Privacy perceptions among millennials versus non-millennials and online shopping behavior

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The fast growth of the internet in the past decade leads to increased use of online shopping. As a consequence, there are increased amounts of security and privacy risks. The purpose of this study is to find out if millennials and non-millennials perceive security and privacy in different ways and if this influences their online shopping behavior. The study found significant differences in online shopping behavior and levels of perceived privacy between the two age groups. Nevertheless, no significant direct relationship can be seen between perceived privacy and online shopping behavior. The study focuses on analyzing the effect between age, perceived trust, perceived risk, perceived privacy, privacy behavior and online shopping behavior.

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Keywords
Age, perceived risk, perceived trust, privacy perceptions, privacy behavior and online shopping behavior

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1. INTRODUCTION

The internet has grown considerably in the last decade. This leads to higher usage of the internet and higher use of online shopping. According to CBS (Centraal Bureau voor de Statistiek), fast internet connection is an important reason for the increased internet activities. The last couple of years, the Dutch are always among the top five countries in Europe when it comes to fast broadband internet. In 2015, 96% of the Dutch population had access to the internet and 77% of them shop online. Most of the online shoppers use iDeal as their preferred payment method (92%) and 28% of online shoppers shop online in different countries. Clothing, holiday trips and event tickets are the most popular online purchases among online shoppers. This increased usage of online shopping leads to greater privacy and security risks. The Dutch government is aware of this increasing problem and therefore changed the "Wet bescherming persoonsgegevens (Wbp)" on 1 January 2016 (Jansen, 2016). This is a law that protects personal data and is comparable with the Personal Data Protection Act ("Personal Data Protection Act Overview", 2016). The new set of rules includes greater fines for violation of privacy rules and compulsory reporting of data leaks. This new law is in line with European standards ("Protection of personal data - European Commission", 2016).

The goal of this thesis is to investigate if security and privacy perceptions among millennials versus non-millennials affect their online shopping behavior. Many different studies analyzed the privacy and security risks regarding online shopping. However, limited research has been conducted on the overall influences of age, perceived risk, perceived trust and privacy perceptions on online shopping behavior. Especially the difference between millennials versus non-millennials in online shopping is not sufficiently studied. The research question being answered in this study is: Do security and privacy perceptions among millennials versus non-millennials affect their online shopping behavior? In order to answer this question, an online survey is constructed and distributed using social media. Based on the survey results some conclusions are made on the relationship between age, privacy perceptions and online shopping behavior. This thesis is divided into nine parts. Part two and three are literature reviews on security and privacy risks and online shopping. Part four is about the methodology used and part five discusses the results. Part six consists of the discussion including practical and theoretical implications and limitations of the study with ideas for further research. Part seven includes acknowledgements and part eight and nine include appendix and references.

2. SECURITY & PRIVACY RISKS

2.1 Security and privacy risks development

In the past decade the world witnessed an extremely large growth of e-commerce. The internet is now a key communication tool for companies to reach their customers. Consequently, more and more businesses focus on conducting online business. Therefore, the amount of online shopping, internet banking and web services increased heavily. Accordingly, data about individuals' online behavior are collected to a greater extent (Mekovec, 2012). This leads to greater security and privacy risks. In 1995, the European Union introduced a privacy legislation that defined "personal data" as any information that could identify a person, directly or indirectly. Nowadays, that definition surrounds far more information than the European legislators could have imagined. The data created each year grows exponentially: it reached 2.8 zettabytes in 2012 and doubled again by 2015. A lot of this data is invisible to most people and seems impersonal, but it is not (Green, 2016).

2.2 Security and privacy risks in literature

Even though there are many different types of security and privacy risks in the digital environment, this thesis will focus on the online shopping domain. Different studies tried to find variables that influence online shopping behavior. I will use the conclusions of different studies to come to my own theoretical framework and hypothesis on which variables influence online shopping behavior.

Miyazaki (2001) concludes that internet experience and remote purchasing method use are both negatively related to risks and concerns of online purchasing. In turn, this is negatively related to online purchasing rate. Appendix A figure 1 shows the framework Miyazaki used. The result of his study provides evidence that higher levels of internet experience lead to lower perceptions of risk regarding online shopping. He also concludes that perceived risk at least partially influences online purchase behavior. Mekovec (2012) argues that perceived security and privacy are related to different factors like: general information sensitivity, control over information collection, perceived internet privacy risk, perceived benevolence, perceived credibility, perceived integrity, perceived service quality and information sensitivity. Appendix A figure 2 shows the framework Mekovec used. He concludes that perceived privacy and security affect customer's trust in online shopping. Moreover, the relationship between perceived security and perceived privacy on one hand, and overall e-service quality on the other hand is confirmed.

Lim (2003) developed a theoretical framework describing the impact that trust and risk have on making decisions. The framework studies how perceived risk and perceived trust influence purchase intention. Mayer et al (1995) define trust as a willingness to take risk and perceived risk as the likelihood of both positive and negative outcomes. In this case trust plays an important role in making decisions since it is related to firm performance, competitive advantage, customer satisfaction and other economic factors like transaction costs. It is assumed that consumers will be more likely to make a purchase when perceived risks are low and perceived trust is high. The framework argues that there are four categories that influence consumer trust when making an online purchase. These are cognition-based, affect-based, experience-based and personality-oriented. Cognition-based factors are associated with consumers' observations and perceptions regarding the features and characteristics of the party from who they buy (Kim, Ferrin, Rao, 2008). Affect-based factors are related to indirect interactions like inputs from friends and family. Experience-based factors are related to personal experience and personality-oriented factors are related to consumers' personality related to shopping habits. Perceived risk is divided in financial, product-performance and psychological risks. The study uses seven types of risk of which four are not important in online shopping. Product-performance risk is associated with the product itself. For example, risks are high when the product is easily defecting. Financial risk is not related to the product but to the channel that is used to pay for the product. Psychological risk is related to the way in which people feel safe in giving out information to the seller. All the different categories are measured extensively and are analysed to come up with reliable conclusions about the effects of perceived risk and trust on online shopping behavior. Appendix A figure 3 shows the model that Kim et all. (2008) used. The results of the study suggest that a consumer's perceived trust affects purchasing intention. The study also provides evidence that

higher perceived risk reduces the intention to purchase and higher perceived benefits and trust increase the intention to purchase. Finally, it is concluded that perceived risk and perceived trust influence the actual purchase decisions.

3. ONLINE SHOPPING

3.1 Trends of online shopping behavior

According to the CBS, around 10 million people of the Dutch population among the age group 12 years and older shopped online in 2010. This number increased with 11% to 11.1 million people in 2015. This amounts to 77% of the population of which 58% recently bought online in the past three months ("77% of Dutch shop online", 2015). More than half of these frequent online shoppers shopped online at least three times in the past three months. These online shoppers spent around 50 to 500 euros per order in 66% of the total orders. The online purchases account for 18% of the total purchases in The Netherlands (Tienkamp, 2016). Even though there are many online shoppers, one part of the population does not shop online for different reasons (15%) and 8% does not have access to the internet. The people who refused to shop online give different reasons. Most of them prefer visiting a traditional retail store to actually see the product. Figure 1 shows all reasons to not buy online and their occurrence.

Figure 1. Reasons not to buy online among the non-e-shoppers (CBS, 2016).

*** Respondents were able to give multiple answers; therefore the sum does not equal 100.*

Especially 25- to 45-year-old people like to shop online: 92% of this age group indicates that they bought online at least once in the past 12 months. However, the share of online shoppers in the age group older than 45 increased most in recent years. More than 50% of the people aged between 65 and 75 and one out of five people aged over 75 buys online.

Even though there is not a significant difference in the share of online shoppers between males and females, males are more active online shoppers. Nine percent of men shopped online more than ten times in the last three months, versus four percent of women. In this same time period, nine percent of men spent over 1000 euros on online shopping versus four percent of women. Men also buy different, more expensive types of products like software, hardware, electronics and financial products. The majority of online shoppers especially buy clothing, holiday trips and tickets for events online ("Mannen geven online meer geld uit dan vrouwen", 2015).

The turnover of online shopping increased faster than that of traditional retail stores. In 2015, the online turnover was 19% higher than that of 2014. During the same period, the turnover of traditional retail stores increased with only one percent. Thus, the increased online shopping numbers seem positive for the Dutch economy. Nevertheless, four out of ten online shoppers encounter problems while shopping online. Late deliveries or technical problems with ordering or paying are the most encountered problems. Figure 2 shows all the encountered problems ("CBS StatLine - Detailhandel; omzetontwikkeling internetverkopen, index 2013=100", 2016).

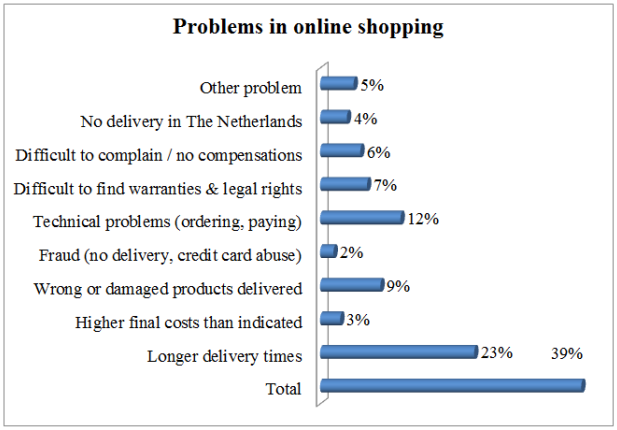

Figure 2. Problems encountered in online shopping in percentages (CBS, 2016).

*** Respondents were able to give multiple answers. Therefore, they do not add up to the total problems or reasons not to buy online.*

3.2 Risks of online shopping

In 2014 around 480.000 people were victims of shopping fraud. This is a relative increase of around 19%. This increase is a consequence of the increased digital shopping fraud. In most of the cases, paid and ordered products and services do not get delivered. ("Meer online shoppers opgelicht", 2015) Three-quarter of victims claim that the offenders operate from The Netherlands ("CBS StatLine - Slachtofferschap criminaliteit; regio", 2016). Millennials and higher educated people are relatively often victim to shopping fraud. The non-millennials, especially aged over 65, are least often victim to this type of fraud. The fact that this age group orders online less frequently, is not an explanation for this difference in victimization. It is assumed that the non-millennnials are more aware of security and privacy risks and are thus less likely to take these risks. In 2014, five percent of the higher educated population was victim of shopping fraud, against only two percent of the lower educated. In this case the difference can be accounted to the higher percentage of the higher educated that shop online.

Many different studies recognize the significant role that perceived risk plays in influencing consumer behavior, especially in online transactions. However, there are not many studies that analyzed the impacts of risk. Hofacker (2000) distinguishes five types of risk: time risk, vendor risk, security and privacy risk, performance risk and price comparison risk. Price comparison risk is especially present at real-life auctions, while the other four types are more important in the online environment (Massad & Tucker, 2000). An early study of Jacoby and Kaplan (1974) identified seven types of risks: financial, product-performance, physical, psychological, social, time and opportunity cost risk. Financial risk, product risk and psychological risk are most important in online shopping (Kim, Ferrin, & Rao, 2008). Miyazaki and Fernandez (2001) found that perceived risks in online shopping may reduce with higher levels of internet experience. A later study of Lim (2003) identified four types of risk associated with online shopping: technology, vendor, consumer and product risk. From a review of past studies Lim identified nine dimensions of perceived risk. Table 1 shows the nine types of perceived risk.

Type of risk	Explanation
Financial risk	Possibility of losing money from online shopping.
Performance risk	Possibility that the purchased products do not work properly or can be used for only a short period of time.
Social risk	Risk regarding other people's perception of the buyer's online shopping behavior.
Physical risk	Possibility that a product is harmful for one's health.
Psychological risk	Possibility that individuals suffer from mental stress because of their shopping behavior.
Time-loss risk	Possibility that individuals lose time due to their shopping behavior.
Personal risk	Possibility that the individual is harmed personally. For example when credit card information is stolen.
Privacy risk	Possibility that businesses collect personal data and use it inappropriately.
Source risk	Possibility that individuals suffer because the businesses from which they buy products are not trustworthy.

Table 1. Nine types of perceived risk derived from different studies (Lim, 2003).

3.3 Behavior in the digital environment

In the past, many studies focused on analyzing shopping behavior. These studies found that the two dominant reasons for shopping in traditional retail stores are either for fun or with a goal in mind (Babin, 1994). Therefore, there are two motives to buy products with either a utilitarian or hedonic aspect. Wolfinbarger and Gilly (2001) conclude that these same reasons are most important in online shopping. They classify online shoppers as either experiential shoppers or goal-oriented shoppers. Experiential shoppers typically like the online shopping experience for certain product groups they like. Goal-oriented shoppers have four main reasons for online shopping: convenience, informativeness, selection and the ability to control the shopping experience. Sarkar (2011) supports these earlier studies and argues that utilitarian shopping values relate to the functional aspects of shopping and hedonic shopping values are derived from the perceived fun of shopping.

