other" category for analysis purposes.

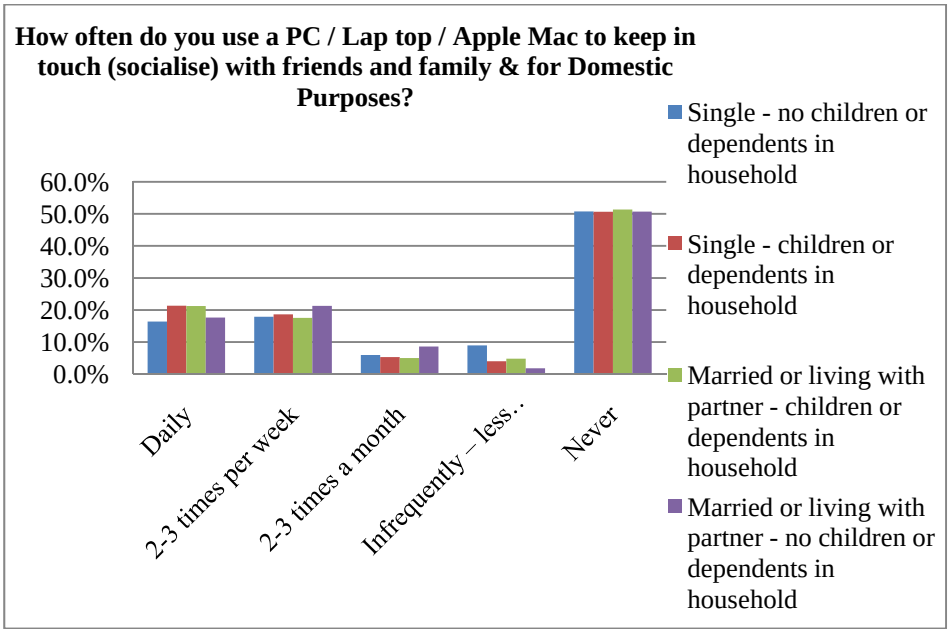
The following table shows the totals responses to each of the above:-

42. Use of a PC to Socialise & for Domestic Purposes – by all Household types

How often do you use a PC / Lap top / Apple Mac to keep in touch (socialise) with friends and family & for Domestic Purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
Single - no children or dependents in household	11	12	4	6	33	34	67
Single - children or dependents in household	16	14	4	3	37	38	75
Married or living with partner - children or dependents in household	110	91	26	25	252	266	518
Married or living with partner - no children or dependents in household	39	47	19	4	109	112	221
TOTAL	176	164	53	38	431	450	881

This is also represented below in the following graph:-

30. USE OF A PC TO SOCIALISE & FOR DOMESTIC PURPOSES - BY ALL HOUSEHOLD TYPES



43. Use of a PC for Work and Educational purposes – by all Household types totals

How often do you use a PC / Lap top / Apple Mac for Work and Educational purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
Single - no children or dependents in household	19	6	2	1	28	17	45
Single - children or dependents in household	22	3	8	4	37	22	59
Married or living with partner - children or dependents in household	126	43	27	33	229	141	370
Married or living with partner - no children or dependents in household	52	20	21	12	105	64	169
TOTAL	219	72	58	50	399	244	643

44. Use of a PC for Work and Educational purposes – by all Household types percentages

How often do you use a PC / Lap top / Apple Mac for Work and Educational purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
Single - no children or dependents in household	42.2%	13.3%	4.4%	2.2%	62.2%	37.8%	100%
Single - children or dependents in household	37.3%	5.1%	13.6%	6.8%	62.7%	37.3%	100%
Married or living with partner - children or dependents in household	34.1%	11.6%	7.3%	8.9%	61.9%	38.1%	100%
Married or living with partner - no children or dependents in household	30.8%	11.8%	12.4%	7.1%	62.1%	37.9%	100%
PERCENTAGE	34.1%	11.2%	9.0%	7.8%	62.1%	37.9%	100%

45. Use of a PC to Socialise & for Domestic Purposes– by Single or Married Households

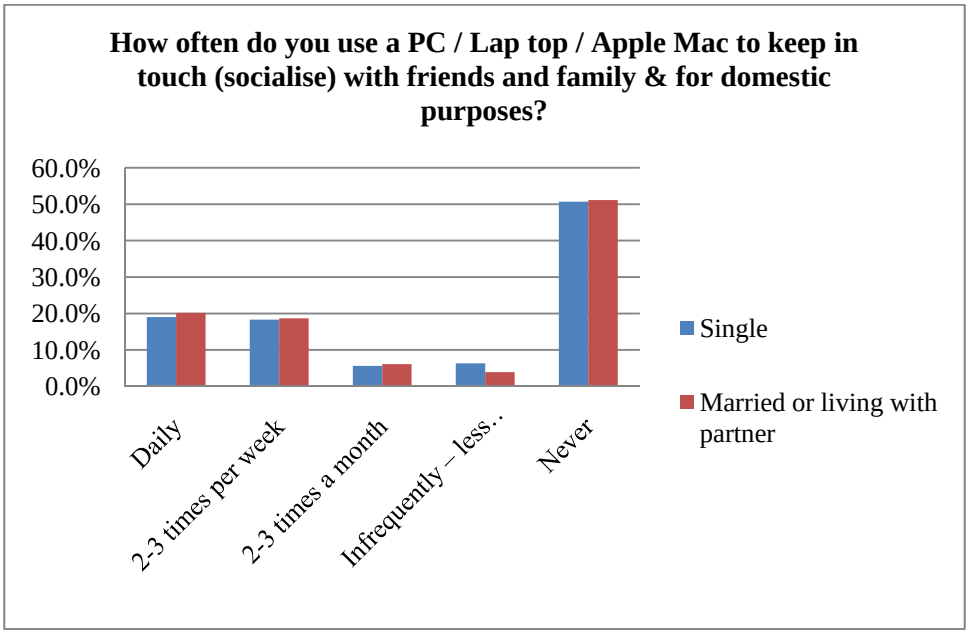
How often do you use a PC / Lap top / Apple Mac to keep in touch (socialise) with friends and family & for Domestic Purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
Single	27	26	8	9	70	72	142
Married or living with partner	149	138	45	29	361	378	739
TOTAL	176	164	53	38	431	450	881
Single	19.0%	18.3%	5.6%	6.3%	49.3%	50.7%	100%
Married or living with partner	20.2%	18.7%	6.1%	3.9%	48.8%	51.2%	100%
PERCENTAGE	20.0%	18.6%	6.0%	4.3%	48.9%	51.1%	100%

The above table shows that there does not appear to appear to any significant differences in how frequently people use the internet based on whether they are single or married. For example 19% of single persons use the internet daily and 20.2% of married with 50.7% and 51.2% respectively never using the internet for this purpose.

46. Type of Household

+	**Male**	**Female**	**Total**	**%**
Single - no children or dependents in household	4	13	17	7%
Single - children or dependents in household	5	14	19	8%
Single sub-total	**9**	**27**	**36**	**16%**
Married or living with partner - children or dependents in household	61	72	133	58%
Married or living with partner - no children or dependents in household	27	29	56	25%
Married sub-total	**88**	**101**	**189**	**83%**
Other	2	1	3	1%
Total	**99**	**129**	**228**	**100%**

