



The Effect of Online Social Proof Regarding Organic Food: Comments and Likes on Facebook

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Social media created a new information environment (e.g., Rutsaert et al., 2013b). Among social media channels, Facebook is the most popular one (Cheung et al., 2011). Using Facebook people can exchange information rapidly with others. Consumers can post a statement or message on Facebook (a post), respond to these posts (the comments), and indicate that they agree with the post and/or comment by using the “thumb up” symbol (the likes). Both comments and likes are cues of social proof, e.g., the viewpoints of others. We investigated how social proof in an online environment impacts reactions toward organic foods in two experimental studies. In study 1, using a representative sample of Dutch internet users ($n = 124$), we manipulated comment valence (positive vs. negative) and reinforcement (number of likes: high vs. low) on a fictitious Facebook page that included four comments. Consumers’ perceptions, feelings, and behavior, such as risk perception, emotions and intended purchasing behavior, were measured. Comment evaluation was used as a moderator. In study 2 ($n = 88$) a full Facebook page, with mixed valence statements, was shown; either the positive or negative statements were reinforced by likes. Results of study 1 showed that the way respondents evaluated the comments in terms of usefulness affected benefit perception and the motivation to find information. Moreover, the interaction between valence and comment evaluation was significant for all dependent variables. That is, the predicted effect of social proof only occurred when the comments were perceived as useful. The number of likes did not have an effect. Results of study 2 where participants watched a full Facebook page with mixed valence comments, showed that the number of likes had an effect on consumers’ reactions, specifically on negative emotions and willingness to pay. This research provides new insights in the effects of explicit as well as implicit online social proof on attitudes toward a positively evaluated topic, namely organic food.

Keywords: social media, Facebook, social proof, organic food, comments, likes

INTRODUCTION

The rise of social media provides new opportunities to organizations (Galvez-Rodriguez et al., 2016), and more specific to communicators of food risks (Rutsaert et al., 2013b, 2014), or chronic diseases (Santoro et al., 2015), for example. Advantages of using social media to disseminate information are, for instance, speed and accessibility (Rutsaert et al., 2014). Social media also empower consumers to interact with other consumers and express their own opinion (Shao, 2009), resulting in an increase of public involvement and interaction (Rutsaert et al., 2013b). Consumers can also use social media as a source of information. They have to make sense of this information and consequently decide how to act. This raises the question to what extent consumers are influenced by online cues that signal the views of others with respect to food risk issues, such as online comments and the number of likes at a statement.

Generally, the Internet is becoming one of the main sources of health information (Dutta-Bergman, 2004; Redmond and Griffith, 2006; Tian and Robinson, 2008; Jacob et al., 2010; Kuttschreuter et al., 2014). In the early days, the Internet was primarily used to search for and check information. Nowadays it has changed into a dynamic information environment of social media, where almost anyone can post messages, and spread or comment on information rapidly (Horst et al., 2007). This results in an abundance of facts and viewpoints on a particular topic, which might be both helpful and confusing to Internet users.

When searching for information on the Internet, it is quite possible that consumers consult a social media website including Facebook and Twitter (Giustini, 2006), rather than a more traditional website of an official information body (Rutsaert et al., 2013a,b). Consumers may use this information to form an opinion. According to Cialdini's principle of social proof (Cialdini, 2001), in ambiguous situations where consumers are uncertain about an appropriate course of action, they may adjust to the viewpoints and behaviors of others whom they assume to be more knowledgeable in dealing with the particular situation. Social media information might serve this purpose.

Facebook, the most popular social media channel (Cheung et al., 2011), is one of the platforms for information exchange, gaining popularity over the last years. Facebook members use Facebook to spread (personal) information to their friends or, depending on their privacy settings, to a broader audience (Kirschner, 2015). Consumers can post a statement or message on Facebook (a post), respond to these posts (the comments), and indicate that they agree with the post and/or comment by using the "thumb up" symbol (the likes). Facebook usage is not only associated with interpersonal communication and maintaining relationships (Cheung et al., 2011), consumers also use Facebook to seek and respond to information (Basilisco and Cha, 2015). In particular, consumers search on Facebook for consumer trends information (Asghar, 2015). Organizations communicating on food issues have responded to this by using Facebook to link with consumers and inform them about (food) issues.

The current research aims to investigate to what extent consumers are susceptible to social proof in an online environment (online social proof). Focusing on organic food, we

examined the research question: "To what extent do comments and likes on Facebook influence consumers' perceptions, feelings and behavior?"

While previous research on online social proof mainly focused on topics on which consumers generally hold negative attitudes, such as smoking (Walther et al., 2010; Shi et al., 2014), our research focused on a topic that is generally viewed as positive, namely organic food products. Food is something that is relevant to all of us, as we all have to eat. This makes the focus on organic food both interesting and important.

In two experimental studies involving a fictitious Facebook page on organic food products, we manipulated social proof by varying the comment valence and reinforcement (the number of likes), and examined the effect on perceptions, feelings, and intended purchasing behavior.

An innovative aspect of our research is that the combined effect of comments and likes were studied. The design of the two studies allowed us to both disentangle these effects and make statements about their combined effect as well.

THEORY

Online Social Proof: Comments, Narratives, and Other Explicit Cues

According to Cialdini (2001), one of the most influential social influence mechanisms is the principle of social proof. This principle is based on the heuristic that consumers follow the lead of similar others when uncertain about an adequate course of action (Cialdini, 2001; Okdie et al., 2013). Basically, the idea is that when a consumer takes a certain course of action that complies with that of many similar others, the risk of making a wrong decision decreases (Lee et al., 2008).

As the Internet is becoming more popular, new forms of social proof arise. For example, there are reviews, narratives, personal blogs, and opinion pages available online. These can be used as indicators of the way in which similar others perceive a certain topic and can in principle create, change or adjust opinions. One of the key aspects of online social proof is its valence: positivity (being pro) or negativity (being against).

Several studies have demonstrated the impact of positive and negative online reactions of other consumers on behavior (Winterbottom et al., 2008), and attitudes (Vermeulen and Seegers, 2009). Vermeulen and Seegers (2009), for example, investigated the effects of online hotel reviews on attitudes toward hotels. While both positive and negative reviews increased awareness of specific hotels, they—not surprisingly—also found that reading positive reviews was associated with more favorable attitudes toward hotels than reading negative reviews.

Although the impact of exposure to solely negative or solely positive online social proof has been studied extensively, in reality it is more likely that consumers are exposed to both positive and negative opinions from different sources at the same time (Lee et al., 2008). In line with this presumption, a study on vaccination focused on the *proportion* of online narratives (peer comments) that reported adverse consequences (Betsch et al., 2011). They found that the higher the proportion of negative narratives, the

more the risk perception increased, which in turn led to a lower intention to vaccinate.

Building on these results, Kause et al. (2014) performed a study in which they systematically varied the proportion of negative and positive narratives about flu vaccination (ratio of positive comments: 0, 0.25, 0.50, 0.75, and 1.00). Results revealed only one significant post-hoc effect between conditions: the intention to vaccinate differed between the participants who received only negative comments and those who received only positive ones. That is, the participants who viewed only positive comments were more inclined to vaccinate compared to those who viewed only negative comments. Similar results were obtained in a recent study by Seo et al. (2015) who examined the effect of Facebook comments on food safety information regarding restaurants. With the proportion of positive comments varying between 0, 0.50, and 1.00, this study showed that the higher the proportion of positive comments, the lower the level of risk perception related to eating in the advertised restaurant.

