Increasing the effectiveness of personalized advertisements with nudges

The influence of social and informational nudges on perceived privacy concern and control for personalized advertisements on social networking sites.

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ABSTRACT

Purpose – Digital advertising sales represent more than half of the global ad sales. It has been proven that personalized advertisements are highly effective within the online environment because of its relevance for the customer. However, the effectiveness of these advertisements is highly dependent on privacy concern and control of the customer. This study aims to examine to what extent a social nudge and a data collection information nudge increase perceived privacy control and decrease perceived privacy concern. It will contribute to the field of digital marketing by examining whether nudges are promising aspects for the design of personalized advertisements.

Method – 189 adults participated in this 2 (social nudge vs. no social nudge) x 2 (data collection information nudge vs. no data collection information nudge) between-subjects design. Participants were exposed to one of the four personalized advertisements and filled in a questionnaire to find out to what extent the social nudge and data collection information nudge effected perceived privacy concern and control with the influence of general privacy concern. The direct effect of perceived privacy control on perceived privacy concern was tested as well. Existing constructs of earlier research that were proven reliable were used to ensure the quality of the measurements for this research.

Results – Only one of the hypotheses was confirmed by the results of this research, being that higher perceived privacy control results in lower perceived privacy concern. However, some interesting non-hypothesized effects were found. Results showed that the social nudge had a significant positive effect on perceived privacy control when there was no data collection information nudge present. Regarding the effect of general privacy concern, results showed that the social nudge had only a positive effect on perceived privacy control for participants with high general privacy concern. Also, a direct effect of general privacy concern on perceived privacy concern and control was found. Furthermore, no effect of the nudges separately on either perceived privacy concern or control was found.

Conclusion – This study contributes to the theoretical field by giving new insights for the effect of nudges on perceived privacy concern and control in the context of personalized advertisements within social networking sites. Also, marketeers could make use of the findings of this research to increase the effectiveness of their personalized advertisements. Results of this study showed that for increasing perceived privacy control, a social nudge should be integrated within the personalized advertisement. Furthermore, higher perceived privacy control resulted in lower perceived privacy concern. However, general privacy concern should be taken into account, since the social nudge had only an effect for participants with high general privacy concern.

Keywords

Personalized advertisements, social nudge, information nudge, privacy concern, privacy control

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1. Introduction

Digital advertising sales are growing and represented more than half of the global ad sales in 2019, with social media as the fastest growing digital format (Magna Global, 2019). According to several studies, personalization within advertisements can greatly influence the effectiveness of advertisements in the online environment because of its relevance for the customer (Anand & Shachar, 2009; Jin & Villegas, 2007; Tucker, 2014). However, other research showed that the effectiveness of personalized advertisements depends on customer trust in the E-tailer. Click-through rates for this type of advertisements were only higher for trusted E-tailers (Bleier & Eisenbeiss, 2015). Moreover, research showed that higher perceived privacy concern results in avoidance of personalized advertisements (Munir, Ramaisa, Rana & Tariq Bhatti, 2017). Furthermore, Tucker (2014) pointed out that after perceived privacy control was increased, the likeliness of customers clicking on the personalized ad was nearly doubled.

In order to create personalized advertisements, personal information about the customer is needed. For some customers, personalized ads increase privacy concerns, because they worry about how their personal data is collected and used (Aguirre, Roggeveen, Grewal & Wetzels, 2016). Furthermore, research pointed out that because of profiling, real-time tracking and the collection of customer data that is needed for personalized advertising, customers feel that they lost control over their personal information (Lee & Cranage, 2011). Since other research found that perceived privacy control directly influences perceived privacy concern, this feeling of lost control could increase perceived privacy concerns (Awad & Krishnan, 2006). As mentioned before, perceived privacy concern and perceived privacy control influence the effectiveness of personalized ads. Therefore, to increase the effectiveness of personalized ads, it is important to decrease perceived privacy concern and to increase perceived privacy control.

Integrating nudges within the design of personalized advertisements seems to be a promising concept for influencing privacy concern and control. “A nudge is any aspect of the choice architecture that alters people’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives.” (Thaler & Sunstein 2008, p. 6). By including nudges, physical, social, or psychological aspects of the context that influence choices can be addressed. Resulting in a ‘better’ opinion regarding personalized advertisements. One of the nudges that was introduced by Thaler and Sunstein (2008) is the social nudge. Social popularity has positive effects on the opinion of customers. By showing people that others already liked or bought something, the opinion of these people will get positively affected (Yi, Jiang & Zhou, 2014). Furthermore, Zhang and Xu (2016) pointed out that people are also less concerned when they see that others trust something too. Another nudge that could influence people´s privacy concern and control is an information nudge. Research of Eslami, Kumaran, Sandvig and Karahalios (2018) showed that customers appreciate transparency in data collection for personalized advertisements. Moreover, Chen and Sundar (2018) pointed out that privacy control was increased by informing participants about the data collection.

Hence, the purpose of this study is to find out whether a social nudge and a data collection information nudge effects perceived privacy concern and control in the context of personalized advertisements. The personalized advertisement will be displayed on the social networking site (SNS) Facebook. As mentioned before, social media is the fastest growing digital format for advertising (Magna Global, 2019). However, relatively little research has been done on how customers respond to personalized advertisements on SNS and what factors can possibly influence customers’ responses (De Keyzer, Dens & De Pelsmacker, 2015). In this study, we try to narrow this knowledge gap by measuring participants’ perceived privacy concern and perceived privacy control after seeing none, one or both nudges. Furthermore, several studies found that some individuals have a higher need for privacy than others. This could influence perceived privacy concern within different situations (Kehr, Kowatsch, Wentzel & Fleish, 2015). Therefore, the possible influence of general privacy concern is also taken into account during this research. This study addresses the following research question:

"To what extent do social and informational nudges within personalized advertisements on social networking sites influence perceived privacy concern and perceived privacy control of customers?"

This research aims at providing (online) marketers and organizations with valuable information regarding the use and effect of nudges within personalized advertisements. Integrating nudges within personalized advertisements could possibly increase the effectiveness of these advertisements. By increasing perceived privacy control and decreasing perceived privacy concern, click-through rates of personalized ads will be increased. Since it appeared that personalized advertisements are only effective when the consumer trusts the E-tailer with their personal information, this research holds great practical relevance.

The (interaction) effect of a social nudge and a data collection information nudge on perceived privacy concern and control was not examined before. Furthermore, as mentioned before, little research has been done on which factors could possibly influence customers' responses on personalized advertisements within SNS. This research will contribute to the theoretical field by giving new insights for the effect of nudges on privacy concern and control within the context of personalized advertisements on SNS. Hereby, general privacy concern will be taken into account as well.

2. Theoretical Framework

Personalized advertising provides advantages for both firms and customers. One of the advantages of personalized advertisements for firms is that the budget of paid advertisements will be used more effectively because of the reduced waste circulation. Furthermore, it appears that the click-through rate is generally higher for personalized advertisements than for non-personalized advertisements (Seckelmann, Bargas-Avila & Opwis, 2011). On the other hand, personalized ads can also be beneficial for customers. A great advantage for customers is the relevance of the advertisements that are shown. As a result, relevant products or services will be shown at the right time and the search process will be more efficient (Van Doorn & Hoekstra, 2013). However, in order to create personalized advertisements, personal information of the customers is needed. This need for personal information results in customer concerns for their information privacy. Firms must be careful that customers do not backlash them for overstepping the boundaries of private information collection (Awad & Krishnan, 2006).

2.1 Perceived privacy concern and control

Several studies have examined factors that can decrease perceived privacy concern for customers. For instance, a research of Kowai-Bell, Guadagno, Little, Preis and Hensley (2011) showed that expectations of customers are influenced by the online opinions of others. Kerkhof and van Den Bos (2012) found that a positive review significantly enhanced the perceived trustworthiness of online stores for customers. Kim and Kim (2011) pointed out that customers rely on trust heuristics when evaluating personalized advertisements. In addition, Aguirre, Mahr, Grewal, de Ruyter and Wetzels (2015) noted that certain trust-buildings strategies and forms of information collection reduced privacy concerns. They found that when a firm informs customers about the data-collection method for the personalized advertisements, behavioral intentions improved. This effect was also found by Culnan and Armstrong (1999), results of their research showed that when customers were informed about (fair) data collection, they were more willing to be profiled by the firm than when there was no transparency on data collection.

According to Westin (1967), information privacy can be defined as “the ability of the individual to control the terms under which personal information is acquired and used” (p. 7). Xu, Dinev, Smith and Hart (2011) argued that perceived control is one of the key factors for explaining perceived privacy concern. They defined perceived privacy control as “An individual’s beliefs in his or her ability to manage the release and dissemination of personal information” (p. 804). By looking at these two definitions it could already be interpreted that increasement of perceived privacy control will decrease perceived privacy concern (Awad & Krishnan, 2006).

This interpretation was confirmed by Gironda and Korgaonkar (2018), their study examined the perception of customers towards personalized advertising. The personalized advertisements were shown on social network sites. They explained that this is a suitable context for showing personalized ads, because these sites have access to a large amount of personal data. To avoid technical and ethical issues regarding the access of individual’s data, research data was collected by scenario-based surveys. In order to increase the generalizability of the findings of this research, a broad sample of U.S. residents filled in this survey. Respondents were of different ages (18-66+) and gender and varied in education (12^{th} grade or less to doctoral degree) and income levels (30.000 dollar or less to 100.000 dollar or more). The results of their research showed that perceived privacy control had a negative effect on customers’ privacy concerns.

In addition, a study towards personalized advertisement within mobile advertising found that perceived privacy control is significantly and negatively related to customers’ privacy concerns. In general, respondents felt that mobile personalized advertisements left them with little control over the personal information collection, which led to high privacy concerns about these personalized ads. This data was collected by executing online surveys, each questionnaire included one of the four personalized ads. The sample of the main study were college students, the researchers acknowledged

that this is a potential limitation for the generalizability of the results. However, since students are the largest Internet user segment, this sample is of importance for marketers (Baek & Morimoto, 2012). Moreover, a research towards ´predicting mobile commerce activity through privacy concerns' (Eastin, Brinson, Doorey & Wilcox, 2016) measured the privacy concerns of mobile users. The participants of this research were U.S. adults with differences in gender, age (18-55+) and educational backgrounds (no degree to college graduate). The data of this research was collected by posting a Qualtrics online survey on the "Human intelligence Task" website. Results of this research showed that most mobile users (cautiously) shared their personal information. However, it appeared that control over their personal data was vital for a satisfactory feeling about the personal data sharing. Based on the results of above-mentioned research, hypothesis 1 was formulated.

H1: Increase of perceived privacy control will lead to decrease of perceived privacy concern.

2.2 Social nudge for influencing perceived privacy concern and control

Customers rely on trust heuristics when evaluating personalized advertisements (Kim & Kim, 2011). A possible manner for addressing this trust heuristic is by using a social nudge. As implied by Flanagin (2017), evaluations of (the credibility of) companies are to a large degree based on a social process. By examining multiple studies towards social influence processes, he found that online opinions by potential or former customers can directly influence the opinion of other online customers. This was supported by Del Guidice (2010), who found that online pages of companies with negative feedback of customers were perceived as less credible than pages with positive audience feedback. Furthermore, results of a research towards social framing in privacy decision-making showed that when the minority social norm was presented (i.e. low cookie acceptance), respondents were less likely to accept the cookies than when majority social norm was presented. This result is in line with other research towards 'social proof', which showed that people have the tendency to imitate the behavior of the majority (Coventry, Jeske, Blythe, Turland & Briggs, 2016). According to Eigenbrod and Janson (2018), trust in the online retailer could be suggested by the indication that others have also clicked on a personalized advertisement. They stated that this social influence could directly decrease individuals' privacy concerns. As indicated by abovementioned research, trust heuristics can be addressed by including a social nudge, which will result in decreased privacy concerns. Based on these findings, hypothesis 2a was formulated.

According to multiple studies, a social nudge could also influence the perceived privacy control of customers. For instance, Cheung, Lee and Chan (2015) found that users of Social Network Sites (SNS) have a tendency to comply with the expectations of others in their social network. It could be that when the social network of people feels comfortable with the privacy control they have when seeing a personalized advertisement, this person will feel the same. This was supported by results of a study of Zhang and Xu (2016). They included a social nudge within an app interface, which stated that the majority of people approved the use of data permissions. The sample of this research included 387 North American adults with differences in gender, age (18-70) and educational backgrounds (less than high school to Ph.D. degree). Data was collected by an online experiment consisting of pre-test questions, the stimulus material and post-test questions. The results of this research showed that the social nudge positively influenced the perceived privacy control of participants. This is in line with earlier research on the power of social influence, which showed that people's perceptions could be altered by social influence (Cialdini, 2007). Based on these findings, hypothesis 2b was formulated.

H2a: The presence of a social nudge within a personalized advertisement will have a negative effect on participants' perceived privacy concern.

H2b: The presence of a social nudge within a personalized advertisement will have a positive effect on participants' perceived privacy control.

2.3 Informational nudge for influencing perceived privacy concern and control

As stated by Aguirre et al. (2015), privacy concern of customers could be decreased by informing customers about the data-collection for personalized advertisements. The data of their research towards the 'personalization paradox' was obtained by the execution of an online survey. All participants were familiar with Facebook, on which the advertisement was shown. The results of their research showed that overt data transparency, in combination with personalization, resulted in lower feelings of vulnerability. Another research indicated that this feeling of vulnerability shapes the perceived privacy concern of Internet users (Dinev & Hart, 2004). In addition, Prabhaker (2000) examined multiple studies towards online customers' privacy concerns and found that privacy concern is not directly caused by the disclosure of personal information, but by the fact that customers do not know how information is collected and used. Furthermore, a study of Eslami, Kumaran, Sandvig and Karahalios (2018) found that participants appreciated transparency in data collection and that these participants were more likely to click on ads that provided this.

As supported by Eigenbrod and Janson (2018), an information nudge could be used to provide this transparent information on data collection. The data collection information nudge can help customers understand that the firm is acting in their favor, which could directly reduce their perceived privacy concerns. However, the results of a study towards flow norms should be taken into consideration when informing about data collection. This study revealed that using personal information gathered from a different website is akin to talking behind someone´s back. Furthermore, they also found that using inferred (instead of stated) personal information was seen as taboo (Kim, Barasz & John, 2019). Because of these findings, the data collection information nudge within this research will inform about personal information that is obtained with stated information and within the website on which the ad appears. Based on abovementioned findings hypothesis 3a was formulated.

