

# Perceptions of Digital Footprints and the Value of Privacy

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**Keywords:** Information Privacy, Privacy Paradox, Privacy Calculus, Privacy Awareness, Information Sensitivity.

**Abstract:** Nowadays, life takes place in the digital world more than ever. Especially in this age of digitalization and Big Data, more and more actions of daily life are performed online. People use diverse online applications for shopping, bank transactions, social networks, sports, etc. Common to all, regardless of purpose, is the fact that personal information is disclosed and creates so-called digital footprints of users. In this paper, the questions are considered in how far people are aware of their personal information they leave behind and to what extent they have a concept of the attributed importance of particularly sensitive data. Moreover, it is investigated in how far people are concerned about their information privacy and for what kind of benefit people decide to disclose information. Aspects were collected in a two-step empirical approach with two focus groups and an online survey. The results of the qualitative part reveal that young people are not consciously aware of their digital footprints. Regarding a classification of data based on its sensitivity, diverse concepts exist and emphasize the context-specific and individual consideration of the topic. Results of the quantitative part reveal that people are concerned about their online privacy and that the benefit of belonging to a group outweighs the risk of disclosing sensitive data.

## 1 INTRODUCTION

Nowadays, a huge portion of everyone's life takes place in the digital world. It exceedingly permeates into our everyday life as more and more formerly offline tasks can now be performed online – e.g., shopping, bank transactions, communication. For many adolescent and younger adults – the generation of the Digital Natives (Helsper, 2010) – the fact that these tasks used to be carried out exclusively offline is not even imaginable anymore. This digital development and era of big data accelerates the market, facilitates to stay socially connected, and offers many more advantages. Every day, new applications are developed and improved and reach more and more formerly offline areas of life – e.g. health care, driving, fitness. Using those online possibilities does have another side to it, however. It goes hand in hand with the sharing of data and disclosure of private information since all applications collect and aggregate data about their users. As the Internet of Things grows in importance and ubiquity and formerly private areas of life get “online”, keywords such as “information privacy concern” or “risks of disclosure” are common issues to be discussed in the public. Science did not fall short

in noticing and many studies in the last decade report that most Internet users are quite concerned about their information privacy and the risks of disclosing information (e.g., Bansal et al., 2010; Rainie et al., 2013; Data Protection Eurobarometer, 2015; TRUSTe, 2014). Paradoxically, digital user behavior does not necessarily reflect this attitude, a phenomenon commonly referred to as the “Privacy Paradox” (Norberg et al., 2007). The theory of the Privacy Calculus (Krasnova and Veltri, 2010) seeks to explain this discrepancy between attitude and behavior. It hypothesizes that users evaluate and weigh the risks and benefits for a decision about whether to use an application or disclose information (e.g. Dinev and Hard, 2006). Ideally, users are aware of all the risks and benefits and therefore able to evaluate them rationally. In reality, though, a decision whether to disclose or share information is made in limited time, with sometimes limited knowledge of the consequences, and affectively (e.g. Acquisti et al., 2015; Kehr et al., 2015). Empirical studies show that people are concerned, they rate risks high, and know much about data collection malpractices – the latter, however, they only voice when explicitly asked about it (Data Protection Eurobarometer, 2015). But do they consider these aspects every time they make a

decision about data disclosure?

In the first part of this study, we took a step back and empirically assessed how aware young adults are about data collection and privacy issues – awareness in this context meaning to take these issues intentionally into consideration without them being pointed out explicitly. Understanding individual behaviors, two focus groups were carried out, guided by the questions a) where digital footprints are left, b) what data types are disclosed when using the Internet, and c) how data is categorized into more or less sensitive data. Complementing this exploratory approach, an online survey of German Internet users was conducted, in a second step. This aims to contrast the “implicit” method (focus group) with “explicitly” asking about the importance of privacy (online questionnaire), the prevalent concerns, and the actual privacy protection behavior. Additionally, reasons within the privacy calculus are assessed.

### 1.1 Information Privacy

Privacy is a multifaceted construct that has been defined by researchers of different areas and intentions. Definitions range from the “right to be left alone” (Warren and Brandeis, 1890), a “state of limited access or isolation” (Schoeman, 1984) and the “control” of access to the self and of information disclosure (Altman, 1975; Westin, 1976). The digitalized world and Big Data put into focus one subset of privacy: the concept of information privacy (“the claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others”, Westin, 1967). Not only is the concept and its definition rather vague. Also, its measurement is proving to be difficult. Often, the *concern for information privacy* construct is used to get an idea of what privacy means to individuals (Kokolakis, 2015). To understand privacy attitudes the actual behavior regarding privacy and data disclosure should to be taken into account as well (e.g. Acquisti et al., 2015; Keith et al., 2013; Ziefle et al., 2016).