31. USE OF A PC TO SOCIALISE & FOR DOMESTIC PURPOSES

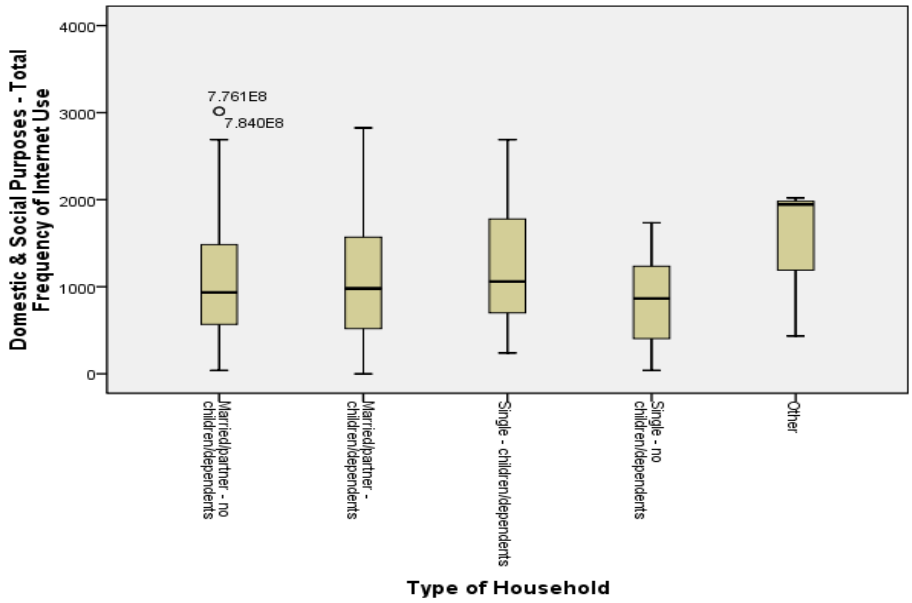


The following table shows the responses by "Gender":-

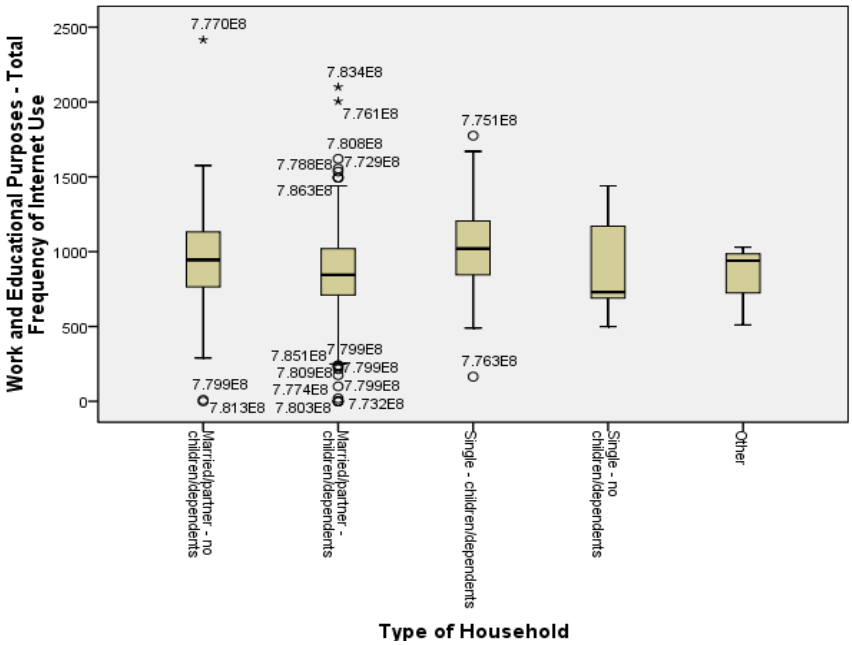
47. Type of Household by Gender

+	Male	Female	Total	%
Single - no children or dependents in household	4	13	17	7%
Single - children or dependents in household	5	14	19	8%
Single sub-total	**9**	**27**	**36**	**16%**
Married or living with partner - children or dependents in household	61	72	133	58%
Married or living with partner - no children or dependents in household	27	29	56	25%
Married sub-total	**88**	**101**	**189**	**83%**
Other	2	1	3	1%
Total	**99**	**129**	**228**	**100%**

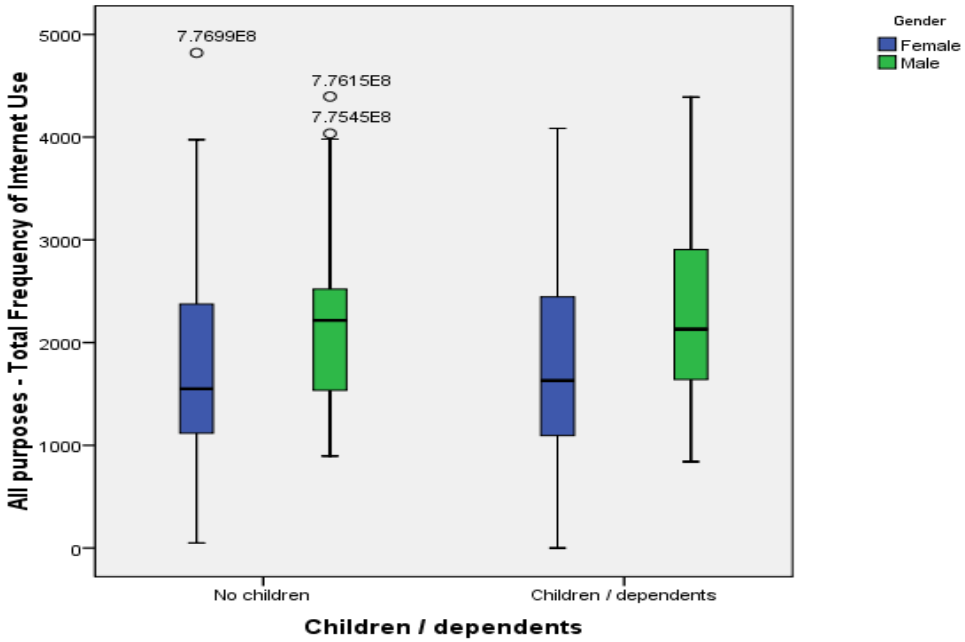
32. Type of Household - Internet Use – Domestic & Social Purposes



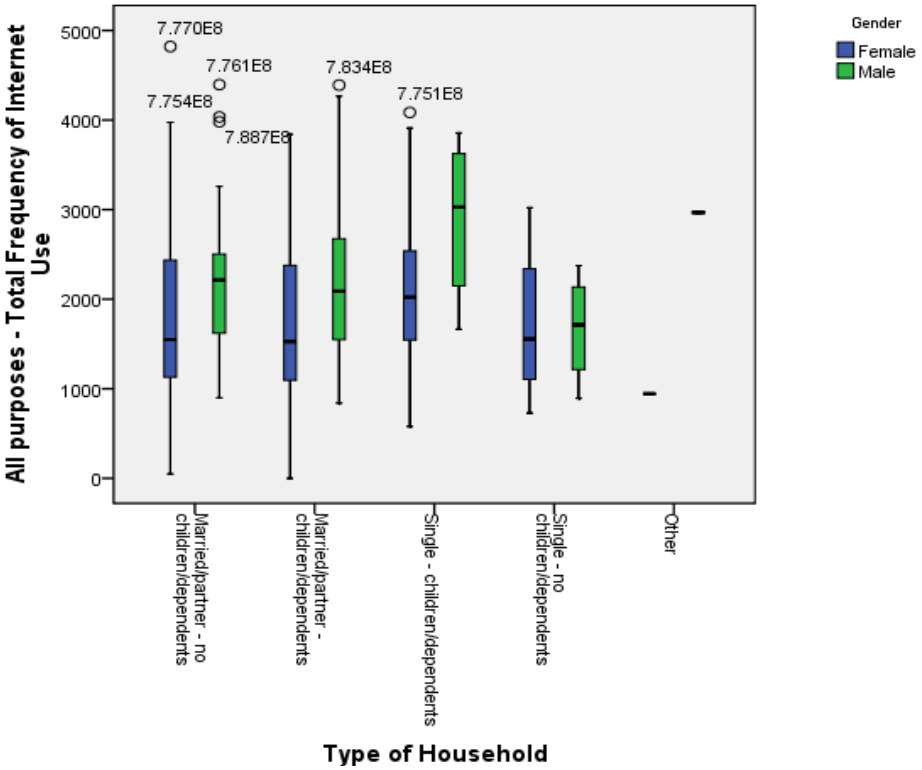
33. Type of Household - Internet Use – Work & Educational Purposes



34. Type of Household – with Children - Internet Use by Gender- All Purposes



35. Type of Household – Internet Use by Gender- All Purposes



48. Kruskal-Wallis Test – Household Type– Internet Use- All Purposes

Ranks	Type of Household	N	Mean Rank
All purposes - Total Frequency of Internet Use	Married/partner - no children/dependents	56	115.79
	Married/partner - children/dependents	133	112.42
	Single - children/dependents	19	134.97
	Single - no children/dependents	17	99.06
	Other	3	140.67
	Total	228	

Test Statistics[a,b]	
	All purposes - Total Frequency of Internet Use
Chi-Square	3.388
df	4
Asymp. Sig.	.495
a. Kruskal Wallis Test	
b. Grouping Variable: Type of Household	

All purposes - Total Frequency of Internet Use				
Type of Household	Mean	N	Std. Deviation	Median
Married/partner - no children/dependents	2005.80	56	989.851	1775.00
Married/partner - children/dependents	1929.10	133	954.813	1870.00
Single - children/dependents	2292.11	19	1048.119	2150.00
Single - no children/dependents	1728.53	17	733.088	1555.00
Other	2293.33	3	1167.715	2960.00
Total	1968.03	228	959.301	1885.00

The Kruskal-Wallis Test revealed that there was no statistically significant difference in frequency of internet use across all the type of household groups (Grp1, n=56: Married/partner - no children/dependents, Grp2, n=133: Married/partner - children/dependents, Grp3, n=19: Single - children/dependents, Grp4, n=17: Single - no children/dependents, Grp5, n=3: Other), X2 (4, n=228) = 3.388, p=0. 495.