When analyzing the relationship between age and online shopping motives, it is found that younger consumers achieved more hedonic and utilitarian benefits of online shopping than older consumers (Dholakia & Uusitalo, 2002). However, they did not study actual online shopping behavior or attitudes and solely focused on perceived benefits. The relative impact of demographic factors, especially age, on online shopping behavior has so far not been studied widely. Nevertheless, some different studies analyzed age and digital behavior. These studies found that older people are more likely to be digitally excluded than younger ones (Olphert, 2005). Age in itself is not a barrier to access of the internet. Many older people can be regarded as high-frequency internet users. Notwithstanding, there are still a lot of older people resisting to access the internet. These older people state that this attitude will not change. Olphert (2005) states that this is due to badly designed websites and poor usability levels. Older people encounter more difficulties in using the internet. Sorce et all. (2005) studied age differences in online shopping and found that younger people search for more different products, but do not actually buy more online.

Most of the early research conducted on online shopping behavior focused on identifying which people are most likely to shop online. Bellman et all. (1999) conclude that demographic variables such as age, income and education have moderate impact on whether someone will buy online. They found that the most important reason for buying online was experience in previous online purchases. This finding is in line with the findings of Miyazaki (2001). A more recent study by Hernández et all. (2011) found that age, gender and income moderate neither the influence of previous use of the internet nor the perceptions of e-commerce. Hence, these factors do not condition the behavior of frequent online shoppers. Chang et all. (2005) analyzed many different studies to derive to a model for the adoption of online shopping. They found a significant positive impact of age on online shopping in some of the studies, while in others there is no significant relationship found. In six studies there is a significant positive relationship between trust and online shopping. In most of the studies there is a significant negative impact of perceived risk.

4. METHODOLOGY

4.1 Theoretical framework

The research goal of this study is to investigate security and privacy perceptions among millennials versus non-millennials and find out if this influences their online shopping behavior. In the current academic field many research focuses on privacy perceptions and online shopping behavior. However, the overall link between age, privacy perceptions and online shopping behavior is not sufficiently studied so far. A theoretical framework is constructed in order to analyze the relationship between age, privacy perceptions and online shopping behavior. This theoretical framework is based on past studies, but focuses on the study of Kim et all. (2008) and Lim (2003). In their study they conclude that perceived risk and perceived trust influence online shopping behavior and intention to purchase. Perceived risk is influenced by seven types of risks. In this study solely the three most important types of risk for online shopping are used. These are: financial, product-performance and psychological risks. Perceived trust is influenced by cognition-based, affect-based, experience-based and personality-oriented factors. Appendix A figure 4 shows the factors affecting perceived risk and trust.

Based on past findings, in this study it is assumed that high perceived risk leads to low perceived privacy. High perceived trust leads to high perceived privacy. Overall perceived privacy is thus based on the combination of perceived risk and perceived trust. In turn, high perceived privacy leads to high intention to purchase. Since age in itself does not clarify anything, we do not know the relationship between age and the other variables. Based on these assumptions we constructed the theoretical framework. Figure 3 shows this framework.

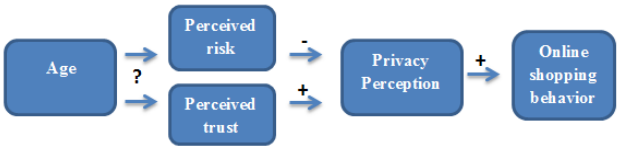

Figure 3. Theoretical framework of the relationship between age, perceived risk, perceived trust, perceived privacy and online shopping behavior.

*** + positive relationship, - negative relationship, ? unknown relationship.*

Note that this is just an assumption. The actual relationship is analyzed based on an online survey. In order to study the relationship between age and the other variables, age is divided in four age groups. These are either millennials or non-millennials. A total of five students focus their research on different age groups to come up with a reliable overall conclusion on the relationship between these variables. Figure 4 shows the distribution of age groups. This study focuses on comparing age group 25-34 (millennials) with 50+ (non-millennials).

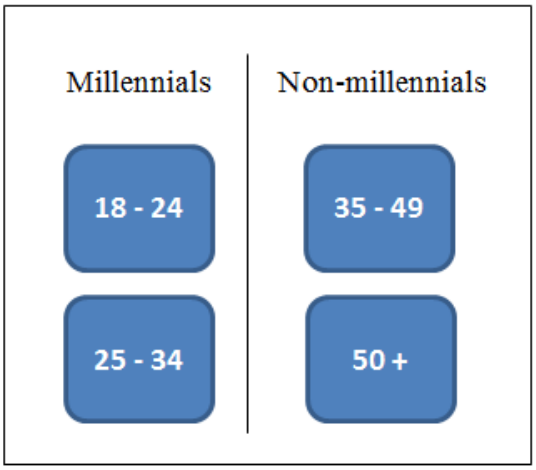

Figure 4. Distribution of age groups.

4.1.1 Hypothesis

Based on past literature I got to the following hypothesis:

- If perceived risks are high, perceived privacy is low and as a consequence online shopping behavior is low.

- If perceived trust is high, perceived privacy is high and online shopping behavior is high

- Non-millennials are more aware of security and privacy risks, thus they have lower privacy perceptions and lower online shopping behavior.

- Non-millennials are more aware of security and privacy perceptions and score higher on privacy behavior.

4.2 Online survey

Based on the theoretical framework we constructed an online survey to measure the different variables. Appendix B shows the complete survey. The use of an online survey has some major advantages over other research methods. Appendix A Table 1 shows 10 advantages of online surveys. Online surveys tend to be the most cost-effective way of collecting data and a broad range of data can be collected. However, they may not reach respondents who are unable to use the internet. These hard-to-reach respondents may be reached by for example surveys on paper or face-to-face interviews. Since this survey is about online shopping behavior, it makes no sense to ask people without internet access to answer these questions on paper. Therefore, it is acceptable to leave these people out of consideration without violating the validity of this study. Another disadvantage of the online survey method is the absence of an interviewer. This online method is not suitable for a survey that consists of many open questions. Survey fraud is probably the worst disadvantage of this method. Some people answer online surveys for the sake of their own advantage. They may give unreliable information or only fill the survey in to get the results (Sincero, 2016). Since this study is not giving out any monetary rewards for filling in the survey, this will not harm the research.

4.3 Respondents

Respondents in the present study were randomly selected through multiple social media channels. It can be assumed that the respondents are independent from each other and that they do not influence each other's responses. A total of 789 useful responses are collected. For the purpose of this study I am comparing age group 25-34 with age group 50+. Therefore, all other respondents are filtered out of the respondent list. Respondents are also filtered on either a Dutch or German nationality. After filtering respondents there are 230 respondents left. The majority of these respondents are female (67%). These 230 respondents are divided into two samples around the same size based on their age. Out of the respondents 108 are aged between 25 and 34 and 122 respondents are aged over 50. A new variable is computed using SPSS which assesses these age groups as either a "1.0" or a "2.0" to make analyzes easier. Appendix A Table 2 shows some demographics of respondents within the two age groups. Appendix A figures 5-12 show more detailed information on the demographics of the respondents.

4.4 Response rate

The online survey is spread mainly through Facebook. Firstly I posted the link with a short text message on my own Facebook page. On that page all my 551 Facebook friends were able to see the link. My parents also posted this link on their Facebook pages containing 291 and 571 friends. Since 148 of these friends are my mutual friends, I am not taking these into consideration for the calculation. Denise Althaus also posted the link on her Facebook account, containing around 50 Dutch friends. The link is also posted in some Facebook groups in which multiple people were able to see it. Appendix A Table 3 shows the Facebook group in which the link was posted with the amount of people that are subscribed to that group. The link is also posted on my LinkedIn account containing 172 connections. However, only 74 of these connections are not friends with me on Facebook and therefore I count these 74 people instead of 172. Since I am also taking into account the German respondents, I take the numbers of the German students to calculate the response rate (18.000). Taking into account the different Facebook pages and LinkedIn connections, the total amount of people that could have seen the link to the survey is 180.173. A total of 856 respondents finished the survey. The response rate is 0.0043. Note that some of the Facebook friends are also subscribed to the Facebook pages in which the link was posted. Therefore, the actual number is a bit lower than 198.173. However, this amount is so small that it does not affect the response rate. Besides, it is also very unlikely that every person subscribed in the Facebook pages actually saw the survey link. The actual response rate is thus assumed to be larger.

4.5 Measures

The measure of privacy perceptions is based on two factors defined by Kim et all. (2008). Namely, perceived risk and perceived trust. Perceived risk is measured by the overall influence of three types of risks: financial, psychological and product performance risks.

Perceived trust is measured by cognition-based, experience-based, affect-based and personal-oriented factors. In order to measure perceived trust, the survey contained six trust-based statements. Respondents scored these statements on a seven-point Likert scale ranging from (1) "entirely disagree" to (7)

"entirely agree". In some of the statements a score of (1) means low perceived trust and in some of the statements it is the other way around. Therefore, the statements are recoded in a way that every score of (1) means low perceived trust and (7) means high perceived trust. This is necessary to find a reliable number for perceived trust. To measure perceived trust, a new variable called "TrustMean" is computed. In order to assess whether it is reliable to use these different items into one scale for a new variable, a Cronbach's alpha score is calculated in SPSS. Cronbach's alpha is the most common measure of internal consistency ("Cronbach's Alpha in SPSS Statistics - procedure, output and interpretation of the output using a relevant example | Laerd Statistics.", 2016). Based on this analysis all six items are used to compute the new variable "TrustMean". This variable is calculated by the mean of the six scores on the trust-based statements. A higher number for "TrustMean", means a higher level of perceived trust. "TrustMean" is always a score between one and seven and is thus classified as a ratio measurement variable.

Perceived risk is assessed by eight items, measured on a Likert scale ranging from (1) "entirely disagree" to (7) "entirely agree". In this case the statements are recoded in such a way that a score of one means high perceived risk and seven means low perceived risk. This is done regarding the negative relationship with perceived privacy. When perceived trust is high, perceived privacy is also high and when perceived risk is high, perceived privacy is low. Therefore, low perceived risk means high perceived privacy. Low perceived risk is recoded into a (7) to find a reliable number for perceived privacy. This construct is reliable ($\alpha = 0.6$).

Perceived privacy is measured based on the means of "Riskmean" and "TrustMean". In other words, it is based on the mean scores of perceived risk and perceived trust. A new variable is computed called "PerceivedPrivacy" to assess this perceived privacy. The score for "PerceivedPrivacy" is always a number between 1 and 7 which makes it also a ratio measurement variable. The higher the score for "PerceivedPrivacy", the higher the perceived privacy of the respondent. Higher perceived privacy implies that respondents feel that their privacy is protected.

Privacy behavior is an extra privacy measure assessed by five items. The five statements are measured on a Likert scale ranging from (1) "Never" to (7) "Always". The statements assessed whether a respondent would refuse a purchase based on privacy policies or terms and conditions. The higher the score, the more likely it is that a respondent refuses a purchase based on privacy issues. Respondent with a higher score are more aware of potential privacy problems and are more cautious in making purchase decisions. After excluding three other privacy related items, this construct is highly reliable ($\alpha = 0.79$).

Online shopping behavior is assessed by three items. Many questions are asked regarding online shopping. However, many of these are not useful to find a reliable score for online shopping behavior. These items are used in a different way to compare online shopping habits. This item describes how often someone shopped online, how much money they spent and for how long they have been shopping online. A higher score implies that a respondent shops online more often and spends more money online. The construct is highly reliable ($\alpha = 0.70$).

Education is a control variable that is based on a multiple choice question. Respondents could choose between nine options ranging from (1) "below high school" to (9) "professional degree". This variable is a nominal measurement variable. Since the options are ranked in a way from low education to high education, it is convenient to number the options from one to nine. One indicates a low educational level and nine indicates a high educational level. This makes it more convenient to check for any correlations with the dependent variables.

Type of products respondents buy online

Sorce et all. (2005) suggests that younger people search for more different products online. In order to check this within the sample of this study, a new variable is computed. This variable "ProductType" is based on the sum of 12 survey items. These 12 items are answered with either a (1) or a (0) in which a one means that the respondents buy that product type and zero is a missing value. The higher the number for "ProductType" the more different products a respondent buys online.

Appendix C shows the exact way these different variables are computed and measured.