Similar studies have found evidence for an effect of online social proof by means of Facebook comments in different contexts, varying from breastfeeding attitudes (Jin et al., 2015), to marijuana legalization (Winter et al., 2015), and brand engagement and sales (Kim and Johnson, 2016). Furthermore, the empirical evidence for the effect of (online) social proof is not restricted to Facebook. Studies have also shown the effect of social proof on YouTube, for example in relation to smoking behavior (Walther et al., 2010; Shi et al., 2014).

Apart from the specific context or type of online social proof, it remains unclear what happens when positive and negative comments are presented together in a way that makes the information in the comments inconclusive. This is, for example, the case when there are as many consumers who are in favor of a particular activity as consumers who are against it. When consumers cannot draw conclusions from explicit cues of online social proof, such as the comments, they might start to look at other pieces of information, such as the number of likes.

Subtitle Cues of Online Social Proof

When explicit expressions of social proof such as comments are unavailable or contradictory consumers might look at more subtle cues of social proof. Research supports this idea. Amblee and Bui (2011) conducted a study on online reviews of short e-books. They showed that consumers focused their attention on the book reviews rather than on the author ratings. When there were no reviews available, however, consumers switched their attention toward the author ratings. This thus suggests that when explicit cues are missing, consumers might turn to other, more subtle cues.

This effect may hold for other implicit cues of social proof, such as the number of likes at Facebook comments and the number of downloads on iTunes. Consumers may view these subtle cues as endorsements: Likes indicate that there is a lot of interest and support and are thus likely to influence consumers' behavior (Muscanell et al., 2014). In support of this reasoning, likes on Facebook have been found to positively influence sales rates of products (Lee et al., 2015).

Previous research into the effect of likes on Facebook on attitudes showed mixed results. Jin et al. (2015) found evidence for the importance of the number of likes on pro-breastfeeding attitudes. In contrast, other research showed that the subtle cue of the number of likes of a comment did not influence consumers' attitudes (Peter et al., 2014; Winter et al., 2015). These studies used the exemplification theory (Zillmann, 2002) to explain the non-significant effect of the number of likes: Consumers are more easily influenced by exemplifying statements than user statistics, such as the number of likes. While Peter et al. (2014) did not find an effect of comment likes, their results indicated an effect of *post* likes on the attitude toward flu vaccination. Concluding, there is some evidence indicating that likes have an effect of consumer attitudes, but results are inconclusive.

Social Proof by Social Media and Organic Food Products

An open question is whether social proof is effective in the case of organically grown food products. Previous research already showed the importance of perceptions of peers' health concerns on healthy food choice (Muturi et al., 2016). Organic food products match a general preference for naturalness and foods produced without human intervention (Rozin et al., 2004; Shafie and Rennie, 2012). Research shows that consumers consider organic foods to have advantages over conventional foods (Hay, 1989; Schifferstein and Ophuis, 1998; Grankvist and Biel, 2001, 2007; Roitner-Schobesberger et al., 2008), while they also perceive organic foods to be less risky than conventional food (Hammit, 1990). Specifically, the risk of microbiological contamination and natural toxins is considered to be very small compared to the risks of pesticide use (Williams and Hammit, 2001). At the same time, the very absence of pesticides makes these products more prone to bacterial contamination. This might encourage food risk communicators to advice the general public on such risks, but at the same time also create uncertainty among consumers and make them more susceptible to social proof.

In many countries around the world, including the Netherlands where this study was conducted, organic food is becoming more popular and available (Giraud, 2002; Hughner et al., 2007; FoodHolland, 2016). In 2014, the Dutch organic food market had a total share of 3% of the food market and the sales increased with more than 10% (FoodHolland, 2016). This implies that, though the Dutch consumers are positive about organic food, this is not reflected in their buying behavior. Research shows that Dutch consumers associate organic food products the most with animal welfare, price, health, and naturalness (Hilverda et al., 2016). Overall, the attitude regarding organic products in the Netherlands is moderately positive (Hilverda et al., 2017). Dutch authorities are also positive about organic production techniques and are funding new initiatives (Bionext, 2017). Dutch newspapers have, however, also reported on scientific research that casts doubts on the claims that organic products are more healthy and better for the environment (www.nu.nl). Consumers consequently have to make up their minds regarding purchasing and consuming those products. This decision is not that simple, however, as it involves the weighing

of the risks and benefits of such products from a health as well as environmental perspective. In such uncertain situations, and following the social proof principle, consumers might be inclined to follow the lead of similar others.

Evaluation of the Comments

When testing effects of comment valence on attitudes, it seems important to take the consumer's evaluation of the comments into account. Slater and Rouner (1996) argue that the evaluation of a message has an effect on source credibility and in turn influences message acceptance and belief change. In a similar vein, a recent study by Lee and Shin (2014) showed that the quality of online reviews had an impact on product evaluations and purchase intentions. These findings suggest that consumers who perceive the comments to be clearer and more valuable are more likely to be influenced by them in such a way that positive Facebook comments lead to more positive reactions, while negative comments lead to more negative reactions. Consumers who perceive the comments as unclear might not be influenced by them, or effects might even be reversed.

The Current Studies

Based on the previous discussion we examined two types of social proof on Facebook pages, namely the *comments' valence* (positive vs. negative) and reinforcement (a high vs. low number of *likes* placed below these comments). Both the valence of the comments and the number of likes are viewed as a form of social proof as they show the opinion of others, with comments being more explicit and likes more implicit. The first experiment was designed to test the main and interaction effects of the number of likes associated with comments with the same valence, whereas the second experiment was designed to examine the effect of the number of likes when the valence of the comments is mixed. In study 1, we thus examined the effect of the two types of online social proof on perceptions, feelings and behavior toward organic food. The evaluation of the comments was included as a moderator. By performing this first experiment we wanted to study how comments and likes interact to affect consumers' perceptions, feelings and behavior. After that, we wanted to replicate the experiment in a more realistic setting. In real life consumers are often exposed to both positive and negative opinions from different sources at the same time (Lee et al., 2008). Following the reasoning that likes might only become relevant when the valence of the comments is mixed, we examined the effect of the number of likes on a mixed valence Facebook page in study 2.

STUDY 1: THE INTERPLAY OF COMMENTS AND LIKES ON FACEBOOK

Hypotheses

In study 1 we tested to what extent consumers were influenced by comments as well as likes on Facebook. In this 2x2 study, the valence of the comments (positive vs. negative) and the reinforcement (high vs. low number of likes) were manipulated. It was first examined whether the levels of comment valence affected perceptions, feelings, and behavioral intentions. In line

with the mechanism of social proof, it was assumed that consumers use the information from the comments and likes as a heuristic cue to constitute the appropriate action. When others express a positive rather than negative opinion in the comments, this is expected to influence consumers' attitudes toward organic food in a positive way. Based on previous studies on online social proof (e.g., Jin et al., 2015; Winter et al., 2015; Kim and Johnson, 2016), it was predicted that:

H1: There is a main effect of comment valence: positive comments lead to more positive perceptions, feelings, and behavioral intentions towards organic food products than negative comments.