49. Kruskal-Wallis Test – Household Type– Internet Use- Domestic & Social Purposes

Ranks	Type of Household	N	Mean Rank
Domestic & Social Purposes - Total Frequency of Internet Use	Married/partner - no children/dependents	56	112.62
	Married/partner - children/dependents	133	114.66
	Single - children/dependents	19	133.45
	Single - no children/dependents	17	92.06
	Other	3	149.50
	Total	228	

Test Statistics[a,b]	Domestic & Social Purposes - Total Frequency of Internet Use
Chi-Square	4.426
df	4
Asymp. Sig.	.351
a. Kruskal Wallis Test	
b. Grouping Variable: Type of Household	

Domestic & Social Purposes - Total Frequency of Internet Use				
Type of Household	Mean	N	Std. Deviation	Median
Married/partner - no children/dependents	1071.52	56	744.247	935.00
Married/partner - children/dependents	1076.35	133	708.198	980.00
Single - children/dependents	1269.74	19	718.560	1060.00
Single - no children/dependents	817.65	17	570.603	865.00
Other	1466.67	3	894.236	1945.00
Total	1077.13	228	712.005	960.00

The Kruskal-Wallis Test revealed that there is no statistically significant difference in frequency of Domestic & Social internet use across all the type of household groups (Grp1, n=56: Married/partner - no children/dependents, Grp2, n=133: Married/partner - children/dependents, Grp3, n=19: Single - children/dependents, Grp4, n=17: Single - no children/dependents, Grp5, n=3: Other), X2 (4, n=228) = 4.426, p=0. 351

50. Kruskal-Wallis Test – Household Type– Internet Use- Work & Educational Purposes

Ranks	Type of Household	N	Mean Rank
Work and Educational Purposes - Total Frequency of Internet Use	Married/partner - no children/dependents	56	123.96
	Married/partner - children/dependents	133	107.26
	Single - children/dependents	19	141.61
	Single - no children/dependents	17	110.97
	Other	3	107.50
	Total	228	

Test Statistics[a,b]	Work and Educational Purposes - Total Frequency of Internet Use
Chi-Square	6.049
df	4
Asymp. Sig.	.196
a. Kruskal Wallis Test	
b. Grouping Variable: Type of Household	

Work and Educational Purposes - Total Frequency of Internet Use				
Type of Household	Mean	N	Std. Deviation	Median
Married/partner - no children/dependents	934.29	56	377.578	945.00
Married/partner - children/dependents	852.74	133	384.349	845.00
Single - children/dependents	1022.37	19	389.723	1020.00
Single - no children/dependents	910.88	17	325.817	730.00
Other	826.67	3	277.909	940.00
Total	890.90	228	378.812	920.00

The Kruskal-Wallis Test revealed that there is no statistically significant difference in frequency of Work and Educational internet use across all the type of household groups (Grp1, n=56: Married/partner - no children/dependents, Grp2, n=133: Married/partner - children/dependents, Grp3, n=19: Single - children/dependents, Grp4, n=17: Single - no children/dependents, Grp5, n=3: Other), X2 (4, n=228) = 6.049, p=0. 196

4.12 PC / Lap top / Apple Mac

Participants were asked "How often do you use a PC / Lap top / Apple Mac to access the internet for each of the following purposes?" Only 70 respondents out of 228 (7.7%) stated that they never used the their PC for that purpose..

51. Use of a PC / Lap top / Apple Mac – Totals

How often do you use a PC / Lap top / Apple Mac to access the internet for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet usage	Never	Total responses
To keep in touch (socialise) with friends and family?	86	74	29	27	216	12	228
For other domestic purposes?	93	93	24	11	221	7	228
Socialising and Domestic Sub-total	**179**	**167**	**53**	**38**	**437**	**19**	**456**
For work? -	192	15	5	3	215	13	228
For educational study purposes?	30	57	55	48	190	38	228
Work and Educational Sub-total	**222**	**72**	**60**	**51**	**405**	**51**	**456**
TOTAL	**401**	**239**	**113**	**89**	**842**	**70**	**912**
Socialising and Domestic Sub-total	39.3%	36.6%	11.6%	8.3%	95.8%	4.2%	100%
Work and Educational Sub-total	48.7%	15.8%	13.2%	11.2%	88.8%	11.2%	100.0%
PERCENTAGES	44.0%	26.2%	12.4%	9.8%	92.3%	7.7%	100%

A total of 12 respondents out of 228 stated that they never used their PC for socialising. The results were that 95.8% of respondents used their PC to access the internet and 88.8% do so for work and educational purposes:-

Use of a PC to Socialise & for Domestic Purposes

The following table shows the totals responses to each of the above:-

52. Use of a PC to Socialise & for Domestic Purposes – by all Household types - totals

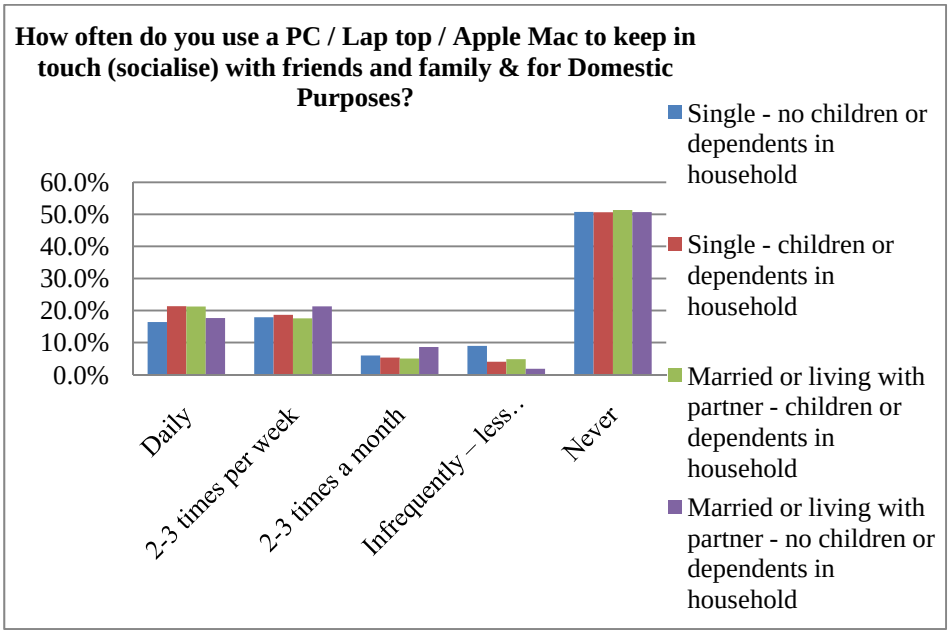
How often do you use a PC / Lap top / Apple Mac to keep in touch (socialise) with friends and family & for Domestic Purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
Single - no children or dependents in household	11	12	4	6	33	34	67
Single - children or dependents in household	16	14	4	3	37	38	75
Married or living with partner - children or dependents in household	110	91	26	25	252	266	518
Married or living with partner - no children or dependents in household	39	47	19	4	109	112	221
TOTAL	176	164	53	38	431	450	881

53. Use of a PC to Socialise & for Domestic Purposes – by all Household types - percentages

How often do you use a PC / Lap top / Apple Mac to keep in touch (socialise) with friends and family & for Domestic Purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
Single - no children or dependents in household	16.4%	17.9%	6.0%	9.0%	49.3%	50.7%	100%
Single - children or dependents in household	21.3%	18.7%	5.3%	4.0%	49.3%	50.7%	100%
Married or living with partner - children or dependents in household	21.2%	17.6%	5.0%	4.8%	48.6%	51.4%	100%
Married or living with partner - no children or dependents in household	17.6%	21.3%	8.6%	1.8%	49.3%	50.7%	100%
PERCENTAGE	20.0%	18.6%	6.0%	4.3%	48.9%	51.1%	100%

This is also represented below in the following graph:-

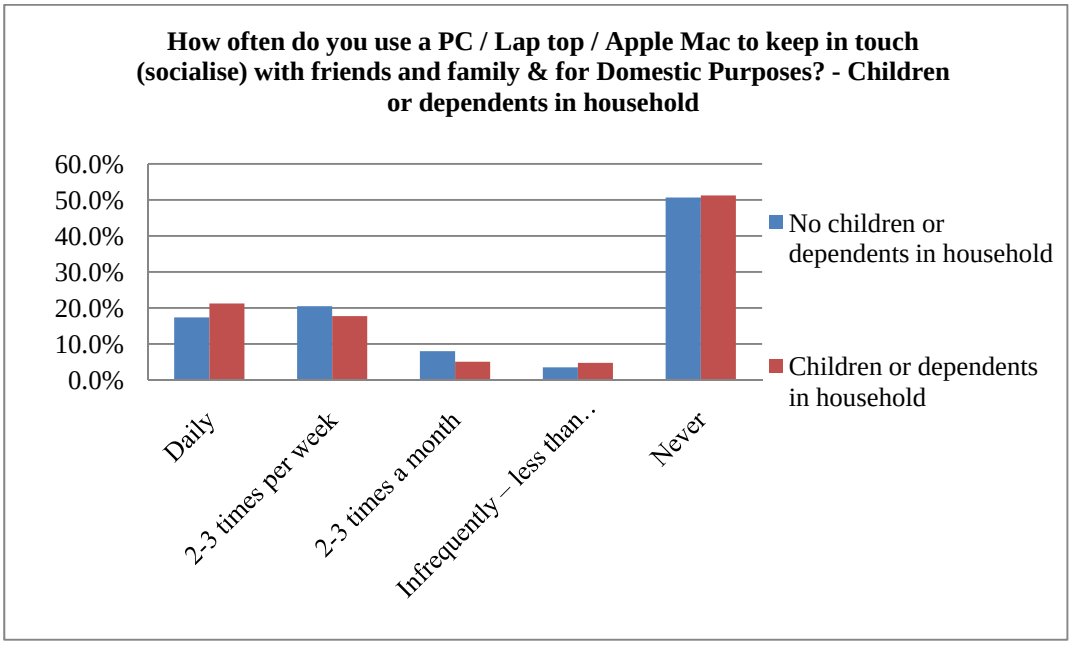
36. Use of a PC to Socialise & for Domestic Purposes - by all Household types