5. RESULTS

Age and perceived privacy

In order to measure if there is a difference in perceived privacy between the two age groups, an analyzes of variance is conducted. ANOVA compares the means between groups and determines whether these means are significantly different from each other (Huizingh, 2007). This method is used since it is comparing two independent groups with a ratio measurement variable. When using ANOVA, the sample has to meet certain conditions (De Veaux, Velleman, & Bock, 2014). Firstly, the sample must meet the independence assumption. In this study, it can be assumed that the sample of respondents are independent from each other and are selected at random from a homogenous population. Secondly, the sample has to be normally distributed. This is also known as the nearly normal condition. In order to check this, a histogram is constructed of the two age groups. Appendix A figure 13 and 14 show these histograms. As can be seen in the figures, both variables are normally distributed. Thirdly, the groups must be independent of each other. In this case it is reasonable to assume that the two age groups are independent from each other. They are selected at random and do not influence each other when answering the survey. Finally, homogeneity of variances is required. This means that the variances in the age groups are equal. Since the conditions are met, ANOVA is used to analyze differences between the two age groups. An alpha level of 5% is used as a standard.

The null-hypothesis is: "There is no difference in privacy perceptions between age groups." The alternative hypothesis is: "There is a difference in privacy perceptions between age groups". The null-hypothesis can only be rejected if a significant p-value below .05 is found. The One-Way Analysis of Variance gives a P-value of .038. Appendix A Figure 15 and 16 shows tables containing all the p-values of the one-way ANOVA analysis between different variables. Since the ANOVA analysis gives a value of .038, there is a significant difference in perceived privacy between the two age groups. In order to check whether there is significant correlation between the two variables, a Pearson correlation analysis is conducted. Appendix A Figure 17 shows a large correlation table. This type is used since both variables are ratio level variables. The Pearson correlation finds a p-value of -.081. This implies a negative relationship between age and perceived privacy. However, this value is so small that it is considered insignificant. When conducting a two-way ANOVA analysis, a significant influence of age on privacy perception can be seen. Appendix A Figure 18 shows the p-value of this analysis. The P-value of .003 shows that there is a significant difference in privacy perception between the two age groups. Since the mean

number of millennials for perceived privacy is higher than for the non-millennials, they perceive higher levels of privacy. Appendix A Figure 22 shows the mean numbers per age group on different variables.

Age and privacy behavior

The difference in privacy behavior between age groups is measured in the same way. When using ANOVA in this study, all the null-hypotheses suggest no differences. A p-value below .05 does always suggest a difference between the age groups. The ANOVA analysis found a p-value below .01, which indicates that the null-hypothesis can be rejected. Within this analysis, a 95%-Confidence Interval is used. Therefore, we can be 95% confident that there is a significant difference in privacy behavior between the two age groups. The Pearson correlation finds a p-value of .265. This number indicates that there is a very weak positive relationship between age and privacy behavior. The mean number for privacy behavior among millennials is 3.16 and for non-millennials this number is 3.81. Non-millennials tend to have slightly higher awareness of privacy risks and are more likely to check for terms and conditions and read privacy policies than the millennials. A two-way ANOVA analysis is conducted to check whether risk and trust influence privacy behavior. Appendix A Figure 19 shows the results of the analysis. The p-value of .015 indicates a significant effect of perceived trust on privacy behavior. Risk does not have a significant effect. Neither does the interaction between risk, trust and age.

Age and online shopping behavior

The two-way ANOVA analysis between age and online shopping behavior found a p-value of .017. This indicates a significant difference in online shopping behavior between the two age groups. The Pearson correlation finds a p-value of -.161. This number indicates that there is an insignificant negative relationship between age and online shopping behavior. The ANOVA result suggests that the millennials tend to slightly buy online more often and spend more money online. When comparing the means there is also a small difference between age groups (millennials m = 2.65 and non-millennials m = 2.42).

Age, risk and trust

When analyzing the ANOVA p-values for perceived risk (p = .222) and perceived trust (p = .417), it is found that there are no significant differences between the age groups. The Pearson correlation finds a p-value of -.092 for "Riskmean" and -.040 for "Trustmean". These values indicate insignificant negative relationships. There are no significant reasons to assume that age has any influence on the way the respondents perceive trust and risk. This can also be seen through the very similar mean scores between the groups. Millennials' mean perceived risk is 4.10 and for non-millenials this is 3.98. For perceived trust these numbers are 4.34 and 4.26.

The main goal of this research is to study differences in privacy perception and online shopping based on age. However, in the next part, the relationship between the different variables and three other demographic variables (occupation, education and gender) is analyzed.

Age and product type

The ANOVA analysis between age and "ProductType" found a p-value of .046. This indicates a significant difference in the amount of different products a respondent buys between the two age groups. The means are also indicating a difference. For millennials the mean score is 3.67 and for non-millennials this score is 3.17.

Occupation

In order to check whether someone's occupation has an effect on the variables RiskMean, TrustMean, PrivacyBehavior, PrivacyPerception and OnlineShoppingBehavior Eta is used to measure the correlation. Eta is chosen since occupation is a nominal variable and the other variables are of a ratio level. Appendix A Table 4 shows the eta-values. The P-values range from zero to one in which one indicates a strong correlation and zero indicates no correlation. As can be seen in the table, all p-values are below .2 which indicates that all the correlations are very weak. The eta-squared value explains how much variation is explained in the dependent variable by variation in the independent variable (De Veaux, Velleman, & Bock, 2014). The eta-squared values are also very small. Almost no variation in any of the variables is explained by occupation. These findings are in line with the Pearson correlation values in Appendix A figure 17. It can be concluded that occupation has no significant effect on any of the dependent variables.

Education

In order to check whether someone's educational level has an effect on the variables RiskMean, TrustMean, PrivacyBehavior, PrivacyPerception and OnlineShoppingBehavior Eta is used to measure the correlation. Eta is chosen since education is a nominal variable and the others are of a ratio level. Appendix Table 5 shows the eta-values. Most of the p-values fall below .2 which indicates weak correlations. The greatest p-value is .210 for perceived risk. The eta-squared values are also very small. Almost no variation in any of the variables is explained by educational level. These finding are in line with the Pearson correlation values. Overall, it can be concluded that educational level has no significant effect on any of the dependent variables.

Gender

The variable gender is a dichotomous variable. In order to check for correlations between gender and the dependent variables it is convenient to use either an eta or spearman's correlation analysis. Appendix A Table 6 shows the eta-values. As can be seen in the table, all eta-values are below .14. These values are too low to indicate any significant correlation. The eta-squared values are even smaller. Almost no variation in any of the variables is explained by gender. These finding are in line with the Pearson correlation values.

Perceived privacy

When looking at the Pearson correlation values regarding perceived privacy no significant relationships can be seen. A two-way ANOVA analysis between risk trust and privacy perception show some significant results. Appendix A Figure 18 shows the results of the analysis. A p –value of .001 shows a significant relationship of perceived trust on perceived privacy. It also shows an interaction effect of age and trust on perceived privacy (p=.004). There is no such interaction effect with risk and age since p = .133. A linear regression analysis gets to the same conclusion. There is a significant effect of trust but not for risk. Appendix A figure 23 shows the results of the linear regression analysis. Another two way ANOVA is conducted to find any relationships with online shopping behavior and privacy behavior. Appendix A figure 21 shows the results. A p-value of .003 suggests that privacy behavior has a significant effect on perceived privacy.

Online shopping behavior

A p-value of -.187 indicates an insignificant relationship between online shopping behavior and privacy behavior. There is significant positive relationship between online shopping behavior and "ProductType" (p= .598). This indicates that

people who buy more different types of products online also shop online more often in general. When conducting a two-way ANOVA analysis it is concluded that neither risk or trust have an influence on online shopping behavior. Appendix A Figure 20 shows the result of the analysis.

Other results

The survey includes some other questions that assess online shopping behavior. These questions lead to some significant differences between the two age groups. Millennials buy significantly more groceries online than the non-millennials. Of all the responses, 77.8% of the people who buy groceries online are millenials. Non-millennials significantly buy more often from the category "Motors" (81.5%). Overall, fashion, sports and electronics are the most popular product categories bought online among the respondents. Appendix A table 7 and figure 24 shows the type of products respondents buy online. The most popular online payment methods among respondents are PayPal (29%) and iDeal (25%). Among the respondents that prefer iDeal payment, 71.9% is a millennial. Non-millenials significantly prefer more conservative and probably safer payment methods. Respondents who prefer the cash on delivery payment method consist for 76.5% of non-millennials. Appendix A figure 25 and 26 show more statistics on the preferred payment methods. Main motivating factors to buy online are convenience of online shopping, better prices and flexibility. There are no significant difference regarding motivating factors between millennials and non-millennials. Appendix A table 8 and figure 27 show more statistics on the motivating factors to buy online. Not being able to see a physical product (28%) and high delivery costs (21%) are the main factors preventing from shopping online. Millennials are significantly more sensitive to longer delivery times than the non-millenials. Appendix A table 9 and figure 28 show more statistics on the factors preventing from shopping online. Figure 5 shows the main results of the study.

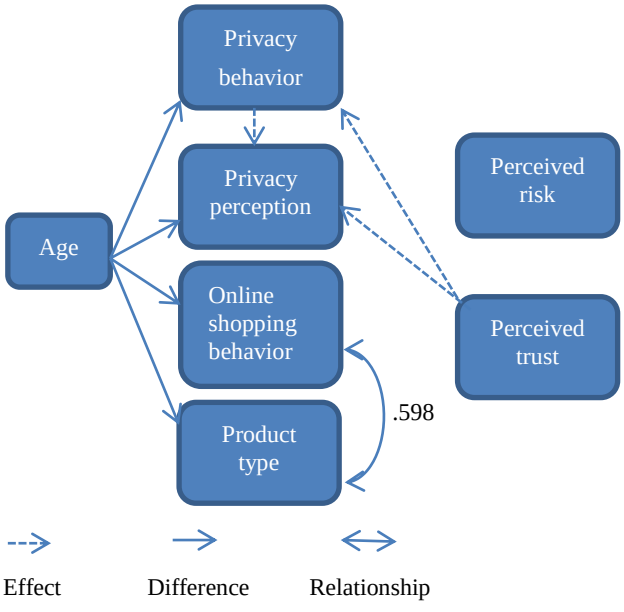

Figure 5. Differences between age groups, effects and relationships between different variables.

6. DISCUSSION

6.1 Theoretical implication

The current academic field already focused highly on the relationship between privacy perceptions and online shopping behavior. However, these studies did not take into account the overall effect of demographic factors. This study implies that there is a significant difference between millennials and non-millennials in the way they perceive their privacy. This finding goes against the theory of Mekovec (2012) who argues that perceived privacy is related to different factors mentioned earlier but is not related to any demographic factors. Mekovec also argues that there is a relationship between perceived privacy and levels of trust. This is in line with the findings of this study. There is a significant effect between perceived privacy and perceived trust. Another finding of this study implies that trust has no significant influence on online shopping behavior. This goes against the theory of Kim et all. (2008) who suggest that higher levels of trust lead to higher levels of online shopping behavior. Kim et all (2008) also provide evidence that lower risk leads to higher purchase intention. Millennials do not solely perceive different levels of privacy, but they are also more cautious in making online purchases. Another main finding of this study suggests that millennials buy online more often and spend more money online than non-millennials. This goes against the theory of Sorce et all. (2005) who studied age differences in online shopping. They concluded that younger people search for more different products, but do not actually buy more online. It does align with the implication of this study that younger people actually buy more different product categories online. Other demographic factors like occupation, educational level and gender do not significantly influence any of the variables. This goes against the implication of the "Centraal Bureau voor de Statistiek" that higher educated people shop online more often than the lower educated. Kim et all. (2008) concluded that higher levels of trust and lower levels of risk increase purchase intention. This study does not find any significant effect of both risk and trust on online shopping behavior. Overall, this study does build upon some earlier research while also going against some.