### 1.2 Privacy Paradox

Several studies report a high level of information privacy concern of Internet users – but the actual behavior regarding privacy protection and data disclosure deviates (e.g. Norberg et al., 2007; Carrascal et al., 2013; Taddicken, 2014). This discrepancy between attitude and exhibited actual behavior is known as the *privacy paradox*. Studies have shown that, in general, people voice concern for

their data, want to protect it, and want control over who has access (Bansal et al., 2010; Acquisti and Grossklags, 2005). Nevertheless, people disclose a multitude of personal information, sometimes even without any restrictions concerning the recipients or erroneous conceptions of their privacy settings (e.g., Lewis et al., 2008; Chakraborty et al., 2013; Van den Broeck et al., 2015). How does that come about? One possible explanation is the so-called privacy calculus.

### 1.3 Privacy Calculus

The *Privacy Calculus Theory* assumes that people decide whether to disclose information or use an application based on several factors, in a given situation. If the perceived benefits outweigh the perceived risks, information is more likely to be disclosed; whereas if perceived risks outweigh the possible benefits, disclosure is less likely to happen (e.g., Li et al., 2010; Dinev and Hart, 2006). Hui et al. (2006) have identified seven possible benefits for information disclosure: monetary savings, time savings, self-enhancement, social adjustment, pleasure, novelty, and altruism. These factors are oftentimes dependent on a single situation and the decision is made more in the spur of the moment than with a lot reasoning (cf. Acquisti et al., 2015; Kehr et al., 2015). Choices are often made by valuing instant gratification more than possible of longtime risks or ramifications (ibid). Optimism bias, the tendency to believe that the risks for oneself is less compared to others (Cho et al., 2010), and affective states influence risk assessment (Kehr et al., 2013). Privacy decisions are made in a state of incomplete information and bounded rationality (Acquisti and Grossklags, 2005). Users lack the ability and necessary information to rationally and completely evaluate privacy risk and disclosure benefits (Kokolakis, 2015). Studies show, that risks are evaluated high if asked about them (e.g., Bansal et al., 2010; Rainie et al., 2013; Taddicken, 2013; European Commission, 2011; Protection Eurobarometer, 2015; TRUSTe, 2014). Young people do adjust their privacy settings in online social networks (Boyd and Hargittai, 2010), a field that has been thoroughly discussed in media. Other areas of Internet usage have not been covered that much in media and society. Are risks even considered in those short moments, for example when deciding to install a new smartphone application? Is it not rather that risks are ignored or are unconscious in most situations? Do users even consider all their knowledge about risks, how much or little it may be? Based on the limited time span in the actual usage situation most users take to make

decisions, it can be hypothesized that only the most obvious risks are considered, if at all.

### 1.4 Privacy Awareness

The concept of *privacy awareness* has been studied as an antecedent to privacy concerns (e.g.: Smith, Dinev and Xu, 2011; Xu et al., 2008; Brecht et al., 2011). It is defined as the “extent to which an individual is informed about organizational privacy practices and policies” (Xu et al., 2008). The scales used to measure privacy awareness obtain users’ knowledge that privacy issues exist and media coverage of the topic (e.g. “I am aware of privacy issues and practices in our society”, Xu et al., 2008, Xu et al., 2011). These measures cannot obtain whether this knowledge is taken into consideration when making privacy decision. The term awareness is also used in this paper, but meant is a more implicit awareness or consciousness: are users considering their knowledge about privacy risks without them being emphasized – e.g. by the context of a privacy survey or experiment?

### 1.5 Information Sensitivity

Not all types of information are equally sensitive and they do not bring about the same risks. Mothersbaugh et al. (2012) define sensitivity of information as “the potential loss associated with the disclosure of that information”. When users weigh privacy risks and benefits of disclosure to make a privacy decision, they have to consider the types of information they know will be affected. Thus, if risks are aware in users’ reasoning about privacy decisions, risks should be considered when evaluation the sensitivity of data types.

## 2 QUESTIONS ADDRESSED AND LOGIC OF EMPIRICAL PROCEDURE

In this paper, individual awareness of data footprints in the Internet, type of data, and conceptions of different sensitivity categories of data are explored qualitatively. Furthermore, attitudes towards privacy concerns in the context of internet usage, security behavior, as well as the privacy calculus are explored quantitatively.

