Master Thesis

Fake it till you break it?!

Impact of fake news on implicit brand attitudes of social media users

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Abstract

Purpose – the spread of fake news on social media might distort the relationship between brands and their customers. The purpose of this research is to test whether fake news can influence the implicit brand attitude of consumers, regardless of their awareness that the news is fake.

Design – the Implicit Association Test (IAT) was used to measure the implicit brand preference of participants twice. After the first IAT, participants (N = 267) were exposed to fake news about a specific brand. Directly after that, the second IAT took place. The differences in the first and second test could be attributed to the exposure to fake news. The data were analysed with the repeated-measure ANOVA and its corresponding tests for assumptions. Gender and social media platforms were hypothesized as moderators.

Findings – the results show that fake news has a weak negative effect on the brand attitude. One explanation might come from the Limited Capacity Model of Message Processing and the Prominence-Interpretation Theory of Web Credibility. These two theories explain that people do not invest their full capacities in processing online information. Furthermore, the social media platform that participants spend most of their time on has no influence on this relationship. However, the gender of consumers has an effect. Fake news has only a significant effect on the implicit brand attitude of women. Disturbingly enough, it seems that fake news even affects the implicit brand attitude of those who realise that they were exposed to fake news.

Value – fake news is mostly analysed in the setting of politics. The value of this research is that it contributes to the literature on how fake news affects brands and the implicit attitude of customers towards brands. As a result, this research takes a fairly new approach to understand the effect of fake news. In addition, this research provides Social Media Managers insights into the effect of fake news on brand attitude.

Research question: *What is the effect of fake news on the implicit brand attitude of social media users?*

Keywords: Fake news, attitude, Implicit Association Test, social media, brand attitude, brand image

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Introduction

Social media made it possible to stay intensively in touch with friends far away and with your favourite brands. However, they also come with a darker side. Social media are also used for spreading fake news and fake reviews. Fake news on social media gained on some occasions more likes and shares than actual news on the same platform (Silverman, 2016). Hence, it can damage the attitude towards businesses and influence societal topics such as public health and democracy (Carrieri, Madio & Principe, 2019; Silverman, 2016). Visentin, Pizzi, and Pichierri (2019) demonstrate that fake news can impact the behaviour of customers and their attitude towards a brand. With the spread of COVID-19 and the spread of fake news about it (Europol, 2020), another research emphasizes the societal urgency of more research on this topic as well. Carrieri, Madio, and Principe (2019) showed how the internet was flooded with fake news on vaccines after a court in Italy judged there was a causality between a specific type of vaccine and autism. The ruling resulted in a lower immunization rate for all types of vaccines.

The interest in online fake news has also increased from an academic angle. Most scholars tend to focus on automatically identifying fake news (Tandoc, Jenkins, & Craft, 2019; Albright, 2017; Shao et al., 2017; Wang, Wang, Melo, & Weikum, 2019). These types of research merely label news as fake or authentic news. However, these do not take into account what the impact of fake news is on the attitude of the exposed social media users towards a topic or a brand. These types of studies are still rare (Egelhofer & Lecheler, 2019). Therefore, this research aims to narrow the gap in the literature of fake news by investigating its effect on brand attitude.

Hence, this research analyses whether exposure to fake news leads to a shift in the brand attitude. The research question is **"What is the effect of fake news on the implicit brand attitude of social media users?"** The research question will be answered by conducting an experiment that measures the implicit brand attitude. First, the participants will be asked to participate in the Implicit Association Test (IAT) to measure their initial attitude towards a given brand. The IAT is a tool for measuring the implicit attitude towards a certain topic (Greenwald, McGhee, & Schwartz, 1998). Then, participants will be exposed to five fake news articles targeting this brand, without being told these articles are fake. Directly after this exposure, they participate again in the IAT. This setup helps to measure whether the implicit attitude of social media users towards a company changes after being exposed to fake news.

The contribution of this study can be found in its focus on the effect of fake news on the attitude of social media users exposed to it. Its added value can be perceived from three perspectives. First, the scientific perspective. As mentioned before, most scholars focus on automated technological solutions for battling fake news on social media. That approach does not take into account what the attitudinal impact on social media users is. This research combines existing theory on fake news with theories of information processing (Brashier & Marsh, 2020; Hocevar et al., 2014; Metzger et al., 2010). As a result, this research takes a fairly new approach to understand the effect of fake news.