54. Use of a PC to Socialise & for Domestic Purposes – by whether Household has children or not – totals & percentages

How often do you use a PC / Lap top / Apple Mac to keep in touch (socialise) with friends and family & for Domestic Purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
No children or dependents in household	50	59	23	10	142	146	288
Children or dependents in household	126	105	30	28	289	304	593
TOTAL	176	164	53	38	431	450	881
No children or dependents in household	17.4%	20.5%	8.0%	3.5%	49.3%	50.7%	100%
Children or dependents in household	21.2%	17.7%	5.1%	4.7%	48.7%	51.3%	100%
TOTAL	20.0%	18.6%	6.0%	4.3%	48.9%	51.1%	100%

37. USE OF A PC TO SOCIALISE & FOR DOMESTIC PURPOSES - BY WHETHER HOUSEHOLD HAS CHILDREN OR NOT

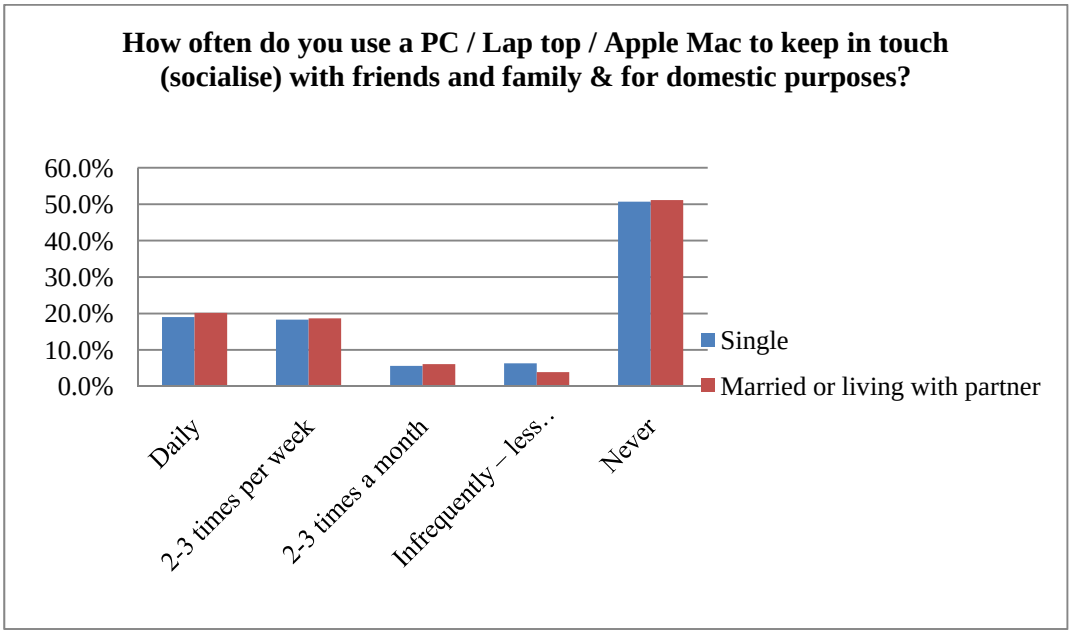


55. Use of a PC to Socialise & for Domestic Purposes– by Single or Married Households

How often do you use a PC / Lap top / Apple Mac to keep in touch (socialise) with friends and family & for Domestic Purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
Single	27	26	8	9	70	72	142
Married or living with partner	149	138	45	29	361	378	739
TOTAL	176	164	53	38	431	450	881
Single	19.0%	18.3%	5.6%	6.3%	49.3%	50.7%	100%
Married or living with partner	20.2%	18.7%	6.1%	3.9%	48.8%	51.2%	100%
PERCENTAGE	20.0%	18.6%	6.0%	4.3%	48.9%	51.1%	100%

The above table shows that there does not appear to appear to any significant differences in how frequently people use the internet based on whether they are single or married. For example 19% of single persons use the internet daily and 20.2% of married with 50.7% and 51.2% respectively never using the internet for this purpose.

38. USE OF A PC TO SOCIALISE & FOR DOMESTIC PURPOSES



Use of a PC for Work & Educational Purposes

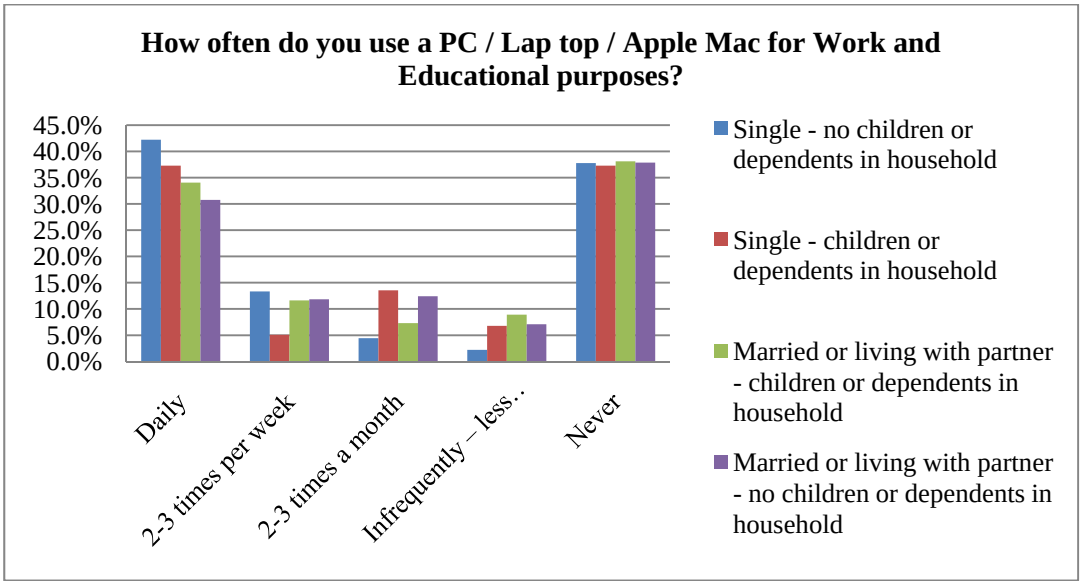
56. Use of a PC for Work and Educational purposes – by all Household types totals

How often do you use a PC / Lap top / Apple Mac for Work and Educational purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
Single - no children or dependents in household	19	6	2	1	28	17	45
Single - children or dependents in household	22	3	8	4	37	22	59
Married or living with partner - children or dependents in household	126	43	27	33	229	141	370
Married or living with partner - no children or dependents in household	52	20	21	12	105	64	169
TOTAL	219	72	58	50	399	244	643

57. Use of a PC for Work and Educational purposes – by all Household types percentages

How often do you use a PC / Lap top / Apple Mac for Work and Educational purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
Single - no children or dependents in household	42.2%	13.3%	4.4%	2.2%	62.2%	37.8%	100%
Single - children or dependents in household	37.3%	5.1%	13.6%	6.8%	62.7%	37.3%	100%
Married or living with partner - children or dependents in household	34.1%	11.6%	7.3%	8.9%	61.9%	38.1%	100%
Married or living with partner - no children or dependents in household	30.8%	11.8%	12.4%	7.1%	62.1%	37.9%	100%
PERCENTAGE	34.1%	11.2%	9.0%	7.8%	62.1%	37.9%	100%

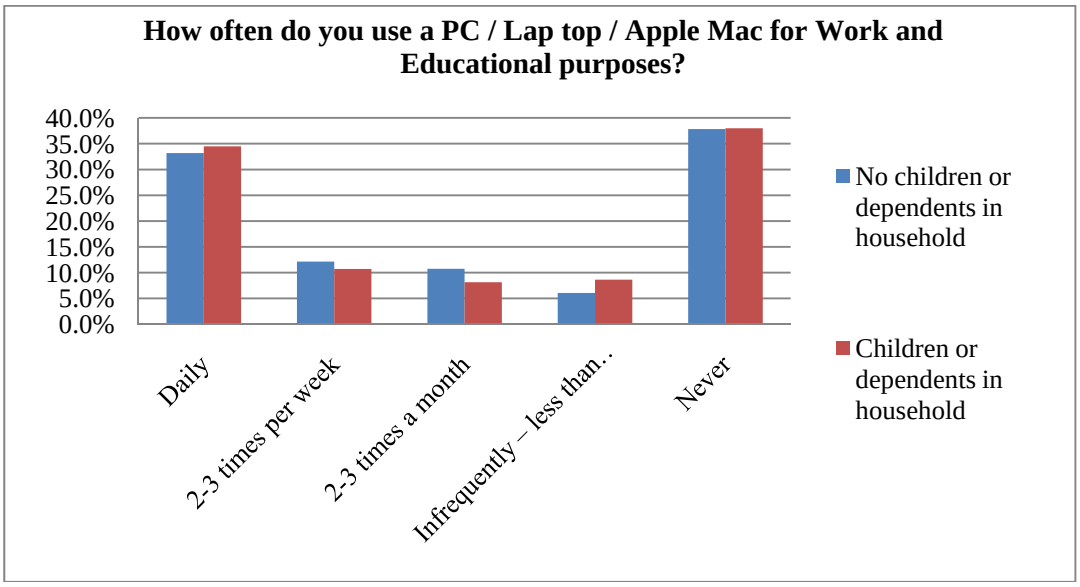
39. USE OF A PC FOR WORK AND EDUCATIONAL PURPOSES