Two focus groups aimed at exploring the awareness of data collection and privacy risks without asking about them directly. Furthermore, they were meant to reveal if a mental concept of privacy issues with online services existed in the young and technology-adept Internet users. Since the methodical approach of the focus group intended to collect different opinions of people’s points of view, very general questions were guiding the group discussion: (1) Where do you leave so called “data tracks”? (2) What kind of data do you leave in the Internet when using it? and (3) Are there different types of data which have a stronger meaning to you than other data?

The second, quantitative study focused, firstly, on privacy attitudes and protection behavior and, secondly, on reasoning within the privacy calculus model. Questions guiding the research were (1) In how far do people care about privacy dealing with internet usage in general? (2) Do age or gender have an impact on data protection behavior? and (3) Do age or gender have an impact on the privacy calculus? In Figure 1, an overview of the study process is depicted.

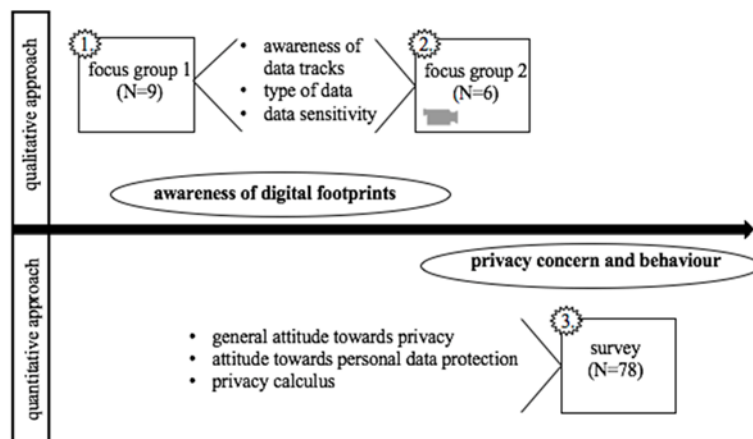


Figure 1: Overview of research process.

### 3 UNDERSTANDING PRIVACY AWARENESS: THE FOCUS GROUP APPROACH

The aim of the focus group approach was to identify and discuss young adults' ideas of individual digital footprints left in the digital world when using devices and applications connected with the Internet, association of data types, and distinction of data types due to their personal perceived sensitivity. To this end, two consecutive focus groups were run.

#### 3.1 Methods

Participants were introduced to the motto of the focus group: "self-confident in the digital world." In the introductory part, participants were encouraged to talk about all kinds of digital applications they use in daily life and what kind of data they disclose in this context. A general question ("Where do you leave so called data tracks?") was raised in the beginning.

As a stimulator for the discussion, pictures were shown to the first group, and videos to the second one. The pictures featured familiar providers and brands; the videos described smart phone apps that collect sensitive data. This stimulation was intended to reveal, whether more digital footprints are "known" when hints are shown. Therefore, they were given at a point where the participants did not come up with more data tracks on their own. The different data types mentioned were written on paper and collected on a pin board.

In a next step, participants were asked to individually arrange data types into categories of how sensitive they perceive them to be.

In the end, a short questionnaire was applied. Its items were taken from literature (e.g. Morton, 2013) and discussions with experts in the field and had to be answered on 5-point Likert scales.

**Familiarity with the topic:** "How much have you dealt with the topic privacy so far?" (1="it's the first time I have heard about it" to 5="I am very familiar with this topic").

**Privacy and data protection:** "How important is privacy to you?", "How important is it for you to protect your information privacy?", and "How intensively do you protect your data?" (1="very unimportant" to 5="very important.")

**Desire for privacy:** "I'm comfortable telling other people, including strangers, personal information about myself.", "I am comfortable sharing information about myself with other people unless they give me a reason not to.", "I have nothing to

hide, so I am comfortable with people knowing personal information about me. (1="I do not agree at all" to 5="I totally agree").

Last but not least, attitudes to the statement "The digital world is for me..." were assessed with a semantic differential (Heise, 1970) where 19 bipolar word-pairs had to be evaluated in the context of using digital media, e.g. "important-unimportant," "interesting - uninteresting," innovative - uninspired". The full list of word-pairs can be taken from figure 6.

#### 3.2 Participants

The focus groups were conducted with 14 participants in total but split into two sessions. The sample was composed of eight female and six male students with an age range from 19 to 29 years ( $M=23.2$ ,  $SD=3.3$ ). The courses of studies covered a broad range (technical communication, political science, teaching, architecture, biology, and health economics).

#### 3.3 Results

Data of the qualitative focus group studies regarding awareness of personal digital footprints and sensitivity rankings were analyzed descriptively, with qualitative data analysis by Mayring (2010).