A data collection information nudge could also increase perceived privacy control. As stated by Awad and Krishnan (2006) "Knowledge is a core element of perceived control" (p. 10). So, by providing information on data collection, perceived privacy control could be increased. Several studies found evidence of this positive relationship. For instance, Culnan and Bies (2003) developed a theoretical framework for consumer privacy concerns. This framework showed that data collection transparency by the use of technology provides customers with greater privacy control. In addition, Chen and Sundar (2018) examined the effect of the type of personalization and the transparency (low-high) of data collection on perceived control, ease of use, privacy concern, trust, user engagement, product involvement, attitude, behavioral intention, purchase intention and power usage. Participants of this research were U.S. residents aged 21 or older, with an average age of 49.22. The data was collected by an online survey, including a pre-questionnaire, interaction with the prototype and a post-questionnaire. Results of this research showed that cues suggesting overt personalization mechanism (i.e. this is recommended for you) positively influenced perceived control. The research highlighted that these cues should not only be present within, in this case, the interface of an app, but should be more apparent. Furthermore, Prince (2018) conducted a research towards the need for customers to control their personal data. Data was collected by a quantitative online survey, filled in by 1000 French participants. Results of this study showed that there is a need for control over personal data and that transparency of data collection exert the perceived privacy control of customers. Based on these findings hypothesis 3b was defined.

Another information nudge that could be used to address trust heuristics is informing customers about the presence of a privacy policy. This was supported by Arcand, Nantel, Arles-Dufour and Vincent (2007), who found that the presence of a privacy policy had a positive effect on consumers' perceived control. Furthermore, a study towards the impact of online privacy disclosures on consumers trust also found that the presence of a privacy policy communicates a "you can trust us" signal to the consumers. According to this study the presence of a privacy policy functions as an assurance that the firm will engage in fair personal information practices (Pan & Zinkhan, 2006). However, there are also multiple studies that did not find an effect of showing a privacy policy on

privacy control and concern. For instance, Pew (2014) found that consumers are confused about the protection that a privacy policy affords. Moreover, a study of Brinson, Eastin and Bright (2019) found no significant relationship between the awareness of a privacy policy and customers' privacy concerns. Furthermore, another study did only find a significant effect of reducing concern with a strong privacy policy when low sensitivity data was gathered. For highly sensitive data the presence of a privacy policy was insufficient (Lwin, Wirtz & Williams, 2007). Based on these findings it was decided that information about the privacy policy will not be included in this research.

H3a: The presence of an information nudge regarding personal data collection within a personalized advertisement will have a negative effect on participants' perceived privacy concern.
H3b: The presence of an information nudge regarding personal data collection within a personalized advertisement will have a positive effect on participants' perceived privacy control.

2.4 Interaction between social and informational nudge

Jessen and Jørgensen (2012) examined several studies towards the effect of social dynamics on online credibility. Based on their theoretical research, they argued that verifications made by others, such as Facebook likes, comments and shares, largely impacts people's evaluation of online information credibility. This statement was supported by a research of Metzger, Flanagin and Medders (2010), who used focus groups to examine credibility processes and strategies. They executed 11 different focus group sessions with a total of 109 participants who all had a U.S. nationality. Participants were aged 18-55+, differed in education level (high school – graduate degrees), income (less than 35.000 dollars – greater than 100.000 dollar per year) and race. Results of this research showed that participants looked, among other things, at the number of positive and negative reviews for making credibility evaluations. Moreover, results of another research of Flanagin and Metzger (2013) showed that social influence affected the perceived information valence of participants. The evaluation of social information of respondents was assessed by showing them fictious movie ratings. After the explosion to these movie ratings, participants were asked to fill in an online survey. Results of this research showed that when participants were exposed to higher movie rankings of others (social information), their ranking of that movie was also higher. Furthermore, a research towards the prediction of mobile commerce activity through privacy concerns included a social nudge within an online article. Data was collected by a laboratory experiment, participants were asked to select and read several news articles. The website included information about the message valence and social recommendations (high and low). It appeared that articles with the social nudge (i.e. higher social recommendations) were read for a longer time (Winter, Metzger & Flanagin, 2016). So, the combination of a social nudge and an information nudge could lead to a positive interaction effect on perceived privacy concern and perceived privacy control. By including a social nudge, the information nudge will be read for a longer time and will be perceived as more credible. Based on these findings, hypothesis 4a and 4b were formulated.

H4a: The presence of a social and an information nudge within a personalized advertisement will interact such that this will have a stronger negative effect on participants' perceived privacy concern than when only one of the nudges is present.

H4b: The presence of a social and an information nudge within a personalized advertisement will interact such that this will have a stronger positive effect on participants' perceived privacy control than when only one of the nudges is present.

2.5 General privacy concern as a moderator

Several studies have found that some individuals have a higher need for privacy than others, and that this characteristic could influence perceived privacy concern within different situations. For instance, the study of Kehr, Kowatsch, Wentzel and Fleisch (2015) examined the effect of general privacy

concerns on the response towards a new smartphone app. Two samples, one from the USA and one from Switzerland, were asked to fill in pre-questions, were assigned to one of the four product presentation pages and filled in post-questions. In order to prevent priming effects, questions regarding general privacy concerns were asked before the cues were presented. Results of this research showed that general privacy concern increased perceived privacy risk, which increased the perceived privacy concern of a new smartphone application that collected behavior data. The results showed no significant difference in general privacy concern for the USA sample compared to the Switzerland sample.

Moreover, a study towards consumers' perceptions of personalized advertising found that disposition to value privacy is positively related to the perceived privacy concern of personalized advertisements (Gironda & Korgaonkar, 2018). The construct of disposition to value privacy (DTVP) was initiated by Xu, Dinev, Smith and Hart (2011) and was used to examine inherent privacy needs. They defined DTVP as "an individual's general tendency to preserve his or her private information space or to restrain disclosure of personal information across a broad spectrum of situations and context" (Xu et al., 2011, p. 805). An online survey was used as method for this research and participants were asked to focus on one of the four different types of websites they had used, being electronic commerce sites, social networking sites, financial sites, and healthcare sites. It appeared that the type of website context explained 40-56 percent of the variance in privacy concerns. The results of this research also showed that DTVP (i.e. general privacy concern) had a negative effect on perceived privacy control for social network sites. The DTVP to perceived privacy control was only significant for this type of website. Furthermore, the results did also show that general privacy concern did have a direct positive effect on privacy concerns for all the website domains. Because of these findings, a high level of general privacy concern is expected to negatively moderate the (direct) effects of nudges on perceived privacy control and perceived privacy concern. Based on this, hypotheses 5a, b, c and d were formulated.

H5a: High general privacy concern of the participant will weaken the negative effect of the social nudge on perceived privacy concern.

H5b: High general privacy concern of the participant will weaken the positive effect of the social nudge on perceived privacy control.

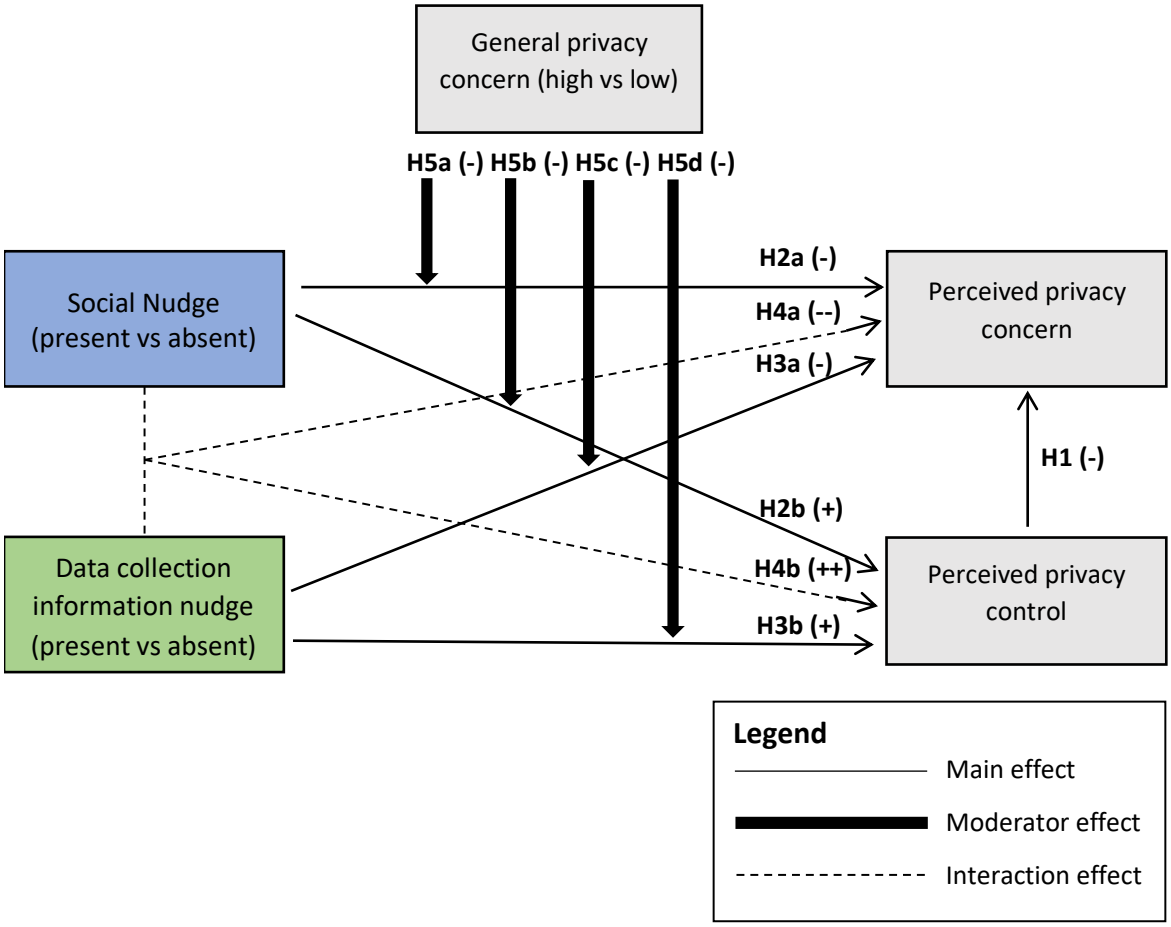
H5c: High general privacy concern of the participant will weaken the negative effect of the data collection information nudge on perceived privacy concern.

H5d: High general privacy concern of the participant will weaken the positive effect of the data collection information nudge on perceived privacy control.

2.6 Conceptual model

Figure 1 shows the conceptual model for this research. This model is based on the independent variables, the dependent variables, the moderator, and the hypotheses that were indicated based on examined research (see paragraph 2.1 till 2.5). The independent variables of this research are the social nudge and the data collection information nudge. Based on previous research, it is expected that combining the social nudge and the informational nudge will result in a positive interaction effect. The dependent variables are 'perceived privacy control' and 'perceived privacy concern', where it is expected that 'perceived privacy control' will decrease 'perceived privacy concern'. Since previous research showed that high general privacy concern decreased perceived privacy control and increased perceived privacy concern, high (vs low) general privacy concern is expected to negatively moderate the effect of the independent variables on the dependent variables.

Figure 1
Conceptual model



3. Method

In total, 189 adults participated in this 2 x 2 between-subjects design. These participants filled in an online scenario-based survey on Qualtrics. A pre-test was executed to decide upon the design of the stimulus materials. The stimulus materials of this research consist of personalized advertisements with either one, two or no nudges. Existing constructs of earlier studies that were proven reliable were used to ensure the quality of the measurements for this research. Several analyses were executed to check the quality of responses, validity of constructs and possible asymptotic differences between conditions.

3.1 Research design

This research focused on the context of personalized advertisements within the social networking site (SNS) Facebook. The decision to use a social networking site for showing the personalized ads was based on the fact that these sites use this type of advertising at an increasing rate. This can be explained by the fact that they have access to a large amount of personal data (Gironda & Kargaonkar, 2018). Since Facebook is still the leading SNS based on reach in the Netherlands (GfK, 2019), it was decided to show the personalized advertisements within the context of this site.

189 participants who were familiar with Facebook participated in a 2 (no social nudge vs. social nudge) x 2 (no informational nudge vs. informational nudge) between-subjects design. Participants were asked to fill in an online scenario-based survey on Qualtrics. This research method was chosen because of its technical and ethical benefits for measuring the effect of personalized advertisements. When the personalized ad would be based on actual individual data instead of a fictional scenario, real personal data would be needed. This would have been challenging for both technical as ethical reasons (Gironda & Kargoankar, 2018). The online survey was distributed via social media, mail and app to acquaintances, family, and the social network.

3.2 Pre-test

In order to decide upon the advertiser, scenario and the design of the nudges that would be shown within the personalized advertisements, a pre-test was conducted. Participants of the pre-test were of different ages (20 till 29 years) and gender (40% male and 60% female). The pre-test contained several aspects that were all based on previous research. Within literature five possible social nudges and three possible informational nudges were found. The five pre-test participants were asked to divide 100 points between the five advertisements with a social nudge. The rating was based on the following statement: “I have the feeling that a relatively large number of people are positive about this ad”. Participants were asked to do the same for the three advertisements with an informational nudge. This ranking was based on the following statement: “I feel sufficiently informed about how and what information about me has been collected”. Besides this, also three possible product groups were tested. The researcher selected three product groups that could be realistic as a gift and somewhat attractive for both male and female. Participants were asked to divide 100 points between the product groups for each of the following statements: “I think this product group is realistic for finding a gift for an aunt.” “I find this product group attractive, an advertisement for a product within this product group would appeal to me.”. After this, for each product group, four advertisers where shown. A total of twelve advertisers were shown to the participants. They were asked to rate each advertiser based on the following statement: “My attitude towards this advertiser is …” on a seven-point Likert scale (very negative – very positive). It was also possible for the participant to state that they did not know the displayed advertiser. Finally, four scenarios that were also based on previous research, were shown to the participants. For each scenario, participants were asked to rate the scenario on the following statements: “When I found myself in this scenario, I would feel like I see advertisements that suit my needs and situation.” “I think it is realistic that someone could be in this scenario.”. All pre-test material

consulted literature and results can be found in Appendix C. A summary of the results of the survey that were discussed during the focus group session are displayed in table 1[1].