Second, the perspective from a corporate angle. This research aims to provide insights into the effect of corporate fake news on the attitude of social media users. This matters especially for Social Media Managers, who are often responsible for the online brand image. This image can be disturbed by a social media firestorm (Hansen, Kupfer, & Henning-Thurau, 2018). A firestorm occurs when a brand is, for instance, confronted with a social failure on social media. Firestorms resulted in a decreased brand perception in the short-term for 58% of the investigated companies, and 40% had long-term negative effects (Hansen et al., 2018). This research provides Social Media

Managers insights into the effect of fake news on the brand attitude. This helps to decide whether resources should be allocated to fighting fake news if they occur.

Third, the societal perspective. We have entered an era in which it becomes harder for an individual to identify authentic content from manipulated or fake content. Furthermore, previous research on the effect of fake news provided two disturbing insights. People have trouble with identifying fake news (Silverman & Singer-Vine, 2016), and people exposed repeatedly to a fake headline appear to be more likely to think the headline is accurate (Pennycook, Cannon, & Rand, 2017). This research provides insights into how fake news affects the implicit attitude of social media users towards a company.

The research is set up as follows. First, the existing theory on fake news and information processing will be discussed. Second, the methodology for the data collection follows. Third, the results will be presented. Fourth, the conclusions of the research will be presented. Finally, the research ends with a brief discussion, reflection on the research, and provides suggestions for further research. The research uses a theoretical framework that is based on multiple information processing and trust transferring theories, including the limited capacity model of message processing (Lang, 2000) and the prominence-interpretation theory of Web credibility (Fogg, 2003).

Theory section

This chapter discusses the relevant theories. It starts with the theoretical background. Then, fake news is defined in the context of brands, the current ways of battling fake news are described, and how the credibility can be assessed online.

Theoretical background

Conceptualizing fake news

This research focusses on fake news in a business setting. The term fake news gained more interest in the last years but the term is not new. The meaning of it has changed during the years though. Waisbord (2018) and Tandoc et al. (2019) note a transformation in the usage of the term. Scholars used to refer to satire and gossip tabloids. Hartley (1996), as cited by Waisbord (2018), refers to this as a type of information that combines reality with gossip. Nowadays, the term is mostly used for fabricated stories without or with a low level of a factual basis that is intended to misinform people (Combert & Grant, 2018; Tandoc, Lim and Ling, 2017; Allcot & Gentzkow, 2017; Wang et al., 2019). Fake news might occur in text, video or audio (Egelhofer and Lecheler, 2019).

In addition, Tandoc et al. (2019) distinguish four types of disinformation, of which fake news is one. They typify fake news as a form of disinformation that is intended to deceive others, is not based on facts, and mimics the layout of actual news. Similarly, Tandoc et al. (2017) described fake news as fictional information that looks like news and went viral. Allcot and Gentzkow (2017) add that it should be verifiable that the information is false. On the other hand, Egelhofer and Lecheler (2019) focus on putting fake news in the bigger picture. They argue that fake news does not just refer to spreading disinformation. Instead, it represents a fundamental shift in the attitude of people towards journalism and how news is obtained online. This research follows the definition used by most of the scholars: ***low factual information which is intended to deceive others. It also mimics the layout of actual news*** (Combert & Grant, 2018; Tandoc, Lim & Ling, 2017; Waisbord, 2018; Wang et al., 2019; Tandoc et al., 2019; Allcot and Gentzkow (2017)**.**

Conceptualizing brand attitude

Brand attitude can be described as the associations that are made with a brand (Alba & Hutchinson, 1987; Mitchell & Olson, 1981; Ajzen & Fishbein, 1977). An association is the thought of an individual after being exposed to an object. This results in attention to, understanding, or interacting with the object

(Fazio, 2001). It is also demonstrated that associations become stronger after repeated exposure (Egelhofer & Lecheler, 2019; Brashier & Marsh, 2020).

