Privacy concerns, dead or misunderstood? The perceptions of privacy amongst the young and old

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Abstract. The concept of ‘privacy’ has become an important topic for academics and policy-makers. Ubiquitous computing and internet access raise new questions in relation to privacy in the virtual world, including individuals’ appreciation of privacy and how this can be safeguarded. This article contributes to the debate by reporting survey data relating to the attitudes of adolescents, young adults and adults in the Netherlands in relation to privacy, freedom and security. This data aims at determining the appreciation of privacy amongst young and old. Data was collected through an online survey of 1,002 12 to 83 year-olds in 2012. The results show that adolescents are less concerned about their privacy than young adults and adults. However, all three age categories reported that privacy was a lesser concern than both freedom and security. The article presents important insights into the different attitudes towards privacy amongst the noted age groups, and therefore offers a commentary on their online behaviour. As such, the analysis is relevant for those with responsibility for the governance of individual privacy on the Internet.

Keywords: Online privacy, online policies, social network sites

1. Introduction

Privacy has become a prominent topic in academic and societal debates. People are gradually sharing more and more personal information as their dependence on the Internet and online services increases. This is despite the fact that people might not always be aware of the information they are sharing. At the same time, the threats to informational privacy are multiplying in the wake of data mining, profiling and identity theft \cite{2,24,34,35,37}. In light of these developments, it is important for policy makers to have an exact understanding of society’s appreciation of privacy.

In particular there is a need for a clearer understanding of young people’s appreciation of privacy. Young people are enthusiastic users of social media, such as social network sites (SNSs). They share vast amounts of personal information with often at best only limited use of privacy settings \cite{1,12,18}. Their online informational presence appears to leave them vulnerable to privacy infringements. News-papers have reported numerous incidents showing the severity of the consequences of privacy breaches...
including examples such as job loss or expulsion from school \[15,21,26,32\]. Given their online informational presence many assume that young people are less concerned about their privacy. Indeed, studies performed in the previous decade have often shown that young people have fewer (informational) privacy concerns than older people in a variety of contexts \[16,27,29,42\]. However, at the same time a small but growing body of work argues that privacy does in fact matter to young people \[4,7,22,31\]. The latter studies often emphasize that young people’s privacy concerns focus on known others accessing their data as opposed to strangers. Yet it is the risk posed by strangers accessing data, in the forms of data mining, profiling and identity theft, which are at the centre of attention in the societal and scholarly privacy debate.

In previous publications we discussed the outcomes of a survey concerning the differences in privacy attitudes between the young and old \[3,4\]. An important outcome of the study was that it confirmed the contention that young people’s privacy concerns are oriented differently due to their slightly alternative conception of privacy rather than the intensity of their concerns. In this paper, we will analyse a second batch of data originally gathered with the intention of obtaining a longitudinal data set concerning individual’s privacy attitudes and their privacy conceptions over several years. The data has been gathered amongst individuals in the age range of 12 to 83 years and was attained from those who participated in the previous survey performed the year before. In this paper our goals are not merely to replicate the findings obtained from the previous data set \[3,4\]. In addition, we will expand on these findings by providing a better context to understand the privacy attitudes. We will, therefore, not only compare the concern and importance attributed to privacy between age groups, but will also compare this with the concern and importance attributed to two other societal values often referred to in the privacy debate: freedom and security. Freedom is often assumed to be a fundamental value for which privacy can be instrumental. In contrast, security interests are often deemed to be pursued at the cost of privacy. This is the case for instance where antiterrorism policies and regulations regarding data and communications are under discussion (see Section 3 for a more extensive explanation). We will show that although relatively little importance is attributed to privacy compared to freedom and security it is still an important concern for most individuals, both young and old.

2. Privacy conceptions and concerns

With ‘privacy conceptions’ we refer – of course in abstracto – to the specific ideas of individuals of what constitutes privacy. An individual’s privacy conception is connected to their attitude or feelings about privacy \[4\]. We thus make a distinction between a privacy conception (personal view) from a privacy concept (definition as theoretical construction) \[17\]. Privacy conceptions can cover a wide range of related situations and values. In the previous century scholarly privacy theories have connected privacy with autonomy, relationships, personal space, and personal information \[9,10,37\]. Personal privacy conceptions can also be expected to cover this variety of dimensions.