After each participant rated the statements, a focus-group session was executed. The researcher formulated conclusions from the results and participants were asked if they agreed to these conclusions. For some aspects discussion was needed to decide upon the options. At the end of the focus-group session, every participant agreed to the choices that were made for the definitive main research materials. For the social nudge, two nudges (likes and comments) were combined for all participants to agree on the social influence. In case of the product group, books (group C) appeared to be the best option for the main research. Because of this, during the focus-group session, participants were asked which genre would be best fitting. All participants agreed that 'literary thriller' would be the best genre option. To decide upon which advertiser would be shown, the researcher looked for the advertiser that got the most neutral score on participants' attitudes. For the advertisers within the product category 'books', the advertiser Bookspot scored the most neutral score (4.67 out of 7). However, multiple participants stated that they were not sure if they saw this advertiser before. Therefore, the second-best scoring advertiser, Boekenvoordeel, was chosen to be included within the research. Regarding the four possible scenarios, Scenario C scored highest on both personalization (*M* = 6.0, *SD* = 1.55) and being realistic (*M* = 7.0, *SD* = 0.00) and was therefore chosen to be included within the main research. Based on all the above-mentioned results, main research materials were conducted.

Table 1

Results from pre-test.

Pre-tested material	Scores	Included in main research	Explanation
Social A – Two positive comments	*M* = 26.0, *SD* = 15.30	Yes	Female participants rated this advertisement the highest.
Social C – Notification within advertisement '2.156.276 people liked this company'	*M* = 24.4, *SD* = 14.26	No	Error by participant, new mean score was lower than for social A and E.
Social E – 495 likes on the advertisement.	*M* = 21.0, *SD* = 9.17	Yes	Male participants rated this advertisement the highest.
Info B – Info button with expanded text block stating: "why am I seeing this ad? This ad is shown based on measured clicks within Facebook and information that you have included in your profile (such as age, place of residence and interests)".	*M* = 38.0, *SD* = 14.70	No	After discussion during focus-group session, participants concluded that 'Info C' was clearer.
Info C – Info button with expanded text block stating: "Facebook uses information that you have reported in your profile and collects information about your clicks within Facebook to provide you with advertisements and products that you may like".	*M* = 38.0, *SD* = 11.66	Yes	Rated as clearest.
Group A – Plants As gift for aunt	*M* = 50.0, *SD* = 8.94	No	Rated as appropriate gift for aunt.
Group A – Plants Attractive group	Male: *M* = 5.0, *SD* = 5.00 Female: *M* = 45.0, *SD* = 17.80	No	This product group was rated as least attractive by men.
Group B – Games As gift for aunt	*M* = 18.0, *SD* = 9.27	No	Lowest score on the 'appropriate gift for aunt' item.

[1] Not all data was included within table 1. Only pre-tested material with relevant scores, which were therefore discussed during the focus-group session, are displayed.

Table 1 (continued)

Pre-tested material	Scores	Included in main research	Explanation
Group B – Games Attractive group	Male: *M* = 75.0, *SD* = 5.00 Female: *M* = 26.7, *SD* = 18.41	No	This product group was rated as least attractive by women.
Group C – Books As gift for aunt	*M* = 32.0, *SD* = 12.88	Yes	Rated as appropriate gift for aunt.
Group C – Books Attractive group	Male: *M = 20.0*, *SD* = 0.00 Female: *M* = 28.3, *SD* = 8.50	Yes	Rated as somewhat attractive by male and female respondents.
Advertiser – Bookspot	*M* = 4.7, *SD* = 1.30	No	Most participants were not sure who this advertiser was.
Advertiser - Boekenvoordeel	*M* = 4.8, *SD* = 1.17	Yes	Mean score was second best (close to neutral) and participants knew the advertiser.
Scenario C Personalization Realism - "You decided to give a gift to your aunt together with your sister. To get an idea of what type of plant/book/game your aunt likes, you decide to look on her Facebook page. You click on different providers that she liked to view them. You decide to go to the chat of one of these pages to ask a question about the advantages and disadvantages of the product that you have seen on the page. You like this page, the provider answers, and you decide to think a little longer before you choose the gift. That evening, you check your Facebook again and you see the following advertisement…"	 *M* = 6.0, *SD* = 1.55 *M* = 7.0, *SD* = 0.00	Yes	Highest scores (out seven points) on both personalization and realism.

Note. For all advertisements (Social and Info) 100 points were divided between the advertisements (100 points for ads with social nudge and 100 points for ads with information nudge). Participants could also divide 100 points between product groups (100 points for product groups as gift for aunt and 100 points for product groups as being attractive for the participant). Advertisers were rated on a 7-point Likert scale (very negative-very positive). Personalization and realism of the scenarios were also rated on a 7-point Likert scale (totally disagree-totally agree).

3.3 Stimulus materials

The stimulus materials of this research are advertisements with one, two or no nudges. Within this research, a social nudge and data collection information nudge are included. To decide upon the design of these nudges, a pre-test was performed. The pre-test contained five different social nudges and three different data collection information nudges. Participants rated, among other things, the social nudges on their social influence and the informational nudge on their informativeness regarding data collection. Furthermore, during a focus group session, participants were asked to elaborate on their answers. The design, execution and results of the pre-test are extensively described in paragraph 3.2 and Appendix C. The final design of the social nudge can be found in figure 2 and the final design of the data collection information nudge is displayed in figure 3. For the main research, there are four different advertisements that will be equally distributed among participants. Advertisement A contains the social nudge, advertisement B contains the data collection information nudge, advertisement C contains both the social nudge and the data collection information nudge and advertisement D contains no nudge (control condition). The design of all advertisements can be found in Appendix A.

Figure 2

Design of the social nudge containing likes and comments.

Note. Translation of displayed comments; “Read it within a week, very well written book!”, “Nice and exciting book to read! Highly recommended.”

Figure 3

Design of the data collection information nudge

Note. Translation of displayed info; “Facebook uses information that you have reported in your profile and collects information about your clicks within Facebook to provide you with advertisements and products that you may like.”

3.4 Measures

Existing constructs of earlier research that were proven reliable were used to ensure the quality of the measurements for this research. All items were measured with 5-point Likert scales (completely disagree – completely agree). Perceived privacy control was measured by an eight-item construct derived from research of Xu, Dinev, Smith and Hart (2011), Zlatoslas, Welzer, Hericko and Hölbl (2015), and Phelps, Nowak and Ferrel (2000). Participants were, among other things, asked to what extend they agreed with the following statement: “I believe I have control over who can get access to my personal information collected by Facebook.”. Reliability analysis for the items that were used to measure perceived privacy control showed that the items have a high reliability (α = .822). For the construct of perceived privacy concern seven items were included, among which “I am concerned that Facebook has too much information about me.”. These items were derived from research of Bleier and Eisenbeiss (2015) and Xu, Dinev, Smith and Hart (2011). The reliability analysis for the items that measured perceived privacy concern showed that these items have a high reliability (α = .878). The moderator variable general online privacy concern was measured by a five-item construct based on items from research of Xu, Dinev, Smith and Hart (2011) and Malhotra, Kim and Agarwal (2004). One of these items stated “Compared to others, I am more sensitive about the way online companies handle my personal information.”. The reliability score of this measure is high with α = .819.

Besides these main constructs, general trust in Facebook and attitude towards the advertiser were measured to check whether there were asymptotic differences between groups. General trust in Facebook was measured with a 6-item construct (α = .880) based on research of Szymczak, Kücükbalaban, Lemanski, Knuth and Schmidt (2016) and Fogel and Nehmad (2009). To give an example, one of the items stated "Facebook gives the impression that it keeps promises and commitments". Attitude towards the advertiser was measured with five items, i.e. "I would rate Boekenvoordeel as bad/good" (very bad-very good). These items were derived from research of Simpson, Horton, and Brown (1996). A reliability analysis for the items that were used to measure attitude toward the advertiser showed that the items have a high reliability (α = .909).

Furthermore, to distract the participants from the fact that the context of the main research was Facebook, general trust in Instagram was also measured. This construct contained the same items as the general trust in Facebook construct, except every reference to Facebook was changed to Instagram, i.e. "Instagram gives the impression that it keeps promises and commitments" (α = .893). Moreover, participants were distracted from the fact that the main research was about privacy by including a construct measuring online shopping enjoyment. This construct was measured by five items, i.e. "Online shopping is generally a lot of fun for me." (α = .756). The items for this construct were derived from research of Dawson, Scott, Bloch and Ridgway (2002). Results of the reliability analyses indicated that all constructs were reliable (α > .700). Within table 2 an overview of the constructs and results of the reliability analyses can be found. In Appendix B a complete overview is given of all constructs with corresponding items.

Table 2
Constructs

Construct	No. of items	Deleted items	Cronbach's alpha	Sources
Perceived privacy concern	8	1[2]	.878	Bleier and Eisenbeiss, 2015; Xu, Dinev, Smith and Hart, 2011
Perceived privacy control	8	0	.822	Xu, Dinev, Smith and Hart, 2011; Zlatolas, Welzer, Hericko and Hölbl, 2015; Phelps, Nowak and Ferrell, 2000
General online privacy concern	5	0	.819	Xu, Dinev, Smith and Hart, 2011; Malhotra, Kim and Agarwal, 2004
Online shopping enjoyment	5	0	.756	Dawson, Scott, Bloch and Ridgway, 2002
General trust in Facebook	6	0	.880	Szymczak, Kücükbalaban, Lemanski, Knuth and Schmidt, 2016; Fogel and Nehmad, 2009
General trust in Instagram	6	0	.893	Szymczak, Kücükbalaban, Lemanski, Knuth and Schmidt, 2016; Fogel and Nehmad, 2009
Attitude towards advertiser	5	0	.909	Simpson, Horton and Brown, 1996.

3.5 Survey procedure

Participants were asked to fill in an online scenario-based survey on Qualtrics. During the first part of the survey, participants were exposed to filter questions, being "Are you 18 years or older?" and "Have you bought something online during the past two years?". Besides this, participants had to indicate whether they have or did ever had an Instagram, Facebook, Linked-In, YouTube, Twitter and Tik Tok account. For this research, it was only of importance that the participant has or did ever had a Facebook account. However, to prevent bias, other SNS were included to distract participants from the fact that the research was within the context of Facebook. When participants answered one or both filter questions with 'no' or indicated that they never had a Facebook account, they were excluded from the research.

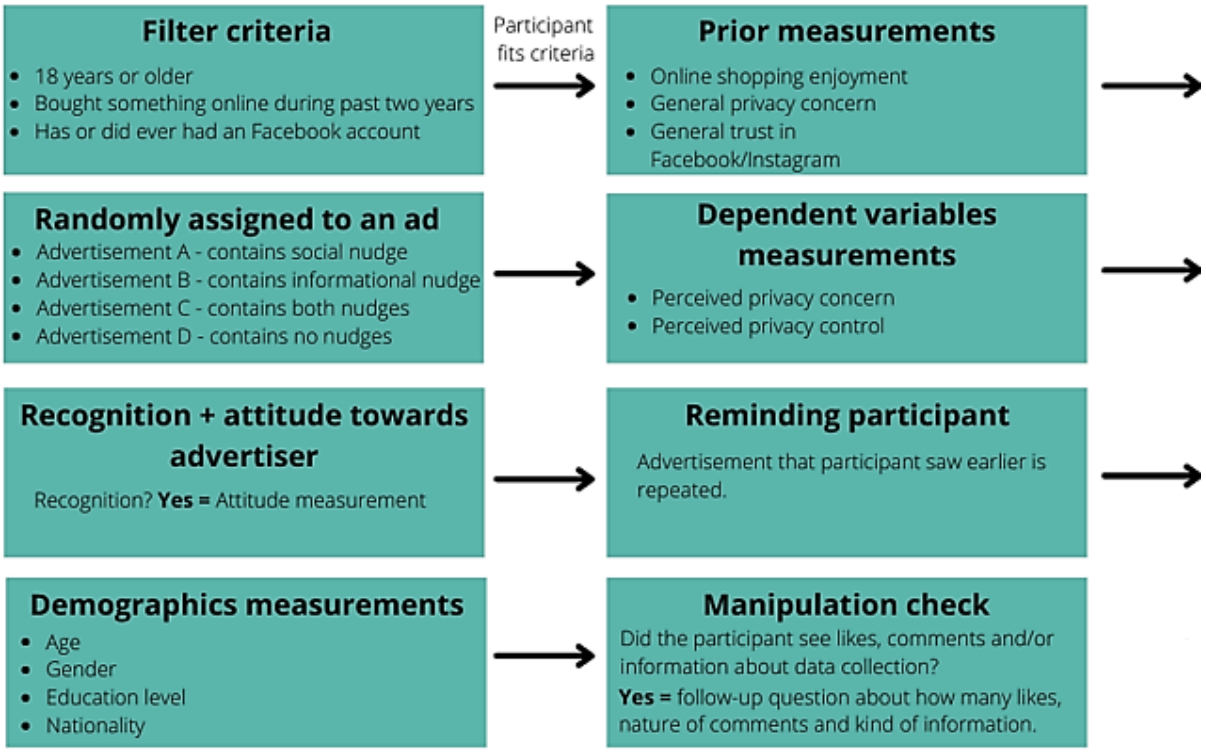
[2] This item was deleted accidently by including another item twice within the survey (see Appendix B).

When the participant did fit the criteria of the research, he or she was asked to fill in a questionnaire. To avoid item order bias, items were randomized for each construct that was measured. The first part of the questionnaire included questions regarding online shopping enjoyment, general privacy concern, general trust in Facebook and general trust in Instagram. These items were measured prior to showing one of the four personalized advertisements to avoid priming effects that could have biased ratings (Kehr, Kowatsch, Wentzel & Fleisch, 2015). Since Krasnova, Spiekermann, Koroleva and Hildebrand (2010) found that trust in the OSN (online social networks) provider reduces perceived privacy risk, general trust in Facebook was measured to check whether there were asymptotic differences between groups in this respect. Also, general trust in Instagram and online shopping enjoyment were not mentioned in the research model. These constructs were included to prevent bias. Respondents were distracted from the fact that this research was about privacy concerns and within the context of Facebook.

