

How do respondents appreciate a survey when they use different devices (computer, tablet or smartphone) and does their attitude towards the survey influences their appreciation?

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### Abstract

Web surveys are commonly used, nowadays often as mixed-device surveys.

Respondents can use a PC or laptop, but also mobile devices, such as a tablet or smartphone, to complete a web survey. Mobile device users are often younger, higher educated and more likely to be female compared to PC or laptop users.

Questions arise if web surveys should be optimized for mobile devices. Not much is known about the opinion of the respondents themselves.

This study investigated if there is a difference in the survey appreciation of respondents when they use different devices and if their general attitude influences this. Appreciation was measured with the evaluation questions at the end of the survey. Attitude was measured at the beginning of the survey. Data from 2527 online respondents from the German GESIS panel was used. Descriptive analyses, factor analyses and multiple regression analyses were conducted.

Results indicate that respondents do not appreciate a survey less when they use different devices. Attitude however, does contribute to survey appreciation.

*Key Words:* Appreciation, Attitude, Mixed-Device, Mobile Device, Web Survey

## 1. Introduction

Web surveys are increasingly used. This can be attributed to for example the development of ICT and widespread use of the Internet (Callegaro, Manfreda, & Vehovar, 2015). There are different kind of web surveys, such as panels and polls (Toepoel, 2016). With rise of the mobile devices (i.e. smartphones and tablets), people are even more inclined to participate in web surveys because they can participate using their preferred device. Hence, web surveys are now mixed-device surveys; respondents can participate using their desktop computer, smartphone or tablet (Couper, Antoun & Mavletova, 2017). Although some research has been done to determine for example whether we need to optimize these surveys for different devices (de Bruijne & Wijnant, 2014), what the best lay-out is (Mavletova & Couper, 2014) or how to reach the most participants (Couper et al., 2017), little is known about the appreciation of the participants when they conduct a survey with a certain device. Since the participants are the ones that use the survey, their opinion should matter and this study aims to address and include the opinion and appreciation of the respondents themselves. In this article the question how respondents appreciate a survey when they use different devices (computer, tablet or smartphone) and if their attitude towards the surveys influences their appreciation will be answered. A background study will be done, in which we will look to the past of surveys, the kind of respondents that use mobile devices, the errors and risks involved and the attitude towards surveys. Furthermore, data from the German GESIS panel will be analyzed, to determine if there is a difference between the devices in appreciation and attitude of the respondents.

## **2. Background**

### **2.1 The rise of web surveys**

A survey is a method of systematic data collection, in which people are asked questions (Groves et al., 2009). These questions are often standardized and used for quantitative data analysis (Callegaro et al., 2015). There are different ways to conduct a survey. Before the online era, traditional survey modes were used, such as telephone, face-to-face or paper-and-pencil surveys. During the last few decades there was an evolution of information and communication technology which allowed for a change in these traditional survey methods (Callegaro et al., 2015). With the development of the computer and the Internet a new survey mode has developed: the web survey. The number of people who use the Internet has increased a lot over the years. For example, in 2005 only 16% of the world population used the Internet, in 2010 this increased to 30% and in 2016 it was 47% (International Telecommunications Union, 2016). In Europe 79% of the population uses the Internet. In the Netherlands the Internet penetration rate is approximately 95.5% and in Germany it is 89.0% (Internet Usage Statistics, 2017).

### **2.2 Respondents' device use in web surveys**

Nowadays, with all the different devices someone can go online with (i.e. desktop PC, laptop, smartphone, tablet), web surveys are mixed-device surveys. Recent studies have focused on the characteristics of mobile device users and whether mobile device use for survey completion could improve coverage of web surveys (Couper et al., 2017). In a study of Antoun (2015) it was concluded that younger people use the Internet the most, from 87.9% for participants aged 18-24 to 50.6% for participants aged 65 and older. Internet usage increased with the level of

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Additionally, a difference can be made between smartphone users and tablet users (de Bruijne & Wijnant, 2014). Smartphones are used among the young, while tablet users are mostly used by working adults. Mobile devices tend to be used more by females than males. Age and education can predict a preference for both smartphones and tablets, while sex and working status only predict tablet preference. Most respondents in a web survey, 83%, prefer to use a desktop computer or laptop (de Bruijne & Wijnant, 2014). Of the 13% of the respondents that prefer a mobile device, 11% prefers a tablet and 2% prefers a smartphone to fill out a survey. Overall, allowing people to participate with a mobile device, smartphone or tablet, seems to minimize coverage error (Couper et al., 2017). It is expected that mobile device users are younger, higher educated and more likely to be female.