58. Use of a PC for Work and Educational purposes – by whether children present in Household - totals

How often do you use a PC / Lap top / Apple Mac for Work and Educational purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet Usage	Never	TOTAL
No children or dependents in household	71	26	23	13	133	81	214
Children or dependents in household	148	46	35	37	266	163	429
TOTAL	219	72	58	50	399	244	643
No children or dependents in household	33.2%	12.1%	10.7%	6.1%	62.1%	37.9%	100%
Children or dependents in household	34.5%	10.7%	8.2%	8.6%	62.0%	38.0%	100%
TOTAL	34.1%	11.2%	9.0%	7.8%	62.1%	37.9%	100%

40. USE OF A PC FOR WORK AND EDUCATIONAL PURPOSES – BY WHETHER CHILDREN PRESENT IN HOUSEHOLD



4.13 Mobile Phone

Participants were also asked "How often do you use your mobile phone to access the internet for each of the following purposes?". The results in the table below show that the vast majority of 45-54 year olds do not use their mobile phones to access the internet (80.6% overall:-

59. Use of a Mobile Phone to access the internet – Totals

How often do you use your MOBILE PHONE to access the INTERNET for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet usage	Never	Total responses
To keep in touch (socialise) with friends and family?	19	12	3	10	**44**	184	228
For other domestic purposes?	9	19	14	10	**52**	176	228
Socialising and Domestic Purposes Sub-Total	**28**	**31**	**17**	**20**	**96**	**360**	**456**
For work?	23	12	6	12	**53**	175	228
For educational study purposes?	2	4	7	15	**28**	200	228
Work and Educational Purposes Sub-Total	**25**	**16**	**13**	**27**	**81**	**375**	**456**
TOTAL	**53**	**47**	**30**	**47**	**177**	**735**	**912**
Socialising and Domestic Purposes	6.1%	6.8%	3.7%	4.4%	21.1%	78.9%	
Work and Educational Purposes	5.5%	3.5%	2.9%	5.9%	17.8%	82.2%	

The most frequent daily use is for work (25), followed by socialising (19) and the least usage is for educational study purposes (2).

4.14 Web Browser

Participants were asked "How often do you use your web browser for each of the following purposes?". The totals are shown below:-

60. Use of a Web Browser– Totals

How often do you use your web browser for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet usage	Never	Total responses
To keep in touch (socialise) with friends and family?	53	55	31	25	**164**	64	228
For other domestic purposes?	75	100	20	10	**205**	23	228
Socialising & Domestic Sub-Total	**128**	**155**	**51**	**35**	**369**	**87**	
For work?	162	24	6	7	**199**	29	228
For educational study purposes?	25	60	46	39	**170**	58	228
Work & Educational Sub-Total	**187**	**84**	**52**	**46**	**369**	**87**	
TOTAL	315	239	103	81	**738**	174	912

Out of a total of 912 responses a total of 738 (81%) stated that they used their web browser to access the internet. The highest level of usage across of types of usage by 45-54 year olds was for other domestic purposes with 89.9% doing so. Looking at the percentages overall the usage for socialising and domestic purposes was exactly the same overall as for work and educational purposes (81%).

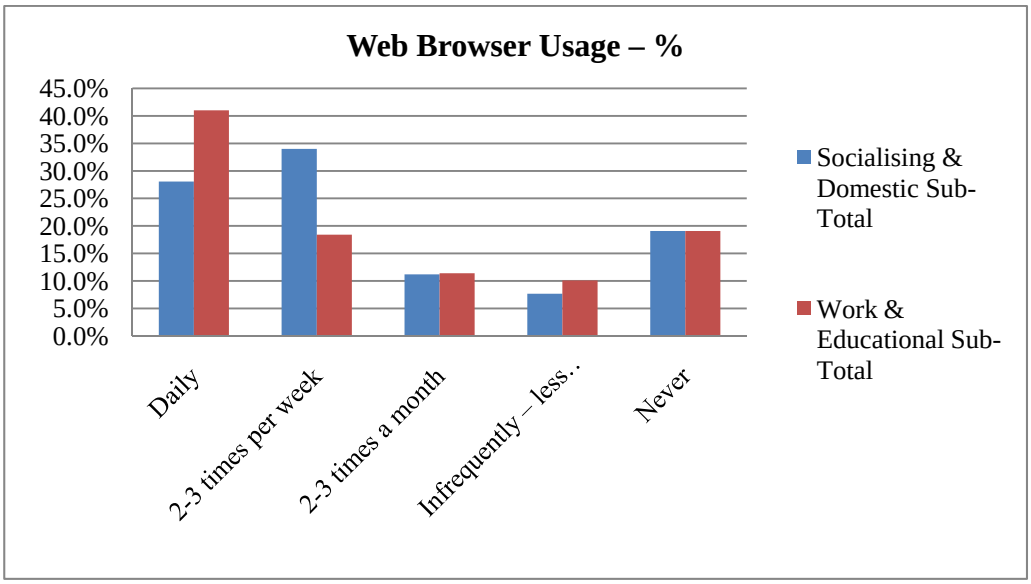
However more respondents stated that they used a web browser to access the internet on a daily basis (41%) for work and educational purposes than for socialising and domestic purposes (28.1%). This is shown in the table below:-

61. Web Browser Usage – %

How often do you use your web browser for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet usage	Never
Socialising & Domestic	28.1%	34.0%	11.2%	7.7%	80.9%	19.1%
Work & Educational	41.0%	18.4%	11.4%	10.1%	80.9%	19.1%
TOTAL	34.5%	26.2%	11.3%	8.9%	80.9%	19.1%

The situation was reversed for usage of 2-3 times per week with 34% using a web browser for socialising and domestic purposes and 18.4% doing likewise for work and educational purposes. This "switch" can be seen more clearly in the following graph:-

41. WEB BROWSER USAGE - PERCENTAGES



The highest single usage type was for domestic purposes, with 205 users overall, was "other domestic purposes"..

Within that the top 5 user categories were as follows-

62. Top 5 Categories of Web Browser Users – domestic purposes -%

Top 5 users of web browser - other domestic purposes	Total Usage
Profession = Computing / IT	66.7%
Residence = North Wales	63.2%
Males	62.5%
Type of Area = Rural	62.5%
Residence = Rest of UK	50.0%

Those professionally qualified in Computing and IT were the most frequent users of a web browser to access the internet and as shown also in the table below they were also the most frequent users at work was well:-

63. Top 5 Users of Web Browsers – for work -%

Top 5 users of web browser - for work	Total Usage
Profession = Computing / IT	100.0%
Education = Doctorate	100.0%
Profession = Medicine, Health, Social care professionals	85.7%
Residence = Cheshire	60.0%
Residence = Lancashire	60.0%

Strangely those with a doctorate used their web browser 100% while those with a post graduate qualification (12 respondents) stated that they never did do. They were in the bottom five users of a web browser for work as shown below:-

64. Bottom 5 Users of Web Browsers – for work -%

Lowest users of web browser for work	Total Usage
Single	14.3%
Education = GCSE / O Level	7.1%
Single - no children or dependents in household	0.0%
Residence = None UK	0.0%
Education = Post Graduate Certificate / Diploma	0.0%

Of the latter 11 were females and 1 male. 11 were married (10 females, 1 male) and only 1 was unmarried, with 6 having children of dependents in their household. All were in paid work, and finally 6 were in medicine, health, or social care.

4.15 Email

The next question asked participants "How often do you use email for each of the following purposes?". The following table shows that emailing is a majority activity (801 users), with more daily users overall (314), with only a minority of 12.2% never using email (111). The most frequent daily use of email is for work (187) followed by socialising:-