Subsequently, respondents were randomly assigned to one of the four personalized advertisement conditions. The conditions contained either none, one or both nudges (see Appendix A). When the respondent had looked at the advertisement for at least ten seconds, he or she was asked to fill in the second part of the questionnaire. This part of the questionnaire included constructs of the dependent variables, being perceived privacy control and perceived privacy concern. Besides this, respondents were asked whether they knew the displayed advertiser. If the respondent indicated that he or she knew the advertiser, a construct of attitude towards the advertiser was included. After this, the advertisement that the respondent saw earlier was repeated to remind him or her of how it looked like. Then, respondents were asked to optionally give their age, gender, educational level, and nationality. During the analysis, it was checked whether there were asymptotic demographic or attitude differences between groups. Finally, a manipulation check was executed. Respondents were asked how sure they were about seeing likes, comments of others and information about data collection. When the respondent indicated a 70 or higher percentage of being sure that he or she saw a particular nudge, a follow-up question was asked regarding the number of likes they saw, the nature of the comments (positive or negative) or the kind of information about data collection (multiple choice question). A visual representation of the survey procedure can be found in figure 4.

Figure 4

Survey procedure



3.6 Participants

192 respondents who fitted the filter criteria completed the survey. However, two participants did not meet the quality requirements set in advance (i.e. took more than 70 minutes for completing the survey), so the researcher excluded them from the analysis. Furthermore, the outlier analysis resulted in one outlier, therefore this response was also excluded from the analysis. Hence, in total 189 responses were used for the analysis. The participants' ages ranged from 18 to 81 years, with an average age of 38.2 years. Participants were of Dutch (99.5%) or Austrian (0.5%) nationality, had a low (4.3%), middle 1.5%), or high (54.3%) educational level[3], and both male (29.1%) and female (70.9%) filled in the survey. The characteristics of participants per condition are described in table 3.

Table 3

Characteristics of participants per condition

Included nudge	Advertisement A Social (n = 48)	Advertisement B Data collection (n = 47)	Advertisement C Social and data collection (n = 44)	Advertisement D None (n = 50)	Total (N = 189)	Between group tests
Gender						$X^2 = 0.702$ $p = .873$
Male	13 (27.1%)	13 (27.7%)	15 (34.1%)	14 (28.0%)	55 (29.1%)	
Female	35 (72.9%)	34 (72.3%)	29 (65.9%)	36 (72.0%)	134 (70.9%)	
Education level						$X^2 = 3.816$ $p = .702$
Low	1 (2.1%)	1 (2.1%)	2 (4.5%)	4 (8.2%)	8 (4.3%)	
Middle	21 (43.8%)	20 (42.6%)	20 (45.5%)	17 (34.7%)	78 (41.5%)	
High	26 (54.2%)	26 (55.3%)	22 (50.0%)	28 (57.1%)	102 (54.3%)	
Nationality						$X^2 = 2.795$ $p = .424$
Dutch	48 (100%)	47 (100%)	44 (100%)	49 (98.0%)	188 (99.5%)	
Austrian	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (2.0%)	1 (0.5%)	
Used device						$X^2 = 6.582$ $p = .361$
Smartphone	43 (89,6%)	41 (87.2%)	43 (97.7%)	41 (82.0%)	168 (88.9%)	
Desktop	3 (6.3%)	4 (8.5%)	0 (0.0%)	6 (12.0%)	13 (6.9%)	
Tablet	2 (4.2%)	2 (4.3%)	1 (2.3%)	3 (6.0%)	8 (4.2%)	
Age	*M* = 37.1 *SD* = 14.91	*M* = 38.3 *SD* = 15.43	*M* = 39.0 *SD* = 14.32	*M* = 38.4 *SD* = 13.95	*M* = 38.2 *SD* = 14.56	F = 0.131 *p* = .941
Attitude towards advertiser	*M* = 3.3 *SD* = 0.59	*M* = 3.5 *SD* = 0.41	*M* = 3.5 *SD* = 0.50	*M* = 3.2 *SD* = 0.46	*M* = 3.4 *SD* = 0.50	F = 1.710 *p* = .174
General trust in Instagram	*M* = 2.9 *SD* = 0.68	*M* = 2.9 *SD* = .74	*M* = 2.8 *SD* = 0.61	*M* = 2.9 *SD* = 0.69	*M* = 2.9 *SD* = 0.65	F = 0.318 *p* = .813
General trust in Facebook	*M* = 2.7 *SD* = 0.65	*M* = 2.7 *SD* = 0.87	*M* = 2.5 *SD* = 0.61	*M* = 2.7 *SD* = 0.67	*M* = 2.7 *SD* = 0.70	F = 0.597 *p* = .618

Note. Attitude towards advertiser, general trust in Instagram and general trust in Facebook were all measured on a 5-point Likert scale. For age, attitude towards advertiser, general trust in Instagram and general trust in Facebook a one-way ANOVA (F) was executed (df = 3). Asymptotic differences between groups for gender (df = 3), education level (df = 6), nationality (df = 3) and used device (df = 6) were tested with Chi-Square Tests (X^2).

[3] The classification of education levels into low, medium, and high educated groups were based on information of CBS (2021).

3.7 Analysis

Several analyses were preformed to check the reliability of and possible errors within the findings. First of all, a reliability analysis was executed for each of the measured constructs. For all constructs Cronbach´s alpha was greater than 0.7 (see table 2). Hence, all constructs were reliable and therefore used for further analysis. Then, an outlier analysis was executed to check for possible outliers. This analysis resulted in one outlier response, which was therefore excluded from further analysis. Thereafter, a median split was executed for the continuous variable 'general privacy concern', resulting in a categorical variable with low and high general privacy concern. With an independent sample t-test it was established that there was a significant difference of the mean scores for general privacy concern between these two groups ($t(187) = -20.122$, $p < 0.001$). Then, to test whether there was an asymptotic significance between the four conditions, a Chi-Square test was conducted for gender, nationality, device type and education level. Furthermore, a one-way ANOVA test was conducted for age, general trust in Facebook and attitude towards the advertiser. None of the variables showed an asymptotic significance between conditions. Hence, main results of this study cannot be explained by one of these variables.

Within all conditions, the shown advertisement was displayed on the SNS Facebook. Earlier research indicated that general trust in the SNS could influence perceived privacy risk. It was already established that the mean score on general trust in Facebook did not significantly differ between conditions. However, based on results of earlier research, it could be that general trust in Facebook functioned as a covariate in the research model. Hence, a correlation analysis between general trust in Facebook and perceived privacy control and concern was executed. It appeared that there was a positive correlation between general trust in Facebook and perceived privacy control ($r(187) = .474$, $p < 0.001$). Furthermore, a significant negative correlation was found for general trust in Facebook and perceived privacy concern ($r(187) = -.352$, $p < 0.001$). Because of these findings, it was checked whether this variable functioned as a covariate within the research model (see figure 1). In this case, the analysis of the main results would be a MANCOVA instead of a MANOVA. Results showed less significant results for the MANCOVA in comparison with the MANOVA. However, since there were only small differences, it was decided to exclude general trust in Facebook as a covariate for this research.

4. Results

The model of this research consists of two dependent variables, being perceived privacy concern (PPCCN) and perceived privacy control (PPCTL). Furthermore, it is expected that increase in perceived privacy control will lead to decrease in perceived privacy concern. Therefore, the multivariate generalized linear model (GLM) was used for data analysis. Furthermore, to see whether certain variables had a linear relationship, multiple linear regression analyses were executed. For additional measures, independent sample t-tests were executed to determine whether means were significantly different.

4.1 Manipulation checks

In order to check whether the manipulations for the data collection information nudge and social nudge were seen by participants, a manipulation check was executed at the end of the survey. All participants were asked how sure they were that they saw likes, comments, and information about data collection. After discussing with other researchers, it was determined that 70 percent was taken as the minimum score for being considered sure about seeing a particular nudge. When the participants indicated that they were for 70 percent or more sure that they saw one of the manipulations, a follow-up question was asked regarding the specifics of this manipulation.

For the social nudge, likes and comments were included within the shown advertisement. Most of the participants that saw the social nudge indicated that they were for 70+ percent sure that they saw comments (82.6%). Furthermore, 75.0% of all participants that saw the social nudge remembered correctly that these comments were positive about the advertised product. Regarding the likes, 57.6% of all participants that saw the social nudge were for 70+ percent sure that they saw these likes. Only 6.5% of the participants that saw the social nudge remembered correctly how many likes were shown.

For the data collection information nudge, an expanded information button was shown with a text box that indicated how personal data was collected by Facebook. Of all participants that saw the data collection information nudge, 57.1 % indicated that they were for 70+ percent sure that they saw information about data collection. Furthermore, 14.3% of all participants that saw the data collection information nudge remembered correctly what information was given about data collection. However, multiple studies pointed out that nudges influence people without them being aware of this (Kahneman, 2012; Thaler and Sunstein, 2008). So, it could be argued that the nudges did still, even when participants did not remember seeing it, influenced perceived privacy concern and control. Therefore, the researcher decided to continue the analysis with these manipulations.

4.2 Hypothesis testing

A multivariate general linear model was conducted to see if the presence of a social nudge and a data collection information nudge effected perceived privacy control and perceived privacy concern and to check whether this effect was moderated by general privacy concern. Also, the direct effect of perceived privacy control on perceived privacy concern was examined. Table 4 provides the results of the regression analysis for perceived privacy control on perceived privacy concern. The descriptive statistics table 5 provides the mean and standard deviation for both perceived privacy concern (PPCCN) and perceived privacy control (PPCTL), which have been split by the presence/absence of the social nudge and the data collection information nudge. In addition, also the descriptive statistics of the two dependent variables split by low versus high general privacy concern were given. In table 6, the descriptive statistics of the four different conditions are given. Hence, this table shows the descriptive statistics of the possible interaction effect. Within table 7, the descriptive statistics of the two dependent variables were split by the presence/absence of the social nudge and data collection information nudge and by the possible moderator, being general privacy concern (low versus high). The results of all multivariate tests, including the mean square, F-values, degrees of freedom and P-values, can be found in table 8.

Table 4.

Regression analysis summary for PPCTL predicting PPCCN

Variable	B	95% CI	β	t	p
(Constant)	4.70	[4.35 5.06]		26.12	<0.001
PPCTL	-0.49	[-0.60 -0.32]	-0.42	-6.33	<0.001

Note. R^2adjusted = 0.172. CI = confidence interval for B.

As shown within table 4, perceived privacy control significantly predicted perceived privacy concern scores (β = -0.42, $t(187) = -6.33$, $p < .001$). Perceived privacy control also explained a significant proportion of variance in perceived privacy concern scores (Adjusted $R^2 = .172$, $F(1, 187) = 40.13$, $p < .001$). So, as hypothesized, increase of perceived privacy control (with 1 on 5-point scale) will lead to decrease of perceived privacy concern (with .42 on 5-point scale). Subsequently, hypothesis 1 was accepted.

Table 5.

Descriptive statistics main effects

	Social nudge				**Data collection information nudge**				**General online privacy concern**			
	Yes (n = 92)		No (n = 97)		Yes (n = 91)		No (n = 98)		Low (n = 94)		High (n = 95)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
PPCCN	3.6	0.59	3.6	0.72	3.6	0.66	3.6	0.66	3.2*	0.62	3.9*	0.49
PPCTL	2.5	0.53	2.4	0.66	2.4	0.64	2.5	0.57	2.5*	0.62	2.3*	0.57

Note. Perceived privacy concern (PPCCN) and perceived privacy control (PPCTL) were both measured with a 5-point Likert scale (completely disagree – completely agree). Significant differences are indicated with *.

Table 6.

Descriptive statistics interaction effect

	Condition A (n = 48)		**Condition B (n = 47)**		**Condition C (n = 44)**		**Condition D (n = 50)**	
Social nudge included	Yes		No		Yes		No	
Information nudge included	No		Yes		Yes		No	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
PPCCN	3.6	0.62	3.6	0.74	3.6	0.56	3.6	0.70
PPCTL	2.6*	0.53	2.4	0.74	2.3*	0.52	2.4	0.59

Note. Perceived privacy concern (PPCCN) and perceived privacy control (PPCTL) were both measured with a 5-point Likert scale (completely disagree – completely agree). Significant differences are indicated with *.

Table 7.

Descriptive statistics moderator effects

	Social nudge								**Data collection information nudge**							
	Yes (n = 92)				No (n = 97)				Yes (n = 91)				No (n = 98)			
GPCCN	Low (n = 46)		High (n = 46)		Low (n = 48)		High (n = 49)		Low (n = 46)		High (n = 45)		Low (n = 48)		High (n = 50)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
PPCCN	3.2	0.55	3.9	0.40	3.2	0.68	4.0	0.56	3.2	0.58	4.0	0.49	3.3	0.65	3.9	0.49
PPCTL	2.4	0.50	2.5*	0.58	2.6	0.71	2.1*	0.52	2.5	0.66	2.2	0.58	2.5	0.58	2.4	0.56

Note. Perceived privacy concern (PPCCN) and perceived privacy control (PPCTL) were both measured with a 5-point Likert scale (completely disagree – completely agree). Significant differences are indicated with *.

Results of the MANOVA indicated that there was no significant difference in perceived privacy concern between the absence and presence of the social nudge. Furthermore, also for perceived privacy control there was no significant difference between the absence and presence of the social nudge. Therefore, both hypothesis 2a and hypothesis 2b were rejected. The difference in perceived privacy concern between the absence and presence of the data collection information nudge was insignificant as well. Moreover, the difference in perceived privacy control between the absence and presence of the data collection information nudge was also not significant. Hence, hypothesis 3a and hypothesis 3b were rejected as well.