Brand associations can be implicit or explicit (Olson, Fazio, & Han, 2009; Greenwald et al., 2003; Wilson, Lindsey, Schooler, 2000; Kahneman, 2011). Whilst people are aware of their explicit associations, an implicit process is a process that people are not aware of. Participants cannot give desired answers with their implicit thoughts (Harris, Ciorciari, & Gountas, 2018). However, the physiological shift can be measured with several instruments, such as eye-tracking, heart rate, and the IAT. Most of these are suitable for measuring behaviour, decision making, arousal, or attention. Additionally, the IAT can be used to measure the implicit brand attitude, which is the topic of interest in this research (Venkatraman et al., 2015). This research defines brand attitude as ***the implicit associations of an individual after being exposed to an object. Which leads to attention to, understanding, or interacting with the object*** (Alba & Hutchinson, 1987; Mitchell & Olson, 1981; Ajzen & Fishbein, 1977; Fazio, 2001)**.**

Relevant theories

Along with the rise of social media, there are also more concerns on how information on social media is processed and trusted. Social media contain more irrelevant, conflicting, outdated, and non-credible information (Sin, 2016). Hence, the theorizing the information processing on social media receives a decent amount of attention from scholars (Metzger, 2007; Metzger, Flanagin, & Medders, 2010; Westerman, Spence, & Van der Heide, 2014; Brashier & Marsh, 2020; Egelhofer & Lecheler, 2019). There is quite some variety in which information processing theories are used by scholars in the social media environment. However, the two main theories revolve around the prior knowledge of those exposed to fake news, and their mental capacity. These will be elaborated on further below. The complete overview of the theories and their core thoughts is presented in Table 1.

Importance of prior knowledge

Several theories focus on how previous knowledge influences the processing, storage, and evaluation of newly obtained knowledge. Hocevar et al. (2014) use the schema theory. This theory proposes that individuals structure obtained knowledge based on their prior knowledge. In addition, the literature review of Brashier and Marsh (2020) identified three angles for how online information is processed. The first angle takes into account that people have a bias before they read information. Interestingly enough, statements that were repeated three times appeared to be truer than statements that are read for the first time (Egelhofer & Lecheler, 2019; Brashier & Marsh, 2020). This is also known as illusory truth. The second angle takes the feelings of people into account. People tend to perceive their own experiences as the truth. The third angle comes from memory consistency. This angle refers to the process of accepting information as true if it matches referential knowledge that is already stored in memory.

Importance of mental capacity

Other theories focus on the limited amount of mental capacity a user is willing to invest in processing information (Metzger et al., 2010). First, Metzger (2007) presents a dual processing model. This model argues that online information seekers only pay attention to the quality and evaluation of the information if they are highly motivated. If they are not highly motivated, they pay attention to cues as the design of a website (also see: Using irrational cues – in Perceived credibility on social media). Second, the amount of online information is more than the cognitive capacity of an individual can process. Hence, social media users tend to pay attention to only the remarkable insights in an article (Lang, 2000, as read in Metzger et al., 2010). This phenomenon is theorized as the 'limited capacity model of message processing' (Lang, 2000, as read in Metzger et al., 2010). Third, a similar theory is

the prominence-interpretation theory of Web credibility proposed by Fogg (2003), as read in Metzger et al. (2010). This theory describes that users do not even notice all elements within an online page.

Table 1: Theories for transferring, trusting, and processing information

Theory	Core of theory	Main thought
Brashier and Marsh (2020) – biases	People have a bias before they read information. Repeated exposure can create this bias.	Previous knowledge influences the processing, storage, and evaluation of newly obtained knowledge.
Brashier and Marsh (2020) – feelings	Own experiences are used to decide what is accepted as their truth.	
Brashier and Marsh (2020): memory consistency	Information is accepted as true if it matches knowledge stored in memory.	
Schema theory (Hocevar et al, 2014)	The obtained knowledge is stored by linking it to prior knowledge.	
Dual processing model (Metzger (2007)	Motivation influences the amount of online attention.	People do not invest their full capacities in processing online information (Metzger et al., 2010)
Limited capacity model of message processing (Lang, 2000, as read in Metzger et al., 2010)	There is more online information than one can process cognitively.	
Prominence-interpretation theory of Web credibility (Fogg, 2003, as read in Metzger et al., 2010)	Users do not notice all the elements of an online page.	