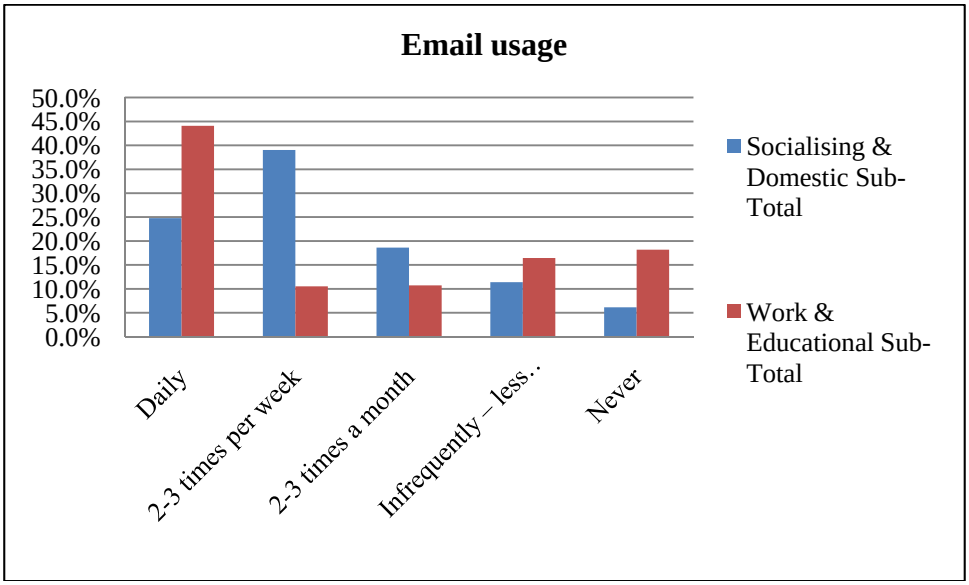
65. Use of Email– Totals

How often do you use email for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet usage	Never
To keep in touch (socialise) with friends and family?	69	91	33	25	**218**	10
For other domestic purposes?	44	87	52	27	**210**	18
Socialising & Domestic Sub-Total	**113**	**178**	**85**	**52**	**428**	**28**
Socialising & Domestic Sub-Total %	**24.8%**	**39.0%**	**18.6%**	**11.4%**	**93.9%**	**6.1%**
For work?	187	12	5	6	**210**	18
For educational study purposes?	14	36	44	69	**163**	65
Work & Educational Sub-Total	**201**	**48**	**49**	**75**	**373**	**83**
Work & Educational Sub-Total %	**44.1%**	**10.5%**	**10.7%**	**16.4%**	**81.8%**	**18.2%**
TOTAL	314	226	134	127	801	111
TOTAL %	**34.4%**	**24.8%**	**14.7%**	**13.9%**	**87.8%**	**12.2%**

Grouping categories together into socialising and domestic purposes and then work and educational purposes the above table shows that the former is used by more respondents (428) than the latter (373).

The overall profile is shown in the graph below:-

42. EMAIL USAGE - PERCENTAGES



Of the daily users the top 5 are shown in the table below:-

66. Top 5 Daily Users of Email– all purposes

Daily email Users	Total Daily Email Users	Daily - %
Education = Doctorate	24	50.0%
Residence = Greater Manchester	27	45.0%
Residence = Rest of UK	90	39.5%
Type of Area = Rural	37	38.5%
Single - no children or dependents in household	26	38.2%

Those with a doctorate are top with 50% followed by those living in Greater Manchester. The following table shows the top 5 categories of user across all purposes (socialising, education, other domestic purposes and work):-

67. Top 5 Users of Email– all purposes

Top Email Users- all purposes	Total Email Users	Usage %
Education = Doctorate	48	100.0%
Type of Area = Rural	94	97.9%
Residence = Greater Manchester	58	96.7%
Education = Post Graduate Certificate / Diploma	46	95.8%
Single - children or dependents in household	72	94.7%

This shows that those 45-54 year olds with a doctorate are the most frequent daily users of email (100%), closely followed by those living in rural areas (97.9%) and those in Greater Manchester (96.7%).

The following table shows the top 5 users of email for work:-

68. Top 5 Users of Email– Totals – for work

Top Email Users- for work	Total Email Users	% of Category
Residence = Greater Manchester	15	100.0%
Type of Area = Rural	24	100.0%
Education = Doctorate	12	100.0%
Education = Other	5	100.0%
Profession = Computing / IT	44	97.8%

The first three are the same as for all purposes with "Education - Other" and Computing /IT replacing the last two categories in the previous table.

Looking at the use of email for other domestic purposes, four of the same categories are in the top five as above, but males are ranked at number five in the table below:-

69. Top 5 Users of Email– Totals - other domestic purposes

Top Email Users- other domestic purposes	Total Email Users	% of Category
Residence = Greater Manchester	15	100.0%
Type of Area = Rural	24	100.0%
Education = Doctorate	12	100.0%
Profession = Computing / IT	45	100.0%
Males	98	99.0%

The bottom five users of email for other domestic purposes are shown in the table below:-

70. Bottom 5 Users of Email– Totals - other domestic purposes

Bottom Email Users- other domestic purposes	Total Email Users	% of Category
Females	112	86.8%
Education = HND / HNC / DIPLOMA / City & Guilds	19	86.4%
"Not in Paid work"	14	82.4%
Education = Other	4	80.0%
Residence = North Wales	7	77.8%

Females appear on the bottom five and North Wales comes last followed by those who recorded their education as "!Other" and those "Not in Paid Work".

4.16 Instant Messaging

Participants were also asked "How often do you use instant messaging for each of the following purposes?". Their total responses are shown below:-

71. Use of Instant Messaging– Totals

How often do you use instant messaging for each of the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet usage	Never	Total responses
To keep in touch (socialise) with friends and family?	21	32	18	23	**94**	134	228
For other domestic purposes?	0	13	9	24	**46**	182	228
For work? -	21	18	9	18	**66**	162	228
For educational study purposes?	1	3	4	15	**23**	205	228
TOTAL	43	66	40	80	**229**	683	912

The above table shows that about a third of 45-54 year olds use instant messaging more for socialising than for other reasons, and the least for educational purposes.

The categories of respondents that use Instant messaging the most are shown in the table below:-

72. Top 5 Categories of Instant Messaging User

Instant Messaging Users	Instant Messaging Users	Total	Usage %
Residence = Cumbria	41	112	36.6%
Type of household = Single - children or dependents in household	26	76	34.2%
Profession = Computing / IT	59	180	32.8%
Males	126	396	31.8%
Residence = Rest of UK	68	228	29.8%

Those from Cumbria use instant messaging the most whilst those from North Wales stated that they did not use instant messaging at all.. Singles with children also rank highly at second place with 34.2% stating that they are users, whilst singles with no children use instant messaging less than any other type of household at 16.2%. From the professions those in Computing/IT rank the highest with 32.8%, while Medicine, Health, Social care professionals are in the bottom five at 19.1%. Male also rank highly at 31.8% with females usage two thirds of that at 20%.

73. Top 5 Categories of Infrequent Instant Messaging User

Instant Messaging Users	Infrequently – less than monthly	Infrequently – less than monthly %
Residence = Cumbria	16	14.3%
Residence = Merseyside	19	12.2%
Males	47	11.9%
Education = Degree	41	11.6%
Type of area = Semi-rural	44	11.5%

At the bottom end of infrequent users, next to North Wales, with zero, the next lowest category is those with "Education = Other" and those with a doctorate at 2.1%:-

74. Bottom 5 Categories of Infrequent Instant Messaging User

Instant Messaging Users	Infrequently – less than monthly	Infrequently – less than monthly %
Single - children or dependents in household	3	3.9%
Residence = None UK	1	3.1%
Education = Doctorate	1	2.1%
Other	0	0.0%
North Wales	0	0.0%

4.17 Social Networking Sites

Participants were also asked "How often do you use Social Networking Sites for the following purposes?"

75. Use of Social Networking Sites– Totals

How often do you use Social Networking Sites for the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet usage	Never	Total responses
To keep in touch (socialise) with friends and family?	21	22	22	32	**97**	131	228
For work? -	5	5	11	15	**36**	192	228
For other domestic purposes?	0	9	6	14	**29**	199	228
For educational study purposes?	0	3	1	14	**18**	210	228
TOTAL	26	39	40	75	**180**	732	912

The top five categories of social networking site users (those that did not select "never" as a response) are shown below:-

76. Top 5 categories of Social Networking Site users

ALL Social Networking Sites	Total Usage	Social Networking Sites Total Usage %
Residence = None UK	12	37.5%
Education = Other	7	35.0%
Doctorate	14	29.2%
Residence = Cumbria	31	27.7%
Single - children or dependents in household	20	26.3%

Of those that use social networking sites on a daily basis the top categories of users are as follows:-

77. Top Categories of Daily Users of Social Networking Sites

Social Networking Site Users	Daily Usage	Total Usage	Daily Usage - % of Total
Education = Other	4	7	57.1%
Residence = Greater Manchester	3	8	37.5%
Type of area = Rural	6	23	26.1%
Profession = Medicine, Health, Social care professionals	7	29	24.1%
"Not in Paid work"	2	9	22.2%
Education = Doctorate	3	14	21.4%
Type of Household = Single - children or dependents in household	4	20	20.0%

So it appears that those who entered their education as "other" use social networking sites more than others followed by those who live in Greater Manchester.

4.18 Blogging

Participants were asked "How often do you Blog for the following purposes?". The results are shown below:-

78. Use of Blogging – Totals

How often do you Blog for the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet usage	Never	Total responses
To keep in touch (socialise) with friends and family?	2	2	6	3	**13**	215	228
For educational study purposes?	0	1	5	3	**9**	219	228
For work? -	0	2	3	6	**11**	217	228
For other domestic purposes?	0	2	2	2	**6**	222	228
TOTAL	2	7	16	14	**39**	873	912

The above shows that Blogging is still a minority activity among 45-54 year olds with most blogging being undertaken for socialising.