### **2.3 Measurement challenges for mixed-device web surveys**

There are different challenges in minimizing the total survey error in mixed-device web surveys. Multiple errors should be considered, such as measurement errors (the deviation of a respondents' answer from their true value), non-response errors (respondents who don't participate, drop out or miss an item), coverage errors (the difference between the frame and the target population) and sampling errors (difference between the sample and the frame population) (Toepoel, 2016). While

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coverage errors may be reduced when different device-users participate in a survey, it can be an extra risk for measurement error. Measurement errors can be larger on tablets and smartphones, compared to computers (de Bruijne & Wijnant, 2014), because mobile devices have smaller screens, different input options and can be used on different locations (Sommer, Diedenhofen & Musch, 2017). Among the things to be considered are the grouping of questions, effects of question type and response and scale effects (Couper et al., 2017).

Questions arise if the survey should be optimized for the different devices. There are different approaches for conducting a survey via mobile devices, such as using a browser, using an app or using a hybrid combination of the two (Buskirk & Andrus, 2012). The most common optimization of a study would be the adaption of browser surveys for mobile devices. Optimization could decrease the respondent burden, since it would be easier for respondents to complete the survey (Toepoel, 2016). The use of tablets does not necessarily lead to increase in response burden, since the screen size is similar to computers, but this still could be a risk for the use of smartphones (de Bruijne & Wijnant, 2014). Revilla, Toninelli, Ochoa and Loewe (2015) suggested that more respondents would prefer mobile devices, if they were adapted to the device, according to the respondents self-reported preferences. However, Sommer et al. (2017) concluded that survey data from non-optimized mobile devices was as consistent, reliable and valid as survey data from desktop computers. Furthermore, it is suggested, that the difference in errors is caused by the difference in respondents rather than the different devices (Lugtig & Toepoel, 2015). In sum, there is no consensus yet whether the optimization of a survey for different devices significantly improves the survey experience and reduces the measurement error. However, it is probable that other factors contribute as well.

## **2.4 Survey attitudes**

Besides a well-optimized survey for different devices, one of the factors that could affect the quality of survey responses is the respondent's survey attitude. Attitude is often seen as an expression of the opinion of a respondent towards the survey taking climate (Loosveldt & Storms, 2008). Respondents with a positive attitude towards surveys have a lower item non-response rate (Stocké, 2006). Respondents with a negative attitude are less likely to participate in future surveys (Loosveldt & Storms, 2008). This attitude can be predicted by former survey experiences of the respondent, in particular the burden they experienced (Stocké & Langfeldt, 2004). Other predictors for survey attitude are the extent to which the respondents enjoyed former surveys and the irritation due to confusing questions. Also, pressuring respondents to participate in an extensive survey might develop a negative attitude towards future surveys (Bergman & Brage, 2008).

Attitude towards a survey has been proven to associate with nonresponse and measurement error (Loosveldt & Storms, 2008). Therefore, it is possible that attitude contributes to the survey quality, regardless of the device that was used. In this study device and attitude are compared to the appreciation of the respondents towards the survey. Appreciation is measured with the evaluation questions at the end of the survey, whereas attitude is measured at the beginning of the survey. Attitude represents the general attitude towards surveys, the appreciation is only measured towards the current survey. If respondents have a more negative general attitude towards surveys, it can be expected that the appreciation at the end of the survey is also relatively lower. However, if a respondent does not like a non-optimized survey for mobile devices, it could be expected that their appreciation is lower than their

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general attitude. Not much is known yet about the appreciation of respondents regarding the use of different devices and their general attitude towards surveys.