The recent privacy debate has focused primarily on personal information. Consequently, with regard to sharing information on the internet in general and on SNSs in particular, much attention has been drawn towards the risks associated with profiling on the basis of data mining \[2\] and identity theft \[24,37\]. Consequently, the findings that young people are unconcerned with these kinds of risks could then be interpreted to indicate a lack of privacy appreciation. This is especially the case when one considers their impressive online informational presence. However, this line of reasoning assumes that the young and old share the exact same privacy conception and this is not necessarily the case.
In a previous study, we showed that adolescents (12- to 19-year-olds), young adults (20- to 30-year-olds), and adults (31-year-olds and older) differ with regard to their privacy conceptions [3,4]. Fewer adults associated situations involving relationships with privacy, while fewer adolescents associated situations involving personal information with privacy [3,4]. In essence, adolescents associated privacy more with having multiple relationships or being able to be alone with a partner or (girl)friend. Furthermore, the situations involving personal information appeared to have the strongest link with concern regarding privacy. This explains the relatively low concern amongst adolescents in comparison to young adults and adults. The latter two age groups did not differ in the reported concerns. These results are in line with some recent studies, which argue that young people do care about privacy [4,7,22,31]. These studies have argued that rather than being worried about data collection by governmental bodies or strangers, adolescents’ main concern appears to be known others (i.e. parents or teachers) accessing their online information intended for friends [4,7,22,31].

In this regard we expect to replicate our previous findings and find similar differences in privacy conceptions between the young and old [3,4]. We therefore formulated the following hypotheses.

**H1:** Fewer adolescents associate privacy with situations involving personal information than young adults and adults.

**H2:** Fewer adults associate privacy with situations involving relationships than adolescents and young adults.

For adults, the informational privacy risks posed by profiling on the basis of data mining by governments, insurance companies, bankers, and enterprises, and identity theft by ill-willed criminals from the other side of the world, will be more prominent. Adolescents’ privacy concerns, instead, will focus more on how ‘to hang out with their friends’ away from the scrutiny of their parents and other grown-ups [4,5,7]. The parental home does not necessarily provide the privacy young people desire in the same way as it may for adults [7, p. 5]. The internet and social media provide them with the opportunities to achieve their privacy [4,30,38]. In other words, the online presence that may instigate concern from an adult’s perspective may be deemed to be beneficial to privacy from an adolescent’s point of view. We therefore expect that concerns regarding privacy will be primarily related to situations involving personal information and less to do with situations involving relationships thus replicating previous findings [3,4].

**H3:** Concern regarding privacy will be more closely related to situations involving personal information when compared to situations involving relationships.

These findings would offer an alternative explanation for the lower concern regarding privacy amongst young people: not because they do not value their privacy, but because they hold a slightly different conception of privacy compared to adults. The current privacy debate – which is a debate mainly of adults – often focuses on privacy concerning the availability of personal information on the internet by strangers, employees and institutions such as the government. However adolescents do not necessarily share this privacy conception, and instead may hold a privacy conception more relevant to their adolescent life in the parental home.

The fact that adolescents hold a privacy conception that gives them less cause for concern does not necessarily mean that they consider their privacy less important. For young people, privacy violations by known others (e.g., parents), rather than by data mining, appear to be a more prominent concern [7]. They employ many additional strategies to safeguard their privacy from these known others, such as the use of multiple sites, using more private channels for more intimate interactions, or by relying on social norms [7,20,36]. This effort in creating their own privacy online suggests that they value their privacy
considerably. At the same time, it explains why they report to be less concerned: they feel in control of the aspects of privacy most prominent to them. We therefore expect that while adolescents do report less concern regarding their privacy, they will not differ from adults in the importance they attribute to privacy.

H4: Adolescents will report less concern regarding their privacy compared to young adults and adults.
H5: Adolescents, young adults, and adults do not differ in the importance attributed to privacy.

3. Contextualizing privacy attitudes

In the previous section we explained in what ways we hope to replicate previous findings and as such provide a better understanding of the differences in reported privacy concerns between the young and old. The second objective of this paper is to provide more detailed insights into general privacy appreciation by comparing privacy attitudes with attitudes regarding other values broadly shared in society (namely security and freedom).

We have decided to compare these attitudes due to the frequency that security and freedom appear in the privacy debate. Security is a value often considered as one that is in competition with privacy. In the past decade numerous publications have referred to perceived conflicts between privacy and public security considerations [19, 29, 40]. Security considerations are often seen to trump privacy considerations. As the respondent quoted by Pavone and Pereira: says “This is it, it is a violation of your privacy but if it truly is for your security you can’t really complain” [29, p. 18]. A more recent survey found that in response to the data collection online by the National Security Agency (NSA) the majority of Americans would rather have the NSA investigate terrorist threats than stopping them from intruding upon personal privacy (62%) [13].