79. Use of Blogging – %

How often do you Blog for the following purposes?	Daily	2-3 times per week	2-3 times a month	Infrequently – less than monthly	Total Internet usage	Never
To keep in touch (socialise) with friends and family?	1%	1%	3%	1%	6%	94%
For educational study purposes?	0%	0%	2%	1%	4%	96%
For work? -	0%	1%	1%	3%	5%	95%
For other domestic purposes?	0%	1%	1%	1%	3%	97%
TOTAL	1%	3%	7%	6%	17%	96%

Among that minority, the top five categories of people that do blog as a percentage of the total population of that category are listed in the table below:-

80. Top Five Categories of Bloggers

Blogging	Bloggers	Blogging Total Usage %
Education = Doctorate	6	12.5%
Residence = Rural	10	10.4%
Education = "Other"	2	10.0%
Residence = None UK	3	9.4%
Profession = Computing / IT	15	8.3%

The top category of blogger is those with a doctorate. The bottom five categories are shown below:-

81. Bottom Five Categories of Bloggers

Blogging	Bloggers	Blogging Total Usage %
Education = A Level	2	2.8%
Females	14	2.7%
Residence = Merseyside	3	1.9%
Residence = Cumbria	2	1.8%
Education = HND / HNC / DIPLOMA / City & Guilds	1	1.1%

A total of 6.3% of males blog which is over twice the percentage of females. In terms of type of household the respondents lived in the results are shown below:-

82. Bloggers by type of Household

Type of household	Bloggers	Blogging Total Usage %
Single - children or dependents in household	4	5.3%
Single	*7*	*4.9%*
Married or living with partner - children or dependents in household	24	4.5%
Single - no children or dependents in household	3	4.4%
Married or living with partner	*32*	*4.2%*
Married or living with partner - no children or dependents in household	8	3.6%

It appears that single people are marginally more likely to blog than married ones. and married 45-54 persons living with a partner, but with no children in their household, blog the least.

4.19 Relationship between time online and purpose

Is there a relationship between the amount of time spent online and what 45-54 year olds do online and how frequently they do it?

83. Total Frequency of Internet Use

Total Frequency of Internet Use	N	Minimum	Maximum	Sum	Mean	Std. Deviation
All purposes -	228	0	4820	448710	1968.03	959.301
Domestic & Social Purposes -	228	0	3015	245585	1077.13	712.005
Work and Educational Purposes -	228	0	2415	203125	890.90	378.812
Work Purposes -	228	0	1265	147820	648.33	270.570
Social Purposes -	228	0	2125	129615	568.49	473.912
Domestic Purposes -	228	0	1370	115970	508.64	348.345
Educational Purposes -	228	0	1150	55305	242.57	231.551

4.20 Normal Distribution Testing

Overview

Each of the responses to the questions relating to frequency of internet use was given a value, as shown in the table below, with, for example, "Daily" having the highest value of "5", and "Never" having the lowest value of "1" to produce the following ordinal scale:-.

84. SPSS Values given to Internet Usage Responses

SPSS	Value
Never	1
Infrequently – less than monthly	2
2-3 times a month	3
2-3 times per week	4
Daily	5

Kolmogorov-Smirnov Test

A check for normal distribution was carried out using a series of One-Sample Kologorov-Smirnov Tests, again using SPSS (Leadbeater, 2006). If the data was normally distributed the test would return a p value of greater than 0.05, meaning that there is no significant difference between the data collected and a normal distribution. All of the tests returned a p value of zero meaning that none at the data was normally distributed, as shown below

85. One-Sample Kolmogorov-Smirnov Test Results

PC - socialise	PC - work	PC - domestic	PC - education
0.000	0.000	0.000	0.000

Mobile - socialise	Mobile - work	Mobile - domestic	Mobile - education
0.000	0.000	0.000	0.000

Web browser - socialise	Web browser - work	Web browser - domestic	Web browser - education
0.000	0.000	0.000	0.000

Email - socialise	Email - work	Email - domestic	Email - education
0.000	0.000	0.000	0.000

Instant msgs - socialise	Instant msgs - work	Instant msgs - domestic	Instant msgs - educational
0.000	0.000	0.000	0.000

Social networking - socialise	Social networking - work	Social networking - domestic	Social networking - education
0.000	0.000	0.000	0.000

Blogging - socialise	Blogging - work	Blogging - domestic	Blogging - educational
0.000	0.000	0.000	0.000

Asymp. Sig. (2-tailed) results in all cases = p = 0.000

If p is less than 0.05 then non-parametric tests should be used (Leadbeater, 2006).

The dependent variable data was not normally distributed, as demonstrated by the application of the above tests.

Mean, Standard Deviation, Skewness and Kurtosis Comparison

The SPSS Descriptive function was then used to identify:-

- The mean of the sample;
- Its standard deviation,(to be normal 68% of as sample should be within one standard deviation from the mean);
- Skewness (measures the degree and direction of a sample's asymmetry, such that a left skewed sample has a positive skewness value and a right one a positive value); and
- Kurtosis (a measure of how heavy the tales are).

If the data collected was normally distributed it would have the following values for each of these measures:-

86. Characteristics of a Normal Distribution

Descriptive Statistics	Mean	Std. Deviation	Skewness	Kurtosis
NORMAL DISTRIBUTION	2.5	1	0	0

The following 8 row extract, closest to one Standard Deviation from the mean, shows that the data collected was not normally distributed:-

87. Characteristics of a Normal Distribution - Standard Deviation

Descriptive Statistics	Mean	Std. Deviation	Skewness	Kurtosis
Using social networking sites for other domestic purposes	1.23	0.69	3.14	9.08
Using instant messaging for other domestic purposes	1.36	0.81	2.35	4.48
Using social networking sites for work	1.32	0.84	2.95	8.38
Using a PC for other domestic purposes	4.11	0.99	-1.31	1.60
NORMAL DISTRIBUTION	2.5	1.00	0	0
Using a PC for work	4.62	1.03	-2.82	6.73
Using email to socialise	3.81	1.12	-0.85	-0.02
Using a mobile for other domestic purposes	1.57	1.16	1.82	1.88
Using email for other domestic purposes	3.49	1.16	-0.60	-0.41

For example, the standard deviation of "Using a PC fro other domestic purposes" was 0.99, very close to 1.00. However the mean was 4.11, far removed from the expected mean of a normal distribution (2.5). Also the skewness was also far removed from that of a normal distribution (0) at -1.31 and similarly the kurtosis, at 1.6, was also far removed.

Sorting the data again centred on Skewness also demonstrates that the sample is not normal:-

88. Characteristics of a Normal Distribution- Skewness

Descriptive Statistics	Mean	Std. Deviation	Skewness	Kurtosis
Using email to socialise	3.81	1.12	-0.85	-0.02
Using email for other domestic purposes	3.49	1.16	-0.60	-0.41
Using a web browser to socialise	3.04	1.55	-0.14	-1.51
Using a PC for educational purposes	2.97	1.29	-0.04	-1.09
NORMAL DISTRIBUTION	2.5	1.00	0	0
Using a web browser for educational purposes	2.80	1.36	0.02	-1.29
Using email for educational purposes	2.41	1.23	0.51	-0.78
Using instant messaging to socialise	2.05	1.44	0.96	-0.67
Using social networking sites to socialise	1.99	1.38	1.10	-0.23

Also if the data is sorted around Kurtosis this also illustrates that the data collected is not normally distributed:-

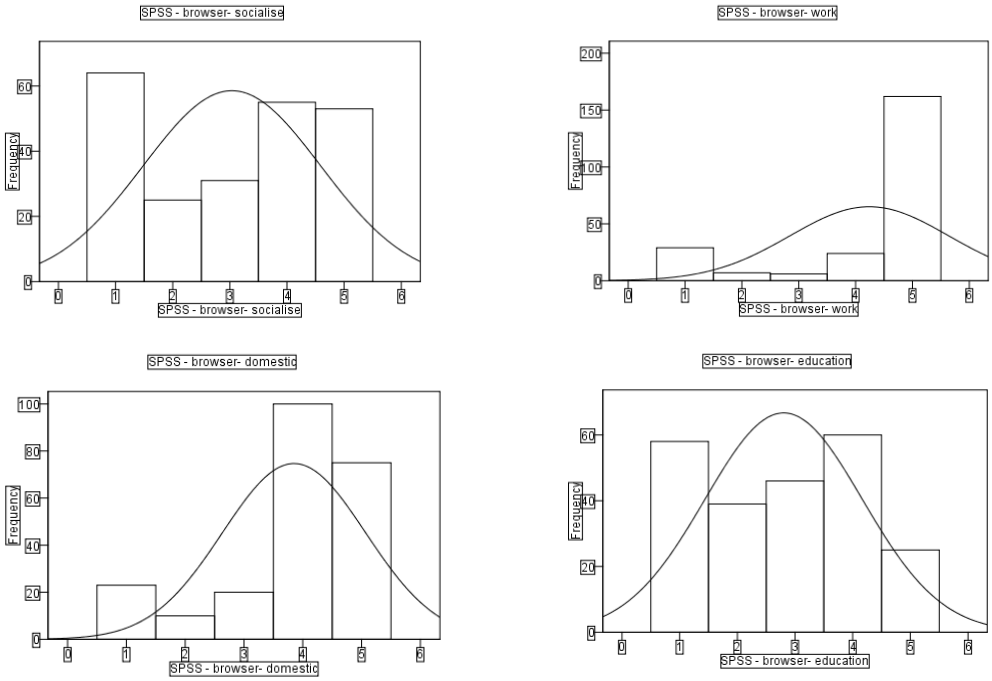
89. Characteristics of a Normal Distribution- Kurtosis