6.2 Practical implication

One of the main findings of this study implies that there is a significant difference in online shopping behavior between the two age groups. Millennials tend to shop online more often than the non-millennials. However, this is not directly related to different perceived levels of risk, trust or privacy. Millennials do perceive slightly higher levels of perceived privacy. Since trust has a significant effect on perceived privacy, giving customers the idea that the online shop can be trusted makes sense. The online retailers may put extra effort in acquiring safety logos and certificates. Another result of the study implies that non-millennial are more cautious in choosing a payment method. Some non-millennials probably do not have the knowledge to use for example iDeal or PayPal. Some non-millennials even stated they are afraid to use online payment methods and therefore prefer buying in a physical retail store. Online retailers may anticipate upon this by educating non-millennials about payment methods or by changing interfaces that makes it easier for them to finish a transaction. Another way to deal with this problem is to accept more old-fashioned payment methods like the giro card or cash payment at delivery. Since high delivery costs are one of the main reasons for respondents not to buy online, retailers may consider reducing these costs. This can be compensated by increasing prices to

make sure the company does not lose any profit margin. This psychological trick can increase profit in the long term. The other main factor not to buy online is not being able to see the physical product. This problem is hard to tackle. Online retailers may consider loosening refund policies to anticipate on this problem. This also tackles another main reason not to buy online since 70 of the respondents indicated that refund policies prevent them from shopping online. Improving graphical design to give accurate information about the product can also improve the way in which customers are able to see a product that is most similar to the physical one. Millennials are very sensitive to long delivery times which prevent them from shopping online. Online retailers may consider outsourcing delivery or improving their logistics to deliver their products in a smarter and faster way.

6.3 Limitations & Further research

The results of this study should be considered taking into account some limitations of the study. Firstly, respondents might have misinterpreted certain questions and have misreported their own knowledge and behavior. Respondents were randomly selected using social media. We did not have any information about their character or personality. In any future research it is advised to test whether respondents interpret questions in the right way to increase validity of the study. Secondly, the respondents in this study were either German or Dutch. There may be different results for different nationalities all over the world. For future research a larger sample size including multiple nationalities can give a more reliable and generalizable result. Thirdly, this study is conducted over a time period of 10 weeks. In this short time period it is hard to conduct a detailed research. It is uncertain that solely risk, trust, privacy and some demographics are the only influential factors influencing online shopping behavior. There may be other variables influencing the studied variables like website usability levels, web experience, religion, cultural background or any other variable. For further research it would be commendable to include many more variables. Since the survey is translated from English into German, Dutch and Chinese, different languages may be interpreted in different ways which influences the results. When translating the survey to Dutch, I asked a friend to do a back translation to English to make sure validity of the research is not in danger. Since my German fellow students did this in the same way it is acceptable to consider the survey to be valid. Finally, it has to be noted that any small mistake in finding results can badly influence the whole thesis. However, I conducted this research very carefully and double checked reliability numbers over and over again.

6.4 Conclusion

The main goal of this study was to find out if different privacy perceptions between millennials and non-millennials affect their online shopping behavior. This study implies that the different age groups perceive their privacy in a different way. Moreover, there is a significant difference in online shopping behavior between millennials and non-millennials. However, the study does not find a direct link between perceived privacy and online shopping behavior. The study indicates that millennials tend to shop online more frequently and spend more money online. Furthermore, there is a significant difference in the way the millennials and non-millennials behave regarding online privacy. Non-millennials tend to check for privacy policies and terms and conditions more often than the millennials. Millennials tend to just accept any terms and conditions without reading them. Millennials do not only shop online more often and spend more money online; they also buy more different product types online. There is a significant relationship between online shopping behavior and the type of products bought online. This makes sense since someone who books a holiday online is also spending more money online. Before conducting this study I assumed that millennials and non-millennials perceive trust and risk in different ways. The study shows that this is not the case. Even though there are significant differences in online shopping behavior, privacy perception, privacy behavior and product types bought online, this is not due to a difference in risk or trust. However, trust does have a significant effect on perceived privacy and privacy behavior. Even though the study does not show the significant expected relationships, I think that this study provides some great insights in the relationship between age, perceived privacy and online shopping behavior.

7. ACKNOWLEDGMENTS

I would like to emphasize that I could not have done this research without the help of some key people. Firstly, this research could have not been conducted without the respondents. The voluntary participation of every single respondent and their honesty is highly appreciated. Secondly, I would like to thank my supervisor Mr. Singaram for supporting me in conducting this research. I know he is a very busy person, therefore his time and effort is really appreciated. Thirdly, I would like to thank my fellow students: Denise Althaus, Liana Brüseke, Theresa Lösing and Ran Ou for the collaboration in conducting the survey and for helping me in multiple other ways. Finally, I appreciate the University of Twente for giving me the opportunity to study at this great university and for giving me access to their facilities and resources.

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9. APPENDIX

Contents Appendix

APPENDIX A – GENERAL FIGURES

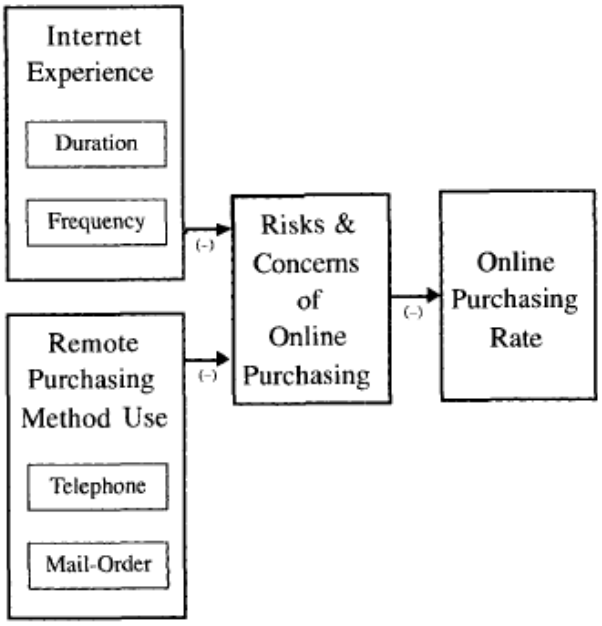

Figure 1. Relationship between internet experience, remote purchasing method use, perceived risks and online purchasing rate (Miyazaki, 2001).

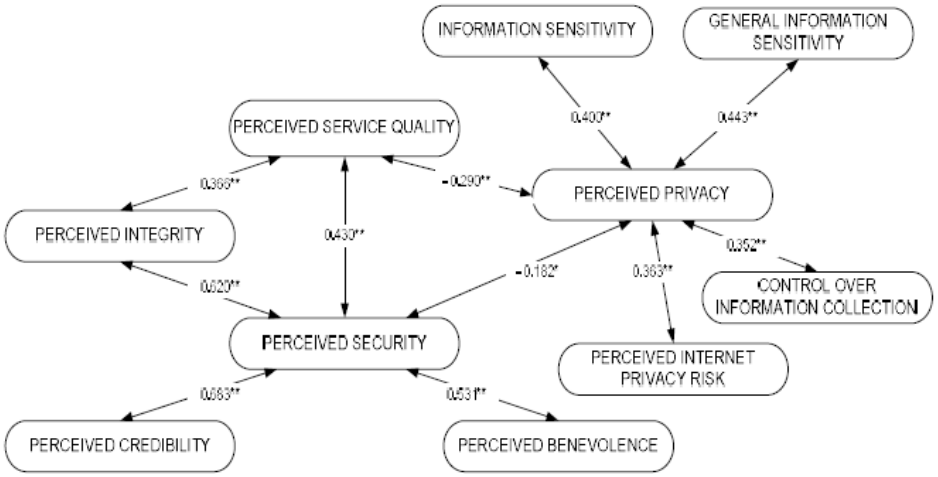

Figure 1. Correlation between (1) perceived service quality, (2) perceived security, (3) preceived privacy, and (4) privacy factors, n=185, ** p<0.01, * p<0.05

Figure 2. Correlation between (1) perceived service quality, (2) perceived security, (3) perceived privacy, and (4) privacy factors (Mekovec 2012).

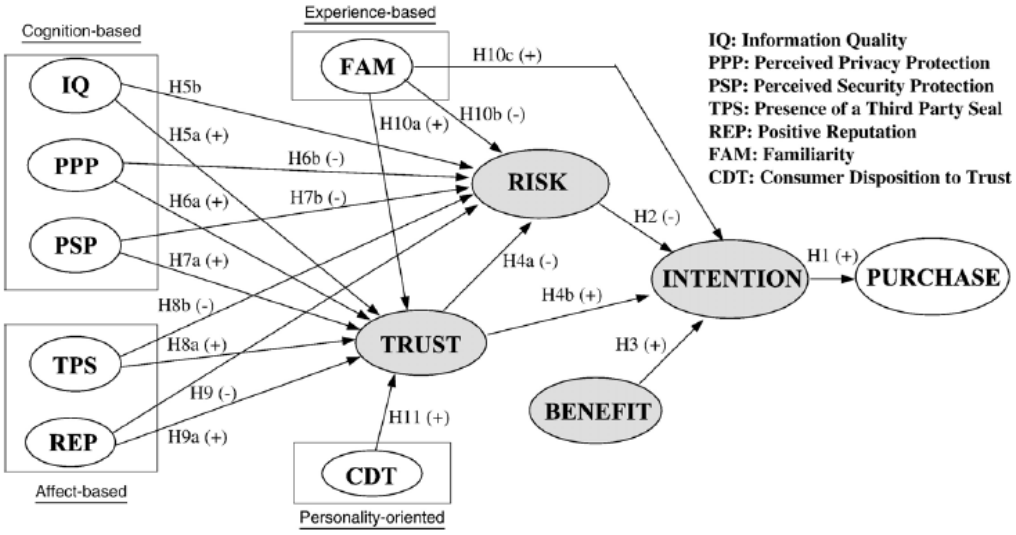

Fig. 2. A trust-based consumer decision-making model.

Figure 3. A trust-based consumer decision-making model (Kim, Ferrin, & Rao, 2008).

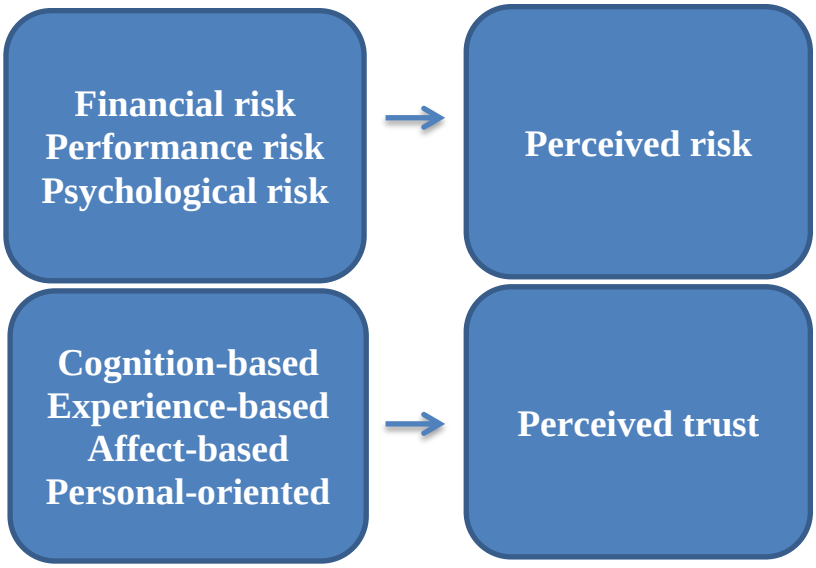

Figure 4. Factors influencing perceived risk and perceived trust (Kim, Ferrin, & Rao, 2008).

Advantage	**Description**
Faster	The time span needed to complete an online survey project is on average two-thirds shorter than that of traditional research methods.
Cheaper	Using online questionnaires reduces research costs. There is no time needed to enter information into a database. Results are accessible anytime.
More accurate	The margin of error is reduced with online surveys because participants enter their responses directly into the system. Traditional methods rely on the staff to enter all details correctly. Naturally human error can occur whenever a person has to perform a repetitive task.
Quick to analyze	The results of the online survey can be analyzed at any time.
Easy to use for participants	The majority of people that have access to the Internet prefer to answer surveys online. With an online survey, participants can pick a moment that suits them best and the time needed to

	complete the survey is much shorter.
Easy to use for researchers	The main benefit of online surveys for researchers is that they increase productivity by saving time. Data is instantly available and can be transferred into specialized statistical software or spreadsheets when more detailed analysis is needed.
Easy to style	An online survey is an opportunity to imprint your brand in the user's mind and remind them of the benefits you provide. Your survey can be styled to match your business website with customized backgrounds, images, logo, fonts, final re-direct page and even the URL of your survey.
More honest	Market researchers have found that participants prefer to complete online surveys rather than take part in written questionnaires or telephone interviews and usually provide longer and more detailed answers.
More selective	With an online survey you can pre-screen participants and allow only those who match your target profile to complete the survey.
More flexible	The order of the questions in an online survey can be changed, or questions can be skipped altogether, depending on the answer to a previous question. This way, a survey can be tailored to each participant as he or she proceeds.

Table 1. Advantages of online surveys ("10 Advantages of Online Surveys | SmartSurvey", 2016).