##### **General attitudes towards privacy**

In general, participants reported to be familiar with the topic privacy ( $M=4.1/5$  points max,  $SD=0.6$ ). Asked about how important it is to protect their general privacy, they also scored quite high ( $M=4.3$ ;  $SD=1.0$ ). Questions concerning the importance of protecting their information privacy was rather important ( $M=3.7$ ,  $SD=0.9$ ) as well as the intensity of protecting personal data with  $M=3.7$  ( $SD=0.9$ ). The three items which measured a dispositional privacy concern, like an individual level of need or desire for privacy, were merged into one overall score. With a mean of  $M=1.9$  ( $SD=0.9$ ), a general low desire for privacy was noticed.

##### **Awareness of Digital footprints**

In the beginning, participants were encouraged to brainstorm about all the applications they use ("Where do you leave so called data tracks?"). The intention behind this question was to point out the participants' digital footprints. First answers to the questions contained those data types that people often must actively provide when registering or signing in to Web Services, as well as obvious data that is collected within social media. Especially in the first

focus group of very young students, the brainstorming often came to a halt because the participants needed time and inquiries to come up with more applications and data types. Data types that are more “covertly” collected, such as location data or interests, were not as present in the beginning. The stimulation media (pictures or videos) induced more ideas, especially concerning applications of “the Internet of Things,” where the data collection is less obvious: cars collecting driving behavior and location, activity trackers revealing everyday routines and habits, etc. Participants seemed to know about many data collection practices when pointed to them, but they did only come up with a few of them on their own and needed a long time. In the end, 45 fields were mentioned, illustrated in the word cloud (Figure 2).



Figure 2: Reported providers where personal data is left (N=45 mentions).

The mentioned fields compassed a wide range of several providers. 12 categories were identified from these: social media, location, messenger, entertainment, booking, banking, connected systems, health, service, free time and leisure activities, information, and organization. In a next step, participants reported which kind of data they leave when using the mentioned Internet or app providers. The following word cloud portrays the 42 mentioned data types (Figure 3).



Figure 3: Reported data types (N=42 mentions).

16 categories arose out of the mentioned data types such as personal data, profession, finances, biometric data, state of health, medical information, fitness

behavior, political orientation, social contacts, photos/videos, interests/hobbies, communication, location, club membership, purchase behavior, mobility behavior.

While summing up the data types a male participant (26 years old) spoke out loud his thoughts and realized:

*“How seldom you actually think about this where you indicate your data or when you download apps and accept all authorizations. You seldom wonder about exactly this background.”*

Delving deeper in the topic, participants began to deal stronger with their own awareness of data they leave behind:

*“(.) once thinking about this topic you realize that you still use it (applications)”*  
(male, 26 years old).

Doubts came up concerning the usage of different apps, participants described that it has become an integral part of people’s life and one can no longer do without it. Also, social Incentives played a part:

*“The social incentive is just too great, especially with Facebook. If I would not be member of some Facebook groups of university, I would miss a lot of information since E-mails are not sent anymore”*  
(female, 26 years old).

As well as habituation as reasons for using different apps:

*“You have once reached a point where things are incredibly prevalent and you do not have the possibility to withstand it anymore”* (female, 23 years old).

**Sensitivity of data**

Once all mentioned data fields and types were collected, the question was posed if there are different types of data which have a stronger meaning to the participants than other data. Without naming the topic privacy, it was intended to draw attention to it. The tenor of the responses was comparable across participants and could be summarized in one comment, a male, 22 years old participant stated:

*“Declare as little as possible online.”*

In order to receive some more opinions, the question was emphasized and it was inquired if there is information which deserves more protection. Participants reported that

*“Everything that involves information about a person such as name and address needs to be protected”* (male, 25 years).

Another female participant stated that everything must be protected that can be used against oneself. Reversely, a male participant stated his opinion that:

*”Depending on who receives data it sometimes seems positive and negative in the same way to me. Talking about fitness or health it is positive for me if science can conclude something out of my data. In this case, I would agree to disclose my disease data. However, if the same data goes to insurance companies I would deny it.”* (male, 25 years).

The group drew the conclusion that the way of protecting or disclosing data is strongly individual and a contextual consideration, depending on the characteristics of the receiver of data.

In the further course of the group discussion, participants were encouraged to contemplate about different sensitivity rankings. In the end, five different ideas were created and presented by the focus group participants. One participant suggested a two-stage classification, distinguishing between data which is okay to disclose and other data which seem to be more sensitive and needs further restrictions when sharing (Figure 4).

okay is...	not okay is...
<ul style="list-style-type: none"> <li>...health data which can be used for research</li> <li>...clubmembership status for friends</li> </ul>	<ul style="list-style-type: none"> <li>...health data which is sent to health insurance companies</li> <li>...clubmembership for employers</li> <li>...data for government or third parties</li> </ul>

Figure 4: Two-step sensitivity ranking.