Subsequently, the effects of the number of likes and the interaction between valence and the number of likes were examined. The main effect of the number of likes, i.e., reinforcement, was examined, even though in some previous studies on the number of likes (e.g., Peter et al., 2014; Winter et al., 2015) no evidence for this effect was found. In addition, the possibility that the number of likes might boost the effect of the comments was tested. The following hypotheses were tested:

H2: There is a significant main effect of reinforcement: The higher the number of likes, the more positive the perceptions, feelings, and behavioral intentions towards organic food.

H3: There is an interaction effect of valence and reinforcement: The number of likes strengthens the effect of the comments.

Following the research of Slater and Rouner (1996), the evaluation of the comments was included as a variable predicting both a main and a moderator effect:

H4: There is a main effect of the evaluation of the comments in terms of clearness and usefulness on the dependent variables.

H5: There is an interaction effect of comment valence with the evaluation of the comments in such a way that the effect of comment valence on perceptions, feelings, and behavioral intentions towards organic food products is stronger when the comments are perceived as more clear and useful.

Materials and Methods

Participants

A total of 241 participants recruited by a certified research agency completed an online experiment, which took them about 15 min. The research agency acted in accordance with the ethical standards of the institutional research committee. The protocol of this experimental study was approved by the Ethics Committee of the Faculty of Behavioral, Management and Social sciences, University of Twente, the Netherlands. All subjects provided informed consent to the agency. As a total of 97% of the Dutch population uses the Internet (CBS) and there is not much variation between SES-groups, recruitment was stratified on age and gender. The sample was representative of the Dutch population of Internet users with respect to age and gender. Only participants who correctly filled out both manipulation

check questions were included in the analyses¹. This resulted in a total sample of 124 participants. There were no differences with respect to age and gender between the final sample and the drop-outs.

Participants were 48 years old on average ($SD = 16.62$). The sample consisted of 65 males (52%) and 59 females (48%). All of them were familiar with Facebook. A randomization check showed that there were no differences between conditions with respect to gender, age, initial knowledge, and initial risk and benefit perception of organic food. Differences between conditions on the dependent variables can therefore be attributed to our manipulations.

Design and Manipulation

We used a 2 (comment valence: positive vs. negative) \times 2 (reinforcement: high vs. low number of likes) between subjects design to test the hypotheses. Participants were randomly assigned to one of the four conditions ($n_{\text{positive-high}} = 44$, $n_{\text{positive-low}} = 18$, $n_{\text{negative-high}} = 47$, and $n_{\text{negative-low}} = 15$).

Participants viewed a Facebook image with four comments (see **Figure 1**). The *valence* of these comments varied. A pilot study was conducted among students to select comments that were content-wise identical while different with respect to valence. The comments with the largest contrast were selected, provided the participants perceived the comments to be realistic Facebook statements.

Comment valence was manipulated by varying the appraisal aspect of the comments: in the *positive condition* all comments were positive; in the *negative condition* all comments were negative. *Reinforcement* was manipulated by varying the number of likes: either a high or low number of likes was given to the comments. To determine the amount of high and low number of likes accompanying comments, popular Facebook pages were visited and materials from previous studies focusing on the effect of likes were considered. Based on these numbers, we included less than 20 likes in the low reinforcement condition, and over 200 likes in the high reinforcement condition.

Measures

All items of study 1 and 2 are shown in **Table 1**.

Perceptions

Three measures of perceptions were used. To measure personal health risk perception, participants indicated whether they considered eating organic to be unhealthy (4 items; $\alpha = 0.93$; 7-point-Likert scale; 1 = strongly disagree to 7 = strongly agree). We measured benefit perception regarding one's own health with four statements about eating organic food being healthy (4 items; $\alpha = 0.90$, 7-point-Likert scale, 1 = strongly disagree to 7 = strongly agree). Participants also indicated on a 7-point semantic differential-type scale (Osgood et al., 1957) what their

overall attitude of eating organic was. Three item-pairs were used ($\alpha = 0.82$): negative-positive, bad-good, and bad for my health-beneficial for my health.

Feelings

We measured emotions by asking participants to what extent they experienced *anxiety* (anxious, concerned, afraid and worried; $\alpha = 0.94$) and *positive emotions* (happy, positive, satisfied, optimistic; $\alpha = 0.97$) when thinking about eating organic food. Items were measured on a 7-point scale from 1 = *not at all* to 7 = *very much*.

Behavioral predictors

Two behavioral predictors were measured: *motivation to find information* and *willingness to buy*. Participants filled out whether they wanted to know more about organic food (4 items; $\alpha = 0.91$; 7-point scale; 1 = *strongly disagree* to 7 = *strongly agree*). As research showed that consumer attitudes are more reliably measured and more predictive of behavior when focusing on specific food products rather than broad product categories (Bredahl, 1999), willingness to buy was measured by asking the participants to what extent they were inclined to buy 7 organic food products (7-point scale, ranging from 1 = *not at all* to 7 = *very much*; adapted from Makatouni, 2002; $\alpha = 0.96$).

Comment evaluation

We measured participants' evaluation of the Facebook comments with three statements about their clearness, usefulness in contribution to an advice for a friend and whether they discussed important aspects of organic products (3 items; $\alpha = 0.67$, 7-point-Likert scale, 1 = *strongly disagree* to 7 = *strongly agree*).

Procedure

Participants were requested to fill out an online questionnaire about new food production methods. A request for advice by a friend on purchasing organic food was used as a cover story to increase involvement. After filling out the questions about their initial knowledge and perceptions regarding organic food, participants viewed the Facebook image. The participants, then, indicated what they thought about the discussion on Facebook, and filled out the two manipulation check questions. The dependent variables were then measured. At the end, the participants answered questions about their socio-demographics and their online media use, and were thanked for their participation. During the entire data collection period, participants could contact the helpdesk of the research agency for questions and debriefing.

