

# Facebook: Privacy and Security Perceptions of Millennials and non-Millennials

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## ABSTRACT

Nowadays, more and more people are using social networking sites (SNS). It has often been assumed that the younger generation is more inclined to share information as they do not know the consequences of their behavior towards social media. Firstly, this study examines the relationship between privacy and security perception, and social media behavior specifically attitude to and trust in Facebook, and willingness to provide personal information. Afterwards, it is examined how age will affect the aforementioned relationship. To gather data, we conducted a survey using measurements from established published research. The results reveal that both generations have the same perception in term of privacy and security; however it is remarkable that the older generation has more positive attitude towards Facebook than the younger generation although are still cautious when it comes to sharing information.

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## Keywords

Facebook; Perceived Privacy; Perceived Security; Social Media Behaviour; Millennials

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# 1. INTRODUCTION

## 1.1 Framing the Problem

Currently, we are in an information age in which “information technology, telecommunication media and computers are used extensively” (Büyükbaykal, 2015). The usage of social media is becoming a part of people’s everyday lives. Social networking sites(SNS) such as Facebook are gaining more and more users(Shin, 2010). SNS are online platforms in which individuals have the possibility to share information about their activities and interest (Shin, 2010) in form of images, texts or by clicking certain features of a platform. Furthermore, users can also view the content that other users put online. Typically, the members of SNS name their full names and include profile pictures(Coelho & Duarte, 2016). Connectivity via SNS is accessible almost everywhere as the applications can be used through smartphones, laptops and other gadgets connected to the internet.

Clearly, SNS have several drivers such as social enhancement by self-promotion, connection with friends and family, developing new contacts and gaining information about others (Mäntymäki & Islam, 2016). SNS have privacy policies which disclose how the social network provider will handle the user’s data (Gerlach, Widjaja, & Buxmann, 2015). Privacy policies have an effect on the risk perceptions of users, hence it has an impact on user’s online behavior such as their willingness to share information about themselves (Gerlach et al., 2015). The amount of content users provide online vary on how users perceive their information as secure (Shin, 2010). Additionally, the privacy settings of the content influence how much information individuals share on social media (Boyd, 2002).

According to the findings of Lenhart, Purcell, Smith, and Zickuhr (2010) 73% of American teens and only 47% of adults use SNS. The adults or non-millennials preconceptions about the lack of privacy of SNS and the complexity of the interface are the main reasons why their participation in SNS are low (Coelho & Duarte, 2016). Furthermore, it is pointed out that the younger generation is not concerned about their privacy as they do not understand the consequences of their social media behavior (Barnes, 2006).

## 1.2 Relevance

### 1.2.1 Theoretical Relevance

This study will provide further insight into the social media behavior of users using user’s behavior on Facebook as an example. In a theoretical point of view, this study will contribute to current literature concerning the difference of social media behavior of young adults and older adults. It addresses other control variables such as nationality, gender and education which also contribute to a different social media behavior.

### 1.2.2 Practical Relevance

For individuals who want to pursue making an SNS it is interesting to understand what factors affect potential users’ behavior to ensure user-friendly performance. Specifically, Facebook can use this paper to improve their policies, privacy settings and the way users can edit their security and privacy preferences. Having the knowledge what factors affect social media behavior allows Facebook to appeal to demographics in order to be more attractive for users. Hereby, companies who are interested in using SNS platforms as a tool for marketing strategies will have an easier way to gather data regarding

consumer preferences, if users are more willing to share information about themselves.

## 1.3 Research Question

Herewith the question arises, “*to what extent do security and privacy perceptions of millennials and non millennials affect their social media behavior on Facebook?*”. For this paper, a survey will be conducted in order to collect data with regards to social media behavior of different age groups. The data will be analyzed to provide insight into the social media behavior of young adults and older adults. In the results, we found out that the older adults have more positive attitude towards Facebook than the younger adults. However, even though the young adults have more negative attitude, they are more willing to provide information about themselves.

# 2. THEORY SECTION

## 2.1 Defining the main concepts

In order to answer the research question the main concepts will be defined. Firstly, it is important to define the subjects of the study which are the millennials and non-millennials. Millennials are referred to as the people born from 1980 to the turn of the century (DeMaria, 2013). They “are history’s first ‘always connected’ generation” therefore technology is its biggest source of distinctiveness(Malikhao & Servaes, 2011). Consequently, this generation is also called the “Net Generation” (Leung, 2013). This paper will elaborate on older adults(50+), therefore in this case the non-millennials the Baby Boomers from 1946 to 1964 (DeMaria, 2013). They are the first generation who grew up with television (Leung, 2013).

In order to understand the privacy and security perceptions of the aforementioned groups, it is crucial to define privacy and security online. Privacy is defined as the information privacy related to the control of users over their personal information in terms of its future usage (Mekovec & Hutinski, 2012), transfer and exchange (Shin, 2010). Security is define as “a discipline that uses the concepts of confidentiality, integrity, and availability to answer the question of how data should be protected” (Mekovec & Hutinski, 2012). In order to provide an insight into the privacy and security perceptions millennials and non-millennials, their SNS behavior will be analyzed using Facebook as is the most popular social networking site. Over 70% of social media users visit Facebook (Jung & Sundar, 2016). The mission of Facebook is “to give people the power to share and make the world more open and connected” (www.facebook.com).

## 2.2 Developing the hypotheses

After establishing the definitions of security and privacy perceptions as well as specification of the subjects of the study, a research model is developed. In the model below (Figure 1), it is illustrated that security and privacy perception on SNS in has an effect on social media behavior. Thus, *social media behavior* is a dependent variable on *security* and *privacy* perception which is an independent variable.