### **3. Methods**

#### **3.1 Data collection**

The data used for this study is from the GESIS Panel (GESIS, 2015). The GESIS Panel is a probability based panel and forms a representative sample of the German population. It includes the German speaking population between 18 and 70 years old who permanently reside in Germany. The panel has over 4800 members who are asked bi-monthly to fill out a survey. This panel started in August 2013 with wave aa and was fully operational in the beginning of 2014 (Bosnjak et al., 2017). For this study the bf wave will be used which was administered from December 2014 to January 2015. At the end of 2014 the panel was running for over a year so possible boot problems were hopefully gone. 3882 Respondents participated in the bf wave, of which 2589 online. The cumulative response rate for the online mode was 91.07%. This is the percentage of respondents that participated online in the bf wave, based on the total active online panel members during the bf wave (GESIS, 2015). Due to the time frame, we will only use respondents that completed the survey. Also, since this study is about the online device use, we will only select the participants who completed the survey online. The final sample used has 2527 respondents.

#### **3.2 Variables and Operationalization**

The main variables used in this study are device use, appreciation and attitude. We study the variations in appreciation based on other variables, so appreciation is the

RESPONDENTS' SURVEY APPRECIATION WHEN DIFFERENT DEVICES ARE USED AND THEIR ATTITUDE dependent variable. The other variables, such as device use and attitude, are the independent variables. Furthermore, some control variables were used.

Device use was measured by a single question. Respondents reported the device they used to answer the questions. They could choose between '1 PC or Laptop', '2 Tablet-PC', '3 Smartphone', and '4 Other device, namely'. The first three answers are also the three categories that will be used in this study: PC or Laptop, Tablet or Smartphone.

Appreciation is the opinion the respondents have of the value for the survey administered. This was measured by six evaluation questions on how the respondents felt about the questionnaire. These questions were asked at the end of the survey. The respondents were asked to response to the following item: 'How was the questionnaire?'. They had to judge to following six concepts on a scale from 1 to 5, where in 1 was 'not at all' and 5 was 'very'. In Table 1 the six concepts of appreciation are displayed.

Table 1

The six concepts of appreciation

How was the questionnaire?
1. Interesting
2. Diverse
3. Important for science
4. Long
5. Difficult
6. Too personal

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Attitude is the point of view the respondents have toward surveys in general and was measured by nine questions at the beginning of the survey. The respondents were given nine statements and had to judge on a Likert scale from 1, 'fully disagree', to 7, 'fully agree', to what extent they agreed with the statement. In Table 2 the statement used to measure attitude are displayed.

Table 2

## Statements about attitude

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In how far do you agree or disagree with these statements?

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1. I am of the opinion that surveys are important for society.
2. I believe that surveys can provide valuable insights.
3. I think that participating in surveys is a waste of time.
4. I enjoy answering surveys that are sent to me through the postal services or the Internet.
5. I feel like opinion surveys are violating my privacy.
6. I enjoy being interviewed for surveys.
7. I find surveys interesting in itself.
8. I am asked way too many times to participate in surveys.
9. I find it exhausting to answer many questions in a survey.

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Different control variables were used in this study. The first is age, which was measured by year of birth (bfzh070c). To guarantee the privacy of the respondents, people born in or before 1943 and in or after 1995 were summarized. The second control variable is gender, respondents could choose between male and female (bfzh69a). The third control variable is education. Respondents were asked to report their highest general degree of education. There were 10 options they could choose from, such as left school without a degree, secondary school or general qualification

RESPONDENTS' SURVEY APPRECIATION WHEN DIFFERENT DEVICES ARE USED AND THEIR ATTITUDE for university entrance. The last control variable is the time the respondents needed to complete the survey, in seconds (bfzp203a). This is not a self-reported question but part of the paradata.

### **3.3 Analyses**

To answer the question how respondents appreciate a survey when they use different devices and if their attitude towards the survey influences this several steps will be taken.