Table 8

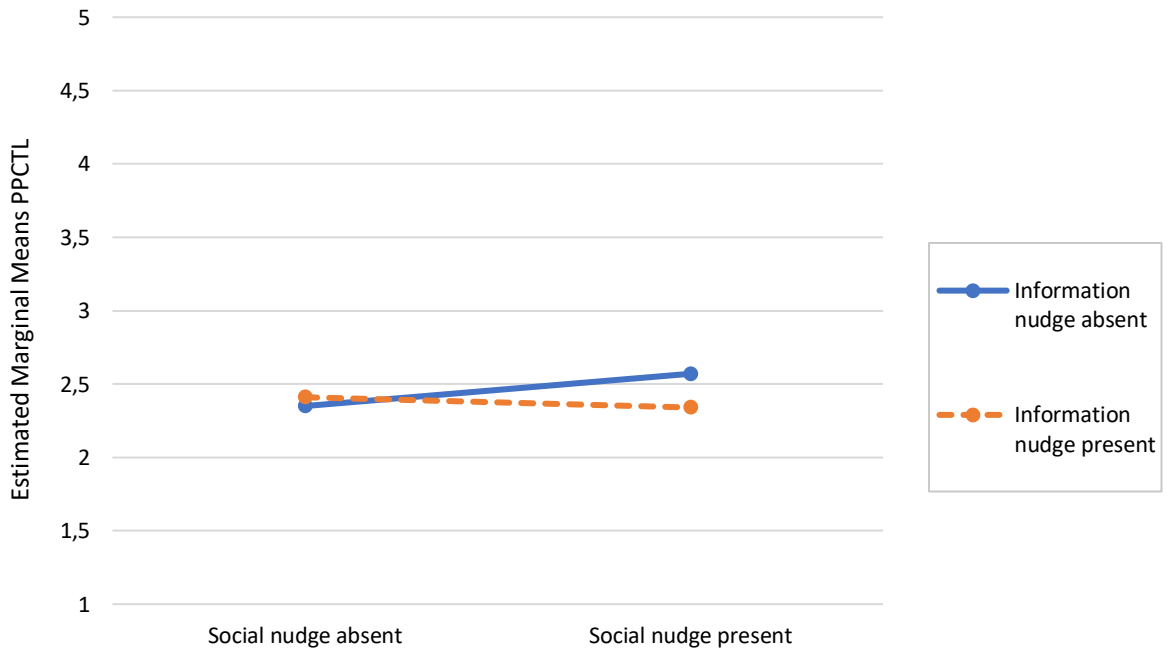
Between-subjects effects

Variable	Items	Mean Square	F	df	p
Social nudge	PPCCN	0.001	0.003	1	.957
	PPCTL	0.259	0.779	1	.379
Data collection information nudge	PPCCN	<0.001	0.001	1	.978
	PPCTL	0.341	1.026	1	.312
General privacy concern	PPCCN	23.85	77.26	1	<.001*
	PPCTL	2.40	7.21	1	.008*
Social nudge X Data collection information nudge	PPCCN	0.256	0.829	1	.364
	PPCTL	0.967	2.909	1	.090**
Social nudge X General privacy concern	PPCCN	0.038	0.122	1	.728
	PPCTL	3.253	9.788	1	.002*
Data collection information nudge X General privacy concern	PPCCN	0.143	0.462	1	.498
	PPCTL	0.564	1.696	1	.194

Note. Significant p-values are indicated with *, marginal significant p-values are indicated with **.

Figure 5.

Interaction effect data collection information nudge and social nudge on perceived privacy control (PPCTL).



MANOVA results indicated that there is no significant interaction effect between the presence of a social nudge and a data collection information nudge on perceived privacy concern. Here for, hypothesis 4a was rejected. However, a marginal significant interaction effect was found for perceived privacy control ($F(1) = 2.909$, $p = .090$). It appeared that perceived privacy control was significantly higher for the social nudge when the information nudge was absent ($M = 2.6$, $SD = 0.53$) than when the information nudge was present ($M = 2.3$, $SD = 0.52$). The measured interaction effect is displayed within figure 5. Since this interaction effect is not the same as the hypothesized interaction effect, hypothesis 4b was rejected as well.

Figure 6

Effect general privacy concern on effect of social nudge on perceived privacy control (PPCTL)

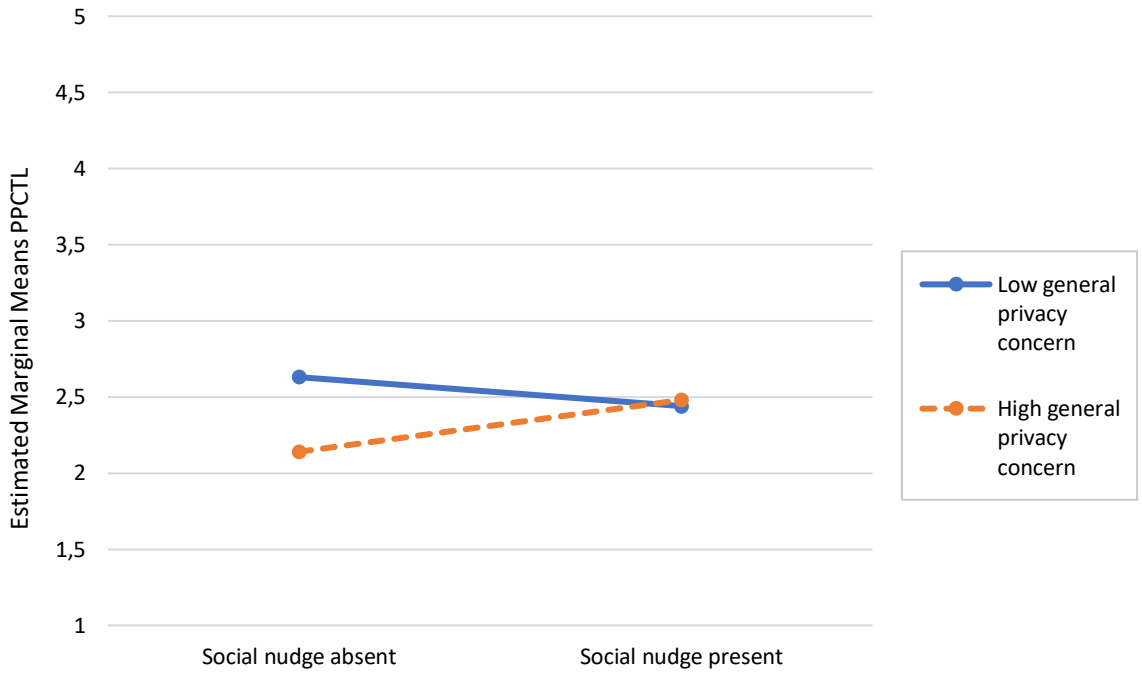
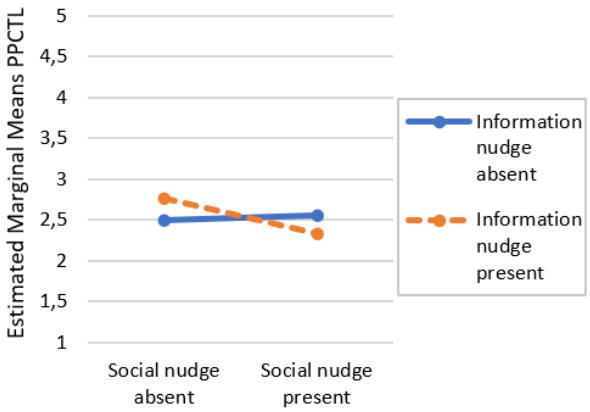


Figure 7.

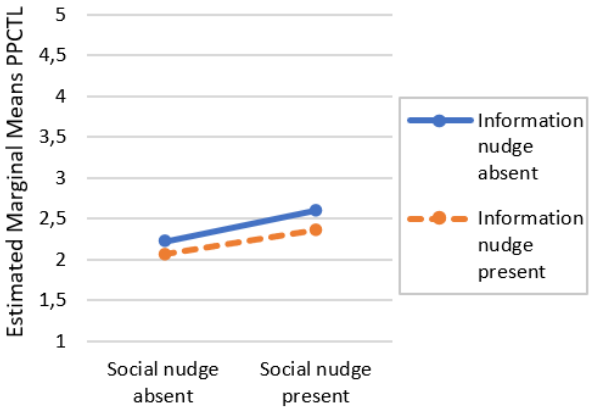
Interaction effect low general privacy concern



Note. This graph shows the interaction effect of the data collection information nudge and the social nudge on perceived privacy control (PPCTL) for participants with low general privacy concern.

Figure 8.

Interaction effect high general privacy concern



Note. This graph shows the interaction effect of the data collection information nudge and the social nudge on perceived privacy control (PPCTL) for participants with high general privacy concern.

Within the MANOVA it was checked whether general privacy concern acted as a moderator for the effect of the nudges on perceived privacy control and perceived privacy concern. First of all, a regression analysis was executed to check whether the moderator had a direct effect on perceived privacy control and perceived privacy concern. A significant direct effect was found for general privacy concern on perceived privacy concern ($t(187) = 10.5$, $p = <0.001$) and perceived privacy control ($t(187) = -3.0$, $p = 0.003$). Participants with low general privacy concern had a lower perceived privacy concern ($M = 3.2$, $SD = 0.62$) than participants with high general privacy concern ($M = 3.9$, $SD = 0.49$). Furthermore, participants with low general privacy concern had a higher perceived privacy control ($M = 2.5$, $SD = 0.62$) than participants with high general privacy concern ($M = 2.3$, $SD = 0.57$).

Hypothesis 5a stated that high general privacy concern of the participant will weaken the effect of the social nudge on perceived privacy concern. Yet, the results of the MANOVA indicated that there was no significant difference in the effect of the social nudge on perceived privacy concern between low and high general privacy concern. Hence, hypothesis 5a was rejected.

The results of the MANOVA did indicate a significant difference in the effect of the social nudge on perceived privacy control between low and high general privacy concern ($F(1) = 9.788$, $p = 0.002$). For participants with a high general privacy concern, perceived privacy control was significantly higher when the social nudge was present ($M = 2.5$, $SD = 0.58$) than when the social nudge was absent ($M = 2.1$, $SD = 0.52$). There was no significant effect of the social nudge on perceived privacy control for participants with a low general privacy concern. The moderation effect is displayed within figure 6. Since this effect is different than hypothesized, hypothesis 5b was rejected as well.

Furthermore, no significant difference was found for the effect of the data collection information nudge on perceived privacy concern between low and high general privacy concern. The MANOVA results indicated that there was also no significant difference in the effect of the data collection information nudge on perceived privacy control between low and high general privacy concern. Because of these findings, hypothesis 5c and 5d were rejected.

Additionally, the three-way interaction of the social nudge*data collection information nudge*general privacy concern on perceived privacy control was analyzed and plotted within figure 7 and 8. This three-way interaction was not suggested within the conceptual model, it gives additional information. Results showed that, for participants with high general privacy concern, the presents of a social nudge had a positive effect on perceived privacy control regardless the presence of the data collection information nudge (see figure 8). When the data collection information nudge was present, perceived privacy control was higher when the social nudge was present ($M = 2.36$, $SD = .65$) than when the social nudge was absent ($M = 2.06$, $SD = .48$). This difference was marginally significant ($t = -1.701$, $p = .099$). However, when the data collection nudge was absent, the difference between the absence and presence of the social nudge for participants with high general privacy concern was significantly positive on perceived privacy control ($t = -2.584$, $p = .013$). In other words, when the data collection nudge was absent, perceived privacy control scores were also higher when the social nudge was present ($M = 2.6$, $SD = .51$) than when the social nudge was absent ($M = 2.21$, $SD = .55$). Furthermore, results of the three-way interaction showed no significant effects of either the data collection information nudge or social nudge on perceived privacy control scores for participants with low general privacy concern (see figure 7). An overview of all hypotheses with the results (accepted/rejected) are given in table 9.

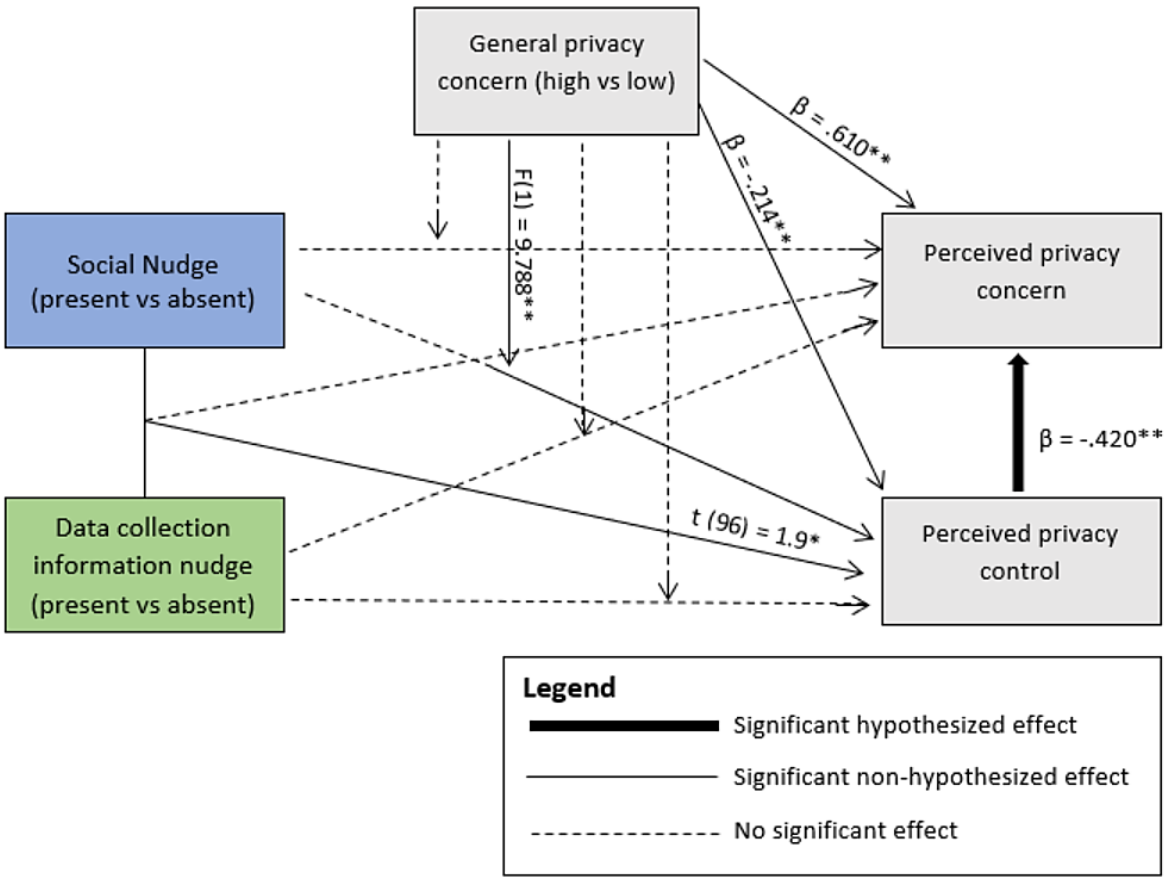
Table 9
Overview results hypotheses

Nr.	Hypothesis	Accepted/Rejected
1	Increase of perceived privacy control will lead to decrease of perceived privacy concern.	Accepted
2a	The presence of a social nudge within a personalized advertisement will have a negative effect on participants' perceived privacy concern	Rejected
2b	The presence of a social nudge within a personalized advertisement will have a positive effect on participants' perceived privacy control	Rejected
3a	The presence of an information nudge regarding personal data collection within a personalized advertisement will have a negative effect on participants' perceived privacy concern.	Rejected
3b	The presence of an information nudge regarding personal data collection within a personalized advertisement will have a positive effect on participants' perceived privacy control.	Rejected
4a	The presence of a social and an information nudge within a personalized advertisement will interact such that this will have a stronger negative effect on participants' perceived privacy concern than when only one of the nudges is present.	Rejected
4b	The presence of a social and an information nudge within a personalized advertisement will interact such that this will have a stronger positive effect on participants' perceived privacy control than when only one of the nudges is present.	Rejected
5a	High general privacy concern of the participant will weaken the negative effect of the social nudge on perceived privacy concern.	Rejected
5b	High general privacy concern of the participant will weaken the positive effect of the social nudge on perceived privacy control.	Rejected
5c	High general privacy concern of the participant will weaken the negative effect of the data collection information nudge on perceived privacy concern.	Rejected
5d	High general privacy concern of the participant will weaken the positive effect of the data collection information nudge on perceived privacy control.	Rejected