Moreover, two three-step classifications were presented with data participants are willing to share, data which depends on where it is retained, as well as data which is considered as very much in need of protecting. Exemplarily, one is shown for both ideas since distinction (Figure 5).

little sensitive	medium sensitive	extremely sensitive
<i>“I am willing to share this information”</i>	<i>“It depends on who receives information”</i>	<i>“Information that I consider as extremely sensitive and I am not willing to transmit”</i>
<ul style="list-style-type: none"> <li>“hardfacts“</li> <li>name</li> <li>profession</li> <li>birthdate</li> <li>hometown</li> </ul>	<ul style="list-style-type: none"> <li>personal interests, hobbies</li> <li>club membership</li> <li>purchase interest</li> <li>location</li> <li>search history</li> </ul>	<ul style="list-style-type: none"> <li>disease data</li> <li>bank data</li> <li>bank history</li> <li>cellphone number</li> <li>passwords</li> <li>political orientation</li> </ul>

Figure 5: Three-step sensitivity ranking.

A further classification was created with four steps by a participant. The idea was almost like the three-step version with the difference that the fourth step was called “not relevant” and included the example “car control”. As a last idea regarding the question in how many sensitivity steps all the different data should be divided, one participant came up with a 6-step ranking (Table 1).

Table 1: 6-step sensitivity classification.

<b>do not disclose at all</b>	disease and health data
<b>very sensitive</b>	bank data, credit card data, and moving profile
<b>more critical</b>	search history, purchase history, photo analyses, vacation time
<b>critical</b>	group of friends
<b>okay</b>	club membership activities and interests
<b>I do not care</b>	name, address, profession

While contemplating the categorization, the participants worked out some important factors that significantly influence their openness to share information: characteristics and type of the receiver of the information, the purpose of information collection, context of disclosure, and familiar practices to what information is already or rather usually known.

In the end, participants were asked to assess a semantic differential which measured the connotative meaning participants associate with the statement: *“For me, the digital world seems...”*

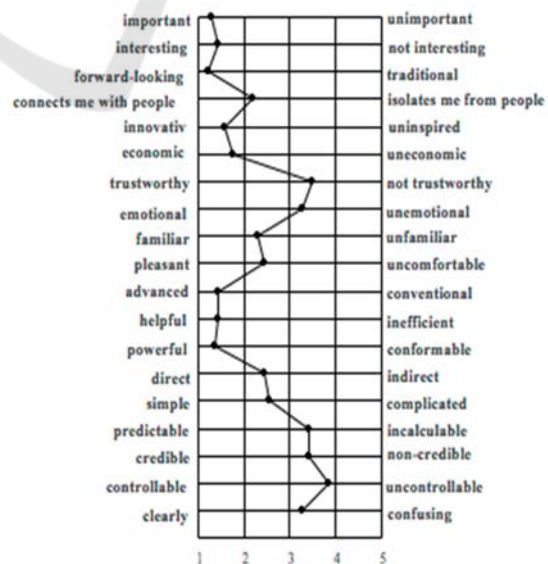


Figure 6: Semantical differential (N=14 participants).

Generally, the perceived digital world was positively connoted, with positive associations such as it is important, interesting, and helpful. However, distrust and concern were also shown by negative associations such as not trustworthy, unemotional, incalculable, non-credible, uncontrollable, and confusing, among others (Figure 6).

## 4 MEASURING ATTITUDES IN THE PRIVACY CONTEXT: THE QUESTIONNAIRE APPROACH

In a quantitative approach, general attitudes towards Internet privacy, behavior of personal data protection was focused at as well as the phenomenon of the privacy calculus. In contrast to the implicitly questioning in the focus groups, the online survey aimed at explicitly posed question regarding the above-mentioned aspects. The aim was to quantify how relevant privacy aspects are for participants in general.

The questionnaire was sent out by email to a wider audience of the university, including staff, but also private contacts of the authors.

### 4.1 Methods

The questionnaire was sent out consisted of four parts. First, demographic data (gender, age) was assessed. Then it was surveyed to what an extent participants have ever been concerned with the topic information privacy and in how far participants have dealt with the topic of data protection so far, using a 10-point scale (1="it's totally new to me" to 10="I am familiar with it").

In a second part, general privacy attitude was investigated with the item "Protecting my privacy is very important to me", using a 5-point Likert-scale (1="I do not agree at all" to 5="I totally agree.")