First, a descriptive analysis will be conducted for all the variables considered, such as device, gender, age, time, highest education. The averages of each variable will be calculated, as well as the averages of the control variables per device.

Second, the variables appreciation (i.e. evaluation questions) and attitude will be reduced with a factor analysis. As described before, the variable appreciation is measured by six evaluation questions and the variable attitude is measured by nine questions. To reduce these to a single variable that can be introduced in a model, a factor analysis is used.

At last a multiple regression analysis will be performed. This is the best analysis for the question, since we don't want to compare different datasets with each other. One dataset is used in which multiple groups can be distinguished. Furthermore, a multiple regression allows for the possibility to add variables to the model, such as attitude and the control variables.

## 4. Results

### 4.1 Descriptives

The size of the used sample consisted of 2527 online respondents. 1257 were male, 1267 female and 3 respondents did not list their gender. The average of the year the respondents were born in was 1970 with a standard deviation of 14.12 years. So most respondents were approximately between 33 and 61 years old. In Table 3 an overview is presented of the distribution of the highest school degree of the respondents. As you can see, most respondents have a general qualification for university entrance.

Table 3

*Distribution of respondents for highest school degree*

Highest School Degree	n	%
Student	15	0.6
Left school without degree	8	0.3
Degree after 7 year of school attendance at most (abroad)	4	0.2
Polytechnic secondary school GDR, Degree 8 <sup>th</sup> or 9 <sup>th</sup> grade	3	0.1
Polytechnic secondary school GDR, Degree 10 <sup>th</sup> grade	157	6.2
Lower secondary school	274	10.8
Secondary school	623	24.7
Advanced technical college certificate	329	13.0
General qualification for university entrance	1049	41.5
Other Degree	51	2.0

Analyzing the device question, 79% filled out the survey on a PC or laptop (1996 respondents), 11.5% used a tablet (291 respondents) and 9.5% used a smartphone (240 respondents). The respondents completed the survey in an average of 1513.32 seconds.

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Table 4 displays the averages per device. More women than man used mobile devices, especially for smartphones there is a big difference. Surprisingly, it took the respondents less time to fill out the survey on a tablet compared to a PC or laptop. For smartphones however, it took more time (193.64 seconds on average) to fill out the survey. Respondents who used mobile devices were younger. Within mobile devices this trend was also visible, smartphone users are younger than tablet users.

Table 4

*Averages of Gender, Duration in seconds & Year of Birth per Device*

Device	Gender				Average duration in sec	Average Year of Birth
	Men		Women			
	n	%	n	%		
PC or Laptop	1041	82.8	953	75.2	1501.33	1967.87
Tablet	133	10.6	158	12.5	1454.20	1971.49
Smartphone	83	6.6	156	12.3	1694.97	1982.14

## 4.2 Factor Analysis

To reduce the variables appreciation and attitude, a factor analysis is conducted. First, the variable appreciation is analyzed. Then a factor analysis for the variable attitude is conducted.

### 4.2.1 Appreciation.

The variable appreciation is measured by 6 items, the evaluation questions. Questions 4 till 6 were recoded to interpret the data into the same direction (i.e. higher scores indicate a higher appreciation of the survey). We expect that there is some overlap between the questions, so a principal axis factor analysis is conducted. Also, because there were correlations between the items, oblique rotation (direct

RESPONDENTS' SURVEY APPRECIATION WHEN DIFFERENT DEVICES ARE USED AND THEIR ATTITUDE (oblimin) was used. The best factor solution included two factors. Factor 1 included items 1 to 3 and factor 2 included items 4 to 6. A solution with 1 fixed factor did not improve the explained variance and only included item 1 to 4. It was also considered to include extra items, such as the general opinion or the difficulty of the survey. But since these items were originally not included in the evaluation questions and didn't improve the factor solution, it was decided to leave them out. In the two-factor solution all items increased in the variance they explained. The reliability (Cronbach's Alpha) of the first factor was .782 and the second factor had a Cronbach's Alpha of .619. These two factors together explained 64.31% of the total variance. Factor 1 explained 41.93% and factor 2 explained 22.38% of the total variance. Table 5 shows the loadings of each item on both factors.