4.3 Structural model

The structural model, which is derived from the results, shows different effects than expected within the theoretical model. As shown within table 9, only hypothesis 5 was accepted. This hypothesis stated that an increase of perceived privacy control will lead to decrease of perceived privacy concern (β = -.420, $t(187)$ = -6.3, p <.001). However, during the analysis, significant non-hypothesized effects were found. First of all, high general privacy concern had a significant direct effect on perceived privacy concern (β = .610, $t(187)$ = 10.5, $p < 0.001$) and perceived privacy control (β = -.214, $t(187)$ = -3.0, p = 0.003). Furthermore, high general privacy concern had a significant positive moderating effect on the effect of the social nudge on perceived privacy control ($F(1)$ = 9.8, p = 0.002). Subsequently, it appeared that the social nudge had a significant positive effect on perceived privacy control for participants with a high general privacy concern ($t(93)$ = 3.2, p = 0.002). Finally, results showed that the presence of a social nudge had a marginal significant positive effect on perceived privacy control when there was no data collection information nudge present ($t(96)$ = 1.9, p = 0.066). The structural model of this research can be found in figure 9.

Figure 9
Structural model



Note. **Significant effect (p < .05) *Marginal significant effect (p < .10).

5. Discussion and conclusion

This study was designed to see whether a social nudge and a data collection information nudge effected perceived privacy concern and perceived privacy control with the influence of general privacy concern. Furthermore, the direct effect of perceived privacy control on perceived privacy concern was examined as well. To study this, four manipulations were designed, being personalized advertisements with either one, two or no nudges. After analyzing the results, only one of the eleven hypotheses was accepted. Nonetheless, some interesting non-hypothesized results were found. Within this chapter, all results will be discussed and practical implementations, limitations and recommendations for future research will be given. At the end of this chapter, a general conclusion of this research can be found.

5.1 Perceived privacy concern and control

Results of this research showed that privacy control predicted perceived privacy concern scores of participants. When the perceived privacy control of the participant was higher, the perceived privacy concern was lower. This is in line with earlier research, multiple studies towards personalized advertising found that perceived privacy control has a negative effect on perceived privacy concern (Gironda & Korgaonkar, 2018; Baek & Morimoto, 2012). Furthermore, Eastin, Brinson, Doorey and Wilcox (2016) stated that participants found control over their personal data vital for a satisfactory feeling about personal data sharing.

No effects were found for the nudges on perceived privacy concern. However, results did show effects of the social nudge on perceived privacy control (see paragraph 5.2). Since perceived privacy control predicts perceived privacy concern, it could be argued that there is an indirect effect of the social nudge on perceived privacy concern. Within this chapter, multiple arguments are given of why there was no direct effect of the nudges on perceived privacy concern. Nonetheless, it is also possible that perceived privacy concern can only be influenced by nudges via perceived privacy control.

5.2 Effects of the social nudge

The social nudge within this research had no direct effect on perceived privacy concern and perceived privacy control. Based on earlier research, it was expected that positive social influence by likes and comments would decrease perceived privacy concern and increase perceived privacy control. This expectation was partly based on research of Cialdini (2007), which showed that people's perceptions could be altered by social influence. Furthermore, as stated by Eigenbrod and Janson (2018), a social nudge would suggest trust, which could directly decrease individuals' privacy concerns. Furthermore, results of earlier research showed that a social nudge positively influences perceived privacy control (Zhang & Xu, 2016).

In contrast with earlier findings, results of this research did not show a direct effect of the social nudge on perceived privacy concern and control. This could possibly be explained by the fact that the social nudge was not noticed by all participants. Most participants that saw the social nudge were for 70+ percent sure that they saw comments (82.6%). However, only 57.6% of all participants that saw the social nudge indicated that they were for 70+ percent sure that they saw likes. Furthermore, only 6.5% of all participants that saw the social nudge remembered correctly how many likes they saw.

It could be that because of overseeing likes, participants did not find positive social proof. As supported by exemplification theory (Zillmann, 2002), it is possible that people perceived the comments as more vivid than the number of likes. Also, comments give more persuasive content to think about. Hence, it could be that likes failed to get people's attention, which also explains why a large part of the participants did not remember seeing likes. Since the comments only showed two positive minded people (versus 495 positive reactions by likes), it is possible that participants found negative social proof that suppressed decrease of perceived privacy concern and increase of perceived privacy control (Das, Kramer, Dabbish & Hong, 2015). This is in line with findings of Cialdini (2007), who stated that social proof becomes more effective when more examples of like-minded others are found.

5.3 Effects of the data collection information nudge

The data collection information nudge within this research had no direct effect on perceived privacy concern and perceived privacy control. It was expected, based on results of earlier research, that the display of information about data collection would decrease perceived privacy concern and increase perceived privacy control. According to several studies, users appreciate transparency in data collection and it causes lower feelings of vulnerability and perceived privacy concern (Eslami et al., 2018; Agguire et al., 2015; Dinev & Hart, 2004). Furthermore, Prince (2018) found that transparency of data collection exerts the perceived privacy control of customers. Results of another research showed that cues suggesting overt data collection positively influenced perceived privacy control (Chen & Sundar, 2018).

Contradictory to these earlier studies, no direct effect for the data collection information nudge (which provided data transparency) on perceived privacy concern and control was found. This non-effect could possibly partly be explained by the fact that not all participants were sure whether they saw information about data collection. 57.1% of all participants that saw the data collection nudge were for 70+ percent sure that they saw information about data collection. Only 14.3% of the participants that saw the data collection nudge remembered correctly which information about the data collection was given. However, since nudges are built on the concept of heuristics (i.e. short-cuts that are used to make decisions) it could be argued that, even when the participant did not remember seeing the nudge, this nudge did (unconsciously) affect perceived privacy concern and control. Another possible explanation for this difference is that the transparency in data collection could have created awareness and/or distrust about privacy use by social media. Of all participants that saw the data collection information nudge, 23.1% thought that the aim of this research was to create awareness for the use of private information by social media or the power of social media. Of the participants that were not exposed to the data collection information nudge, only 14.3% indicated this kind of aim.

5.4 Interaction between the social and data collection information nudge

The results of this research showed interaction between the social and data collection information nudge on perceived privacy control. It appeared that the social nudge only caused an increase for perceived privacy control when there was no data collection information nudge present. No interaction was found for the effect of the nudges on perceived privacy concern. Based on earlier research, it was expected that the nudges would interact such that the effect would be stronger. In other words, it was expected that the combination of the social nudge and the data collection information nudge would cause more decrease in perceived privacy concern and more increase in perceived privacy control than when only one of the nudges was present. This expectation was based on findings of multiple studies, indicating that (positive) social influence affects perceived information valence and credibility (Jessen & Jørgensen, 2012; Metzger, Flanagin & Medders, 2010; Flanagin & Metzger, 2013). Furthermore, results of a research of Winter, Metzger and Flanagin (2016) showed that articles with a social nudge were read for a longer time. So, it was expected that by including a social nudge, the data collection information nudge would be read for a longer time and would be perceived as more credible.

The results of the interaction between the social nudge and data collection information nudge within this research are not as expected. The combination of the social and data collection information nudge did not affect perceived privacy concern. A possible explanation of this is that a remarkable proportion of the participants who were exposed to the combination of nudges was not sure whether they saw the nudges. Of the 44 participants that saw both nudges, only 47.7% indicated to be 70+ percent sure that they saw likes. Furthermore, only one participant (2.3%) remembered correctly how many likes he/she had seen. Regarding the comments, 72,7% of all participants that saw both nudges was for 70+ percent sure that they had seen comments. Moreover, 68.2% remembered correctly that the comments were positive towards the advertised product. Then, the data collection information nudge, of the 44 participants that saw both nudges, 17 (38.6%) were for 70+ percent sure that they saw information about data collection. Furthermore, 11% of all participants that saw both nudges

remembered correctly which information about data collection was given. So, however most participants that saw both nudges remembered seeing comments, more than half of the participant was not sure whether they saw likes and/or information about data collection. This can be an explanation for the non-effect of the nudges on perceived privacy concern.

Within the results of this research, an interaction effect was found for the social and data collection information nudge on perceived privacy control. However, the results of this interaction are not as expected. It appeared that the social nudge only had a positive effect on perceived privacy control when there was no data collection nudge present. A possible explanation of this is already mentioned above, being the fact that participants that saw the data collection information nudge did more often argue that the aim of this research was to create awareness for the use of private information by social media or the power of social media. Possibly, the information about data collection created awareness or distrust in the data collection of Facebook. In this case, the nudge created the opposite effect and did not interact as expected with the social nudge.

5.5 The effect of general privacy concern

General privacy concern had a direct effect on outcomes of perceived privacy concern and perceived privacy control. It appeared that participant with high general privacy concern had also a higher perceived privacy concern than participants with low general privacy concern. Furthermore, participants with high general privacy concern had a lower perceived privacy control than participants with low general privacy concern. However, no difference was found for the effect of the data collection information nudge on either perceived privacy concern or perceived privacy control between low and high general privacy concern. There was also no difference found for the effect of the social nudge on perceived privacy concern between high and low general privacy concern. However, a difference was found for the effect of the social nudge on perceived privacy control between high and low general privacy concern. It appeared that the social nudge only increased perceived privacy control when the participant had a high general privacy concern. No effect was found of the social nudge on perceived privacy control for participant with low general privacy concern.

Based on earlier research, it was expected that high general privacy concern would negatively influence the effect of the nudges on perceived privacy concern and control. Earlier research found that there are individuals with a higher need for privacy than others (i.e. high general privacy concern) and that this increases perceived privacy risk, also when certain cues were presented (Kehr, Kowatsch, Wentzels & Fleisch, 2015). In contrast, results of this research showed that for the social nudge, the positive effect on perceived privacy control was only present when participant had a high general privacy concern. And no differences were found for the effect of the social nudge on perceived privacy concern or the data collection information nudge on both perceived privacy concern and control between high and low general privacy concern. However, in line with earlier research, direct effects were found for general privacy concern on perceived privacy concern and perceived privacy control.

Also in this case, it could be that the expected effect failed to materialize because a substantial part of the participants was not sure whether they saw certain cues. However, an opposite influence of general privacy concern was found for the effect of the social nudge on perceived privacy control. The social nudge positively effected the perceived privacy control for participants with high general privacy concern. This can possibly be explained by research on mood and cognitive processing. Research within this subject found that cognitive capacity for information processing is higher when people are in a negative mood. As a result, it is possible that people with a negative mood are more tended to pay attention to persuasive content (Mackie & Worth, 1991). When analyzing the manipulation checks, it is possible that this has been the case. It appeared that participants with high general privacy concern (i.e. ‘negative’ about privacy issues) remembered more often correctly the number of likes that they saw (10.9%) than participants with low general privacy concern (2.2%). So, possibly, because participants with high general privacy concern processed the social information more extensively than participants with low general privacy concern, there has been an effect on perceived privacy control for this first group.

5.6 Practical implications

After analyzing the results, some interesting practical implications for marketeers and other advertisers can be found. Personalized advertisements can be beneficial for both firms as customers. However, for creating personalized ads, personal information about customers is needed. As a company or marketeer, you do not want that customers backlash you for overstepping the boundaries of private information collection. Therefore, it is important that customers feel that they have control over their privacy and that a personalized advertisement does not increase privacy concerns. This study showed that including a social nudge within an advertisement can positively influence the perceived privacy control of the customer. No direct effects for nudges on perceived privacy concern were found. However, it appeared that by increasing perceived privacy control, perceived privacy concern decreases. It is important for advertisers to realize how social influence could possibly affect perceived privacy control of their customers.

The results of this research showed that, for customers with high general privacy concern, positive social influence (by likes and comments) results in increase of perceived privacy control. It was also found that by increasing perceived privacy control, perceived privacy concern was decreased. According to earlier research, lower perceived privacy concern results in higher trust beliefs and lower risk beliefs in online firms (Kumar, Mohan & Holwczak, 2008). Furthermore, Zimmer, Arsal, Al-Marzouq, Moore and Grover (2010) found that a higher perceived privacy concern reduces information disclosure. For personalized advertisements to be effective, it is important that customers disclose their personal information. So, to enhance trust in the company and to increase information disclosure by customers, it is necessary to decrease perceived privacy concern. According to results of this research, companies can do this by including social nudges to increase perceived privacy control (of customers with high general privacy concern).

Another important practical implication of this research arises from the fact that providing information about data collection had the opposite effect. The social nudge only increased perceived privacy control when the data collection information nudge was absent. It appeared that for some people, receiving information about personal data collection results in awareness and distrust in personal data collection by social networking sites. Including information about data collection had no effect on either perceived privacy concern or control. Since it did had a negative effect on the results for the social nudge, results of this research dissuade giving information about data collection within an advertisement.

5.7 Theoretical implications

Based on examined literature (see paragraph 2.2 and 2.3), it was expected that both the social nudge as the data collection information nudge would directly decrease perceived privacy concern. However, results of this research suggest otherwise. No direct effects of either the social nudge or the data collection information nudge were found. On the other hand, in line with earlier research, a direct effect of perceived privacy control on perceived privacy concern was found. Therefore, this research gives a possible new insight for influencing perceived privacy concern by the use of nudges within the context of personalized advertisements. According to results of this research, social and informational nudges can only decrease perceived privacy concern by increasing perceived privacy control.