The third part surveyed data protection behavior with three items that were taken from Buchanan (2007): (1) "I am exerted to protect my privacy in the Internet by e.g. erasing cookies, installing specific software and/or changing settings." (2) "I am trying to actively protect my data in the Internet, by, e.g., erasing cookies, installing specific software and/or changing settings." (3) "I have once refrained from the usage of an application, because I have seen my privacy being at risk." Again, a 5-point Likert scale was used (1="I do not agree at all" to 5="I totally agree.").

The last part contained statements outlining aspects of the privacy calculus (items were based on findings in the focus groups study): (1) "I would always disclose my data for applications many of my friends /colleagues/relatives use, in order to not be excluded." (social pressure) (2) "Protecting my privacy on the internet (even better) is too time-consuming for me." (effort) (3) "I would disclose more data, if I received money for it" (reward).

### 4.2 Participants

The questionnaire was completed by 78 participants (33 women and 45 men) in an age range between 28 and 66 years ( $M=31.9$  years,  $SD=11.7$ ). For an age comparison regarding the different items, the sample was split by median into two groups: 35 participants fell into the "younger group" (< 28 years, 13 women and 22 men) and 42 into the "middle-aged group" aged (> 28 years, 20 women and 22 men). In general, the sample was more familiar with the topic privacy ( $M=7.3/10$  points max,  $SD=2.1$ ) than with the topic of data protection ( $M=6.7$ ,  $SD=2.4$ ).

### 4.3 Results

The data from the questionnaire dealing with the participants' attitude towards privacy concern and their actual behavior was analyzed with non-parametric tests due to the small sample size (Mann-Whitney-U-Test). In the analysis, we put a focus on age and gender as potential influencing factor of privacy and data protection attitudes.

#### Importance of privacy

In general, the importance of personal privacy appeared overall high, with a mean of  $M=4.4$  ( $SD=0.7$ ). In this context, a significant gender effect was found: the importance to protect one's own privacy was rated significantly ( $U=513$ ,  $p=0.010$ ) higher by female participants ( $M=4.6$ ;  $SD=0.6$ ) than by male participants ( $M=4.2$ ;  $SD=0.8$ ).

#### Protection Behaviors

When looking at the reported protection behaviors we registered a high awareness of the importance of protection behaviors. Participants reported to protect their privacy by taking actions, such as erasing cookies or installing specific software ( $M=3.7$ ;  $SD=1$ ). Almost the same response pattern occurred when asked about protection behavior regarding personal data with a mean of  $M=4.2/5$  points max ( $SD=1$ ). In addition, participants fully supported the statement that they have once refrained from the

usage of an application because they have seen their privacy being at risk ( $M=4.2$ ;  $SD=1.0$ ) (Figure 7). Interestingly, the protection behaviors were comparably high in both, gender and age groups, showing to be insensitive to user diversity.

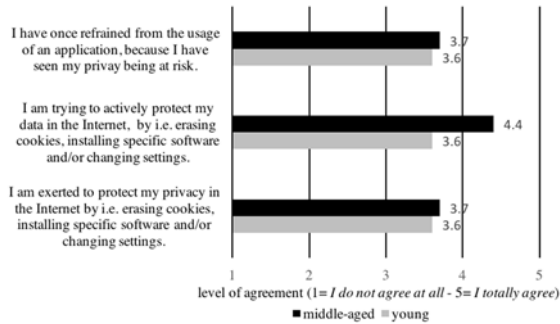


Figure 7: Age comparison of data protection behaviors (means) for younger (<28;  $N=35$ ) and middle-aged persons (>28 years;  $N=42$ ).

**Privacy Calculus**

The results regarding aspects of the privacy calculus are pictured in Figure 8. Asked about the time effort participants would tolerate to protect their privacy (“Protecting my privacy in the Internet (even better) is too time-consuming for me.”) was mostly confirmed ( $M=3.2$ ,  $SD=1.1$ ). However, the question, if participants would disclose more information if they received monetary compensation, was mostly denied ( $M=2.0$ ;  $SD=1.1$ ). In this regard, again, female and male as well as both age groups responded in the very same way. A significant age difference ( $U=505$ ;  $p=0.014$ ) was observed in the privacy calculus regarding social pressure (“I would always disclose my data for applications many of my friends use, in order not to be excluded”). Here, younger participants stated to rather disclose information in order to stay socially connected with friends via applications ( $M=3.1$ ,  $SD=1.0$ ) while participants