Table 5

*Item Loading Evaluation per Factor Appreciation*

Evaluation Items:	Factor	
	1	2
How was the questionnaire?		
1. Interesting	.840	
2. Diverse	.788	
3. Important for science	.586	
4. Long		.679
5. Difficult		.697
6. Too personal		.430

Factor 1 combines the topics interesting, diverse and important for science. This can be summarized as positive appreciation items. Factor 2 combines long, difficult and too personal evaluation questions. This can be summarized as negative appreciation questions.

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For further analyses the z-scores of these factors will be used. The means of factor 1 ( $M=0.002$ ,  $SD=0.920$ ) and factor 2 ( $M=0.019$ ,  $SD=0.822$ ) are not very different.

#### 4.2.2 Attitude.

The variable attitude is measured with 9 items. Questions 3, 5, 8 and 9 were recoded to interpret the data into the same direction. To reduce these items a principal axis factor analysis was performed, without rotation. This analysis cumulated in 1 factor, consisting of items 1 to 7. Items 8 and 9 explained too little variance after extraction. This factor solution explained 40.27% of the total variance and has a Cronbach's Alpha of .806, which is good. In Table 6 the item loading on the factor are represented. All items included in this factor have an item loading of at least .40.

Table 6

*Item Loading Attitude per Factor*

Attitude Items:	Factor
In how far do you agree or disagree with these statements?	1
1. I am of the opinion that surveys are important for society.	.714
2. I believe that surveys can provide valuable insights.	.700
3. I think that participating in surveys is a waste of time.	.583
4. I enjoy answering surveys that are sent to me through the postal services or the Internet.	.641
5. I feel like opinion surveys are violating my privacy.	.404
6. I enjoy being interviewed for surveys	.572
7. I find surveys interesting in itself.	.728
8. I am asked way too many times to participate in surveys.	-
9. I find it exhausting to answer many questions in a survey.	-

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These 7 items can be summarized as the attitude in the beginning of this survey. For further analyses the z-score of the attitude factor is used ( $M=-0.022$ ,  $SD=0.912$ ).

### 4.3 Multiple Regression Analysis

To answer the main question of this study, how respondents appreciate a survey when they use different devices and how their attitude effects this, a multiple regression analysis is conducted. A hierarchical multiple regression is used, so new variables can be added for each model. Every regression analysis is assessed twice, for both factor scores of appreciation (the dependent variables). In the first model, only the device is added, in the second model the control variables gender, age, education and time are added. In the third and final model attitude is added.

Table 7 shows that both factors of appreciation have a high correlation with attitude. The correlation with age is also significant, but not so big.

Table 7

*Correlations between appreciation factors and device use, gender and the control variables.*

	Device	Gender	Year of Birth	Highest Education	Time in seconds	Attitude Factor
Appreciation Factor 1	.003	.037*	-.058**	-.015	.006	.489***
Appreciation Factor 2	-.028	.061**	-.137***	.016	-.117***	.379***

*Note.* \* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$  (1-tailed)

From here the factors will be discussed separate. Factor 1 will be referred to as positive appreciation and factor 2 will be referred to as negative appreciation.

### 4.3.1 Positive appreciation.

In the first model, where only device use and positive appreciation were compared, device accounted for 0% of the variability in positive appreciation. This proportion of variance is statistically non-significant,  $F(1,2092)=.024$ ,  $p=.876$ . When the control variables gender, age, education and time are added in model two  $R^2$  increased to .005, these variables explained 0.5% more of the variability in positive appreciation. Although this is not a big increase, it is statistically significant,  $\Delta F(4,2088)=2.87$ ,  $p=.022$ . When attitude was added in model three  $R^2$  increased to .238, so attitude explained 23.3% of the variance in positive appreciation. This increase is statistically significant,  $\Delta F(1,2087)=655.90$ ,  $p<.001$ . All the variables together collectively accounted for a statistically significant proportion of the variance in positive appreciation,  $F(6,2087)=111.83$ ,  $p<.001$ . When all these variables are combined in model three, gender,  $t(2087)=2.32$ ,  $p=.021$ , and attitude,  $t(2087)=25.61$ ,  $p<.001$ , are the only predictors capable of explaining a significant proportion of unique variance in positive appreciation. For model three  $R^2$  is .243, so Cohen's  $f^2$  is 0.321, this is a large effect (Cohen, 1988). As can be seen in Table 8, the only significant predictor in the regression model of positive appreciation are gender and attitude. However, gender only accounts for 0.02% of the variance ( $sr^2=.002$ ), while attitude accounts for 23.8% of the variance ( $sr^2=.238$ ).