In the following paragraphs the hypotheses will be developed. Using previous research, it will be stated as to what extent *perceived privacy and security* affects *social media behavior*. Due to the fact that *age* is a moderating variable, existing literature are used to form a hypotheses as what extent *age* influences the relationship between *perceived privacy and security* and *social media behavior*.

### 2.2.1 Perceived privacy

Privacy in SNS is referred to as the control one has over the flow of one's personal information, including the transfer and exchange of that information (Shin, 2010). A study shows that different privacy settings for has an impact on the process of information dissemination by users (Zhu, Huang, Lu, & Li, 2016).

### 2.2.1 Perceived security

In SNS, perceived security is defined as the extent to which a user believes that using a SNS application will be risk-free (Shin, 2010). Security refers to the degree to which users believe that SNS are secure platforms for sharing personal data. Security perception has been found in prior studies to influence adoption behavior (Arpaci, Kilicer, & Bardakci, 2015), consequently users who believe that a certain SNS is not secure might forgo or reduce using it. A survey was conducted which has shown results that "a website that provides security of transaction and data" reduces the concern regarding privacy amongst users (Mekovec & Hutinski, 2012). Nepomuceno, Laroche, and Richard (2014)'s findings state that security perception is more important to control than privacy concerns to influence users risk perception. Therefore, it is suggested that perceived security is an antecedent of perceived privacy.

### 2.2.2 Social Media Behavior

Firstly, trust is a crucial factor that is widely used among existing literature to predict social media behavior (Wang, Min, & Han, 2016). Secondly, Shin (2010) found out that attitude is an important indicator for social media behavior. Lastly, a study suggests that self-disclosure is a social media behavior strongly related to privacy concerns (Krasnova, Kolesnikova, & Guenther, 2009).

The following sections are the operationalization for social media behavior which is *trust*, *attitude* and *self-disclosure*.

#### 2.2.2.1 Trust

Trust is defined as "an individual's confidence in the trustworthy characters of members or platforms" (Wang et al., 2016). It is divided into three dimension which are: integrity, ability and benevolent (Hwang & Lee, 2012). Integrity means that the user believes the trusted party will be honest and keep its promises. Ability is referring to the confidence of the user that the trusted party has the capability to keep its promise. Benevolence is the confidence in the trusted party to act on the behalf of its costumers even though they are for-profit. According to research, in online market's perception of privacy and security are factors that affect costumers' trust (Mekovec & Hutinski, 2012). Research have shown that improving the perception towards privacy protection through transparency of privacy policies enhances trust towards the company (Hoffman, Novak, & Peralta, 1999; Shin, 2010). Therefore:

H1: Perceived privacy has positive affect on Trust.

Due to the fact that perceived security is implied to affect perceived privacy positively, it is indicated that perceived security also has a positive effect on trust.

H2: Perceived security has positive affect on Trust.

#### 2.2.2.2 Attitude

Attitude is "the positive or negative feeling of a user to perform the target behavior while subjective norm refers to a person's

perception that most people who are important to him or her think he or she should or should not perform the behavior in question" (Shin, 2010). According to theory of reasoned action (Ajzen & Fishbein, 1980), individuals will perform in a certain manner due to their pre-existing attitudes which means that attitude affects behavior. In the study of Arpaci et al. (2015) shows that security and privacy perceptions have a significant impact on attitude.

H3: Perceived privacy has positive affect on Attitude.

H4: Perceived security has positive affect on Attitude.

#### 2.2.2.3 Self-disclosure

Self-disclosure in SNS is defined as sharing personal information which other users can see and herewith others will perceive the person sharing (Lin, Zhang, Song, & Omori, 2016). In studies, it is characterized by the amount of information one reveals as well as the intent, honesty and accuracy (Taddei & Contena, 2013). In Krasnova et al. (2009)'s paper, results indicate that privacy concerns has negative impact on self-disclosure. Therefore, if user thinks their data is secure, they are less reluctant to provide information about themselves.

H5: Perceived privacy has positive affect on Self-disclosure.

H6: Perceived security has positive affect on Self-disclosure.

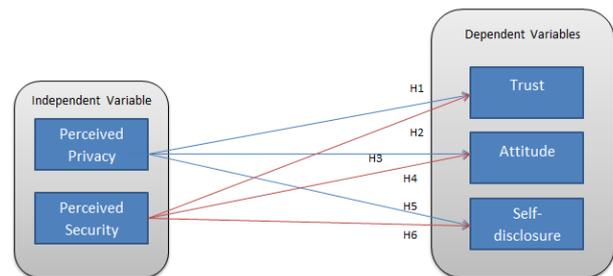


Figure 1 Theoretical Model

Using existing literature six hypotheses are produced which are shown in the model above (Fig. 1)

In the following sections existing literature will be examined as to how *age* affects the relationship between *perceived security* and *perceived privacy* to form a hypothesis.

### 2.2.3 Age groups

In order to state a hypothesis as to how *age* affect the relationship between *perceived privacy and security* and *social media behavior*, it is crucial understand the stance of each age group on SNS.

The millennials are the active users of SNS (Vengadasamy, Amir, Noor, Subramaniam, & Razak, 2014). Their Facebook usage is motivated to socialize with people in their age (Jung & Sundar, 2016). They are more open, confident and self-expressive. Thus they are more open to reveal information about themselves (Malikhao & Servaes, 2011). This behavior is not due to their age but it is linked to their ideology or socioeconomic status (Malikhao & Servaes, 2011). It is pointed out that the younger generation are more keen to share

information on SNS as they are not aware of the consequences of providing information online; implying that they have lesser privacy concern (Barnes, 2006).