Freedom is also often mentioned in the privacy debate but not so much as a competing value. Rather freedom is considered a more encompassing value of which privacy is only a part or, arguably, a prerequisite [33, 41]. We therefore formulated the following hypothesis.

H6: Individuals will attribute less importance to privacy when compared to freedom and security.

Even if individuals consider other values more important than privacy, this does not automatically mean that individuals are no longer concerned with privacy when they sacrifice it for another value (e.g. security or freedom). Pavone and Pereira reported that although their respondents were generally willing to give up their privacy, they only wanted to do so under specific conditions [29] namely, the security goals of new technologies should be clear and privacy invasions should be restricted to a minimum where possible. In other words, privacy remains an important consideration for individuals even if other values such as security are often given priority during direct trade-offs. Here, we therefore expect that although individuals attribute less importance to privacy compared to freedom and security, they will report to be more concerned with their privacy compared to their freedom and security. This is particularly true now that privacy and the associated dangers are featured heavily in the media. Accordingly it is expected that individuals will report more concerns for privacy compared to freedom and security. We will therefore test the following hypothesis.

H7: Individuals will report more concern about their privacy compared to freedom and security.
Table 1
Sample demographic

<table>
<thead>
<tr>
<th></th>
<th>Adolescents</th>
<th>Young adults</th>
<th>Adults</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>307</td>
<td>152</td>
<td>263</td>
<td>722</td>
</tr>
<tr>
<td>Age</td>
<td>14.46 (1.92)</td>
<td>25.52 (3.19)</td>
<td>47.06 (12.50)</td>
<td>28.66 (16.49)</td>
</tr>
<tr>
<td>Gender (Male)</td>
<td>47.2%</td>
<td>30.3%</td>
<td>39.5%</td>
<td>40.9%</td>
</tr>
</tbody>
</table>

Note: Age provides means with standard deviation in brackets.

4. Method

4.1. Sample

The data used in this study was gathered in the Netherlands from September 6 to September 17 2012 as part of a larger questionnaire used for a project concerning online behaviour and privacy. The independent research institute TNS-NIPO conducted an online survey and recruited respondents from a sample of 1002 users of SNSs. The respondents ranged from 12 to 83-years-old, had completed a similar survey a year earlier and had been recruited through a stratified procedure from a sample pool representative to the Dutch population maintained by TNS-NIPO. In total, 642 respondents completed the survey resulting in a response rate of 64.1%. An additional, 80 new 12-year-olds were recruited from the TNS-NIPO’s sample pool. This resulted in a total of 722 respondents completing the survey. Table 1 provides the distribution of respondents over the chosen age groups; adolescents (12- to 19-year-olds), young adults (20- to 30-year olds), and adults (31-year olds and older). The table also specifies their age and gender. Respondents gave their consent to participate in the research survey (parents provided consent for individuals younger than 18 years old). Upon completion of the survey the respondents received special credits, which they could trade for discount coupons.

4.2. Measures

Privacy conception. Respondents were asked which of eight situations they personally associated with privacy by answering simple yes-no questions. The situations were based on the four factors often associated with privacy: relationships, personal information, personal space, and autonomy [4,9,10,39]. Although the hypotheses only addressed situations involving personal information and relationships, the situations involving personal space and autonomy were also included for further exploration and completion. These were as follows:

**Relationships**
- alone partner – “Being able to be alone with a partner or (girl)friend”,
- various relationships – “Being able to have different friendships and relations”.

**Personal information**
- data collection – “The government collecting information about me”,
- information sharing – “Putting information on the Internet”.

**Personal space**
- burglary – “When someone breaks into my house”,
- cameras – “Camera surveillance in a shopping mall”.

**Autonomy**
- voting – “Being able to vote for political parties”,


In addition, the scores of the appropriate items, with yes (1) and no (0), were added to create the four variables: relationship ($M = 0.96$, $SD = 0.77$), personal information ($M = 1.36$, $SD = 0.74$), personal space ($M = 1.26$, $SD = 0.71$), and autonomy ($M = 0.84$, $SD = 0.78$), each with a scale from 0 to 2. The reliability analysis provided only weak support for these scales ($\alpha = 0.501$; $\alpha = 0.408$; $\alpha = 0.243$; $\alpha = 0.498$; respectively). However, from a theoretical point of view, the scales make sense. The fact that an individual associates camera surveillance with privacy does not necessarily mean that he or she also associates burglary with privacy. However, both situations appear to address a completely different aspect of privacy in comparison to situations involving data collection or autonomy. We, therefore, proceeded to make use of the scales in our analysis.