Features	***Age***	
Gender	25 – 34	50 +
Male	12,6%	20,4%
Female	34,3%	32,6%
Occupation		
Student	4,8%	0,0%
Employed	37,4%	36,5%
Self-employed	0,9%	5,7%
Unemployed	0,0%	1,3%
Retired	0,0%	4,8%
Stay-at-home	3,5%	2,6%
Unable to work	0,4%	2,2%
Highest education		
Below high school	0,0%	0,4%
High school graduate	0,9%	2,6%
Trade/technical/vocational training	7,0%	7,0%
Associate degree	7,8%	14,8%
Bachelor degree	15,2%	6,1%
Master degree	11,7%	9,6%
Doctorate degree	0,9%	0,9%

Table 2. Summary of demographics of respondents within age groups, in percentages of total respondents (n = 230).

How old are you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25	14	6,1	6,1	6,1
	26	19	8,3	8,3	14,3
	27	15	6,5	6,5	20,9
	28	13	5,7	5,7	26,5
	29	11	4,8	4,8	31,3
	30	10	4,3	4,3	35,7
	31	7	3,0	3,0	38,7
	32	7	3,0	3,0	41,7
	33	6	2,6	2,6	44,3
	34	6	2,6	2,6	47,0
	50	18	7,8	7,8	54,8
	51	16	7,0	7,0	61,7
	52	14	6,1	6,1	67,8
	53	9	3,9	3,9	71,7
	54	10	4,3	4,3	76,1
	55	6	2,6	2,6	78,7
	56	9	3,9	3,9	82,6
	57	6	2,6	2,6	85,2
	58	5	2,2	2,2	87,4
	59	4	1,7	1,7	89,1
	60	4	1,7	1,7	90,9
	61	3	1,3	1,3	92,2
	62	4	1,7	1,7	93,9
	63	4	1,7	1,7	95,7
	64	1	,4	,4	96,1
	65	2	,9	,9	97,0
	67	2	,9	,9	97,8
	69	1	,4	,4	98,3
	70	2	,9	,9	99,1
	71	1	,4	,4	99,6
	72	1	,4	,4	100,0
	Total	230	100,0	100,0	

Figure 5. Distribution of respondents based on age.

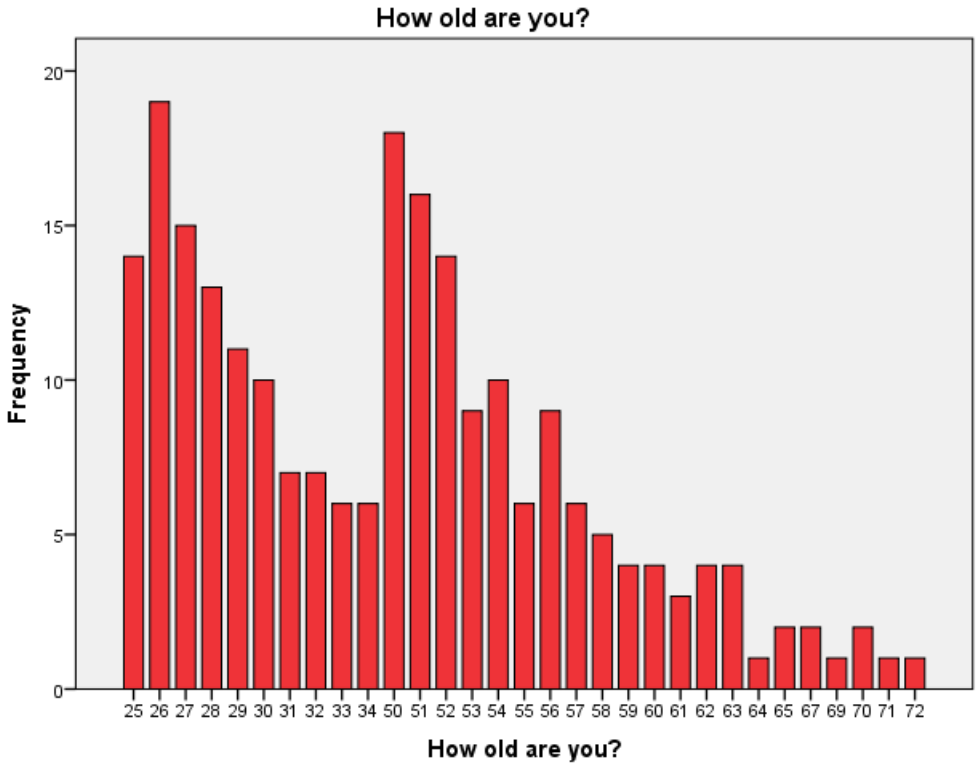

Figure 6. Histogram of the distribution of respondents based on age.

What is you gender?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	76	33,0	33,0	33,0
	Female	154	67,0	67,0	100,0
	Total	230	100,0	100,0	

Figure 7. Distribution of respondents based on gender.

Figure 8. Histogram of distribution of respondents based on gender.

What is your current occupation?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Student	11	4,8	4,8	4,8
	Employed	170	73,9	73,9	78,7
	Self-employed	15	6,5	6,5	85,2
	Unemployed	3	1,3	1,3	86,5
	Retired	11	4,8	4,8	91,3
	Stay-at-home	14	6,1	6,1	97,4
	Unable to work	6	2,6	2,6	100,0
	Total	230	100,0	100,0	

Figure 9. Distribution of respondents based on their occupation.

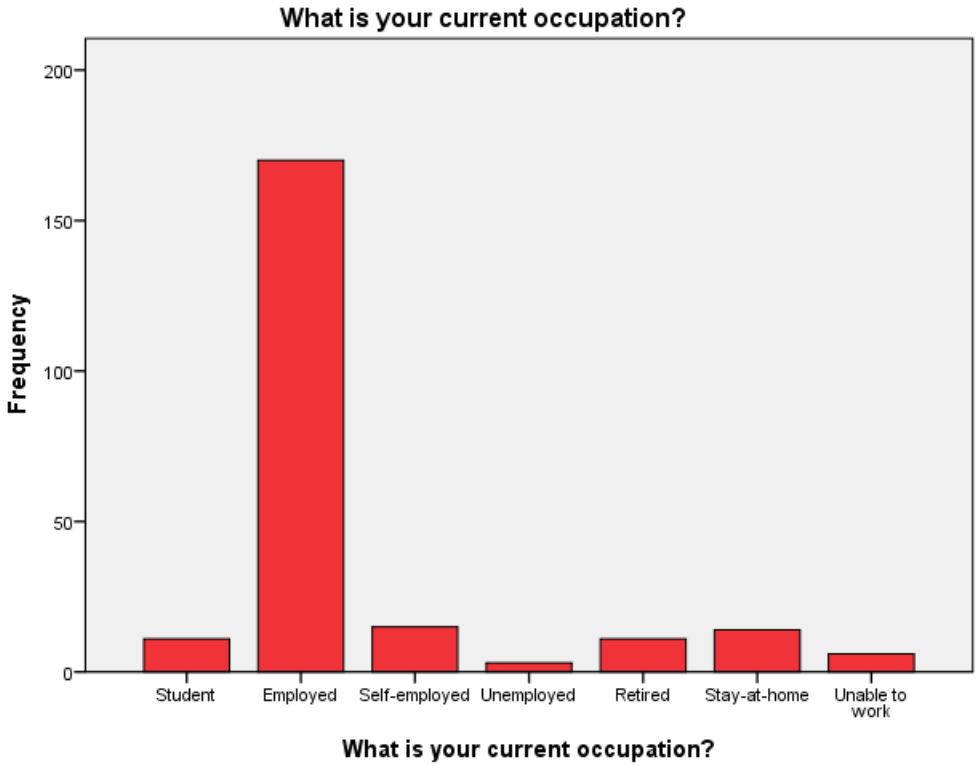

Figure 10. Histogram of distribution of respondents based on their occupation.

What is your highest education?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below High school	1	,4	,4	,4
	High school graduate	8	3,5	3,5	3,9
	Trade/technical/vocational training	32	13,9	13,9	17,8
	Associate degree	52	22,6	22,6	40,4
	Bachelor degree	49	21,3	21,3	61,7
	Master degree	49	21,3	21,3	83,0
	Doctorate degree	4	1,7	1,7	84,8
	College graduate	32	13,9	13,9	98,7
	Professional degree	3	1,3	1,3	100,0
	Total	230	100,0	100,0	

Figure 11. Distribution of respondents based on their education.

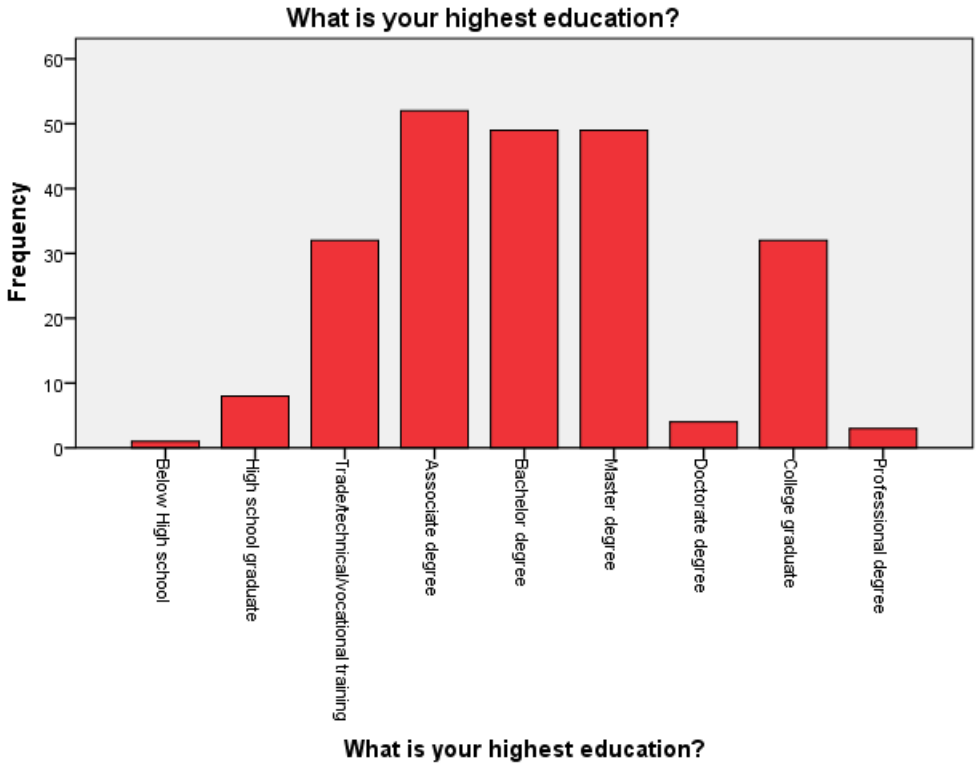

Figure 12. Histogram of distribution of respondents based on their education.

Facebook Page	**Amount of subscribers**
IBA UT 2013/2014	177
IBA Utwente 2014/2015	271
Zorg voor de Natuur begint bij Jezelf!	4.203
FC Twente	1.908
Erasmus Valencia -2016 (Parties,Trips,Help)	402
Smart Marketing Group	414
Marktplaats 0546	22.801
University of Groningen	66.654
Utrecht University	46.821
Universiteit Leiden	34.429
Moeders zonder moeders	480
Psychologie Universiteit Twente 2013/2014	224
“Priscilla Keijzers” account	551
“Frank Keijzers” account	571
“Marcelle Fraaij” account	291
LinkedIn “Priscilla Keijzers”	74
“Denise Althaus” account	50
Mutual friends	-148
Germans reached	18.000
TOTAL	198.173

Table 3. Pages in which the survey was posted.