Moreover, another new insight that was provided by the results of this research, is that the social nudge only positively influenced perceived privacy control when the participants had high general privacy concern. The researcher expects that this can be explained by research in the field of mood and cognitive processing. It is possible that people with high general privacy concern (i.e. within a negative mood regarding privacy issues) are more tended to pay attention to the social nudge (being likes and positive comments). Furthermore, it appeared that the social nudge did had an effect for all participants when the data collection information nudge was absent. It seemed that the information about data collection caused awareness and distrust in personal data collection for some participants. So, this research contributed to the theoretical knowledge about the effect of nudges on perceived privacy concern and control in the field of personalized advertisements.

5.8 Limitations and recommendations for future research

Although results of this research provided new insights into the effect of social and informational nudges on perceived privacy concern and control, some limitations should be taken into account. First of all, especially for the social nudge, there are lots of possibilities regarding the design of this nudge. Based on results of the pre-test, likes and comments were used as social nudge within this research. However, a considerable number of participants that were exposed to the social nudge were not sure whether they had seen likes within the advertisement. Furthermore, only a few people remembered correctly how many likes were shown. Because of this, it could be that the effect of the social nudge was influenced. Based on exemplification theory (Zillmann, 2002), the researcher would recommend future research to concentrate more on comments for social proof, since this information is considered more vivid than likes. Furthermore, when likes are included, they should be more noticeable. This could possibly be done by increasing the size of the font or by changing the color. On the other hand, it could be that likes as a social nudge did (unconsciously) influence participants. Future research should examine whether people need to be able to recall a nudge for it to be effective.

Second, the data collection information nudge caused awareness and distrust in personal data collection for some participants. Even though the given information about data collection was pre-tested and seen as acceptable by participants of the pre-test, it could be that a different text or more subtle nudge would have given another effect. Because of this possibility, the researcher would recommend a more extensive preliminary study towards possible information nudges regarding data collection for future research.

Moreover, based on results of the pre-test, a book was chosen as advertised product. Although all pre-test participants rated this product as at least somewhat attractive, it could be that some participants were not interested in this product. Especially with personalized advertisements, it is important that the advertised product is in line with the interests of the customer. Even though the researcher tried to resolve this problem by providing a realistic scenario to the participant, it could be that the results of this research are influenced by the fact that only one product was given. For future research, it is recommended to include multiple products within the conditions, to see whether the results differ. Another possibility for future research is to include a question regarding the attractiveness of the advertised product for the participant. This variable could than be taken into account during the analysis of the results.

Furthermore, more females (70.9%) than males (29.1%) participated in this research, almost all participants were of Dutch nationality (99.5%) and most participants had a middle (41.5%) or high (54.3%) education level. This influences the generalizability of the results. For future research, it is recommended to equal the distribution between male and female and educational levels and to include multiple nationalities. However, by executing multiple tests it was established that gender, nationality, device type, education level, age, and scores for general trust in Facebook and attitude towards the advertiser of participants were equally divided among the four conditions. Therefore, these factors could not have influenced the main results of this research.

5.9 Conclusion

This research was executed to see whether a social nudge and a data collection information nudge had an effect on perceived privacy concern and perceived privacy control in the context of personalized advertisements and if this effect was influenced by general privacy concern. The results of this research contributed to the theoretical knowledge about the effect of nudges within the context of personalized advertisements. Furthermore, the results contributed to the practical field by giving insights of how perceived privacy concern can be decreased, resulting in more trust in the online firm and greater willingness of the customer to disclose personal information. Thus, resulting in more effective personalized advertisements that are beneficial for both firm and customer.

This research was conducted with a 2 (social nudge vs. no social nudge) x 2 (data collection information nudge vs. no data collection information nudge) between-subject design. The four conditions consisted of personalized advertisements with either a social nudge, a data collection

information nudge, no nudge, or both nudges. An online questionnaire was designed with questions regarding general privacy concern, online shopping enjoyment, general trust in Facebook and Instagram, perceived privacy concern, perceived privacy control, attitude towards the advertiser and demographics. Manipulation checks were executed to see whether the participant remembered seeing the nudge(s) within the advertisement.

In line with previous research, results showed that perceived privacy control directly affected perceived privacy concern. When perceived privacy control was increased, perceived privacy concern decreased. However, all other results of this research where not in line with results of examined research. No direct effect was found for either the social nudge or the data collection information nudge on perceived privacy concern and perceived privacy control. The results of this research did show an interaction effect, but this effect was not as expected. It appeared that the social nudge had a positive effect on perceived privacy control when the data collection information nudge was absent. Furthermore, general privacy concern directly affected perceived privacy concern and control. However, no difference was found between the effect of the data collection nudge on either perceived privacy concern or control between high and low general privacy concern. Also for the effect of the social nudge on perceived privacy concern, no difference was found between high and low general privacy concern. In contrast, general privacy concern did influence the effect of the social nudge on perceived privacy control. Results showed that the social nudge had only a positive effect on perceived privacy control when the participant had high general privacy concern.

To conclude, in order to decrease perceived privacy concern, perceived privacy control should be increased. According to the results of this research, this can be done by including a social nudge within the personalized advertisement. This nudge only positively effects perceived privacy control when there is no data collection information nudge present. Furthermore, it appeared that general privacy concern influences the effect of the social nudge. The positive effect of the social nudge on perceived privacy control was only present for participants with high general privacy concern.

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Appendices

Appendix A. Stimulus materials

Figure A1
Advertisement A contains social nudge.

Figure A2

Advertisement B contains data collection information nudge.

Figure A3

Advertisement C contains social nudge and data collection information nudge.

Figure A4

Advertisement D contains no nudge (control condition).

Appendix B. Measurements

Table B1.
Constructs main research

Construct	Items	Cronbach's alpha	Derived from
Perceived privacy concern	1. I am concerned about providing personal information to Facebook because of what others do with it. 2. I am concerned that Facebook has too much information about me. 3. I am concerned about providing personal information to Facebook because it could be used in a way I did not foresee. 4. am concerned about providing personal information to Facebook because it could be used in a way I did not foresee. 5. I am concerned that the information I submit to Facebook could be misused. 6. I am concerned that others can find private and personal information about me from Facebook. 7. It bothers me that Facebook is able to track information about me. (r) 8. It bothers me that Facebook is able to access information about me. (r)	.878	Bleier and Eisenbeiss, 2015; Xu, Dinev, Smith and Hart, 2011
Perceived privacy control	1. I believe I have control over who can get access to my personal information collected by Facebook. 2. I think I have control over what personal information is released by Facebook. 3. I believe I have control over how personal information is used by Facebook. 4. I believe I can control my personal information provided to Facebook. 5. I believe that I have control over who can access my personal information that I post on Facebook.* 6. I do not think that I have control over how Facebook uses my personal information. (r) 7. I do not believe that I have access to information collected by Facebook. (r) 8. I do not believe that I have the ability to edit the personal information that was collected by Facebook. (r)	.822	Xu, Dinev, Smith and Hart, 2011; Zlatolas, Welzer, Hericko and Hölbl, 2015 ; Phelps, Nowak and Ferrell, 2000

* This item was accidently copied from item 4. Hence, this item was deleted for the analysis. Displayed Cronbach's alpha was based on the construct without this item.

Table B1. (continued)

Construct	Items	Cronbach's alpha	Derived from
General online privacy concern	1. Compared to others, I am more sensitive about the way online companies handle my personal information. 2. To me, it is the most important thing to keep my online information private. 3. Compared to others, I tend to be more concerned about threats to my online information privacy. 4. I am concerned about threats to my online personal privacy today. 5. To me, it is the most important thing to keep my privacy intact from online companies.	.819	Xu, Dinev, Smith and Hart, 2011; Malhotra, Kim and Agarwal, 2004
Online shopping enjoyment	1. I enjoy browsing for things even if I cannot buy them yet. 2. I enjoy visiting new and interesting online shops. 3. Online shopping is generally a lot of fun for me. 4. I often visit webshops just for something to do, rather than to buy something specific. 5. I consider online shopping a big hassle. (r)	.756	Dawson, Scott, Bloch and Ridgway, 2002
General trust in Facebook	1. Facebook gives the impression that it keeps promises and commitments. 2. Facebook is trustworthy. 3. I believe that Facebook has my best interests in mind. 4. I can count on Facebook to protect my privacy. 5. I can count on Facebook to protect my personal information from unauthorized use. 6. Facebook can be relied on to keep its promises.	.880	Szymczak, Kücükbalaban, Lemanski, Knuth and Schmidt, 2016; Fogel and Nehmad, 2009
General trust in Instagram	1. Instagram gives the impression that it keeps promises and commitments. 2. Instagram is trustworthy. 3. I believe that Instagram has my best interests in mind. 4. I can count on Facebook to protect my privacy. 5. I can count on Facebook to protect my personal information from unauthorized use. 6. Facebook can be relied on to keep its promises.	.893	Szymczak, Kücükbalaban, Lemanski, Knuth and Schmidt, 2016; Fogel and Nehmad, 2009
Attitude towards advertiser	1. Bad/good 2. Unpleasant/pleasant 3. Unfavorable/favorable 4. Negative/positive 5. Not reputable / reputable.	.909	Simpson, Horton and Brown, 1996

Note. (r) stands for 'reverse-coded'.

Appendix C. Pre-test

Consulted literature

Table C1.
Consulted literature for the design of pre-test materials.

Design	Source
Social 1.	Del Guidice, K. (2010). Trust on the web: The impact of social consensus on information credibility. *Electronic Theses and Dissertations, 4273*
Social 2.	Coventry, L. M., Jeske, D., Blythe, J. M., Turland, J., & Briggs, P. (2016). Personality and social framing in privacy decision-making: A study on cookie acceptance. *Frontiers in psychology, 7*, 1341.
Social 3.	Li, Y. M., Lin, L., & Chiu, S. W. (2014). Enhancing targeted advertising with social context endorsement. *International Journal of Electronic Commerce*, *19*(1), 99-128.
Social 4.	Eigenbrod, L., & Janson, A. (2018). How digital nudges influence consumers–Experimental investigation in the context of retargeting. *Research-in-Progress Papers, 50*.
Social 5.	Bhattacharyya, S., & Bose, I. (2020). S-commerce: Influence of Facebook likes on purchases and recommendations on a linked e-commerce site. *Decision Support Systems*, *138*, 113383.
Info 1.	Aguirre, E., Mahr, D., Grewal, D., de Ruyter, K., & Wetzels, M. (2015). Unraveling the personalization paradox: The effect of information collection and trust-building strategies on online advertisement effectiveness. *Journal of retailing*, *91*(1), 34-49.
Info 2.	Kim, T., Barasz, K., & John, L. K. (2019). Why am I seeing this ad? The effect of ad transparency on ad effectiveness. *Journal of Consumer Research*, *45*(5), 906-932.
Info 3.	Chen, T. W., & Sundar, S. S. (2018). This app would like to use your current location to better serve you: Importance of user assent and system transparency in personalized mobile services. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, *537*, 1-13
Scenario 1 and 2	Donis Arriaza, S. G. (2020). *What are you offering me?: Measuring click-through intentions when offering incentives* (Master's thesis, University of Twente).
Scenario 3 and 4	Gironda, J. T., & Korgaonkar, P. K. (2018). iSpy? Tailored versus invasive ads and consumers' perceptions of personalized advertising. *Electronic Commerce Research and Applications*, *29*, 64-77.

Pre-test material

Figure C1

Pre-tested advertisements with a social nudge.

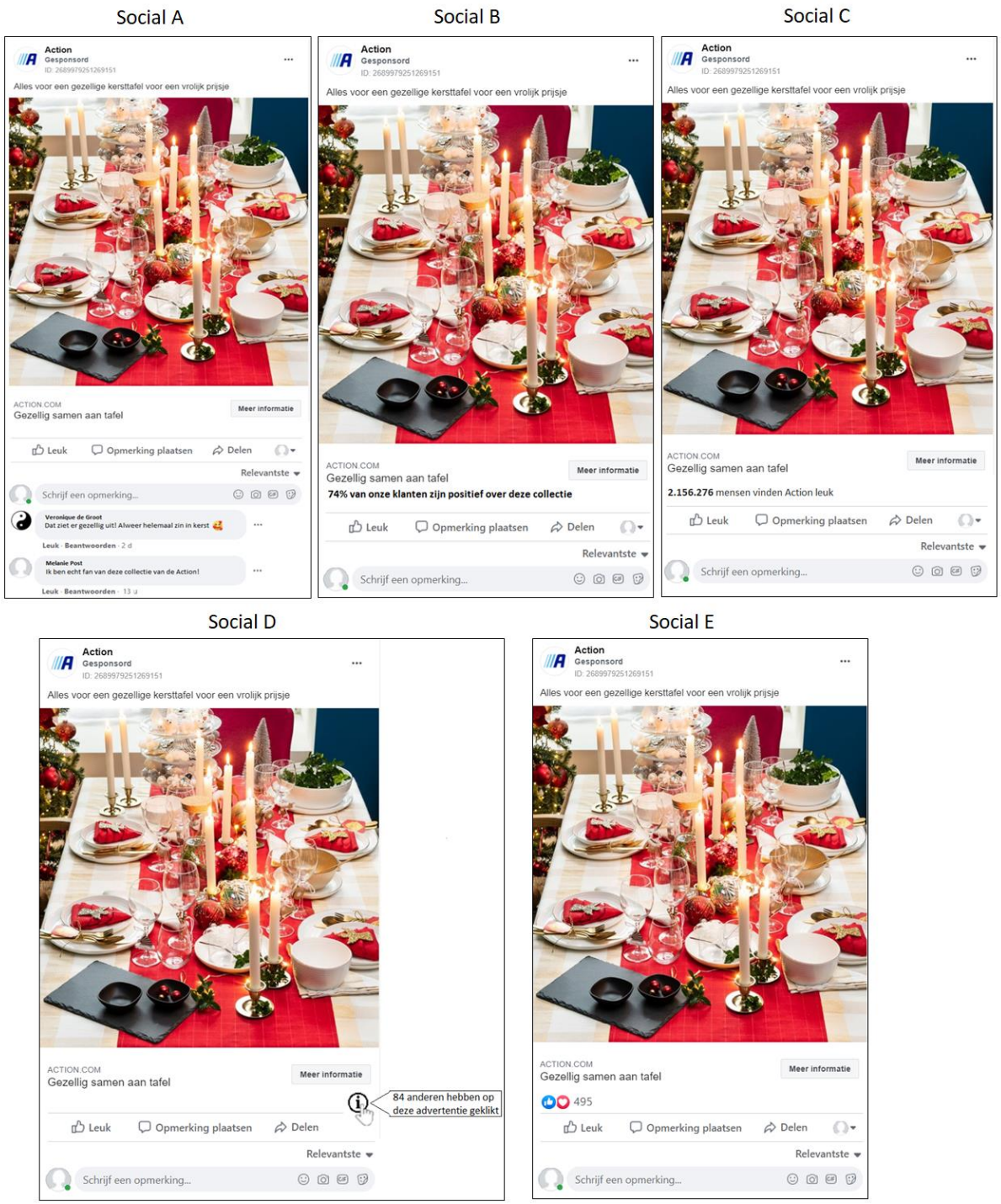
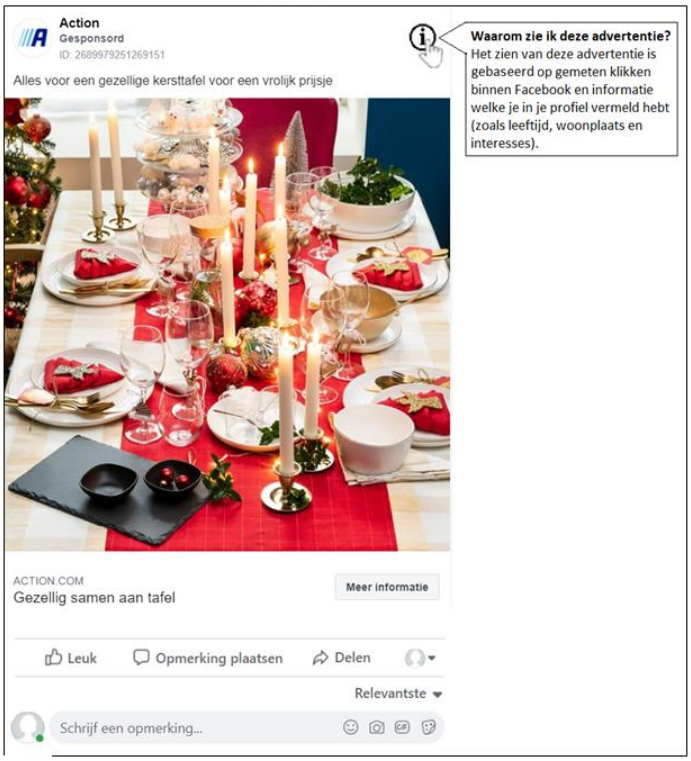