In comparison, the baby boomers are the adopter to SNS such as Facebook (Vengadasamy et al., 2014). The non-millennials are concerned about the privacy control as they “perceived the Internet as a socially unsafe place”. (Coelho & Duarte, 2016). This implies that older people are concerned about the risks of the data online they provide online (Vošner, Bobek, Kokol, & Krečič, 2016). Due to privacy concerns adults are less willing to provide personal information in SNS (Barnes, 2006). Older people often have negative attitudes toward SNS because of their privacy concerns and preference to socialize in person (Vošner et al., 2016). Another reason for not revealing information about themselves is due to the fact that the elderly perceive self-disclosure as negative as it illustrates self-centeredness (Vošner et al., 2016). However, in spite of their privacy concerns the elderly enjoy the affordance of SNS as well as the possibilities it offers when it comes to staying connected with their loved ones (Jung & Sundar, 2016). The elderly like to view photographs of loved ones online and more refrain posting something themselves (Jung & Sundar, 2016).

Therefore, *age* will be used as a moderating variable for the relationship between *perceived privacy and security* and *social media* behavior. The research model can be seen in figure 2. Using prior research the following hypotheses can be stated:

H7: Perception has a negative relationship to social media behavior with age as moderator

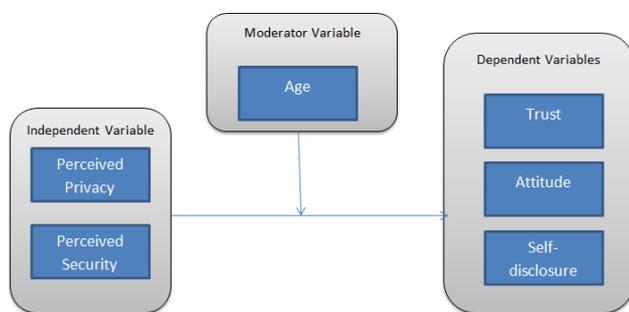


Figure 2 Research Model

### 3. METHODOLOGY

#### 3.1 Measurements

The measurements we used are from established published research which were used in Shin (2010)’s study. Perceived privacy will be measured with items from Buchanan, Paine, Joinson, and Reips (2007) and Metzger (2004). To address the elements of perceived security, we used Yenisey, Ozok, and Salvendy (2005) measures. For trust and attitude we took most from Shin (2010) and a few questions are self-developed. We measured self-disclosure through the amount of personal information posted on Facebook.

### 3.2 Reliability of data

Table 1 Cronbach’s Alpha reliability

<i>Reliability Statistics</i>			
	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Security	,118	,108	5
Privacy	,255	,298	4
Attitude	,430	,484	4
Trust	,539	,583	4

The Cronbach’s alpha to each variable is visible in the table above (Table 2). It is clear that there is no evidence that the test is reliable as the Cronbach’s alpha is lower than 0.7. Removing certain questions do not affect the Cronbach’s alpha to an extent in which the Cronbach’s Alpha is higher than 0.7. However, the questions were the same or inspired by the survey questions used from established published research. We took all questions to measure *perceived privacy*, three questions for *perceived security*, three questions for *trust* and two for *attitude* from the study of Shin (2010) which are derived from the authors stated in the measurements.

In his paper, the Cronbach’s alpha for *security*, *privacy*, *attitude* and *trust* are higher than 0.7 thus the questions does measure the variables. For the purpose of the study I will continue using the collected data with questions shown in the appendix which are 12 out of 17 from Shin (2010).

#### 3.3 Data collection

First of all, the data is collected using a quantitative method in form of an online questionnaire. The survey is developed with my fellow students who are concerned with the subject social media in terms of privacy and security perception of millennials and non-millennials using the platform Qualtrics. The questionnaire is in form of a 7-point Likert scale in order to enable respondents answer more accurate to their opinions. In this questionnaire “one” means *strongly disagree* and “seven” means *strongly agree*. The survey is developed using the operationalization of security and privacy perception, and social media behavior. We are interested to know the user’s trust and attitude towards Facebook and the degree of their Facebook usage in order to answer the research question. The questions asked in the survey can be seen in the appendix (9.1 Survey). However, in contrast to the survey presented in the appendix, respondents cannot see what their response is supposed to measure to avoid bias answers. Additionally, we randomized the order of questions, for instance *perceived privacy* and *security* questions are randomly asked in one page while in the next page the questions for *trust*, *attitude* and *self-disclosure* are mixed as well.

The link to the questionnaire has been posted on Facebook. The first time it was published on Facebook it has been shared sixteen times and the second time six times. Individually, we sent the link through private messages to potential respondents. The data is collected in two weeks. The response rate is estimated as the real number of people, who have seen the post cannot be identified as Facebook does not have a mechanism to show the number of views. To estimate the response rate the “friends” of the original poster, sixteen users who shared the post in the first time and the second time will be added which is

a total of 13,191 Facebook friends who potentially have seen the post. However, due to overlapping of friends, different time zones and friends not being regularly online, it can be assumed that half of the aforementioned number of people has seen the post which is 6596. There were a total of 448 respondents. Therefore, the response rate is 6.7%.

In the end, there were 349 completed surveys out of 448 respondents. Hereafter, the results are checked for straight lining thus in which we found out 12 responses invalid. Thus, there are a total of 337 valid and completed responses. Shortly, the data is analyzed according to the research question. Ideally, the findings will provide further insights to the extent of difference of security and privacy perceptions of millennials and non millennials on Facebook.