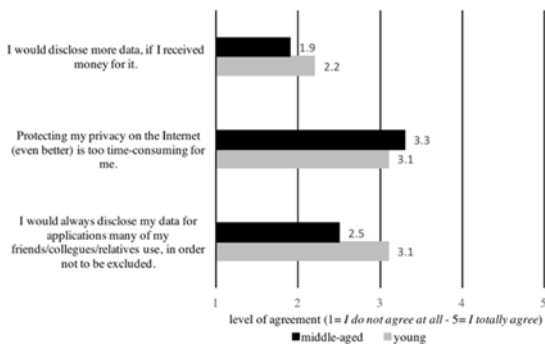


Figure 8: Age comparisons with respect to the privacy calculus for younger (<28;  $N=35$ ) and middle-aged persons (>28 years;  $N=42$ ).

belonging to the middle-aged group ( $M=2.5$ ,  $SD=1.0$ ) were less willing to do so. No gender effects were found (Figure 8).

**5 DISCUSSION**

In this paper, we sought to shed light on the “phenomenon” of privacy perceptions and the importance of data protection, exclusively taking a user-centered perspective. The overall research focus was directed to the question to what extent people are aware of personal information they leave behind and in how far they have a cognizant mental concept of the attributed importance of particularly sensitive data. Moreover, it is investigated in how far people are concerned about their information privacy and for what kind of benefit people decide to disclose information.

In a first step, focus groups were run, in which we analyzed users’ awareness of data footprints in the Internet, type of data, and conceptions of different sensitivity categories of data. As focus groups intent to understand individual habits, predominately qualitative data was collected. In a second step, an online questionnaire was sent out in which privacy attitudes, and behaviors in the context of data disclosure vs. protection was quantitatively determined. Findings were analyzed with a diversity focus, thus, comparing gender and age groups respecting privacy attitudes and behaviors.

As participants, we focused predominately on the so-called “Digital Natives” which are described as a generation that has spent their entire lives surrounded by and using computers and digital applications (Prensky, 2001). This generation is assumed to have a “natural” relation to using digital media and to have a quite elaborated practise and experience. In order to see if digital natives behave and think differently we had a somewhat “older” control group in the questionnaire study (30-66 years of age).

Insights won from the focus group study show that participants are not cognizant about their digital footprints. While personal data are rather prominent in participants’ mind as sensitive, data types that are more “invisibly” collected, such as location data, usage behavior, or interests are to a lesser extent mentally represented as digital footprints. Basically, participants seemed to be aware of privacy as a general good and regarded it as a societally important phenomenon, but when it came to the personal relations of themselves and digital footprints, participants had some difficulties to connect personal



habits and digital behaviors, overall hinting at a low personal awareness of data footprints.

It seemed that only with the help of extra stimuli (pictures and video sequences) participants did start to contemplate and think about it more strongly.

To sum up the focus groups' findings, we observed a diffuse picture. When directly asked for the importance privacy and data protection, participants attached high importance to both. Digging deeper, it was found that participants seemed to have only rudimentary awareness for their own behaviors, as if young users lack reflection on their own behaviors (Bennett et al., 2008). However, due to the small sample size in focus group studies, we cannot generalize these findings as typical for the whole group of digital natives but should validate these findings with a larger sample size. The task to categorize data types considering sensitivity was also not easy to accomplish for the participants, as the idea of "sensitivity of data" was not an obvious one. Finally, four central aspects were developed by focus group participants which were mentioned to have an impact on the decision to disclose data: (1) the receiver of the information (science (tolerated) vs. companies or insurances (not tolerated)) (2) the purpose of information collection (benefit for society (tolerated) vs. e-commerce or data malpractice (not tolerated)), (3) the context of disclosure (health data (tolerated) vs. information collected by third parties, the government (not tolerated)), and (4) familiar practices to what information is already or rather usually known (clubmembership, age (tolerated) vs. passwords, bank data (not tolerated)).

When looking into argumentation lines, participants stressed that they wish to protect their data, want to control who might have access to the data but still, social (being part of a group) or technical (accessibility, efficacy) benefits outweigh their decisions of sharing data. It turns out that participants seldom consciously realize what kind of information they factually disclose. It is much more that convenience and attractiveness of applications are more prominent, deflecting attention from the awareness which data footprints they leave behind. Moreover, social incentives offered by social media (e.g., the benefit of belonging to a group) outweigh the potential risk of disclosing personal data, corroborating earlier findings (Hui, 2006; Morando et al., 2014; Kowalewski et al., 2015).

When looking to the outcomes in the questionnaire study, again, it was corroborated that persons attach a high importance to privacy and data protection as a general good. This is true for the whole sample, still, privacy is significantly more important

to female users in comparison to men.