Results Study 1

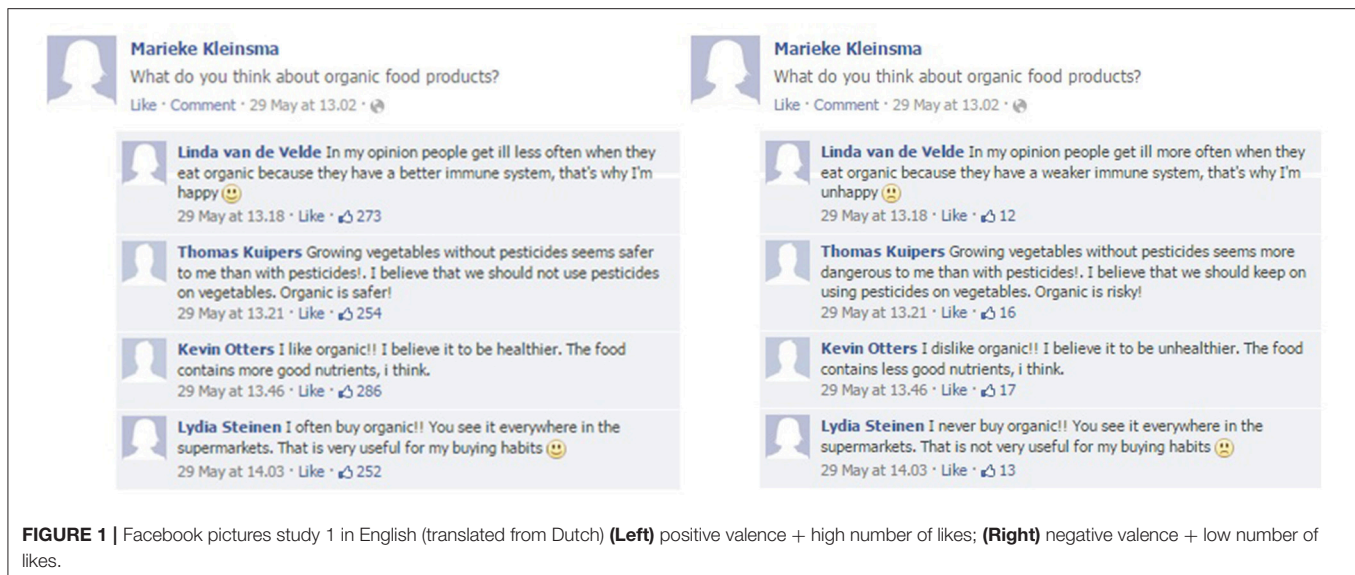
Means and Correlations

Table 2 reports the means, standard deviation, reliabilities, and correlations of the constructs. Risk perception and anxiety were relatively low, while benefit perception and attitude were quite high. Positive emotions, motivation to find information, willingness to buy and the evaluation of the comments all scored somewhat above the midpoint of the scale.

Risk perception and benefit perception were negatively associated. While risk perception correlated positively with

¹A total of 97% participants correctly filled out the manipulation check question about the valence of the comments (92% in the positive condition and 94% in the negative condition).

A total of 52% participants correctly filled out the manipulation check question about the number of likes (76% in the many likes condition and 28% in the few likes condition).



anxiety and negatively with overall attitude, positive emotions, and willingness to buy, the opposite was true for benefit perception. Furthermore, while benefit perception was positively related to motivation to find information, risk perception was unrelated to it. The overall attitude and positive emotions showed similar correlation patterns as benefit perception, although the correlations between attitude and the motivation to find information, and between positive emotions and anxiety were not significant. Anxiety was negatively correlated with willingness to buy; the more anxiety, the less willingness to buy. Finally, the evaluation of the comments in terms of clearness and usefulness was only positively related to the motivation to find information.

Hypotheses Testing

A MANCOVA was performed to test the main effects of valence and reinforcement, and their interaction on the six dependent variables jointly, including the evaluation of the comments as a moderator variable (centered around the mean). This MANCOVA was followed by separate ANCOVAs for each of the dependent variables.

There were no statistically significant multivariate effects of valence (H1), reinforcement (H2), and the interaction between valence and reinforcement (H3), all p 's > 0.05. These results are in contrast with H1, H2, and H3 that predicted a significant effect of valence, reinforcement and an interaction effect.

There was a significant multivariate effect of the evaluation of the Facebook comments (H4), $F_{(7,112)} = 3.55$, $p = 0.002$; Wilk's $\lambda = 0.82$, partial $\eta^2 = 0.18$. Univariate analysis showed that this effect only held for benefit perception, $F_{(1, 118)} = 7.21$, $p = 0.008$, and motivation to find information, $F_{(1, 118)} = 14.40$, $p < 0.001$. In line with hypothesis 4, it was found that the more clear and useful the comments were perceived to be, the more benefits participants perceived and the more motivated they were to find additional information. The multivariate interaction of valence and the evaluation of the comments was also significant, $F_{(7,112)} = 5.60$, $p < 0.001$; Wilk's $\lambda = 0.74$, partial $\eta^2 = 0.26$.

Univariate analysis showed that this effect held for all dependent variables: risk perception, $F_{(1, 118)} = 7.29$, $p = 0.008$, benefit perception, $F_{(1, 118)} = 20.21$, $p < 0.001$, attitude, $F_{(1, 118)} = 6.13$, $p = 0.015$, anxiety, $F_{(1, 118)} = 13.87$, $p < 0.001$, positive emotions, $F_{(1, 118)} = 14.28$, $p < 0.001$, motivation to find information, $F_{(1, 118)} = 8.09$, $p = 0.005$, and willingness to buy, $F_{(1, 118)} = 5.66$, $p = 0.019$. **Figure 2** shows the interaction effect of valence and comment evaluation on risk perception. It shows that the more positive the evaluation of the comments, the stronger the effect of valence in the expected direction. Similar patterns are found for anxiety and (reversed) for the other dependent variables. These results are in line with hypothesis 5 and confirm the moderating role of comment evaluation. Please see **Table 3** with the means per condition, including corresponding F - and p -values.

STUDY 2: THE FULL FACEBOOK PAGE

In study 2 we focused on the effect of reinforcement in terms of Facebook *likes* when consumers are exposed to both positive and negative opinions from different sources at the same time. The participants were shown a fictitious Facebook page with multiple posts and comments about eating organic foods, in which either the positive or the negative statements were reinforced by a high number of likes. Positive comments stressed that the absence of pesticides (which are used in traditional agriculture) improves the healthiness of organic food, while negative comments emphasized that organic foods are not always pesticide-free and that consumers underestimate the risks of organic products, such as bacterial contamination. Based on the study by Amblee and Bui (2011), who showed that consumers switch their attention to implicit social proof when explicit social proof is missing, we expected that participants in the condition where positive comments were reinforced were overall more positive about organic products than participants in the condition where negative comments were reinforced. The following hypotheses were tested:

TABLE 1 | Scales, items, and reliabilities of constructs from study 1 and study 2.