### 3.4 Participants

As mentioned, we are interested in the opinion of the millennials and non-millennials on Facebook. In my paper I am concerned of the millennials who are between 18-24 years old and the non-millennials are older than 50 years old. Therefore, the respondents are of the aforementioned ages who are Facebook users. As previously stated there are a total of 337 valid responses from which 165 respondents are 18-24 years old and 69 respondents were older than 50 years old.

### 3.5 Data analysis

Firstly, the Cronbach's Alpha is calculated in order to find out the reliability of data. Secondly, I had 165 respondents whose ages are 18-24(millennials) and 69 who ages are older the 50 (non-millennials) respondents which is uneven, thus 165 millennials cannot be compared to 69 non-millennials. Therefore, the millennials will be divided in three and will be compared to the non-millennials. 55 millennials are randomly selected. Hereafter, it is tested whether the three millennial groups differentiate from one another. Herewith, it is easier to compare the millennials with non-millennials if there is little difference between the millennials.

**Table 2 Categories for the Scale**

	Low	Medium	High
Perceived Privacy (7-scale)	1-3	3.1- 5	5.1-7
Perceived Security (7-scale)	1-3	3.1-5	5.1-7
Self-disclosure (11-items)	1-4	4.1-7	7.1-11

Using descriptive statistics, an overview of the mean responses of the millennials and non-millennials on the dependent and independent variables are presented as visible in tables 3 and 4. In order to categorize the opinions of the millennials and non-millennials in Table 1 the scales are divided into three categories which are low, medium and high.

Using ANOVA, it is tested whether there is a statistical significant difference between the two age groups in terms of their opinions towards Facebook. Afterwards, in order to have an insight whether the variables are correlated, the Pearson's correlation for continuous variables is utilized. Herewith, it can be seen which variables affect each other.

A regression analysis is conducted in order to estimate the nature of the relationships between variables. Firstly, the relationship between the control variables and the dependent variables are examined. Afterwards, it is tested how the independent variables predict the dependent variables. Lastly, the relationship between the independent and dependent variables with age as moderating variable is examined.

## 4. RESULTS

In the following paragraphs the results from the online questionnaire are summarized. In the Appendix the tables of the test conducted are presented.

### 4.1 Difference within the millennials

As mentioned, due to the fact that there were more respondents who are millennials than non-millennials, the millennials are divided in three groups. Thus, in appendix 9.2 a comparison of the opinions within the millennials is elaborated. Herewith it can be seen that the average opinion per variables within the millennials are similar therefore in the following sections non-millennials will be compared with the first group of millennials ("MillGrOne"), n=55.

### 4.2 Perceived privacy, security, trust, attitude and self-disclosure of millennials and non-millennials

In tables below the descriptive statistics are presented. Herewith the mean and the standard deviation of the independent and dependent variables can be seen.

**Table 3 Descriptive – independent variables**

		N	Mean	Std. Deviation
Perceived Privacy	Millennials	55	3,2773	,70984
	Non-Millennials	69	3,6196	1,05162
	Total	124	3,4677	,92831
Perceived Security	Millennials	55	4,4291	,72563
	Non-Millennials	69	4,6841	,69824
	Total	124	4,5710	,71894

In table 1 the categories of the score is illustrated. Firstly the independent variables are shown – *perceived privacy* and *security*. It can be stated that for *perceived privacy* both millennials and non-millennials have a medium mean *perceived privacy* score ( $3 > \leq 5$ ) with little difference in standard deviation. According to ANOVA (Appendix 9.3) there is a statistical difference in mean between age groups as  $F = 4,272$  and  $p = 0.041$ . This means that non-millennials have higher perceived privacy.

For *perceived security* both age groups have relatively high medium score and appears to be similar however, there is evidence that both groups are different (ANOVA:  $F = 3.941$ ,  $p = 0.49$ ). This means that non-millennials have higher perceived security.

**Table 4 Descriptive – dependent variables**

		N	Mean	Std. Deviation
Attitude	Millennials	55	4,7773	0,80604
	Non-Millennials	69	5,5978	0,89445
	Total	124	5,2339	0,94608
Trust	Millennials	55	4,0773	0,81773
	Non-Millennials	69	4,2971	1,13701
	Total	124	4,1996	1,0101
Self-Disclosure Score	Millennials	55	5,8364	1,75081
	Non-Millennials	69	4,1014	1,89539
	Total	124	4,871	2,02009

For the dependent variables, non-millennials scored high on *attitude* while millennials have a medium score. There was a statistically significant difference between age groups (ANOVA:  $F=28.094$   $p=0.00$ ). Thus, the attitude towards Facebook of the non-millennials is more positive than millennials.

Both age groups have scored medium on *trust* and *self-disclosure*. There is not enough evidence to state that there is a difference between millennials and non-millennials when it comes to *trust*. It can be seen that the mean *self-disclosure* score of millennials are higher than of the non-millennials. Plus, there is a statistically significant difference between the two age groups (ANOVA:  $F=28.094$   $p=0.00$ ).

### 4.3 Nationality, Gender and Education of both Age groups

In this section the difference of the control variables' for millennials and non-millennials are elaborated. For *nationality*, there was statistically significant difference between millennials and non-millennials. It is clear that millennials are predominantly of Dutch nationality which can be seen in table 9.3 in the appendix below. For *gender* and *education* it cannot be concluded that there was a statistical difference between the age groups. Therefore, it can be stated that *gender* and *education* is represented homogeneously on both age groups.

### 4.4 Association between Continuous variables - correlation

In the appendix below (table 9.5), results of a Pearson's correlation coefficient can be seen. Hereby, the relationship between all the continuous variables is assessed. Additionally, the strength of the correlation is described using Evans (1996)' classification.