Privacy, freedom, and security attitudes. In this paper, we were specifically interested in two attitudes: attributed concern and attributed importance. Respondents were presented with two items for privacy, freedom, and security resulting in six items total. First, respondents were asked to what degree they were concerned about their privacy, about their freedom, and about their security separately on a 4-point Likert scale ranging from completely disagree (1) to completely agree (4). Next, respondents were asked to what degree they think privacy, freedom, and security are important on a 4-point Likert scale using the same range classification. This resulted in 6 scales with lower scores indicating less concern or importance.

5. Results

5.1. Privacy conceptions

The results concerning the privacy conceptions are presented in Table 2. Burglary was associated with privacy by most respondents closely followed by Data collection (67.6%), and Information sharing (68.8%), whereas Voting (30.6%) and Various relationships (32%) were chosen the least. Adolescents generally selected fewer situations ($M = 4.13$, $SD = 1.98$) compared to both young adults ($M = 4.68$, $SD = 1.82$) and adults ($M = 4.61$, $SD = 2.07$), the latter two do not differ significantly from each other, $F(2, 719) = 5.76$, $p = 0.003$.

Our $\chi^2$-analysis showed a significant age effect for the situations Data collection, $\chi^2(2, 722) = 22.02$, $p < 0.001$, Information sharing, $\chi^2(2, 722) = 7.24$, $p = 0.027$, Burglary, $\chi^2(2, 722) = 10.98$, $p = 0.004$, Voting, $\chi^2(2, 722) = 10.58$, $p = 0.005$, and Freedom of choice, $\chi^2(2, 722) = 15.13$, $p = 0.001$. Investigation of the adjusted standardized residuals (ad. res.) reveals which percentages are significantly different from the total percentage. An ad. res. with an absolute value of 2.0 or greater indicates a significant deviation from the total percentage. From the results fewer adolescents associate Data collection, Information sharing, Burglary, Voting, and Freedom of choice with privacy compared to the total percentage. Furthermore, more young adults associate Data collection and Information sharing with privacy compared to the total percentage, but fewer young adults associated Freedom of choice with privacy. Finally, more adults associated Voting and Freedom of choice with privacy.

These results support the first hypothesis. Fewer adolescents associated situations involving personal information with privacy compared to young adults and adults. No support was found for the second hypothesis: no significant age effect was found for the situations involving relationships.
Table 2

<table>
<thead>
<tr>
<th>Situations</th>
<th>Adolescents</th>
<th>Young adults</th>
<th>Adults</th>
<th>Total</th>
<th>$\chi^2$(df 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Relationships</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alone partner</td>
<td>65.8%</td>
<td>67.1%</td>
<td>58.9%</td>
<td>63.6%</td>
<td>3.92</td>
</tr>
<tr>
<td>Ad. res.</td>
<td>1.1</td>
<td>1.0</td>
<td>−2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Various relationships</td>
<td>32.6%</td>
<td>27.6%</td>
<td>33.8%</td>
<td>32.0%</td>
<td>1.79</td>
</tr>
<tr>
<td>Ad. res.</td>
<td>0.3</td>
<td>−1.3</td>
<td>0.8</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td><strong>Personal information</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data collection</td>
<td>58.6%</td>
<td>78.9%</td>
<td>71.5%</td>
<td>67.6%</td>
<td>22.02***</td>
</tr>
<tr>
<td>Ad. res.</td>
<td>−4.4</td>
<td>3.4</td>
<td>1.7</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Information sharing</td>
<td>64.2%</td>
<td>76.3%</td>
<td>70.0%</td>
<td>68.8%</td>
<td>7.24*</td>
</tr>
<tr>
<td>Ad. res.</td>
<td>−2.3</td>
<td>2.2</td>
<td>0.5</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td><strong>Personal space</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burglary</td>
<td>67.1%</td>
<td>78.9%</td>
<td>77.6%</td>
<td>73.4%</td>
<td>10.98**</td>
</tr>
<tr>
<td>Ad. res.</td>
<td>−3.3</td>
<td>1.7</td>
<td>1.9</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>Cameras</td>
<td>50.8%</td>
<td>60.5%</td>
<td>49.0%</td>
<td>52.2%</td>
<td>5.51</td>
</tr>
<tr>
<td>Ad. res.</td>
<td>−0.6</td>
<td>2.3</td>
<td>−1.3</td>
<td>3.2</td>
<td></td>
</tr>
<tr>
<td><strong>Autonomy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voting</td>
<td>24.4%</td>
<td>32.2%</td>
<td>36.9%</td>
<td>30.6%</td>
<td>10.58**</td>
</tr>
<tr>
<td>Ad. res.</td>
<td>−3.1</td>
<td>0.5</td>
<td>2.8</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Freedom of choice</td>
<td>49.5%</td>
<td>46.1%</td>
<td>63.1%</td>
<td>53.7%</td>
<td>15.13**</td>
</tr>
<tr>
<td>Ad. res.</td>
<td>−2.0</td>
<td>−2.1</td>
<td>3.8</td>
<td>6.2</td>
<td></td>
</tr>
</tbody>
</table>