Measures	Characteristics		
	Scale	Reliability	
STUDY 1 (n = 124)			
Perceptions	<i>Personal health risk perception</i> 1. I think that organic food is bad for my health 2. I think that there are many risks attached to organic food 3. I think that organic food has many disadvantages 4. I think that organic food is dangerous for my health	7-point Likert scale from 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i>	0.93
	<i>Personal health benefit perception</i> 1. I think that organic food is good for my health 2. I think that there are many benefits attached to organic food 3. I think that organic food has many advantages 4. I think that organic food is beneficial for my health	7-point Likert scale from 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i>	0.90
	<i>Attitude</i> Overall, how do you think about organic food products? 1. Negative–positive 2. Bad–good 3. Bad for my health–good for my health	7-point semantic differential-type scale	0.82
Feelings	<i>Anxiety</i> When I think about eating organic food products, I feel.. 1. Anxious 2. Concerned 3. Afraid 4. Worried	7-point scale from 1 = <i>not at all</i> to 7 = <i>very much</i>	0.94
	<i>Positive emotions</i> When I think about eating organic food products, I feel.. 1. Happy 2. Positive 3. Satisfied 4. Optimistic	7-point scale from 1 = <i>not at all</i> to 7 = <i>very much</i>	0.97
Behavioral predictors	<i>Motivation to find information</i> I would like to know more about... 1. the advantages and disadvantages of eating organic food products 2. the most important differences between organic and non-organic food 3. how I can recognize an organic product 4. the laws on organic food production	7-point Likert scale from 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i>	0.91
	<i>Willingness to buy</i> Imagine you want to buy the following products. How likely is it that you'll buy the organic option? 1. An apple 2. Carrots 3. Meat products 4. Bread 5. Pasta 6. Eggs 7. Yogurt	7-point Likert scale from 1 = <i>not at all</i> to 7 = <i>very much</i>	0.96
Additional measures	<i>Comment evaluation</i> 1. I think that the viewpoints in the comments are clear 2. I think that the comments discuss important aspects in relation to organic food 3. I can use these comments to advice a friend about eating organic food	7-point Likert scale from 1 = <i>strongly disagree</i> to 7 = <i>strongly agree</i>	0.67
STUDY 2 (n = 88)			
Perceptions	<i>Risk perception of pesticide use</i> 1. Pesticides are harmful for people 2. Pesticides have long-term consequences for humans 3. Pesticides have severe consequences for mankind 4. Pesticides are harmful for animals		

(Continued)

TABLE 1 | Continued

Measures	Characteristics	
	Scale	Reliability
5. Pesticides have long-term consequences for animals 6. Pesticides have severe consequences for animals 7. Pesticides are harmful for the environment 8. Pesticides have long-term consequences for the environment 9. Pesticides have severe consequences for the environment	5-point scale from 1 = <i>strongly disagree</i> to 5 = <i>strongly agree</i>	0.94
<i>Benefit perception</i> 1. Organic food contains more vitamins than non-organic food 2. I believe that eating organic food is riskless 3. Organic food helps fighting obesity 4. An organic apple is healthier than a non-organic apple 5. Organic food is richer in nutrients than non-organic food 6. Organic food helps me to relax 7. I trust that organic food is healthy for me 8. Organic food is good for the immune system 9. I am confident that organic food is safe 10. Organic food has a positive impact on a person's well-being 11. Organic food is better for the skin than non-organic food 12. Organic food helps me to cope with stress	5-point scale from 1 = <i>strongly disagree</i> to 5 = <i>strongly agree</i>	0.86
Feelings <i>Anxiety</i> When I think about eating organic food products, I feel.. 1. Anxious 2. Concerned 3. Hopeless 4. Pessimistic	5-point scale from 1 = <i>not at all</i> to 5 = <i>very much</i>	0.80
<i>Positive emotions</i> When I think about eating organic food products, I feel.. 1. Happy 2. Positive 3. Satisfied 4. in a good mood	5-point scale from 1 = <i>not at all</i> to 5 = <i>very much</i>	0.94
Behavioral predictors <i>Motivation to find information</i> 1. I would like to know more about how I can recognize an organic product 2. I would like to know more about the advantages and disadvantages of eating organic food products 3. I would like to know more about the laws on organic food production 4. I would like to know more about the most important differences between organic and non-organic food	5-point scale from 1 = <i>strongly disagree</i> to 5 = <i>strongly agree</i>	0.77
<i>Willingness to pay</i> 1. How much would you be willing to pay for an organic apple? 2. How much would you be willing to pay for a non-organic apple?	Difference in eurocents was used in the analysis	n.a.

TABLE 2 | Means, standard deviations, reliabilities, and correlations between all constructs—study 1 (*n* = 184).

Constructs	Mean	sd	α	Correlations									
				1.	2.	3.	4.	5.	6.	7.	8.		
1. Personal health risk perception	2.76	1.14	0.93	1									
2. Personal health benefit perception	4.80	1.02	0.90	-0.66**	1								
3. Attitude	4.78	1.33	0.82	-0.52**	0.66**	1							
4. Anxiety	2.02	1.21	0.94	0.50**	-0.37**	-0.33**	1						
5. Positive emotions	4.14	1.68	0.97	-0.46**	0.68**	0.55**	-0.13	1					
6. Motivation to find information	4.45	1.24	0.91	0.02	0.35**	0.14	0.001	0.29**	1				
7. Willingness to buy	4.20	1.65	0.96	-0.48**	0.73**	0.60**	-0.22*	0.70**	0.41**	1			
8. Evaluation comments	4.22	1.09	0.67	0.04	0.14	-0.05	0.01	0.05	0.27**	0.11	1		

All constructs were measured on a 7-point Likert scale. *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

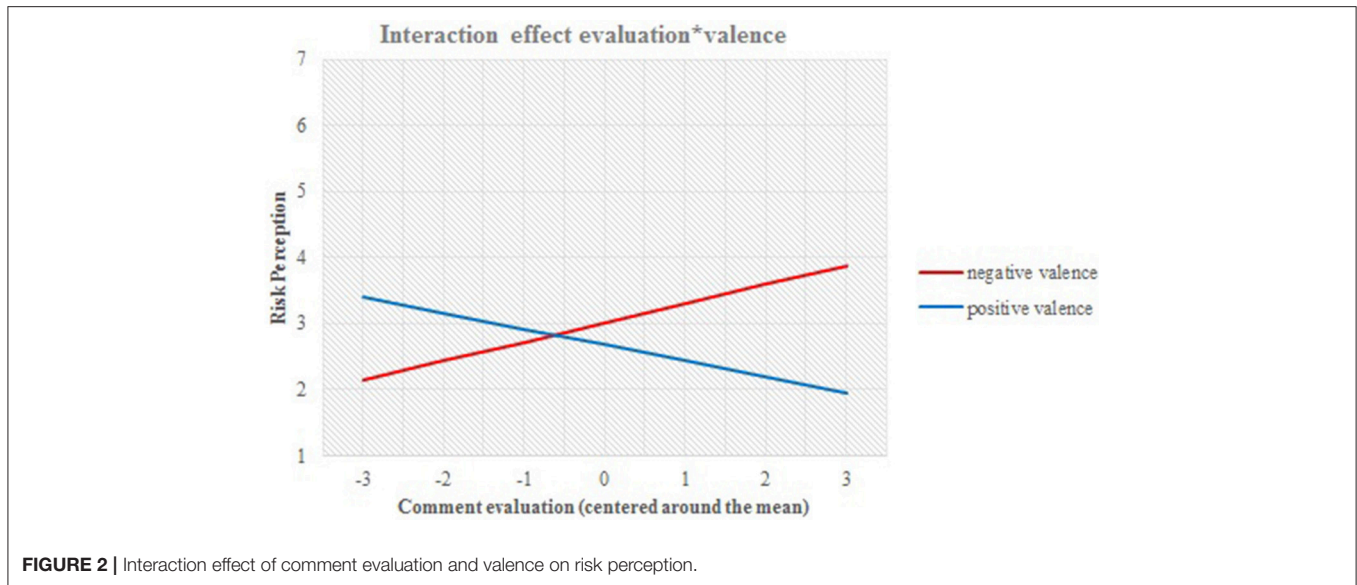


FIGURE 2 | Interaction effect of comment evaluation and valence on risk perception.