Using the Pearson's correlation it can be concluded that there is a very weak positive correlation between *age* and *education*,  $r=.198$ ,  $p=.028$ , *age* and *perceived privacy*  $r=.179$ ,  $p=.047$ ; in comparison, *age* and *attitude*  $r=.422$ ,  $p=.00$  were moderately positively correlated. However, there was a weak negative correlation between the *age* and *self-disclosure*,  $r = -.397$ ,  $p =$

$0.001$ . There was a very weak negative correlation between the *education* and *perceived privacy*,  $r = -.196$ ,  $p = 0.029$ , while there was a very weak positive correlation between *education* and *attitude*,  $r = .187$ ,  $p = 0.037$ . *Perceived privacy* has a moderate positive correlation to *security*,  $r = .412$ ,  $p = 0.00$ , very weak positive correlation to *attitude*,  $r = .194$ ,  $p = 0.031$ , and moderate positive correlation to *trust*,  $r = .524$ ,  $p = 0.00$ . *Perceived security* and *attitude*,  $r = .315$ ,  $p = 0.00$  and *perceived security* and *trust*,  $r = .370$ ,  $p = 0.00$  both have a weak positive correlation. Furthermore, it can be seen that *attitude* has a moderate positive correlation to *trust*,  $r = .419$ ,  $p = 0.00$ . Lastly, there was a very weak negative correlation between *trust* and *self-disclosure*,  $r = -.125$ ,  $p = 0.008$ .

It can be stated that all continuous variables are associated with other continuous variables. However, the highest strength of correlation is solely "moderate" and Pearson's correlation cannot be used as a tool to state a cause and effect relationship. Thus, a regression analysis is used to verify and to validate the hypotheses.

### 4.5 Hypotheses Testing (Theoretical model)

**Table 5 Hypotheses testing results (Theoretical model)**

Hyp	R <sup>2</sup>	t	p-value	b	Report
H1	.303	5.382	.0001	0.519	PS predicts TR
H2	.303	2.221	.028	0.571	PP predicts TR
H3	.104	2,182	.471	.078	No evidence
H4	.104	3.005	.003	.373	PS predicts AT
H5	.022	0,239	.891	0.047	No evidence
H6	.022	-1,387	0.106	-0.35	No evidence

The regression analysis is used to estimate the relationship between *perceived privacy and security* and *trust*, *attitude* and *self-disclosure*. In table 5, it is evident that in three out of six hypotheses the independent variables predicts the dependent variables. It is evident that *perceived privacy* and *security* has a positive effect on *trust* (H1 and H2). H4 is also supported meaning the *perceived security* predicts *attitude* towards Facebook even though it appears that *perceived privacy* does not affect *attitude*.

However, there no evidence that *perceived privacy and security* affect *self-disclosure*. Even though the aforementioned relationships are significant but it cannot be stated that they are reliable as of all the relationships the highest prediction is 30.3% of *perceived privacy and security* predicts *trust* which is a relatively low indicator.

### 4.6 The Relationship between Perception (combined) and Social Media Behavior

In the theory section prior studies have suggested that security and privacy perception are strongly linked. Furthermore using correlation, we found that both perceptions have a moderate positive correlation.

In this part the security and privacy perception was combined to find out its relationship with social media behavior. Consequently, the means of security and privacy perception together were utilized for the regression analysis which is noted as "Perceived P&S" in the appendix (9.6.3 Regression). Herewith the *Perceived P&S* was tested on its relation to the

constructs of social media behavior: attitude, trust and self-disclosure. Unfortunately, social media behavior cannot be summed up due to the fact that trust and attitude was measured by a scale of seven and self-disclosure with eleven elements.

Hereby it can be concluded that security and privacy perception statistically significant explains attitude  $b=.399, t=3.383, p=.001$  and trust  $b=.788, t=7.122, p<.05$ . It cannot be stated that *Perceived P&S* significantly predicts *self-disclosure*  $b=-.008, t=-4.008; p<.05$ .

#### 4.7 Testing on the Research Model

In Appendix 9.6.4 the combination of the means of privacy and security perception in relation to age ("*PerceivedP&S\*Age*") is tested on its interaction with the dependent variables. In this section it will be examined how *perceived privacy* and *security* affect *attitude*, *trust* and *self-disclosure* with *age* as moderating variable. It can be concluded that *PerceivedP&S\*Age* significantly positively predicts *attitude*,  $b=.005, t=5.842, p<.05$  and *trust*  $b=.004, t=3.602, p<.05$ . It negatively predicts *self-disclosure*  $b=-.008, t=-4.008, p<.05$ . Although *PerceivedP&S\*Age* explains all the dependent variable it can be seen that only 21.9% explains *attitude*, 9.6% explains *trust* and 11.6% explains *self-disclosure* which are low indicators ergo in can be assumed that there are other variables affecting the relationship.

#### 4.8 Effects of control variables

In the aforementioned tests, although there were relationships found, due to low indicator ( $R^2$ ) it can be assumed that there are other variables affecting the relationships. In this part, the control variables *nationality*, *gender* and *education* will be tested on their effect on *attitude*, *trust* and *self-disclosure*. It is clear that *gender* positively predicts *trust*  $b=-.399, t=2.126, p=.036$ . In this case, I used values one for males and two for females ergo it can be concluded that male's attitude towards Facebook is more positive than females. *Nationality* negatively explains *self-disclosure*  $b=-.933, t=-3.721, p<.036$ . *Nationality* is divided into three values which are: one= Dutch, two= German and three= Others. Thus, it can be assumed that Germans provide lesser information on Facebook than Dutch; other nationalities provide the least information.