Note. $\chi^2$ statistic significant at $^*p<0.05$ level $^{**}p<0.01$ level $^{***}p<0.001$ level. Ad Res: Adjusted Standardized Residual. A residual with an absolute value of 2.0 or higher indicates a significant deviation from the total percentage.

5.2. Privacy conceptions and attitudes

In order to investigate our third hypothesis, i.e., concerns regarding privacy are more closely related to situations involving personal information, we decided to use linear regression analysis. We used a stepwise model in which we entered age and gender as predictors in the first step to predict the concern and importance attributed to privacy, freedom and security in six separate analyses. In the models predicting the concern and importance attributed to privacy, we also included a second step in which we added the four privacy conception scales for personal information, relationships, personal space, and autonomy as predictors in the second step. Table 3 provides the outcome of the regression analysis. Adding the four privacy conception scales as predictors improved the model for predicting both the concern and importance attributed to privacy.

The analyses provide support for our third hypothesis. The privacy conception scale involving personal information is the only conception scale predicting concern regarding privacy ($b = 0.11, p = 0.025$). In other words, concern can be expected to be stronger for individuals with a privacy conception focused more on situations involving personal information.

Further exploration of the results in Table 3 shows some additional findings. Respondent’s concern for each of the values is primarily related to their age ($b = 0.008, p < 0.001; b = 0.008, p < .001; b = 0.006, p < 0.001$, for privacy, freedom, and security concerns respectively). In that older individuals will report more concern. Significance is also attached to the deviations based on gender, for privacy ($b = −0.151, p = 0.003$) and security ($b = −0.103, p = 0.015$). The results indicate that females consider privacy and security more essential. The importance attributed to freedom is related to age ($b = 0.004, p = 0.004$), in that older individuals consider freedom more important.

We also see that the privacy conception scales of personal information and autonomy are related to the importance attributed to privacy ($b = 0.085, p = 0.025$, and $b = 0.093, p = 0.010$, respectively). Individuals, who associate privacy with their personal information online or with the ability to make free decisions, consider privacy more important.
Table 3

Regression values and critical statistics from linear regression analysis

<table>
<thead>
<tr>
<th></th>
<th>Privacy Concern</th>
<th>Importance</th>
<th>Freedom Concern</th>
<th>Importance</th>
<th>Security Concern</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>10.89***</td>
<td>4.70**</td>
<td>8.038***</td>
<td>8.16***</td>
<td>13.39***</td>
<td>4.25*</td>
</tr>
<tr>
<td>R²</td>
<td>0.029</td>
<td>0.013</td>
<td>0.022</td>
<td>0.022</td>
<td>0.036</td>
<td>0.009</td>
</tr>
<tr>
<td>Age</td>
<td>0.01 (0.00)***</td>
<td>0.00 (0.00)</td>
<td>0.01 (0.00)***</td>
<td>0.01 (0.00)***</td>
<td>0.01 (0.00)***</td>
<td>0.00 (0.00)</td>
</tr>
<tr>
<td>Gender</td>
<td>−0.01 (0.06)</td>
<td>−0.15 (0.05)**</td>
<td>0.02 (0.06)</td>
<td>−0.07 (0.04)</td>
<td>−0.00 (0.06)</td>
<td>−0.10 (0.04)*</td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>5.94***</td>
<td>4.05**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>0.047</td>
<td>0.033</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ R²</td>
<td>0.018**</td>
<td>0.020**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.01 (0.00)***</td>
<td>0.00 (0.00)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>−0.01 (0.06)</td>
<td>−0.15 (0.05)**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal information</td>
<td>0.11 (0.05)*</td>
<td>0.09 (0.04)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relationship</td>
<td>−0.06 (0.05)</td>
<td>−0.06 (0.04)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal space</td>
<td>0.06 (0.05)</td>
<td>0.01 (0.04)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>0.07 (0.05)</td>
<td>0.09 (0.04)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. "p < 0.05 level **p < 0.01 level ***p < 0.001 level. Gender was coded female (0) and male (1). Positive regression values indicates male score a higher concern or importance and vice versa, negative regression values indicate female score a higher concern or importance.