TABLE 3 | Testing H1-H5: Main effect of valence, main effect likes and interaction, including evaluation as moderator—study 1 (n = 124).

Constructs	Positive condition		Negative condition		H1 Valence		H2 Likes		H3 Interaction		H4 Evaluation comments		H5 Moderation	
	Many likes	Few likes	Many likes	Few likes	F	Sig	F	Sig	F	Sig	F	Sig	F	Sig
1. Personal health risk perception	2.63	2.57	2.95	2.83	1.82	0.18	0.23	0.63	0.004	0.95	0.07	0.79	7.29	0.008
2. Personal health benefit perception	4.79	4.82	4.81	4.75	0.24	0.63	0.04	0.85	0.24	0.63	7.21	0.01	20.21	<0.001
3. Attitude	4.75	4.96	4.68	4.93	0.05	0.82	0.94	0.34	<0.001	0.997	0.006	0.94	6.13	0.02
4. Anxiety	1.89	2.01	2.14	2.05	0.29	0.59	0.01	0.93	0.11	0.74	0.15	0.70	13.87	<0.001
5. Positive emotions	4.04	4.76	4.16	3.58	1.72	0.19	0.18	0.67	4.75	0.03	1.66	0.20	14.28	<0.001
6. Motivation to find information	4.61	3.97	4.43	4.62	3.40	0.07	0.51	0.48	2.20	0.14	14.40	<0.001	8.09	0.01
7. Willingness to buy	4.11	4.32	4.18	4.37	0.35	0.56	0.57	0.45	0.04	0.85	3.40	0.07	5.66	0.02

All constructs were measured on a 7-point Likert scale.

Reinforcement of positive comments (compared to negative comments) leads to:

H1: More positive perceptions of organic food:

- a) a higher perception of the benefits of organic food products
- b) a higher perception of pesticide risks

H2: More positive feelings:

- a) more positive emotions
- b) less anxiety

H3: Higher behavioral intentions towards organic food:

- a) a higher motivation to find more information about organic products
- b) a willingness to pay more for an organic apple compared to a regular apple

Materials and Methods

Design and Participants

There were two conditions with the same statements and both positive and negative comments. In the reinforcement of positive comments condition, many likes (>300) were given to positive statements regarding organic foods and few likes (<20) to negative ones. In the negative condition, this pattern was reversed: many likes were given to negative statements and few likes to positive statements (see Figure 3). Participants were randomly assigned to one of the two conditions.

In study 2 participants were psychology students who participated to earn course credits. All subjects gave online (digital) informed consent before starting the questionnaire. The protocol of this experimental study was approved by the Ethics Committee of the Faculty of Behavioral, Management and Social sciences, University of Twente, the Netherlands. Participants were requested to fill out an online questionnaire, which took

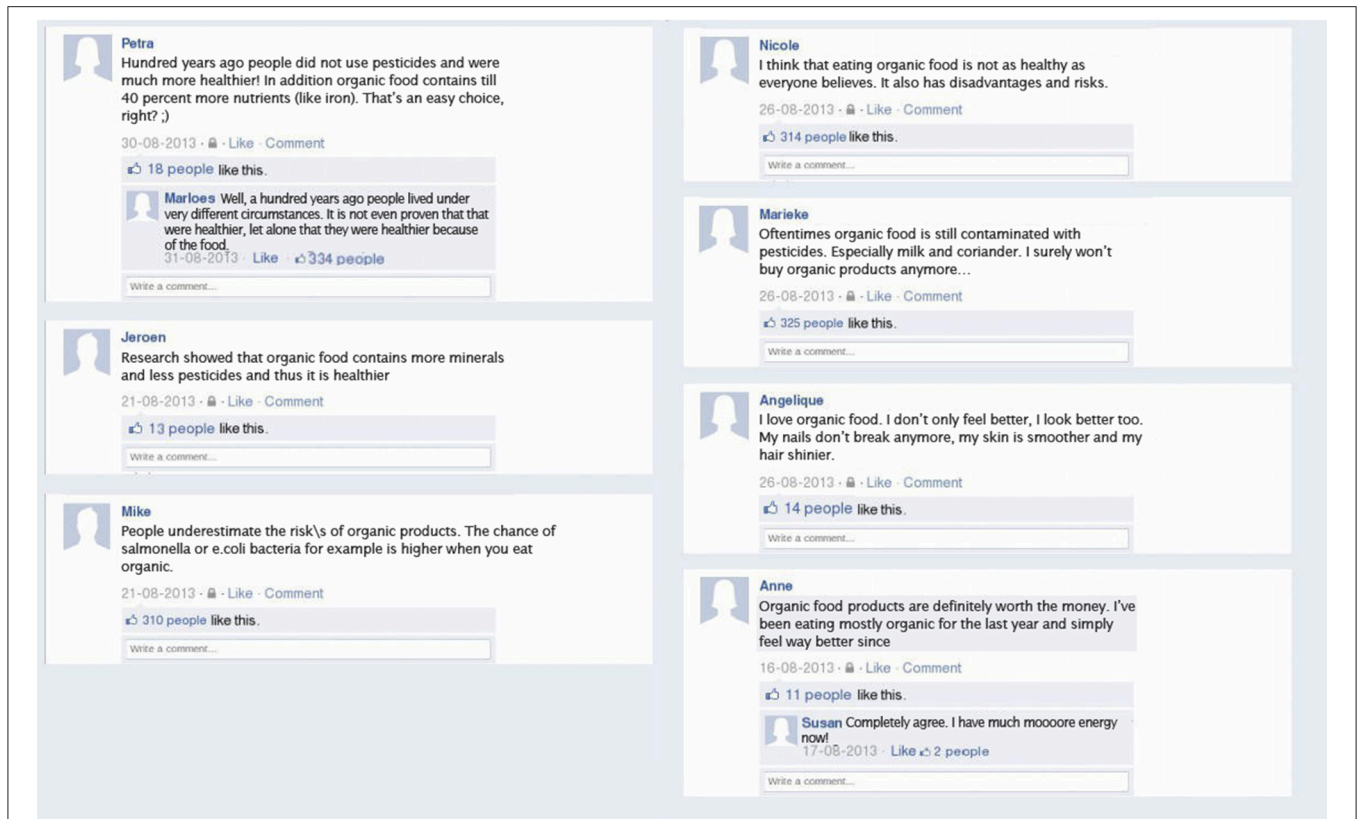


FIGURE 3 | Full Facebook page study 2 in English (translated from Dutch) Negative reinforcement condition is shown. The number of likes were reversed in the positive condition.

them about 15 minutes in total. The final sample consisted of 88 participants². This sample consisted of 25 males (28%) and 63 females (72%) who were 21 years old on average. A randomization check showed that there were no differences between conditions with respect to gender and age.

Measures

Instruments were similar to those in study 1, except for a few modifications³ With respect to behavior, willingness to pay was used as a substitute for willingness to buy as how much money a respondent is willing to pay is more closely linked to actual behavior than buying intentions.