### 5. DISCUSSION

The motivation for this study is to provide insight as "*to what extent do security and privacy perceptions of millennials and non millennials affect their social media behavior on Facebook?*". Using our research model which is consistent with prior established literatures, I have developed hypotheses.

Firstly, H1 to H6 is about the theoretical model in which we hypothesize that perceived privacy and security influences each construct operationalized for social media behavior. The results suggest that perceived privacy affects trust; while perceived security affects trust and attitude.

As security and privacy perceptions are strongly linked, combining the two variables will lead to an effect on trust and attitude. It can be assumed that self-disclosure as a social media behavior is moderated by another variable which is according to prior research trust. Due to the fact that trust is affected by privacy and security perception, it can be stated that self-disclosure is indirectly linked to privacy and security perceptions.

By introducing age as a moderating variable it can be seen that the relationship between user perception and social media behavior is partial changed. Age does not change the relationship between user perception and the attitude and trust towards Facebook however the relationship to self-disclosure changes. 11.6% of perception in relation to age explains self-disclosure. This may be due to the fact that the older generation seldom posts something about themselves.

However, even though established research has indicated that the older generations have lower perceived privacy and security in SNS. In this paper, it can be concluded the older generations trust and have better attitude towards Facebook. However, they are less willing share information online. But this may due to other factors than perceived security and privacy.

In section 4.2 it is clear that there is a difference between the attitude and self-disclosure tendencies for millennials and non-millennials. Therefore, it can be concluded that in terms of security and privacy perceptions on Facebook the millennials have lesser trust and less positive attitude towards Facebook; while non-millennials are more concerned about the amount of information they have online but are more trusting and more positive towards Facebook.

#### 5.1 Theoretical Implications

The results presented above will provide certain theoretical implications. Firstly, it shows the link of security and privacy perception towards the attitude, trust and self-disclosure of users on SNS. It was hypothesized that user's security and privacy perception affects social media behavior. Our results partially support this hypothesis. Prior research has shown that that higher level of security and privacy perception positively influences attitude towards cloud services and therefore affect the actual usage. (Arpaci et al., 2015). In online markets, positive perception of privacy and security are factors that positively affect costumers' trust (Mekovec & Hutinski, 2012). Krasnova et al. (2009) point out that users who have privacy and security concerns are less likely to reveal personal information. The result of this implies that trust and attitude are influenced by user's perception however other variables might affect self-disclosure.

In the paper of Shin (2010), security perception is a moderating variable between privacy perception and trust. However, in this paper it is implied that both privacy and security perception positively influences trust on SNS. In investigating connection of privacy and security perception in consideration of their age on trust, attitude and self-disclosure, it is proposed that it has a positive effect on trust and attitude. For self-disclosure, it is indicated that elderly dislike self-disclosure as negative as they perceive it as being self-centered (Vošner et al., 2016). Furthermore, older generation are less like willing to provide person information due to security risks online (Barnes, 2006). The results of this paper align with prior research when it comes to age and self-disclosure. Thus, it is implied that age perceptions has an influence on the extent users are willing to provide personal information on SNS as points out adults are not as willing to give out information as the younger generation. In contrast, even though the young adults have less positive attitude and lesser, they are more willing to provide information about themselves.

In the study of Shin (2010) similar findings have been found on the relationship between privacy and security perceptions on trust and attitude. However, it is stated in the limitations that the demographics were not taken into consideration for his paper.

In this paper, it is implied that gender has an effect on attitude. It is proposed that males have a more positive attitude towards Facebook than females. This result does not reflect prior research that states women rated social media more positively than men (Lewis & Nichols, 2012)

Furthermore nationality has an influence on self-disclosure on social media. It is implied that Germans are less keen to post personal information than the Dutch.

## 5.2 Practical Implications

The results highlight several implications. As the results stated users' security and privacy perceptions affect their trust and attitude towards SNS which leads to social media usage. Therefore, SNS developers should pursue that SNS users feel secure in using their platforms. Provision of user-friendly privacy and security measures will improve use retention.

The results also imply advantages for marketing. For instance, companies who want to target millennials for their marketing strategies, it can be easier as the younger generation is likely to provide information online. Furthermore, companies can use the data revealed by millennials for product evaluation as they are more open to state their opinion online. Using features like tag, share and posting their whereabouts can be used for promotional strategies.

Facebook can use this paper as a tool for business-to-business marketing towards clients who are interested in using Facebook as a marketing tool as it states the about the users' opinion about Facebook.

## 6. LIMITATIONS AND FURTHER RESEARCH

Firstly there are several limitations with regard to taking a random sample from the population. Despite having a very large amount of Facebook users, we are mostly limited to gathering data primarily from the Netherlands and Germany. Thus our sample cannot be generalized worldwide. Furthermore, using *nationality* as a control variable is not reliable as 83.6% of the millennials are Dutch; while 58% of the non-millennials are Dutch.

In addition to this, our respondents were only the ones either connected to us directly or up until third degree connection. This may have resulted in over and under representing certain demographics of users as our responses will come from people within our social environment.

It is also important to point out that the questions used for our survey had a low Cronbach's Alpha; thus the conclusions of this paper necessitate further research.

As the respondents for non-millennials were 51-80 years old, their responses for attitude, trust and self-disclosure might have different reasons than perceived privacy and security.

Furthermore, the results from this study cannot be generalized amongst all social networking sites as this study concentrates on Facebook.