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Table 8

*Unstandardized (B) and Standardized ( $\beta$ ) Regression Coefficients, and Squared Semi-Partial Correlations ( $sr^2$ ) for all predictor variables in Model 3 (N=2094).*

Variable	B [95%CI]	$\beta$	$sr^2$
Device	.028 [-.030, .086]	.019	.000
Gender	.081 [.012, .150]*	.044	.002
Year of Birth	-.002 [-.004, .001]	-.028	.001
Highest Education	.020 [-.004, .044]	.032	.001
Time in seconds	.000 [.000, .000]	-.027	.001
Attitude Factor	.493 [.456, .531]***	.492	.238

Note. \* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$

#### 4.3.2 Negative appreciation.

In the first model, where only device use and negative appreciation were compared, device accounted for 0.01% of the variability in negative appreciation. This proportion of variance is statistically non-significant,  $F(1,2092)=1.59$ ,  $p=.208$ . When the control variables gender, age, education and time are added in model two  $R^2$  increased to .042, these variables explained 4.1% more of the variability in negative appreciation. This increase is statistically significant,  $\Delta F(4,2088)=23.15$ ,  $p<.001$ . When attitude was added in model three  $R^2$  increased to .144, so attitude explained 10.2% of the variance in negative appreciation. This increase is statistically significant,  $\Delta F=(1,2087)=368.400$ ,  $p<.001$ . Although there is a credible increase, it is not that big as with factor 1, positive appreciation. All the variables together collectively accounted for a statistically significant proportion of the variance in negative appreciation,  $F(6,2087)=79.88$ ,  $p<.001$ . When all these variables are combined in model three, they are all capable of explaining a significant proportion of unique variance in negative appreciation, except for device (see Table 9).

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Table 9

*Unstandardized (B) and Standardized ( $\beta$ ) Regression Coefficients, t-value and Squared Semi-Partial Correlations ( $sr^2$ ) for all predictor variables in Model 3 for Negative Appreciation (N=2094).*

Variable	B [95%CI]	$\beta$	t	$sr^2$
Device	.031 [-.023, .085]	.023	1.12	.000
Gender	.114 [.050, .178]***	.070	3.51	.005
Year of Birth	-.008 [-.011, -.006]***	-.141	-6.64	.017
Highest Education	.033 [.011, .055]**	.059	2.93	.003
Time in Seconds	.000 [.000, .000]***	-.154	-7.64	.023
Attitude Factor	.343 [.308, .378]***	.382	19.19	.144

Note. \*p < .05 \*\*p < .01 \*\*\*p < .001

For model three  $R^2$  is .187, so Cohen's  $f^2$  is 0.230, which can be considered as a medium to large effect (Cohen, 1988). As can be seen in Table 7, although all predictors, except device, are significant, they explain less than 5% of the variance. Attitude however, accounts for 14.4% of the variance in negative appreciation ( $sr^2=.144$ ).

## 5. Discussion

In this study we investigated if respondents have a different appreciation for a survey when they use different devices. Web-surveys can be completed on different devices, such as a PC or laptop, or mobile devices, such as a tablet or smartphone. The use of mobile devices in a web-survey has grown steadily in recent years (De Bruijne & Wijnant, 2014; Mavletova & Couper, 2014; Poggio, Bosnjak & Weyandt, 2015). Although the use of different devices in surveys increases, the research about the effects is still limited (Lugtig & Toepoel, 2015). Especially research about the appreciation of the respondents regarding these different devices. Not many researchers have asked the respondents what they thought about the survey when they used different devices. To investigate the appreciation of respondents this research looked at the evaluation questions in the German GESIS panel and compared these to the device use and attitude. The findings from this research suggests that respondents do not appreciate a survey less when they use different devices. Attitude however, does play a significant role in the appreciation of a survey. To come to this conclusion different steps were conducted.