Perceptions

There were two perception measures. To measure benefit perception ($\alpha = 0.86$), participants filled out to what extent they

agreed that organic products have advantages (for example “more nutritious”). The scale consisted of 12 items, all measured on a five-point-Likert scale (1= strongly disagree to 5 = strongly agree). To measure risk perception of pesticide use, participants indicated on a 5-point scale, ranging from 1= strongly disagree to 5 = strongly agree, to what extent they thought pesticides were harmful to humans (3 items), animals (3 items), and the environment (3 items). Reliability was good ($\alpha = 0.94$).

Feelings

We measured *positive emotions* by asking to what extent they experienced four positive states (happy, positive, satisfied, being in a good mood; $\alpha = 0.94$). Items were measured on a 5-point scale from 1 = *not at all* to 5 = *very much*. Analogously, we measured *anxiety* by asking the participants to what extent they experienced negative emotions when thinking about eating organic food (anxious, concerned, hopeless, pessimistic; $\alpha = 0.80$).

Behavioral predictors

Two predictors of behavior toward eating organic were included: the motivation to find information and the willingness to pay. Participants filled out, on a 5-point scale ranging from 1= strongly disagree to 5 = strongly agree, whether they wanted to know more about organic food (4 items; $\alpha = 0.77$). Participants

²A total of 88 participants (out of 145) correctly filled out the manipulation check; they were aware that there was more support (number of likes) in favor of eating organic foods in the positive condition, or against eating organic foods in the negative condition. Only those participants who correctly answered the manipulation check questions were included in the analyses.

³All constructs in study 2 were measured on a 5-point Likert scale instead of a 7-point scale. As a replacement for health risk perception of eating organic food we measured risk perception of pesticide use, which was found to be a central association with respect to organic food (Hilverda et al., 2016). Attitude was excluded to shorten the questionnaire.

were then asked how much they were willing to pay for an organic and a regular apple. The difference in eurocents in the amount of money reported was used in the analysis.

Procedure

Participants were requested to fill out an online questionnaire about organic food. After filling out an informed consent form and their socio-demographics, participants viewed an image of a Facebook page with several comments. They then answered an open-ended question about their opinion of the information on the Facebook page, and filled out the manipulation check. After that, the dependent variables were measured. Participants were debriefed by email afterwards.

Results Study 2

Means and Correlations

Please see **Table 4** for means, standard deviations, reliabilities and correlations of the constructs used. Risk perception was relatively high. Benefit perception and positive emotions were around the mid-point of the scale. They correlated positively with each other and with the perceived risks of pesticide use. Higher benefit perceptions were associated with more positive emotions and higher risk perception of pesticide use. Anxiety was low and did not correlate with any of the other dependent variables. There was a positive correlation between motivation to find information and positive emotions, showing that the more positive emotions, the higher the motivation to find information.

On average, participants were willing to pay 19 cent more for an organic apple than for a regular apple. This amount was related to both risk perception of pesticide use and positive emotions toward eating organic food: the higher the perceived risks of pesticide use and the more positive emotions with respect to eating organic, the higher the amount the participants were willing to pay.

Hypotheses Testing

Separate ANOVAs were conducted to test for differences between conditions (**Table 5**). There were two significant effects and one marginally significant result. Participants in the positive condition scored marginally higher on the perceived risks of pesticide use compared to the participants in the negative condition, $F_{(1, 85)} = 2.97, p = 0.09, \eta^2 = 0.03$, which was in

line with H1b. In line with H2b, they also scored significantly lower on anxiety compared to the participants in the negative condition, $F_{(1, 86)} = 7.68, p = 0.01, \eta^2 = 0.08$. In the positive condition, participants were willing to pay 25 cents more for an organic apple compared to a regular apple, whereas this was only 13 cents in the negative condition. The difference between conditions was significant, $F_{(1, 80)} = 5.48, p = 0.02, \eta^2 = 0.06$, and confirmed hypothesis H3b. There were no significant differences between the conditions for benefit perception (H1a), positive emotions (H2a), and the motivation to find information (H3a), *all p's* > 0.05.

DISCUSSION

The Internet is becoming one of the main sources of information. Social media enables consumers to share their opinion with a great number of other consumers or organizations. This led us to examine to what extent the online opinions of others (i.e., social proof) on Facebook influences consumers' perceptions, feelings and behavior. Organic food was used as the topic of the two experiments, because consumers have to make up their minds regarding purchasing and consuming those products. In this decision process, they might be inclined to follow the lead of similar others. Our research was conducted in The Netherlands, where already back in 2012 nearly 70% of the Dutch Internet users used social media (CBS, 2013).

Key Findings

To get insight into the effects of explicit *comments* and reinforcement in terms of *likes* two experimental studies were conducted. In the first online experimental study we manipulated both comment valance (positive vs. negative) as well as the reinforcement of the comments (the number of likes: high vs. low). Although previous research (e.g., Winterbottom et al., 2008; Betsch et al., 2011; Kause et al., 2014; Seo et al., 2015) found evidence that comment valance directly influenced consumer responses, we did not find such a direct main effect of valance on perceptions, emotions, or behavioral intentions. However, when we included comment evaluation as a moderator in our analyses, effects of comment valance did come to the fore. As expected, the more respondents perceived the comments as valuable and clear, the stronger the effect of comment valance on all dependent

TABLE 4 | Means, standard deviation, reliabilities, and correlations—study 2 (n = 82–88).

Constructs	Mean	sd	alpha	Correlations						
				1.	2.	3.	4.	5.	6.	
1. Risk perception pesticide use	3.83	0.66	0.94	1						
2. Benefit perception	2.93	0.59	0.86	0.39**	1					
3. Anxiety	1.81	0.75	0.80	-0.12	-0.07	1				
4. Positive emotions	2.85	1.03	0.94	0.33**	0.63**	-0.05	1			
5. Motivation to find information	3.85	0.71	0.77	0.10	0.11	-0.05	0.29**	1		
6. Willingness to pay	0.19	0.24	n.a.	0.30**	0.43**	-0.14	0.43	-0.04	1	

All constructs were measured on a 5-point Likert scale. **Correlation is significant at the 0.01 level (2-tailed).

TABLE 5 | Differences between conditions in means of the constructs—study 2 ($n = 82\text{--}88$).

Constructs	Positive condition mean (std)	Negative condition mean (std)	F-value	Sig 2-tailed
1. Risk perception pesticide use	3.94 (0.64)	3.70 (0.67)	2.97	0.09
2. Benefit perception	2.98 (0.58)	2.88 (0.60)	0.56	0.46
3. Anxiety	1.61 (0.54)	2.04 (0.90)	7.68	0.01
4. Positive emotions	2.99 (0.99)	2.68 (1.06)	1.99	0.16
5. Motivation to find information	3.87 (0.79)	3.83 (0.62)	0.09	0.77
6. Willingness to pay	0.25 (0.29)	0.13 (0.15)	5.48	0.02

All constructs were measured on a 5-point Likert scale.

variables. These findings are in line with research by Slater and Rouner (1996) who demonstrated the importance of message evaluation as a moderator in a persuasion context. However, it is important to note that based on the effect size, this multivariate effect can be characterized as small to medium-sized (Hedrick et al., 1993).