Figure C2

Pre-tested advertisements with data collection information nudge.

Info A

Info B



Info C

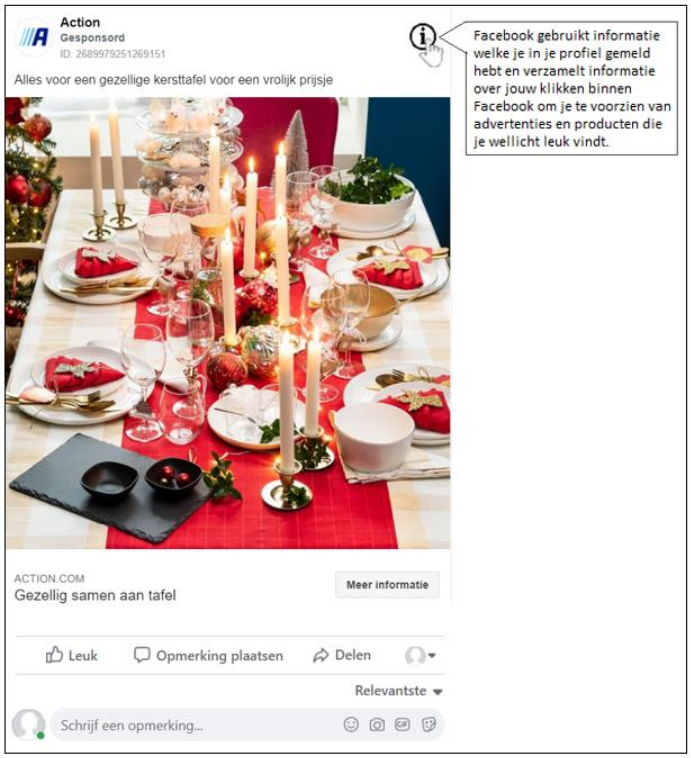


Figure C3
Pre-tested product groups.

Productgroep A.

Planten

Zoals bijvoorbeeld deze kamerplanten

Productgroep B.

Gezelschapsspellen

Zoals bijvoorbeeld deze bordspellen

Productgroep C.

Boeken

Zoals bijvoorbeeld deze spannende boeken

Figure C4
Pre-tested advertisers.

Figure C5

Pre-tested scenarios.

Scenario A

Stel je voor dat je tante volgende week jarig is. Je hebt een goede band met je tante en weet dat ze erg van planten/boeken/gezelschapsspellen houdt. Toen je een paar weken geleden bij haar op visite was, vertelde ze je dat ze graag een nieuw(e) kamerplant/spannend boek/bordspel wilde. **Je overlegt met je zus en jullie besluiten om dit samen cadeau te geven.**

Even later scrol je door je tijdlijn op Facebook en **ziet dat je tante een winactie voor een kamerplant/boek/bordspel heeft gedeeld**. Je besluit even op haar Facebookpagina te kijken en ziet dat ze geïnteresseerd is in verschillende aanbieders van kamerplanten/boeken/bordspellen. Je klikt verschillende van deze pagina's aan om hier eens rond te kijken voor een geschikt cadeau. **Ook lees je de reviews van klanten over de voor- en nadelen van de verschillende kamerplanten/boeken/bordspellen. De twee meest interessante aanbieders like je zodat je deze later terug kan vinden.** Je hebt al wat leuke ideeën opgedaan en besluit dat je even gaat overleggen met je zus wat de beste optie is.

Diezelfde avond scrol je weer door je tijdlijn op Facebook en je ziet de volgende advertentie.

Scenario B

Stel je voor dat je tante volgende week jarig is. Je hebt een goede band met je tante en weet dat ze erg van planten/boeken/gezelschapsspellen houdt. Toen je een paar weken geleden bij haar op visite was, vertelde ze je dat ze graag een nieuw(e) kamerplant/spannend boek/bordspel wilde. **Daarom besluit je dit als cadeau te willen geven.**

Even later scrol door je tijdlijn op Facebook **en ziet dat je tante een winactie voor een kamerplant/boek/bordspel heeft gedeeld.** Je besluit even op haar Facebookpagina te kijken en ziet dat ze geïnteresseerd is in verschillende aanbieders van kamerplanten/boeken/bordspellen. Je klikt verschillende van deze pagina's aan om hier eens rond te kijken voor een geschikt cadeau. **Ook lees je de reviews van klanten over de voor- en nadelen van de verschillende kamerplanten/boeken/bordspellen. De twee meest interessante aanbieders like je zodat je deze later terug kan vinden**. Je wil namelijk nog even nadenken over wat de beste optie is.

Diezelfde avond scrol je weer door je tijdlijn op Facebook en je ziet de volgende advertentie.

Scenario C

Stel je voor dat je tante volgende week jarig is. Je hebt een goede band met je tante en weet dat ze erg van planten/boeken/gezelschapsspellen houdt. Toen je een paar weken geleden bij haar op visite was, vertelde ze je dat ze graag een nieuw(e) kamerplant/spannend boek/bordspel wilde. **Je overlegt met je zus en jullie besluiten om dit samen cadeau te geven.**

Om een idee te krijgen van welk type kamerplant/boek/bordspel je tante leuk vindt, besluit je even op haar Facebookpagina te kijken. Je ziet dat ze verschillende aanbieders van planten/boeken/gezelschapsspellen leuk vindt en je klikt enkele van deze pagina's aan om ze te bekijken. Op deze pagina's zie je verschillende posts over nieuwe kamerplanten/spannende boeken/bordspellen. **Je besluit om in de chat van één van deze pagina's een vraag te stellen over de voor- en nadelen van het bordspel / de plant / het spannende boek dat je gezien hebt. Je liket deze pagina, de aanbieder antwoordt** en je besluit om nog even met je zus te overleggen of dit een goede optie is.

's Avonds log je opnieuw in op Facebook en je ziet de volgende advertentie voorbij komen.

Scenario D

Stel je voor dat je tante volgende week jarig is. Je hebt een goede band met je tante en weet dat ze erg van planten/boeken/gezelschapsspellen houdt. Toen je een paar weken geleden bij haar op visite was, vertelde ze je dat ze graag een nieuw(e) kamerplant/spannend boek/bordspel wilde. **Daarom besluit je dit als cadeau te willen geven.**

Om een idee te krijgen van welk type kamerplant/boek /bordspel je tante leuk vindt, besluit je even op haar Facebookpagina te kijken. Je ziet dat ze verschillende aanbieders van planten/boeken/gezelschapsspellen leuk vindt en je klikt enkele van deze pagina's aan om ze te bekijken. Op deze pagina's zie je verschillende posts over nieuwe kamerplanten/spannende boeken/bordspellen. **Je besluit om in de chat van één van deze pagina's een vraag te stellen over de voor- en nadelen van het bordspel / de plant / het spannende boek dat je gezien hebt. Je liket deze pagina, de aanbieder antwoordt** en je besluit nog even na te denken over of dit een goede optie is.

's Avonds log je opnieuw in op Facebook en je ziet de volgende advertentie voorbij komen.

Results pre-test

First of all, the results of the advertisements with a social nudge. Social A received the highest mean score, but had also the highest standard deviation (*M* = 26.00, *SD* = 15.30). The advertisement with the second highest mean score was social C. However, also for this advertisement, the standard deviation was relatively high (*M* = 24.40, *SD* = 14.26). On the third place, regarding the mean score, was social E (*M* = 21.00, *SD* = 9.17). Then, social B (*M* = 20.60, *SD* = 5.04) and at last social D (*M* = 8.00, *SD* = 6.78). These results, and the reason of the high standard deviation, were discussed during the focus group session. It was noteworthy that for social A, female respondents gave relatively high scores (*M* = 38.33, *SD* = 2.36) and male respondents gave low scores (*M* = 7.50, *SD* = 2.50). The researcher asked whether this was the case because there were only females reacting on the post. The male respondents stated that this was not why they rated this advertisement low. They stated that there were only two comments and for the other advertisements they saw high numbers of people liking the advertisement or the company. However, female respondents stated that they trusted comments more than likes. They had the feeling that likes could be easily bought. Regarding the other two advertisements, one participant stated that he made an error with the score. He intended to give 50 points to social E, that was now rated with 10 points, instead of social C. This explained the high standard deviation for both advertisements. New mean scores gave a new ranking, social E scored higher than social C. Since male respondents gave the highest scores for social E and female respondents preferred social A, it was decided to combine the two social influences. All participants agreed that this would give the feeling that a relatively large amount of people is positive about the advertisement.

For the advertisements with a data collection information nudge, results showed the same and highest mean scores for info B (*M* = 38.00, *SD* = 14.70) and info C (*M* = 38.00, *SD* = 11.66). Info A had the lowest mean score, but also the highest standard deviation (*M* = 24.00, *SD* = 14.97). To understand these results and to make a choice for the main research, the researcher asked for an explanation by each participant. After the first respondent explained her choice for advertisement C, respondents that gave a (slightly) higher score to B also came back to that. It appeared more clear by the explanation within advertisement C that likes where also taken into account. Respondents stated that it was annoying when advertisements were shown because he or she clicked, maybe only once, on something. Participants could understand and appreciate that an advertisement was shown after they liked some page or post.

Then, the results of the product groups. First of all, the results on the statement “I think this product group is a realistic product group for finding a gift for an aunt”. For this statement, the highest mean score was for product group A (*M* = 50.00, *SD* = 8.94), second was product group C (*M* = 32.00, *SD* = 12.88) and the lowest mean rating was for product group B (*M* = 18.00, *SD* = 9.27). For the next statement, there was a clear distinction between the opinion of male respondents and the opinion of female respondents. The statement was: “I find this product group attractive, an advertisement for a product within the product group would appeal to me”. For male respondents, product group B (boardgames) scored the highest (*M* = 75.00, *SD* = 5.00), Product group C (books) were rated as somewhat attractive (*M = 20.00*, *SD =* 0.00). By far the lowest score was given to product group A (plants) (*M* = 5.00, *SD* = 5.00). For female respondents, this product group (plants) was rated highest (*M* = 45.00, *SD* = 17.80). Product group C (books) was rated second best (*M* = 28.33, *SD* = 8.50) and the lowest mean score was for board games (*M* = 26.67, *SD* = 18.41). Since product group C (books) was (somewhat) attractive for both male and female respondent and rated as a proper gift for an aunt, the researcher decided that this would be the best fitting product group for the main research. Participant agreed to this during the focus group session. The researcher asked which genre would be the best fitting according to the participants. All participants agreed that the shown genre (literary thriller) would be the best fitting genre to be (somewhat) attractive for both male and female and a realistic gift for an aunt.

Because books where the chosen product group, the researcher decided to discuss only the results of the attitude towards advertisers of books. The goal for this part of the pre-test was to

decide which brand got the most neutral attitude. Scores were given on a 7-point scale, which meant that a mean score of 4 would be the perfect neutral score. However, it was also important that there were no very negative or very positive ratings. It was also possible for the respondents to choose for the option 'I do not know this advertiser'. According to the results, 'Bookspot' was the best scoring (i.e. most neutral) advertiser (*M* = 4.75, *SD* = 1.30) with one person that stated that he did not know this advertiser. However, during the focus group session, it appeared that respondents had to look the advertiser up on Internet and where not sure whether they really knew who the advertiser was. The second-best scoring advertiser was 'Boekenvoordeel' (*M* = 4.80, *SD* = 1.17). All participant stated that they saw this advertiser before. None of the respondents where very negative or very positive about this advertiser. Because of these results, the researcher decided that this would be the best fitting advertiser for the main research.

For the scenarios, the ratings for personalization and being realistic where fairly the same for each respondent. Scenario C scored highest on both personalization (*M* = 6.00, *SD* = 1.55) and being realistic (*M* = 7.00, *SD* = 0.00). One respondent slightly disagreed with the statement "When I found myself in this scenario, I would feel like I see advertisements that suit my needs and situation". However, this respondent stated that he made an error, he wanted to agree with the statement. Because of these results, the researcher decided that scenario C would be the best fitting scenario for this research.