Active protection behaviors were reported by all participants, however, protection behaviors turned out to be age-sensitive. On the one hand, middle-aged users report to have a stronger protection behavior (changing settings, using protection software) in contrast to younger users. On the other hand, younger persons are more willing to disclose their data whenever they have the chance to stay connected with their peers in contrast to middle-aged users which are more reluctant in this regard. Thus, when it comes to social adjustments, younger participants perform a calculus between the expected loss of privacy and the potential gain of disclosure and finally decide for the social aspect and against the potential risk of privacy loss (Debatin, 2009).

While the social reason to stay connected is a strong argument for disclosing data, a potential monetary reward is not perceived as attractive. On the contrary, the whole sample rather denies that getting money back (for data disclosure) would change attitudes and behaviors. This is an interesting finding as the relation between monetary rewards and data protection or disclosure is well-known. In daily life, many shops offer pay back benefits for data disclosure and many people use it frequently. Also, there is experimental evidence that monetary incentives motivates people to disclose more data (Carrascal et al., 2013) or, inversely, lead persons to pay extra money in order not to disclose data and keep their privacy (Beresford et al., 2012). Future studies will have to explore under which circumstances data disclosure can be motivated by different kinds of monetary rewards and which persons might be especially attracted by financial benefits in the context of privacy and data protection.

## 6 LIMITATIONS AND FUTURE RESEARCH DUTIES

Even though the study revealed first findings into users' awareness of digital footprints, and underlying attitudes and behaviors in the context of data protection, still, outcomes represent only a first glimpse into a complex topic.

A first limitation regards the methodology used. Focus groups and questionnaire assess users' attitudes and beliefs with respect to a certain topic, however, it is questionable if attitudes mirror what people actually do when it comes to data disclosure in real digital usage contexts. Here, experimental studies could be helpful in which persons decide

under which conditions and usage contexts they share their data. A second research duty regards the question how effective education programs regarding digital awareness and digital protection behaviour have to be designed. Delivering information only seems to be of limited power - as persons “know” much about the importance of privacy and the risk of malpractice in the context of Big data. However, they are not able or not willing to relate the knowledge to their own behaviors. Therefore, practical, demonstrative and concrete training programs should be developed which allow persons to see and feel consequences of their digital traces in the Internet, thereby possibly influencing their digital behaviors to the better. This could be of specific educative benefit not only for younger people, but also for the digital immigrants (Prensky, 2001), older Internet users, which need to be supported in using digital media correctly.

From a didactic point of view, it is a basic question how concrete trainings programs should be in order to provoke a cognizant attitude towards Internet behaviours in general and privacy-sensitive behaviors in particular. Definitely, it is not enough to merely inform persons about risks, as from a psychological point of view the relation between benefits and risks is complex and considerably impacted by affective usage motives (Alhakami, 1994).

Many learners refuse to respond to dictating tutor systems with a superior attitude in the sense “you should” or “you must”. Therefore, privacy behaviors need to be mediated by quite seamless assistant which let the users know about their current digital traces and how valuable the data might be for external or illegal access.

A running project funded by the German Federal Ministry of Education and Research seeks to support digital citizenship (responsible and mature behaviors with digital data and services). “Mynedata”, the project which we are involved in, catches up on the situation that many Internet companies make money through the re-utilisation of personal user data of their customers. Usually, the individual user has no chance to control the utilization of his/her data and receives none of the generated profit. The idea of the project is to offer a technical solution which turns the use and exchange of personal data in a more transparent process and allows the individual user a more self-confident attitude in the digital world. Therefore, we are currently exploring on a kind of data-cockpit which allows users to manage the disclosure of own data more consciously in all online services and digital applications. The project pursues three aims:

first of all, data needs to be protected adequately. Individually adjustable procedures of anonymising data and privacy warranties are developed. For this reason, the cockpit is supposed to offer the user a classification of own data types into sensitivity grades or rather privacy protection grades. First sensitivity tendencies could already be found in this reported research. Secondly, the user perspective receives special interest. Right from the beginning a user-centred design is chosen, to develop the technical solution according to the user’s needs. Research findings of empirical user studies are immediately entering the technical development of the cockpit. A third aspects lies in the individual profit of data transfer. Disclosure of personal data is supposed to be rewarded with a benefit e.g. in a monetary kind. That way not only businesses profit from data disclosure but also users, the actual data owners itself. At the moment a study is running, investigating on the acceptance and the different functions regarding the privacy protection such a cockpit should contain. Besides the scientific user perspective point of view, also technical and security related, as well as juristic and economic aspects are considered and taken into account for the interdisciplinary approach.

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