In the first study, results also indicated that the interaction between valence and reinforcement via the number of likes was not significant, indicating that the effect of comment valence was not influenced by the number of likes. Overall, reinforcement via likes did not have any effect on the dependent variables. This is in line with other research showing that the number of likes of a comment did not influence consumers' attitudes (Peter et al., 2014; Winter et al., 2015). It is also consistent with the exemplification theory (Zillmann, 2002), suggesting that consumers are more easily influenced by comments than likes, because comments are perceived as concrete examples or opinions. One might argue that the number of likes becomes more relevant when consumers process information in a heuristic way. For example, when under time pressure consumers might not have enough cognitive resources to systematically review all the comments and might therefore depend on the number of likes as a heuristic cue for validation. Further research is needed to investigate this and examine how information processing styles influence the effects of subtle cues such as likes.

Taken together, study 1 showed that online social proof in the form of comment valence can be effective when consumers perceive the comments as valuable and clear. Reinforcement via the number of likes, which can be viewed as a more implicit form of online social proof, did not seem to have an effect on consumers' attitudes.

Study 2 was conducted to get insight into the effect of the number of likes when consumers are confronted with both positive and negative comments at the same time. We compared a positive condition in which the positive comments received many more likes than the negative comments (>300 vs. <20) with a negative condition in which these numbers were reversed. In this more inconclusive but also more realistic situation (Lee et al., 2008), we found that subtle cues of social proof, i.e. the number of likes, did have an effect on consumers' reactions (e.g., Jin et al., 2015) regarding organic food.

We found an effect of likes on risk perception of pesticide use (marginal), negative emotions, and willingness to pay. Consumers in the positive condition were willing to pay 25 cent

more on average for an organic apple compared to a non-organic apple. This difference was only 13 cents in the negative condition. These results imply that subtle cues of social proof can influence perceptions, emotions, and behavioral intentions. It is assumed that consumers need additional information to base their opinion on and that they start looking at implicit types of social proof, such as likes. This is consistent with research by Amblee and Bui (2011) in relation to online reviews of short e-books: Consumers switched their attention to author ratings when there were no reviews available.

No significant effects of the number of likes were found regarding benefit perception, positive emotions, and the motivation to find information. One possible explanation for the non-significant effects of our manipulations for some of the dependent variables could be that our research sample already had stable, rather positive attitudes toward organic food products. The principle of social proof has been proven to work especially well in ambiguous situations (Cialdini, 2001). This might be less applicable to the subject of organic food.

Limitations and Future Research

It is uncertain to what extent our results are generalizable to other issues about which consumers have to form an opinion. Further research is needed to gain more insight in how consumers are influenced by comments and likes on Facebook about other products than organic foods.

In addition, it is unclear to what extent our results are generalizable in terms of age and SES of the population. As young people are often more engaged with social media (e.g., Kuttschreuter et al., 2014), it can be argued that Facebook comments and likes might influence them even more strongly. As both experiments used different samples with respect to age, we maintain however that the effects of social proof are present for a wider range in age. Concerning SES, SES-effects seem to be of lesser importance in the Netherlands than in the USA and/or other countries as differences in income are smaller and organic food is widely available in regular supermarkets.

It is also unclear whether the usage of a fictitious Facebook page might be considered as a limitation of our study design. This methodological approach was needed to examine the "pure" effects of comments and likes, while keeping all other variables constant. To avoid ethical issues, participants in study 1 could contact the helpdesk of the research agency for questions and debriefing during the entire data collection period and

participants in study 2 were debriefed about the origin of the Facebook page afterwards. Previous research indicated that using imaginary scenarios is a valid method to examine the effects of real crises (Theofilou et al., 2011), and that effects are comparable or more dominant in real life settings compared to fictitious ones. This implies that our findings do not result from the use of a fictitious Facebook page with fictitious comments instead of a real page with real comments; in real life the effects might even be stronger. To ensure our Facebook comments were realistic, we pretested them in study 1 and selected the ones that the participants considered most realistic. Future research is needed, however, to study to what extent our results are generalizable to real life settings, i.e., when using a non-fictitious Facebook page.

An interesting question that remains unanswered is how different information sources on Facebook would have impacted consumers' reactions. Study 1 showed that the way in which the Facebook comments are perceived is an important moderator in the relationship between comment valence and consumers' reactions to the topic. Previous research has demonstrated the importance of source credibility (Slater and Rouner, 1996), also with respect to consumers' reactions on Facebook (Seo et al., 2015). Consumers might respond differently when information comes from trusted sources, such as friends and family members, compared to unknown others.

As is common in social psychological experimental studies, only participants who correctly filled out the manipulation checks were included in the analyses, resulting in a smaller sample size. In study 1, up to 97% of the participants correctly identified the valence of the comments. However, only about half of the sample (52%) correctly identified the number of likes. This implies that participants possibly paid more attention to the post and comments, while ignoring the number of likes. This is in line with the idea that likes are an implicit form of social proof. In study 1, the number of likes could have been perceived as irrelevant, because all the comments carried the same positive or negative message. Another explanation of the high dropout rate in study 1 could be that the participant's perceptions of the magnitude of the number of likes did not match our intended manipulation. Specifically, some participants in the conditions with a low number of likes perceived the number of likes to be high. It is likely that participants used their own Facebook experience as a reference point instead of the reference frame with which we provided them.

In study 2, when valence was mixed, one might expect that subtle cues in terms of the number of likes should have been more easily noted. This was however not the case as still about 50% of the sample in study 2 failed to correctly answer the manipulation

check question. The question is whether consumers simply do not pay attention to the number of likes, perceive them as irrelevant or are unaware of these cues. Future research might want to include eye-tracking to disentangle these processes.

Practical Implications and Conclusion

Together, the two studies conducted showed that social media information, such as comments and likes on Facebook, does influence consumers' attitudes, feelings and behavioral intentions. These effects are especially present when consumers perceive the explicit social proof as clear and useful, leading to more positive attitudes following positive social proof and more negative attitudes when receiving negative social proof. Study 2 showed that the likes are influential when consumers watch a Facebook page with mixed valence statements. The results of these two studies indicate that it might be useful for communicators and authorities to communicate with consumers by using social media, for example Twitter or Facebook, to inform them about the risks of a positively evaluated topic and to respond to consumer comments (Veil et al., 2011). Being visible on social media might help to build trust and gain a good reputation. When using social media to communicate with consumers one needs to be aware that consumers might also influence each other by responding to the information both in the form of posted comments as well as in the form of giving "a like" at a comment. To avoid misunderstandings, it would be useful for communicators to participate in online conversations themselves, on Facebook and possibly also in chatrooms. In this way, consumers can exchange information on social media guided by a professional, who could use this as an opportunity to correct factual errors.

AUTHOR CONTRIBUTIONS

FH performed the two studies as part of her PhD-project. The studies were planned in consultation with MK and EG. FH performed statistical analyses on both samples, interpreted data, drafted the manuscript and acted as corresponding author. MK supervised development of work, helped in data interpretation, manuscript evaluation, and edit the manuscript. EG provided a critical overview of the project and edit the manuscript. All authors read and approved the final version of the manuscript.

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