Descriptive Statistics	Mean	Std. Deviation	Skewness	Kurtosis
Using email for other domestic purposes	3.49	1.16	-0.60	-0.41
Using a PC to socialise	3.86	1.20	-0.88	-0.24
Using social networking sites to socialise	1.99	1.38	1.10	-0.23
Using email to socialise	3.81	1.12	-0.85	-0.02
NORMAL DISTRIBUTION	2.5	1.00	0	0
Using a web browser for other domestic purposes	3.85	1.22	-1.22	0.61
Using instant messaging for work	1.76	1.36	1.52	0.72
Using a web browser for work	4.24	1.40	-1.64	1.04
Using a mobile for work	1.60	1.40	1.60	1.20

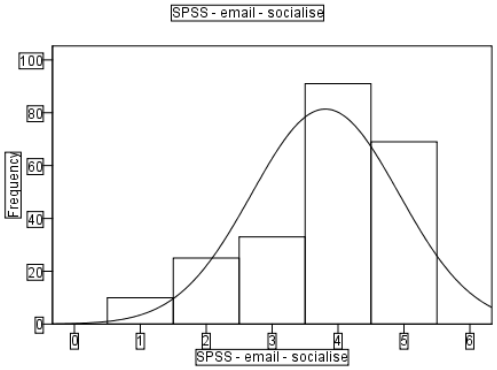
Normal distribution Visual Check using Graphs

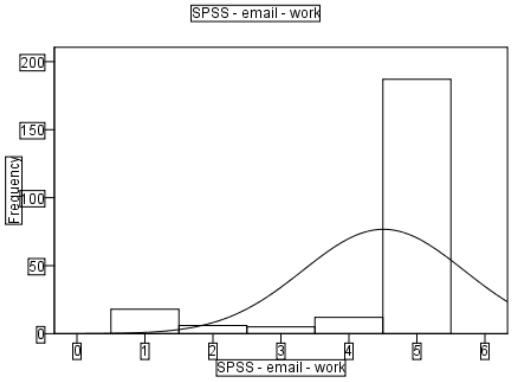
After plotting the data on a histogram graph using SPSS, with a normal curve included, none of the data looked like it was normally distributed. A number of examples are shown below:

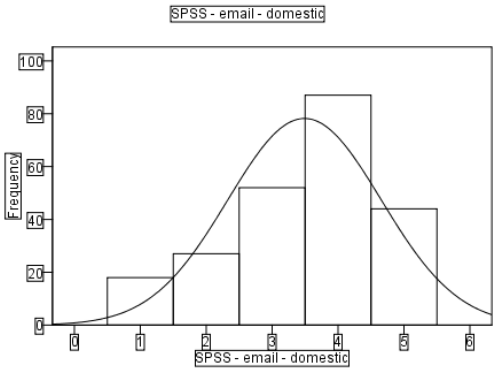
Distribution of Web Browser Usage Data

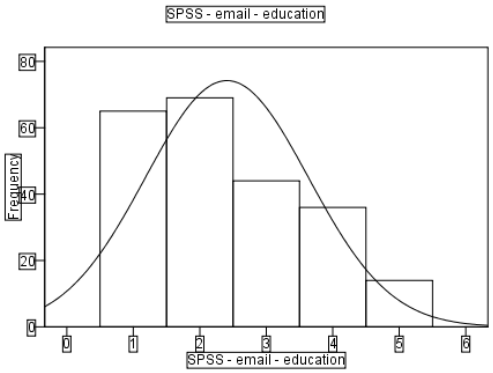


Distribution of Email Usage Data

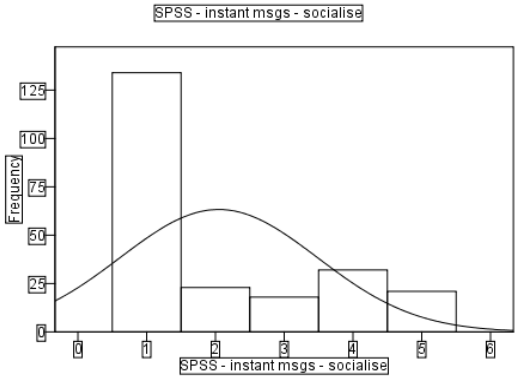


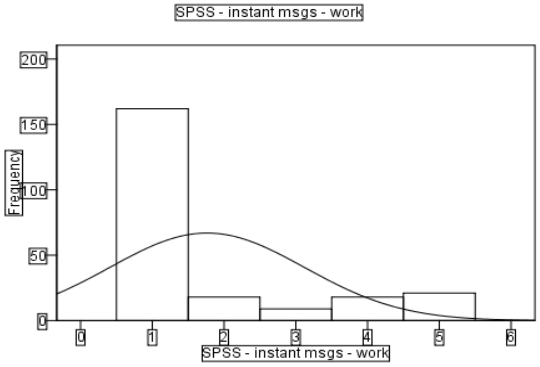


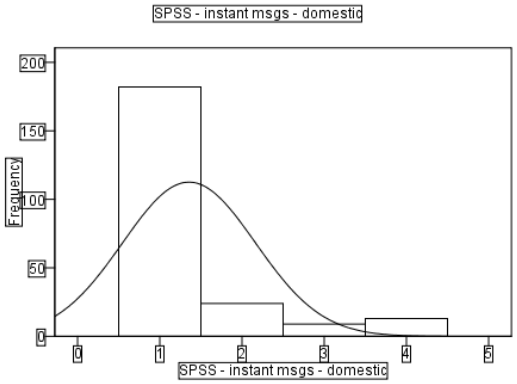


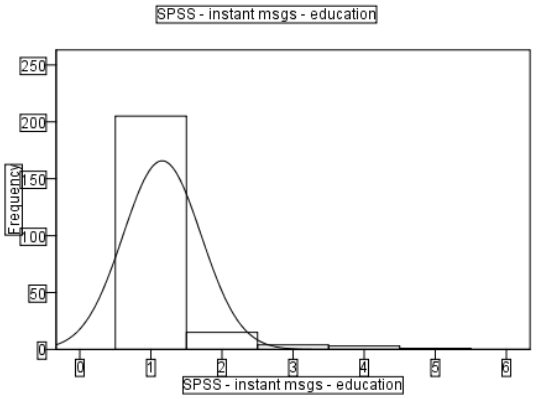


Distribution of Instant Messaging Usage Data

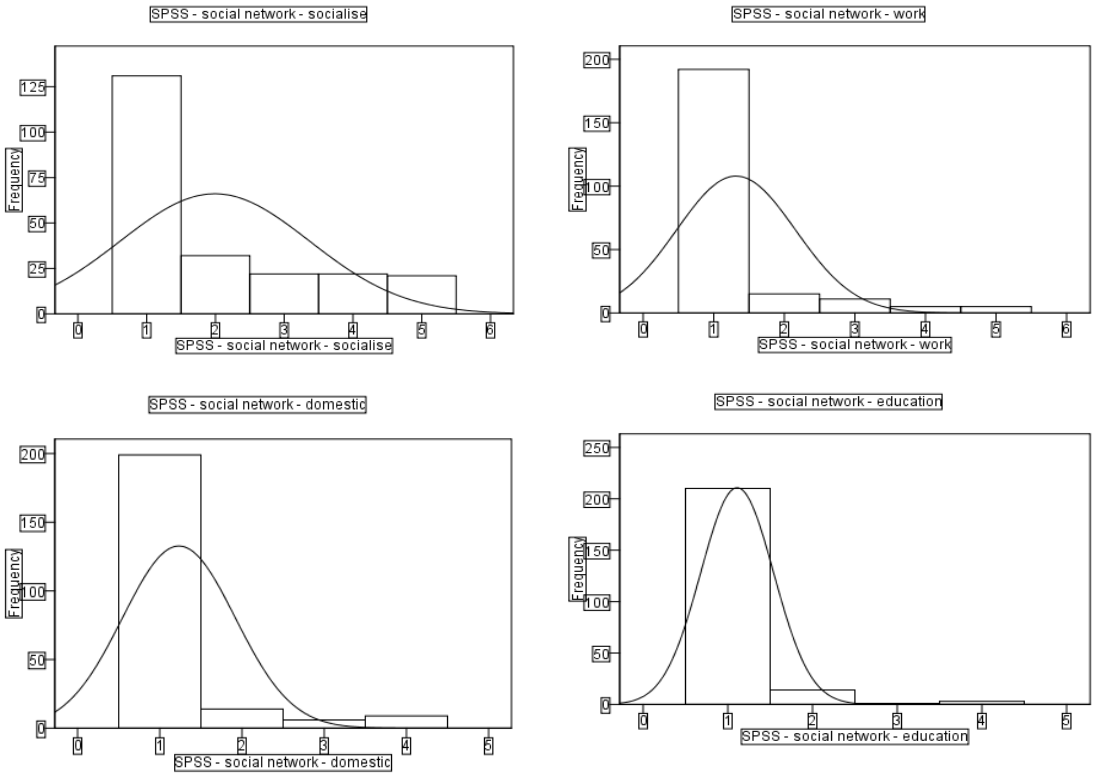








Distribution of Social Networking Sites Usage Data



Distribution of Blog Usage Data