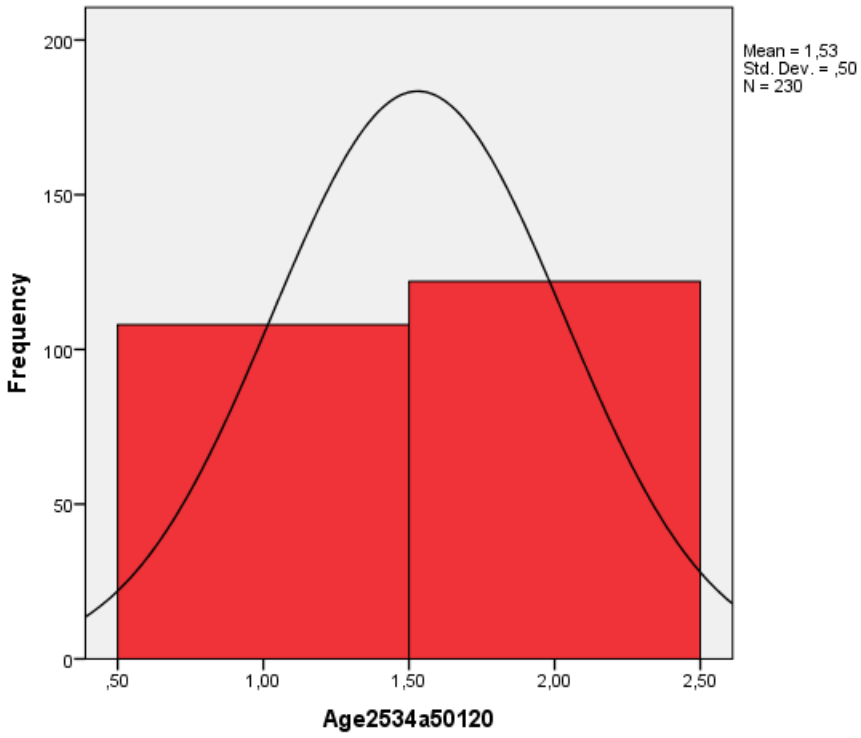

Figure 13. Distribution of "Age2534a50120" also known as variable age.

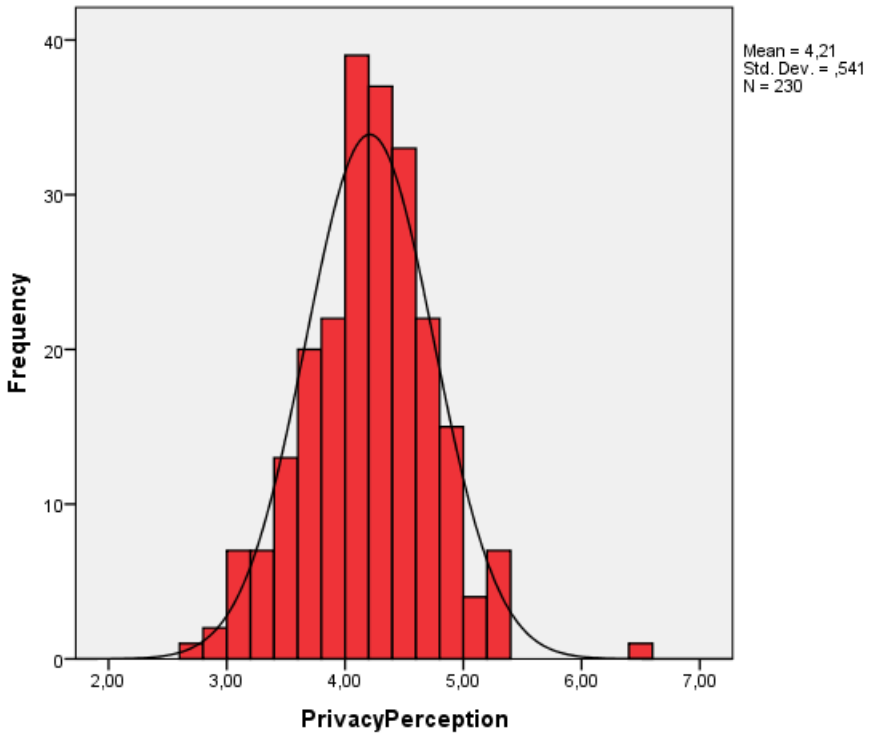

Figure 14. Distribution of "PrivacyPerception" also known as perceived privacy.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
OnlineShoppingBehavior	Between Groups	3,115	1	3,115	5,770	,017
	Within Groups	123,099	228	,540		
	Total	126,214	229			
PrivacyBehavior	Between Groups	24,140	1	24,140	13,947	,000
	Within Groups	394,639	228	1,731		
	Total	418,779	229			
ProductType	Between Groups	14,010	1	14,010	4,026	,046
	Within Groups	793,385	228	3,480		
	Total	807,396	229			
RiskMean	Between Groups	,770	1	,770	1,498	,222
	Within Groups	117,178	228	,514		
	Total	117,948	229			
TrustMean	Between Groups	,342	1	,342	,661	,417
	Within Groups	117,769	228	,517		
	Total	118,111	229			
PrivacyPerception	Between Groups	1,263	1	1,263	4,372	,038
	Within Groups	65,849	228	,289		
	Total	67,112	229			

Figure 15. One-Way Analysis of Variance of different dependent variables by age.

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
How old are you? (fill in the number only, e.g. 56)	Between Groups	41721,349	1	41721,349	2265,298	,000
	Within Groups	4199,212	228	18,418		
	Total	45920,561	229			
What is you gender?	Between Groups	,781	1	,781	3,552	,061
	Within Groups	50,106	228	,220		
	Total	50,887	229			
What is your current occupation?	Between Groups	18,522	1	18,522	10,052	,002
	Within Groups	420,126	228	1,843		
	Total	438,648	229			
What is your highest education?	Between Groups	,000	1	,000	,000	,995
	Within Groups	858,365	228	3,765		
	Total	858,365	229			

Figure 16. One-way Analysis of Variance of different demographics by age.

Correlations

		Age	Gender	Occupation	Education	OnlineShoppingBehavior	PrivacyBehavior	PrivacyPerception	ProductType	RiskMean	TrustMean
Age	Pearson Correlation	1	-,116	,295**	,012	-,161*	,265**	-,081	-,153*	-,092	-,040
	Sig. (2-tailed)		,079	,000	,852	,015	,000	,223	,020	,163	,547
	N	230	230	230	230	230	230	230	230	230	230
Gender	Pearson Correlation	-,116	1	,125	-,111	-,144*	,112	-,136*	-,070	-,139*	-,084
	Sig. (2-tailed)	,079		,059	,094	,029	,090	,040	,288	,036	,207
	N	230	230	230	230	230	230	230	230	230	230
Occupation	Pearson Correlation	,295**	,125	1	-,043	-,044	,034	,075	-,046	,033	,089
	Sig. (2-tailed)	,000	,059		,520	,505	,610	,260	,491	,620	,177
	N	230	230	230	230	230	230	230	230	230	230
Education	Pearson Correlation	,012	-,111	-,043	1	-,006	,001	,058	,034	,075	,019
	Sig. (2-tailed)	,852	,094	,520		,927	,985	,384	,606	,254	,773
	N	230	230	230	230	230	230	230	230	230	230
OnlineShoppingBehavior	Pearson Correlation	-,161*	-,144*	-,044	-,006	1	-,187**	,213**	,598**	,262**	,087
	Sig. (2-tailed)	,015	,029	,505	,927		,004	,001	,000	,000	,189
	N	230	230	230	230	230	230	230	230	230	230
PrivacyBehavior	Pearson Correlation	,265**	,112	,034	,001	-,187**	1	-,296**	-,138*	-,257**	-,227**
	Sig. (2-tailed)	,000	,090	,610	,985	,004		,000	,036	,000	,001
	N	230	230	230	230	230	230	230	230	230	230
PrivacyPerception	Pearson Correlation	-,081	-,136*	,075	,058	,213**	-,296**	1	,154*	,819**	,819**
	Sig. (2-tailed)	,223	,040	,260	,384	,001	,000		,019	,000	,000
	N	230	230	230	230	230	230	230	230	230	230
ProductType	Pearson Correlation	-,153*	-,070	-,046	,034	,598**	-,138*	,154*	1	,207**	,046
	Sig. (2-tailed)	,020	,288	,491	,606	,000	,036	,019		,002	,487
	N	230	230	230	230	230	230	230	230	230	230
RiskMean	Pearson Correlation	-,092	-,139*	,033	,075	,262**	-,257**	,819**	,207**	1	,342**
	Sig. (2-tailed)	,163	,036	,620	,254	,000	,000	,000	,002		,000
	N	230	230	230	230	230	230	230	230	230	230
TrustMean	Pearson Correlation	-,040	-,084	,089	,019	,087	-,227**	,819**	,046	,342**	1
	Sig. (2-tailed)	,547	,207	,177	,773	,189	,001	,000	,487	,000	
	N	230	230	230	230	230	230	230	230	230	230

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Figure 17. Pearson correlation table showing correlations between different variables.

Tests of Between-Subjects Effects

Dependent Variable: PrivacyPerception1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	109,343	1	109,343	446,227	,000
	Error	45,079	183,969	,245[a]		
Age2534a50120	Hypothesis	2,302	1	2,302	9,297	,003
	Error	46,260	186,833	,248[b]		
TrustMean1	Hypothesis	3,070	1	3,070	12,503	,001
	Error	43,461	177	,246[c]		
RiskMean1	Hypothesis	5,874	27	,218	,660	,854
	Error	8,222	24,931	,330[d]		
Age2534a50120 * RiskMean1	Hypothesis	7,421	22	,337	1,374	,133
	Error	43,461	177	,246[c]		
Age2534a50120 * TrustMean1	Hypothesis	2,115	1	2,115	8,614	,004
	Error	43,461	177	,246[c]		

a. ,021 MS(RiskMean1) + ,001 MS(Age2534a50120 * RiskMean1) + ,978 MS(Error)

b. ,022 MS(Age2534a50120 * RiskMean1) + ,978 MS(Error)

c. MS(Error)

d. ,918 MS(Age2534a50120 * RiskMean1) + ,082 MS(Error)

Figure 18. Univariate analysis on perceived privacy with risk, trust and age.

Tests of Between-Subjects Effects

Dependent Variable: PrivacyBehavior

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	111,799	1	111,799	71,853	,000
	Error	288,685	185,537	1,556[a]		
TrustMean1	Hypothesis	9,441	1	9,441	6,084	,015
	Error	274,665	177	1,552[b]		
RiskMean1	Hypothesis	46,360	27	1,717	,842	,670
	Error	52,435	25,712	2,039[c]		
Age2534a50120 * RiskMean1	Hypothesis	47,768	23	2,077	1,338	,149
	Error	274,665	177	1,552[b]		
Age2534a50120 * TrustMean1	Hypothesis	,002	1	,002	,001	,971
	Error	274,665	177	1,552[b]		

a. ,021 MS(RiskMean1) + ,001 MS(Age2534a50120 * RiskMean1) + ,977 MS(Error)

b. MS(Error)

c. ,928 MS(Age2534a50120 * RiskMean1) + ,072 MS(Error)

Figure 19. Univariate analysis on privacy behavior with risk, trust and age.

Tests of Between-Subjects Effects

Dependent Variable: OnlineShoppingBehavior

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	30,016	1	30,016	58,362	,000
	Error	95,746	186,161	,514[a]		
TrustMean1	Hypothesis	,033	1	,033	,064	,801
	Error	90,598	177	,512[b]		
RiskMean1	Hypothesis	17,009	27	,630	1,327	,234
	Error	12,806	26,980	,475[c]		
Age2534a50120 * RiskMean1	Hypothesis	10,851	23	,472	,922	,570
	Error	90,598	177	,512[b]		
Age2534a50120 * TrustMean1	Hypothesis	,034	1	,034	,066	,797
	Error	90,598	177	,512[b]		

a. ,021 MS(RiskMean1) + ,001 MS(Age2534a50120 * RiskMean1) + ,977 MS(Error)

b. MS(Error)

c. ,928 MS(Age2534a50120 * RiskMean1) + ,072 MS(Error)

Figure 20. Univariate analysis on online shopping behavior with risk, trust and age.

Tests of Between-Subjects Effects

Dependent Variable: PrivacyPerception1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	Hypothesis	198,313	1	198,313	885,518	,000
	Error	7,692	34,346	,224[a]		
OnlineShoppingBehavior	Hypothesis	1,773	9	,197	,758	,655
	Error	54,281	209	,260[b]		
PrivacyBehavior	Hypothesis	2,295	1	2,295	8,838	,003
	Error	54,281	209	,260[b]		
OnlineShoppingBehavior * PrivacyBehavior	Hypothesis	1,739	9	,193	,744	,668
	Error	54,281	209	,260[b]		

a. ,570 MS(OnlineShoppingBehavior) + ,430 MS(Error)

b. MS(Error)

Figure 21. Univariate analysis on perceived privacy with online shopping behavior and privacy behavior.