Firstly, we looked at the difference in respondents. As expected, more woman than men used mobile devices. Furthermore, mobile device users were younger than PC or laptop users. Also, smartphone users were younger than tablet users. This confirmed earlier research about the difference in respondents (Antoun, 2015; De Bruijne & Wijnant, 2014; Sommer et al., 2017). The age difference can be explained because perhaps younger adults are more likely to make a (quicker) technological transition (Antoun, 2015). There was a small difference in the completion time for the different devices, but this is not noteworthy. Regarding the education level, most participants have a general qualification for university entrance, meaning most

RESPONDENTS' SURVEY APPRECIATION WHEN DIFFERENT DEVICES ARE USED AND THEIR ATTITUDE respondents were higher educated. This can be a limitation for the generalization of this research.

The main aim of this research was to find out if there was a difference in the appreciation of respondents regarding the different devices. A distinction was made between positive and negative appreciation. As was mentioned earlier, no significant results were found. Respondents do not appreciate a survey less when they use different devices. This was not expected, as the survey was not optimized for mobile devices. This could be because the difference between devices is not based on the device use, but on the respondents who use these devices (Lugtig & Toepoel, 2015).

Another variable considered in this survey was attitude. Attitude did have a significant impact on the appreciation of respondents. Respondents with a more positive attitude, had a higher appreciation of the survey. Respondents with a more negative attitude, had a lower appreciation of the survey. This effect was significant for both positive and negative appreciation, although the effect was bigger with positive appreciation. This confirms earlier research, that survey attitudes have an impact on participation in other surveys (Bergman & Brage, 2008; Loosveldt & Storms, 2008; Stocké, 2004).

There are some limitations for this research. The GESIS panel is representative for the German population (Bosnjak et al., 2017). Since Germany is a western country, there could be some implications of this research for other western countries, but these should be made very carefully. Furthermore, for this research only part of the data was used, since only respondents that completed the survey online were included. Offline respondents and respondents who broke off the survey before the end were not included. This limits the possibility to generalize the results and reduces the external validity.

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Although respondents do not appreciate the survey less, based on device use, it could be that respondents would be more positive about the surveys on mobile devices when they are optimized. Since most respondents don't have experience with optimized surveys, they might not know the difference. It is also suggested in earlier research that more respondents would choose a mobile device, if the survey was optimized (Revilla et al., 2015). Another limitation of the non-optimization could be that mobile device respondents made more errors. For this study the data quality was not taken into account. There were no analyses to see if there was a difference in measurement errors or break offs between devices, only the self-reported evaluation of the respondents was used. This appreciation was self-reported and asked in each wave. This could also limit the reliability, since the respondents had previous experience with them (Struminskaya, 2016). Furthermore, this research is based on a panel. Participants in a panel tend to be more positive regarding surveys. This could have implications for the variables attitude and appreciation that were used. Respondents also chose the device for this survey, rather than being randomly assigned. This could be a limitation to the internal validity. In conclusion, there are multiple limitations that should be considered when interpreting and using the data from this study.

Moving forward, researchers should continue to study mixed device web surveys and their effects. However, they should not forget to consider the opinion of the respondents themselves. For future research, it is recommended to expand the evaluation questions. To measure the appreciation more questions should be asked about different components of appreciation. Considering the device use, more evaluation question regarding device and optimization should be included. Furthermore, the differences between devices when using optimized surveys for

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each device should be investigated. It is hard to find a good research design to compare different optimized surveys. However, it is the only way one can compare the best possible survey mode for each device. Finally, different populations should be used, so the results can be compared and generalized to different members of the society.

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