## 7. FURTHER RESEARCH

In this paper, the nationality of the respondents was heterogeneous because the difference of nationality to age group ratio is high. Thus, future research can examine the differences in social media behavior between nationalities because culture may have an effect on the opinions towards SNS and consequently social media behavior.

I propose that future research activities in this area should focus on the older generation's experiences and preferences on social media. For the millennials, future research could focus on their experiences, preferences, social implications and motivations for using SNS.

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## 9. APPENDIX

### 9.1 Survey

#### Demographics

NAT: What's your nationality?

- Dutch
- German
- Other:

AGE: What's your age?

GEN: What's your gender?

- Male
- Female

EDU: What's your highest level of completed education:

- Did Not Complete High School
- High School
- Trade/technical/ vocational training
- Some College
- Bachelor's Degree
- Master's Degree
- Advanced Graduate work or Ph.D.

### **Perceived privacy**

PP1: I am confident that I know all the parties who collect the information I provide during the use of Facebook

PP2: I am aware of the exact nature of information that will be collected during the use of Facebook

PP3: I am not concerned that the information I submitted on Facebook could be misused

PP4: I believe there is an effective mechanism to address any violation of the information I provide to Facebook

### **Perceived security**

PS1: I believe the information I provide with Facebook will not be manipulated by inappropriate parties

PS2: I am confident that the private information I provide with Facebook will be secured.

PS3: I believe inappropriate parties may deliberately view the information I provide with Facebook

PS4: I adjust my privacy settings on Facebook in order to make my posts visible to a specific group of people.

PS5: I make use of the private groups feature of Facebook

### **Usage**

USE: How often do you come into contact with Facebook?

- Less than once a week
- Once a week
- At least once a day
- 11-20 times a day
- More than 20 times a day

TIM: About how much time do you spend on Facebook a week?

- 0-5 hours
- 5-10 hours
- 10-15 hours
- 15-20 hours
- 20+ hours

DEV: On which devices do you use Facebook? You can give multiple answers.

- Desktop computer
- Laptop
- Smartphone
- Tablet
- Other

### **Self-disclosure**

ADD: Please indicate what information you include on your Facebook profile (also when it is not shown to other users). You can give multiple answers.

- Photograph of yourself
- Real name
- Hometown
- Email address
- Cell phone number
- Relationship status
- Sexual orientation
- Work
- Religion
- Political preference
- Education

**Trust**

TR1: Facebook is a trustworthy social network

TR2: I can count on Facebook to protect my privacy

TR3: Facebook can be relied on to keep its promises

TR4: I never read privacy policies on Facebook

**Attitude**

AT1: I would have positive feelings towards Facebook in general

AT2: The thought of using Facebook is appealing to me

AT3: Facebook has become part of my daily routine.

AT4: The fact that my posts on social media may be viewed by other individuals in my social environment influences my social media behavior

**9.2 Perceived privacy, security, trust, attitude and self-disclosure for each group of millennials**

*Descriptive*

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		N	Mean	Std. Deviation
Perceived Privacy	MillGrOne	55	3,2773	,70984
	MillGrTwo	55	3,6045	,98800
	MillGrThree	55	3,1318	,94386
	Total	165	3,3379	,90552
Perceived Security	MillGrOne	55	4,4291	,72563
	MillGrTwo	55	4,5309	1,03152
	MillGrThree	55	4,5091	,94345
	Total	165	4,4897	,90484
Attitude	MillGrOne	55	4,7773	,80604
	MillGrTwo	55	5,1136	,70188

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	MillGrThree	55	4,9000	,88924
	Total	165	4,9303	,80990
Trust	MillGrOne	55	4,0773	,81773
	MillGrTwo	55	4,1727	1,00562
	MillGrThree	55	4,0227	,93699
	Total	165	4,0909	,91984
Self-Disclosure Score	MillGrOne	55	5,8364	1,75081
	MillGrTwo	55	6,1091	1,99697
	MillGrThree	55	5,6909	2,19319
	Total	165	5,8788	1,98405

### 9.3 ANOVA Test – Comparing control and independent variables by age groups (Millennials and Non-Millennials)

		Model 1		Model 2		Model 3	
		F	Sig.	F	Sig.	F	Sig.
<b>Control Variable</b>	Nationality	6,603	,011	6,603	,011	6,603	,011
	Gender	,019	,890	,019	,890	,019	,890
	Education	3,771	,054	3,771	,054	3,771	,054
<b>Independent Variable</b>	Perceived Privacy			4,272	,041	4,272	,041
	Perceived Security			3,941	,049	3,941	,049
<b>Dependent Variable</b>	Attitude					28,094	,000
	Trust					1,455	,230
	Self-Disclosure					27,423	,000

### 9.4 Nationality and age groups

			Age Groups		
			Millennials	Non-millennials	Total
Nationality	Dutch	Count	46	40	86
		% within Age Groups	83,6%	58,0%	69,4%
	German	Count	6	24	30
		% within Age Groups	10,9%	34,8%	24,2%
	Others	Count	3	5	8
		% within Age Groups	5,5%	7,2%	6,5%
Total	Count	55	69	124	