5.3. Attitudes and age

Our fourth and fifth hypotheses concerned the differences between the young and old in relation to the concern and importance they attribute to privacy. Specifically, adolescents were expected to be less concerned with privacy, but no difference was expected concerning the importance young and old attribute to privacy. The regression in the previous section already showed that although concern was related to age, the importance attributed to privacy was not. In this regard we did a one-way ANOVA to directly compare the privacy attitudes of adolescents, young adults and adults as an additional test of the hypotheses.

In support of our fourth hypothesis, a significant age effect was found in relation to concern regarding privacy, \( F (2, 719) = 21.55, p < 0.001 \). Post hoc comparison showed that this age effect is in line with the hypothesis: adolescents reported less concern \((M = 2.02, SD = 0.76)\) compared to both young adults \((M = 2.41, SD = 0.86)\) and adults \((M = 2.45, SD = 0.90)\). However, the last two categories did not differ significantly. In support of our fifth hypothesis no significant age effect was found for importance, \( F (2, 719) = 1.04, p = 0.355 \), indicating that adolescents, young adults, and adults do not differ in how much importance they attribute to privacy.

Concerning importance, the only age effect was found in relation to freedom, \( F (2, 719) = 16.66, p < 0.001 \), and concern regarding security, \( F (2, 719) = 17.92, p < 0.001 \), similar to the age effect found for concern regarding privacy. Consistent with the positive age effects reported in Table 3, post hoc comparison shows that adolescents consistently reported lower concerns not only for privacy \((M = 2.02, SD = 0.76)\), but also for freedom \((M = 1.79, SD = 0.75)\) and security \((M = 1.87, SD = 0.73)\) compared to young adults \((M = 2.08, SD = 0.75; M = 2.12, SD = 0.68, respectively)\) and adults \((M = 2.14, SD = 0.79; M = 2.22, SD = 0.77, respectively)\). No differences were found between young adults and adults.

Concerning importance, the only age effect was found in relation to freedom, \( F (2, 719) = 3.74, p = 0.024 \). Post hoc comparison, also shown in Table 5, shows that adolescents \((M = 3.50, SD = 0.60)\)
Table 4
Concern scores for adolescents, young adults, and adults

<table>
<thead>
<tr>
<th></th>
<th>F (2, 719)</th>
<th>Adolescents</th>
<th>Young adults</th>
<th>Adults</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td></td>
<td>307</td>
<td>152</td>
<td>263</td>
<td>722</td>
</tr>
<tr>
<td>Privacy</td>
<td>21.55***</td>
<td>2.02 (0.76)</td>
<td>2.41** (0.86)</td>
<td>2.45** (0.90)</td>
<td>2.26 (0.86)</td>
</tr>
<tr>
<td>Freedom</td>
<td>16.66***</td>
<td>1.79 (0.75)</td>
<td>2.08** (0.75)</td>
<td>2.14** (0.79)</td>
<td>1.98 (0.78)</td>
</tr>
<tr>
<td>Security</td>
<td>17.29***</td>
<td>1.87 (0.73)</td>
<td>2.12** (0.68)</td>
<td>2.22** (0.77)</td>
<td>2.05 (0.75)</td>
</tr>
</tbody>
</table>

Note. Item scale was 1 to 4, lower scores indicating less concern attributed to the concept. Standard deviations are given between brackets. ** indicates a significant different concern compared to adolescents. *** p < 0.001.