Report

Age2534a50120		PrivacyPerception	TrustMean	RiskMean	ProductType	OnlineShoppingBehavior	PrivacyBehavior
1,00	Mean	4,2878	4,3395	4,0995	3,6667	2,6512	3,1574
	N	108	108	108	108	108	108
	Std. Deviation	,54756	,75777	,67989	1,89934	,64511	1,12708
2,00	Mean	4,1393	4,2623	3,9836	3,1721	2,4180	3,8066
	N	122	122	122	122	122	122
	Std. Deviation	,52828	,68230	,74810	1,83489	,80581	1,46224
Total	Mean	4,2091	4,2986	4,0380	3,4043	2,5275	3,5017
	N	230	230	230	230	230	230
	Std. Deviation	,54135	,71817	,71768	1,87770	,74240	1,35231

Figure 22. Mean numbers of different variables by age group.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,305[a]	,093	,085	,51781

a. Predictors: (Constant), TrustMean1, RiskMean1

b. Dependent Variable: PrivacyPerception1

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6,247	2	3,124	11,650	,000[b]
	Residual	60,865	227	,268		
	Total	67,112	229			

a. Dependent Variable: PrivacyPerception1

b. Predictors: (Constant), TrustMean1, RiskMean1

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5,355	,245		21,845	,000
	RiskMean1	-,086	,051	-,114	-1,691	,092
	TrustMean1	-,186	,051	-,247	-3,670	,000

a. Dependent Variable: PrivacyPerception1

Figure 23. Results of linear regression analysis of risk and trust on perceived privacy.

Dependent variable (IV = Occupation)	**Eta analysis Value**	**Eta-squared**
OnlineShoppingBehavior (Online Shopping Behavior)	.184	.034
PrivacyBehavior (Privacy Behavior)	.162	.026
PrivacyPerception (Perceived Privacy)	.170	.029
RiskMean (Perceived Risk)	.136	.018
TrustMean (Perceived Trust)	.157	.025

Table 4. Eta values for the correlation between occupation and different dependent variables.

Dependent variable (IV = Education)	Eta analysis Value	Eta-squared
OnlineShoppingBehavior (Online Shopping Behavior)	.190	.036
PrivacyBehavior (Privacy Behavior)	.200	.040
PrivacyPerception (Perceived Privacy)	.170	.029
RiskMean (Perceived Risk)	.210	.044
TrustMean (Perceived Trust)	.164	.027

Table 5. Eta values for the correlation between education and different dependent variables.

Dependent variable (IV = Gender)	Eta analysis Value	Eta-squared
OnlineShoppingBehavior (Online Shopping Behavior)	.114	.021
PrivacyBehavior (Privacy Behavior)	.112	.112
PrivacyPerception (Perceived Privacy)	.136	.018
RiskMean (Perceived Risk)	.139	.019
TrustMean (Perceived Trust)	.084	.007

Table 6. Eta values for the correlation between gender and different dependent variables.

What type of products do you usually buy online?	Age group		
	25-34	50+	Total
Fashion	83 (55.3%)	67 (44.7%)	150
Electronics & Software	62 (51.2%)	59 48.8%)	121
Books, Music & Films	64 (51.6%)	60 (48.4%)	24
Mobile Phone Apps	30 (66.7%)	15 (33.3%)	45
Pharmaceutical products	17 (45.9%)	20 (54.1%)	37
Travel	34 (42.5%)	46 (57.5%)	80
Home and Garden	38 (50.7%)	37 (49.3%)	75
Sports	30 (55.6%)	24 (44.4%)	54
Motors (Cars, equipment)	5 (18.5%)	22 (81.5%)	27
Groceries	7 (77.8%)	2 (22.2%)	9
Cosmetic products	15 (48.4%)	16 (51.6%)	31
Others	11 (36.7%)	19 (63.3%)	30

Table 7. Type of products respondents buy online grouped by age.

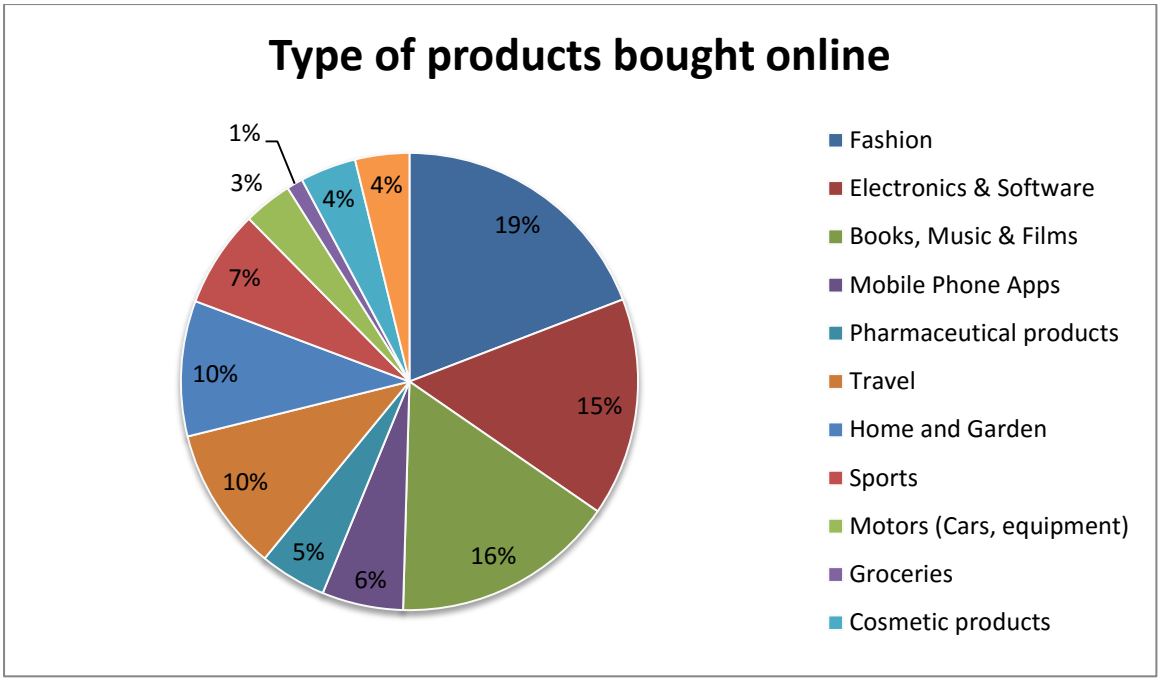

Figure 24. Type of products respondents buy online in percentages of total responses.

What is the payment method you feel most safe with? * Age2534a50120 Crosstabulation

			Age2534a50120		
			1,00	2,00	Total
What is the payment method you feel most safe with?	Credit card	Count	10	22	32
		% within What is the payment method you feel most safe with?	31,3%	68,8%	100,0%
		% within Age2534a50120	9,3%	18,0%	13,9%
	PayPal	Count	33	34	67
		% within What is the payment method you feel most safe with?	49,3%	50,7%	100,0%
		% within Age2534a50120	30,6%	27,9%	29,1%
	iDeal	Count	41	16	57
		% within What is the payment method you feel most safe with?	71,9%	28,1%	100,0%
		% within Age2534a50120	38,0%	13,1%	24,8%
	Klarna	Count	4	2	6
		% within What is the payment method you feel most safe with?	66,7%	33,3%	100,0%
		% within Age2534a50120	3,7%	1,6%	2,6%
	Cash on delivery	Count	4	13	17
		% within What is the payment method you feel most safe with?	23,5%	76,5%	100,0%
		% within Age2534a50120	3,7%	10,7%	7,4%
	Direct debit	Count	6	16	22
		% within What is the payment method you feel most safe with?	27,3%	72,7%	100,0%
		% within Age2534a50120	5,6%	13,1%	9,6%
	Other	Count	10	19	29
		% within What is the payment method you feel most safe with?	34,5%	65,5%	100,0%
		% within Age2534a50120	9,3%	15,6%	12,6%
Total		Count	108	122	230
		% within What is the payment method you feel most safe with?	47,0%	53,0%	100,0%
		% within Age2534a50120	100,0%	100,0%	100,0%

Figure 25. Respondent's preferred payment method.

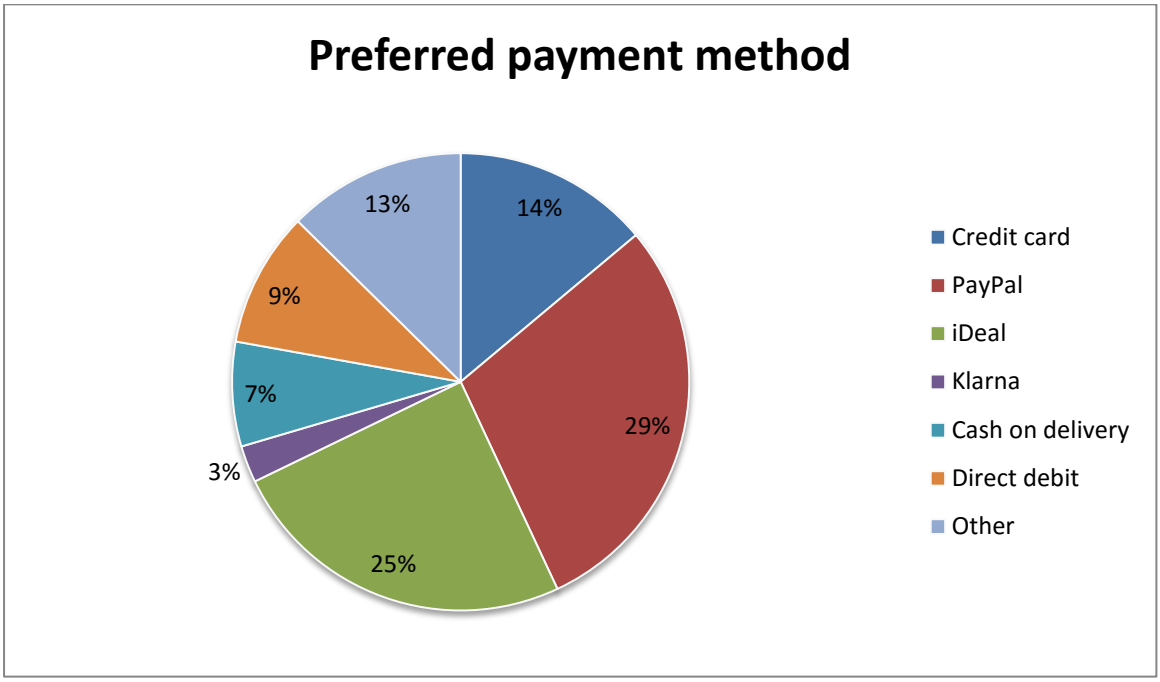

Figure 26. Respondent's preferred payment method in percentages of total responses.

Motivating factors to buy online	**Age group**		
	25-34	**50+**	**Total**
Better prices	65 (51.6%)	61 (48.4%)	126
Convenience	64 (44.8%)	79 (55.2%)	143
Variety of products / brands	47 (49.5%)	48 (50.5%)	95
Flexibility (24/7 open)	65 (61.9%)	40 (38.1%)	105
Availability of reviews	43 (50.6%)	42 (49.4%)	85
Discreteness of shopping	6 (27.3%)	16 (72.7%)	22
Price comparisons	56 (48.3%)	60 (51.7%)	116
Other	6 (33.3%)	12 (66.7%)	18

Table 8. Motivating factors for respondents to buy online grouped by age.

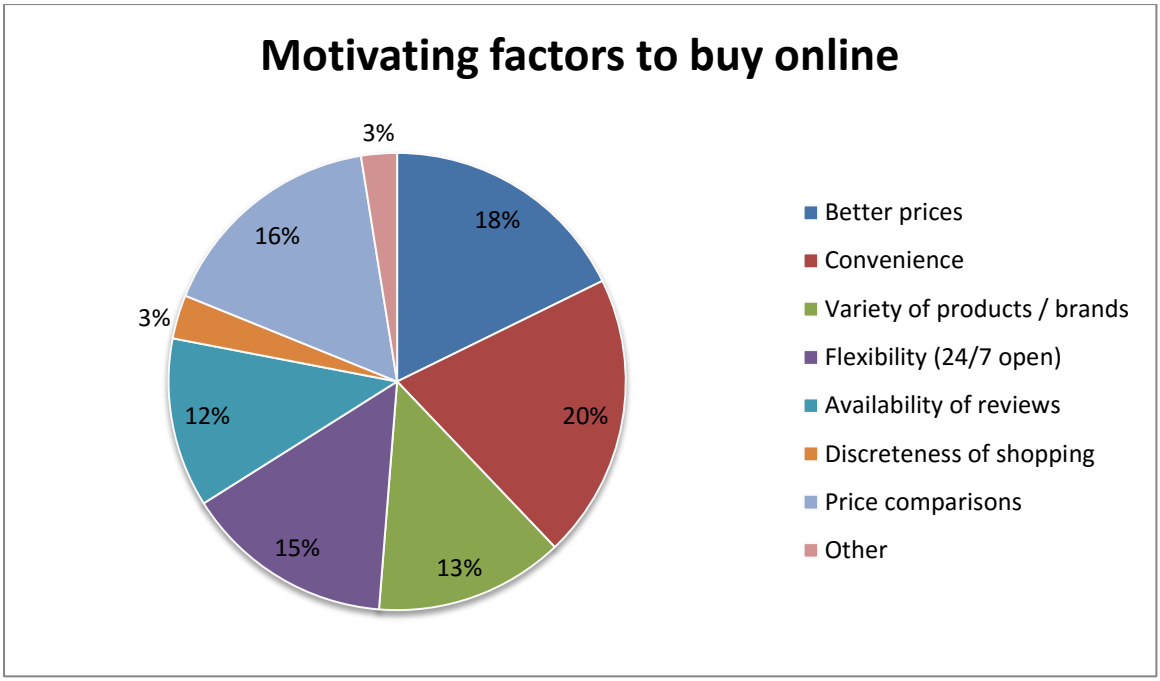

Figure 27. Respondent's motivating factors to buy online in percentages.