### 9.5 Correlations table – continuous variables (Pearson’s correlation)

		Age in text	Education	Perceived Privacy	Perceived Security	Attitude	Trust	Self-Disclosure Score
Age in text	Pearson Correlation	1	,198*	,179*	,166	,422**	,117	-,387**
	Sig. (2-tailed)		,028	,047	,066	,000	,194	,000
	N	124	124	124	124	124	124	124
Education	Pearson Correlation	,198*	1	-,196*	,030	,187*	-,065	-,114
	Sig. (2-tailed)	,028		,029	,739	,037	,471	,206
	N	124	124	124	124	124	124	124
Perceived Privacy	Pearson Correlation	,179*	-,196*	1	,412**	,194*	,524**	,022
	Sig. (2-tailed)	,047	,029		,000	,031	,000	,812
	N	124	124	124	124	124	124	124
Perceived Security	Pearson Correlation	,166	,030	,412**	1	,315**	,370**	-,125
	Sig. (2-tailed)	,066	,739	,000		,000	,000	,168
	N	124	124	124	124	124	124	124
Attitude	Pearson Correlation	,422**	,187*	,194*	,315**	1	,419**	-,086
	Sig. (2-tailed)	,000	,037	,031	,000		,000	,341
	N	124	124	124	124	124	124	124
Trust	Pearson Correlation	,117	-,065	,524**	,370**	,419**	1	,238**
	Sig. (2-tailed)	,194	,471	,000	,000	,000		,008
	N	124	124	124	124	124	124	124
Self-Disclosure Score	Pearson Correlation	-,387**	-,114	,022	-,125	-,086	,238**	1
	Sig. (2-tailed)	,000	,206	,812	,168	,341	,008	

N 124 124 124 124 124 124 124

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

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

## 9.6 Regression Analysis

### 9.6.1 Regression Analysis – Control Variables vs. Dependent Variables

#### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Attitude	,481 <sup>a</sup>	,231	,205	,84338
Trust	,242 <sup>a</sup>	,059	,027	,99643
Self-disclosure	,471 <sup>a</sup>	,221	,195	1,81223

a. Predictors: (Constant), Education, Age in text, Gender, Nationality

#### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Attitude	(Constant)	3,333	,402		8,288	,000
	Nationality	,134	,133	,085	1,003	,318
	Age in text	,019	,004	,371	4,399	,000
	Gender	,352	,159	,184	2,221	,028
	Education	,092	,058	,135	1,567	,120
Trust	(Constant)	3,485	,475		7,335	,000
	Nationality	-,083	,158	-,050	-,527	,599
	Age in text	,007	,005	,136	1,454	,149
	Gender	,399	,187	,195	2,126	,036

	Education	-.028	,069	-.039	-.405	,686
Self-disclosure	(Constant)	7,514	,864		8,694	,000
	Nationality	-.933	,287	-.279	-3,255	,001
	Age in text	-.034	,009	-.316	-3,721	,000
	Gender	,000	,341	,000	,001	,999
	Education	,017	,126	,012	,134	,893

### 9.6.2 Regression Analysis – Independent variables vs. Dependent variables

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Attitude	,323 <sup>a</sup>	,104	,090	,90269
Trust	,551 <sup>a</sup>	,303	,292	,84998
Self-disclosure	,148 <sup>a</sup>	,022	,006	2,01424

a. Predictors: (Constant), Perceived Security , Perceived Privacy

#### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
Attitude	(Constant)	3,255	,533		6,105	,000
	Perceived Privacy	,078	,096	,077	,814	,417
	Perceived Security	,373	,124	,284	3,005	,003

Trust	(Constant)	1,321	,502		2,631	,010
	Perceived Privacy	,488	,091	,448	5,382	,000
	Perceived Security	,260	,117	,185	2,221	,028
<hr/>						
Self-disclosure	(Constant)	6,274	1,190		5,273	,000
	Perceived Privacy	,191	,215	,088	,891	,375
	Perceived Security	-,452	,277	-,161	-1,630	,106

### 9.6.3 Regression Analysis – Independent variables (combined) vs. Dependent variables

In this part the means of security and privacy perception together will be utilized for the regression analysis which is noted as “Perceived P&S”.

#### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Attitude	,293 <sup>a</sup>	,086	,078	,90830
Trust	,542 <sup>a</sup>	,294	,288	,85240
Self-disclosure	,050 <sup>a</sup>	,003	-,006	2,02581

a. Predictors: (Constant), Perceived P&S

#### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
Attitude	(Constant)	3,630	,481		7,547	,000
	Perceived P&S	,399	,118	,293	3,383	,001
Trust	(Constant)	1,031	,451		2,285	,024

	Perceived P&S	,788	,111	,542	7,122	,000
Self-disclosure	(Constant)	5,457	1,073		5,086	,000
	Perceived P&S	-,146	,263	-,050	-,554	,581

#### 9.6.4 Regression Analysis – Independent vs moderating variable

##### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Privacy	,179 <sup>a</sup>	,032	,024	,91712
Security	,166 <sup>a</sup>	,027	,019	,71192

a. Predictors: (Constant), Age in text

##### Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Privacy	(Constant)	3,095	,203		15,235	,000
	Age in text	,009	,004	,179	2,005	,047
Security	(Constant)	4,304	,158		27,287	,000
	Age in text	,006	,003	,166	1,854	,066

#### 9.6.5 Regression Analysis – Interaction between Age and Privacy and Security

##### Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Attitude	,468 <sup>a</sup>	,219	,212	,83973

Trust	,310 <sup>a</sup>	,096	,089	,96426
Self-disclosure	,341 <sup>a</sup>	,116	,109	1,90671

a. Predictors: (Constant), Perceived P&S\*Age

*Coefficients<sup>a</sup>*

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
Attitude	(Constant)	4,364	,167		26,157	,000
	Perceived P&S*Age	,005	,001	,468	5,842	,000
Trust	(Constant)	3,584	,192		18,706	,000
	Perceived P&S*Age	,004	,001	,310	3,602	,000
Self-disclosure	(Constant)	6,225	,379		16,432	,000
	Perceived P&S*Age	-,008	,002	-,341	-4,008	,000