Table 5
Importance scores for adolescents, young adults, and adults

<table>
<thead>
<tr>
<th></th>
<th>F (2, 719)</th>
<th>Adolescents</th>
<th>Young adults</th>
<th>Adults</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td></td>
<td>307</td>
<td>152</td>
<td>263</td>
<td>722</td>
</tr>
<tr>
<td>Privacy</td>
<td>1.04 n.s.</td>
<td>3.35 (0.69)</td>
<td>3.30 (0.68)</td>
<td>3.40 (0.66)</td>
<td>3.36 (0.68)</td>
</tr>
<tr>
<td>Freedom</td>
<td>3.74*</td>
<td>3.50 (0.60)</td>
<td>3.53 (0.61)</td>
<td>3.63* (0.52)</td>
<td>3.55 (0.58)</td>
</tr>
<tr>
<td>Security</td>
<td>0.56 n.s.</td>
<td>3.54 (0.58)</td>
<td>3.59 (0.53)</td>
<td>3.59 (0.55)</td>
<td>3.57 (0.56)</td>
</tr>
</tbody>
</table>

Note. Item scale was 1 to 4, lower scores indicating less importance attributed to the concept. Standard deviations are given between brackets. * indicates a significant difference from adolescents. p < 0.05.

Table 6
Critical statistical information and effect sizes for repeated measure ANOVA

<table>
<thead>
<tr>
<th></th>
<th>Mauchly’s test</th>
<th>Huynh-Feldt estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \chi^2 ) (DF = 2)</td>
<td>p</td>
</tr>
<tr>
<td>Concern</td>
<td>59.06</td>
<td>0.000</td>
</tr>
<tr>
<td>Importance</td>
<td>52.36</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Note. Huynh-Feldt estimates were used since the assumption of sphericity was violated according to the Mauchly’s test.

and young adults \( (M = 3.53, SD = 0.61) \) attribute less importance to freedom \( (M = 3.50, SD = 0.60) \) compared to adults \( (M = 3.63, SD = 0.52) \). This is in line with the finding of age as a significant predictor for freedom importance reported in Table 3.

5.4. Privacy, freedom, and security attitudes

Finally, we investigated our final two hypotheses concerning the comparison of privacy, freedom and security attitudes. Significant correlations were found between the concern scores (0.488 to 0.634) and the importance scores (0.206 to 0.389) on a \( p < 0.001 \) level. Repeated measures analyses were done to address this question and compare the concern and importance attributed to privacy, freedom, and security. Table 6 provides the critical statistical information for these analyses.

Bonferroni post hoc comparison showed, in support of our fifth hypothesis, that respondents reported significantly less importance for privacy \( (M = 3.36, SD = 0.68) \) compared to both freedom \( (M = 3.56, SD = 0.58) \) and security \( (M = 3.57, SD = 0.56) \). No significant differences were found between the importance attributed to freedom and security. We also found support for our sixth hypothesis: respondents are significantly more concerned with their privacy \( (M = 2.26, SD = 0.86) \) than they are with their security \( (M = 2.05, SD = 0.75) \), which in turn were significantly higher than concern for freedom \( (M = 1.98, SD = 0.78) \).
6. Discussion

The investigation reported in this paper aimed at achieving two goals. First, to discover whether we could replicate the previous findings that adolescents’ differing privacy conceptions can explain their lower concern regarding privacy. Secondly, we tried to provide a better understanding of relative privacy appreciation in society by comparing reported privacy attitudes with the reported attitudes concerning security and freedom. The results showed that the lower level of concern reported by adolescents compared to young adults and adults, indeed appears to be related for some part to adolescents’ differing privacy conception. We also showed that adolescents attribute similar importance to privacy when compared to young adults and adults. Furthermore, the results showed that while privacy is considered less important than freedom and security, individuals of all ages are more concerned about their privacy than about these other values.

Before discussing the main findings, we want to draw attention to some limitations of the current study that should be taken into account when interpreting the reported findings. First of all, although we have presented the findings here as if privacy conceptions affect the privacy attitudes, of course, causality cannot be determined on the basis of the presented findings. We consider attitudes and conceptions as aspects or dimensions that can merely be distinguished in abstracto. Consequently, it does not make much sense to make claims about the exact causal relationships between attitudes and conceptions. Our claims are merely about the different orientations of privacy attitudes and conceptions and the correlation between these two. Secondly, we have treated the attitudes concerning freedom, security, and privacy as if they are unrelated. However, the significant correlations found between the concern scores suggest that certain factors may cause some individuals’ concern to be generally higher than that of other individuals for all of the three values. Such factors (e.g., individual traits) were not taken into account here. Instead, we focussed exclusively on differences in attitudes and conceptions between age groups. We do recognize however that privacy conceptions and concerns can differ within age groups as a result of individual differences. Thirdly, we used a single items scale to assess the concern and importance respondents attributed to privacy. Ideally, larger scales would be used to assess these attitudes. However, the items presented in this paper were part of a larger panel study concerning the behaviour on SNSs and as a result it was not possible to include such scales. In addition, respondents may have been primed to report more concern about privacy rather than for freedom and security, as they had also been answering other items concerning their online behaviour in the same questionnaire. However, our focus in this analysis is on establishing the potential differences between age groups thus setting individual differences aside for the moment. Finally, the reported findings are based on a Dutch sample whereas most privacy work is based on American samples. It is possible that privacy conceptions vary according to culture and replication of these findings with different samples will be required.