Main factors preventing from shopping online	**Age group**		
	25-34	**50+**	**Total**
Online payment methods	24 (54.5%)	20 (45.5%)	44
Added tax / customs duty	12 (63.2%)	7 (36.8%)	19
High delivery costs	53 (54.6%)	44 (45.4%)	97
Long delivery time	33 (68.8%)	15 (31.3%)	48
Refund policies	37 (52.9%)	33 (47.1%)	70
Warranty & claims	17 (43.6%)	22 (56.4%)	39
No physical product	64 (49.2%)	66 (50.8%)	130
Other	2 (11.8%)	15 (88.2%)	17

Table 9. Main factors preventing respondents to buy online grouped by age.

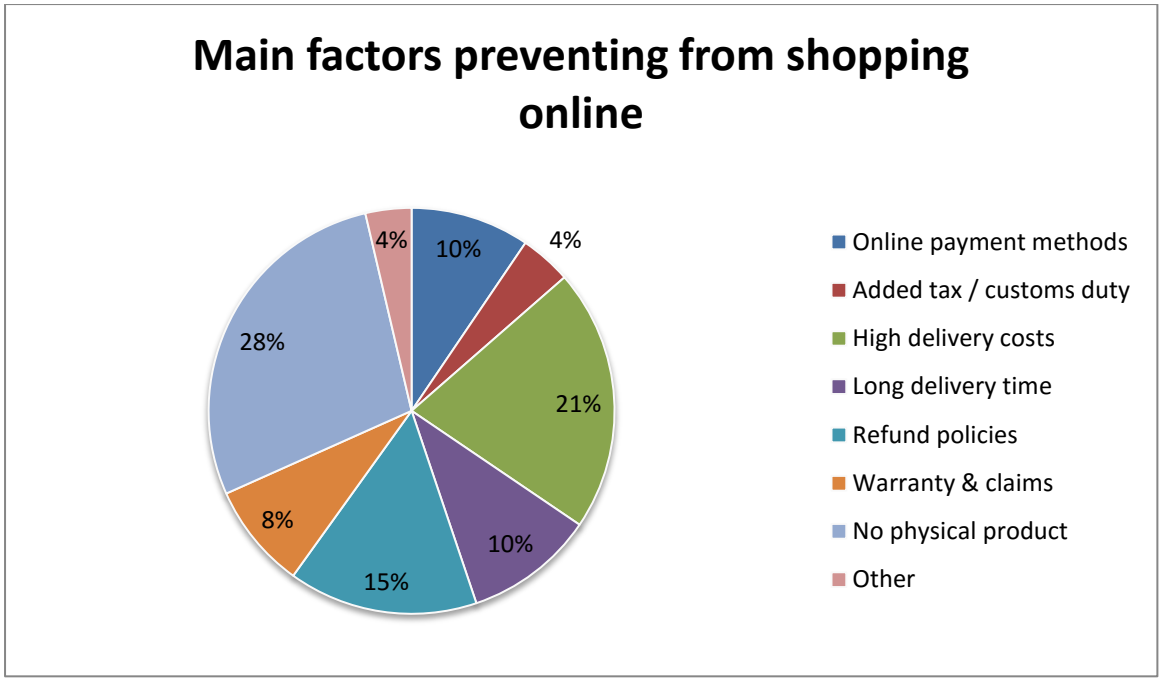

Figure 28. Main factors preventing respondents from shopping online in percentages of total responses.

APPENDIX B – THE SURVEY

Demographics

How old are you?

What is your gender?

What is your nationality?

What is your current occupation?

What is your highest education?

Online shopping behavior

How often do you use the Internet?

I use the Internet to search for a product, but actually buy the product in a retail store.

I look for product information in a retail store, but buy the product in an online shop.

I search for product information on the Internet and buy the product in an online shop.

For how long have you been shopping online?

How often did you shop online in the past year?

What type of products do you usually buy online?

How much money do you spend on average per month for online shopping in Euros?

Which online payment methods do you know and use?

What is the payment method you feel most safe with?

What are the main motivating factors for you to shop online?

What are main factors preventing you from shopping online?

Risks

Do you use different E-Mail accounts for different purposes?

Do you use different passwords for different websites?

Which safety feature logos for online shops do you know?

Would you refuse to give information to an online shop, if you think it is too personal or not necessary for the transaction?

Do you read privacy policies on online shopping websites?

Would you refuse an online purchase because of privacy policies?

Do you read terms and conditions on online shopping websites before you agree to them?

Would you refuse an online purchase because of terms and conditions?

Online shopping risk

I believe that my personal information is protected during online shopping.

I am aware that my private data can be given to 3rd parties by online shopping sites.

I am aware that advertisement is based on my prior searches and shopping behavior.

I receive newsletters/mails from online shops I did not register for.

The possibility that online shops are fake is high.

The possibility that my online purchase will not be delivered is high.

I buy from online shops without a physical store.

I am afraid to use my credit card online.

The possibility that hackers will steal my credit card information is low.

The possibility that my credit card information is sold to third parties is high.

In general I trust mainstream online payment methods.

Trust

The product information I get in online shops is complete and understandable.

Privacy policies in online shops are easily accessible and understandable.

I expect mainstream online shops to fulfill basic digital security protection(s).

I check for safety logos and certification (eg. trusted e-shops) in online shops before I purchase.

I ask friends and family for recommendations of an online shop before I purchase.

I read reviews of an online shop before I purchase.

Have you ever had a bad experience with an online shop related to privacy and security concerns? Please share your experience below.

APPENDIX C – SPSS RECODING AND COMPUTED VARIABLES

Variable "TrustMean" to assess "Perceived Trust"

Assessed by the following six items:

Trust_1_1 - The product information I get in online shops is complete and understandable

Trust_2_1 - Privacy policies in online shops are easily accessible and understandable

Trust_3_1 - I expect mainstream online shops to fulfill basic digital security protection(s)

Trust_4_1 - I check for safety logos and certification (eg. trusted e-shops) in online shops before I purchase

Trust_5_1 - I ask friends and family for recommendations of an online shop before I purchase

Trust_6_1 - I read reviews of an online shop before I purchase

Scored from 1 to 7:
1 = entirely disagree 7 = entirely agree.

Recode in such a way that for every statement 1 means low trust and 7 means high trust.
So statement 4,5 and 6 have to be recoded in the following way in SPSS:

RECODE Trust_4_1 Trust_5_1 Trust_6_1 (1=7) (2=6) (3=5) (4=4) (5=3) (6=2) (7=1).

Compute "TrustMean" in SPSS:

COMPUTE TrustMean = MEAN(Trust_1_1,Trust_2_1,Trust_3_1,Trust_4_1,Trust_5_1,Trust_6_1).

Variable "RiskMean" to assess "Perceived Risk"

Assessed by the following eight items:

Risk_1_1 - I believe that my personal information is protected during online shopping

Risk_2_1 - I am aware that advertisement is based on my prior searches and shopping behavior

Risk_5_1 - The possibility that online shops are fake is high

Risk_6_1 - The possibility that my online purchase will not be delivered is high

Risk_8_1 - I am afraid to use my credit card online

Risk_9_1 - The possibility that hackers will steal my credit card information is low

Risk_10_1 - The possibility that my credit card information is sold to third parties is high

Risk_11_1 - In general I trust mainstream online payment methods

Scored from 1 to 7:
1 = entirely disagree 7 = entirely agree.

Recode in such a way that for every statement 1 means high risk and 7 means low risk! This is due to the relationship with "Perceived Privacy". Since low risk (7) means high privacy and high trust (7) means high privacy. In this way I could compute a variable called "PrivacyPerception_RT" which is based on the mean numbers of "RiskMean" and "TrustMean"

So statement 1, 7, 9 and 11 have to be recoded in the following way in SPSS:

RECODE Risk_2_1 Risk_3_1 Risk_4_1 Risk_5_1 Risk_6_1 Risk_8_1 Risk_10_1 (1=7) (2=6) (3=5) (4=4) (5=3) (6=2) (7=1).

Compute "RiskMean" in SPSS:

COMPUTE RiskMean = MEAN(Risk_1_1,Risk_2_1,Risk_5_1,Risk_6_1,Risk_8_1,Risk_9_1,Risk_10_1,Risk_11_1).

The scale is reliable (Cronbach's Alpha $\alpha = 0.6$).

Variable "PrivacyPerception" to assess "Perceived Privacy"

Based on the means of "RiskMean" and "TrustMean", so based on perceived risk and perceived trust.

Computed in SPSS:

COMPUTE PrivacyPerception_RT = MEAN(RiskMean, TrustMean).

Will give a score between 1 and 7. The closer the number is to 7, the higher the perceived privacy of the respondent.

Variable "PrivacyBehavior" to assess "Privacy Behavior"

Assessed by the following five items:

Privacy_behavior_4_1 Would you refuse to give information to an online shop, if you think it is too personal or not necessary for the purchase

Privacy_behavior_5_1 Do you read privacy policies on online shopping websites?

Privacy_behavior_6_1Would you refuse an online purchase because of privacy policies?

Privacy_behavior_7_1Do you read terms and conditions on online shopping websites before you agree to them?

Privacy_behavior_8_1 Would you refuse an online purchase because of terms and conditions?

Scored from 1 to 7:
1 = Never 7 = Always

Computed in SPSS:

COMPUTE PrivacyBehavior = MEAN (Privacy_behavior_4_1, Privacy_behavior_5_1, Privacy_behavior_6_1, Privacy_behavior_7_1,Privacy_behavior_8_1).

The construct is highly reliable (Cronbach's Alpha $\alpha = 0.79$).

Variable "OnlineShoppingBehavior" to assess "Online Shopping Behavior"

Assessed by the following three items:

Online_Shopping_6 - For how long have you been shopping online?

Online_Shopping_7 - How often did you shop online in the past year?

Online_Shopping_9 - How much money do you spend on average per month for online shopping in Euros?

COMPUTE OSB = MEAN(Online_Shopping_6,Online_Shopping_7,Online_Shopping_9).

The construct is highly reliable ($\alpha = 0.70$).

Variable "ProductType" to assess amount of different products a respondent buys

Consists of the following items:

Online_Shopping_8_1 - What type of products do you usually buy online? (multiple answers possible)-Fashion

Online_Shopping_8_2 - What type of products do you usually buy online? (multiple answers possible)-Electronics & Software

Online_Shopping_8_3 - What type of products do you usually buy online? (multiple answers possible)-Books, Music, Films etc.

Online_Shopping_8_4 - What type of products do you usually buy online? (multiple answers possible)-Mobile Phone Apps

Online_Shopping_8_5 - What type of products do you usually buy online? (multiple answers possible)-Health care/ Pharmaceutical products

Online_Shopping_8_6 - What type of products do you usually buy online? (multiple answers possible)-Travel

Online_Shopping_8_7 - What type of products do you usually buy online? (multiple answers possible)-Home and Garden

Online_Shopping_8_8 - What type of products do you usually buy online? (multiple answers possible)-Sports

Online_Shopping_8_9 - What type of products do you usually buy online? (multiple answers possible)-Motors (cars, equipment, etc.)

Online_Shopping_8_10 - What type of products do you usually buy online? (multiple answers possible)-Groceries

Online_Shopping_8_11 - What type of products do you usually buy online? (multiple answers possible)-Others (please fill in below)

Online_Shopping_8_12 - What type of products do you usually buy online? (multiple answers possible)-Cosmetic products

Computed in SPSS:

COMPUTE ProductType =
SUM(Online_Shopping_8_1,Online_Shopping_8_2,Online_Shopping_8_3,Online_Shopping_8_4,Online_Shopping_8_5,Online_Shopping_8_6,Online_Shopping_8_7,Online_Shopping_8_8,Online_Shopping_8_9,Online_Shopping_8_10,Online_Shopping_8_11,Online_Shopping_8_12).

The higher the number, the more different products the respondents buy online.