That being said, the results reported in this article show that people are first and foremost concerned about informational privacy. Indeed, the main cause for concern from a privacy perspective in current society appears to be the scale of personal data gathering online by companies such as Facebook or governmental organizations such as the NSA. Our findings further suggest, however, that this informational aspect of privacy is not as prominent in adolescents’ privacy conception compared with that of adults. These findings replicate those from our previous survey reported elsewhere [34].

We found no statistical support for our hypothesis that adolescents and young adults conceptualize privacy in terms of situations related to relationships. Therefore, the results, did not confirm previous studies, including our own, which argued that adolescents are more concerned with known others (i.e., parents or teachers) accessing the information they share online with their friends rather than with institutions unknown to them accessing this information [34][22][31]. Future studies may wish to further
assess the exact differences in privacy conception and their basis from the perspective of younger and older individuals.

We went on to show that even though adolescents were found to be less concerned about their privacy compared to older people, they were not found to consider privacy less important. This finding in combination with the one concerning the differences in privacy conceptions present a possible explanation for the paradoxes in previous studies that report that younger people are less concerned with their privacy [16,27,28,42] while they do find privacy important [7,22,31]: the primary cause for concern in present day information society (i.e., the potential threats of data mining and constant institutional or governmental surveillance) are less prominent in adolescents’ privacy conception. As a result, adolescents may report to be less concerned, while privacy (e.g., from parents or teachers) is still important to them.

We also compared privacy attitudes with freedom and security attitudes. Privacy was considered less important than security and freedom by respondents of all ages. A possible explanation for this could be the fact that the direct consequences of a security breach may be considered more threatening compared to that of a privacy breach. That is, individuals may be able to envision the consequences of a terrorist attack more vividly than the possible consequences of living in a society in which the government has full knowledge of its citizens.

Our results also show that respondents were generally more concerned about their privacy compared to security and freedom. This suggests that even if individuals compromise their own privacy by sharing information online or by allowing for camera surveillance for security reasons, they are still concerned about their privacy and do not disregard it entirely. It is therefore important that privacy and security should not be seen as opposites when developing new technologies. New technologies should rather try to provide security while protecting privacy. A means of achieving such a balance could potentially be achieved through the implementation of privacy by design, i.e. the inclusion of privacy protecting measures in the overall design of a system, as much as possible without weakening its performance [11, 14].

Finally, we found that adolescents consistently reported to be less concerned than young adults and adults, not only about their privacy, but also about their freedom and security. This suggests that being less concerned about values, such as privacy, freedom, and security, could be a developmental trait associated with adolescence. Most threats to these values (e.g., terrorism or governmental surveillance) do not feature prominently in adolescent life. As such, these findings offer an alternative to the assumption that the lower concern is a generational trait – i.e. that current adolescents will preserve the lower concern throughout their lives – as has been claimed concerning privacy [25]. For an elaboration of this alternative, i.e., a developmental perspective, see Authors [5]. Future studies may wish to explore whether similar differences can be found for freedom and security conceptions like those reported for the privacy conceptions in this analysis.

The findings reported in this article may interest policymakers involved in the protection of minors. Not only do the results show that young people consider privacy important (contrary to common perceptions), they also offer an explanation for the apparent lack of concern young people show towards their online information. If the lower concern is indeed a developmental trait as is postulated here, this would suggest that adolescence is a developmental phase during which individuals are inherently vulnerable from an informational privacy perspective. Even if informational privacy is of less concern to individuals during their adolescence, their enthusiastic sharing of online information will leave their informational privacy vulnerable in the current online environment. As a result, their privacy may have already been compromised beyond repair before they grow into adulthood when informational privacy, just as security and freedom, will become a greater concern to them. A possible step that could be taken would
be to offer adolescents, like younger children, additional protection online concerning their personal information.

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