Shaping associations and attitudes

The tri-component model for attitudes is a model for reasoning on how brand attitude arises (Rosenberg, 1960). An attitude exists out of a cognitive, affective, and a conative part. The cognitive aspect refers to knowledge, the affective aspect refers to creating an attitude, the conative aspect refers to performing an action. The scope of this research is set to the first three steps (also see: figure 1).

The researcher uses the IAT, initially developed by Greenwald et al. (1998), to measure changes in the implicit attitude. The IAT is proven to be useful for predicting the success of advertisements (Harris et al., 2018). It is used as follows in this research: a social media user is exposed to fake news articles (trigger), processes the information (cognitive), and this results in certain associations and an attitude (affective). As mentioned before, the part of performing an action (conative) is not within the scope of this research.

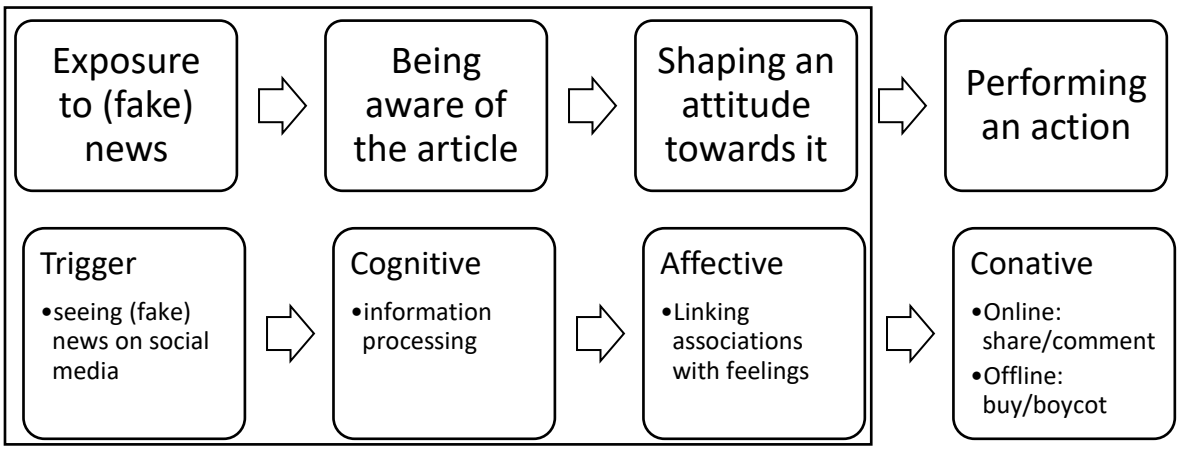

Figure 1: steps tri-component model and research scope

Literature review

What is fake news

A common way of classifying the type of disinformation is with the dimensions 'facticity' and 'intention to deceive' (Tandoc et al., 2019; Waisbord, 2018; Tandoc et al., 2017; Wang et al., 2019). Parody is information with a low level of facticity and a low level of intention to deceive. Satire is information with a high level of facticity and a low level of intention to deceive. The label of fake news is only correctly applied if the information has a low level of facticity and a high level of intention to deceive (Tandoc et al., 2019).

According to Waisbord (2018), the usage of fake news is not new. Using disinformation disguised as news goes further back in time than the start of consciously spreading the news that represents actual events. This type of fake news is commonly spread, especially during a crisis, conflict, or revolution. Fake news has two main purposes: creating a financial or ideological gain (Tandoc et al., 2019; Wang et al., 2019). A financial gain can be achieved by tricking users to click on remarkable or provocative headlines to visit the website. This type of website earn money by showing ads on their website, of which the height depends on the number of visits. An ideological gain can be found in politics. Fake news can be used to take a stance on a certain topic and to influence the perception and actions of people (Khandarove and Pantti, 2016).

Identifying fake news is hard since fake news comes in different shapes. Several scholars have introduced a classification model for capturing all the types of fake news (Wang et al., 2019). Rashkin, Choi, Jang, Volova and Choi (2017) developed a widely accepted classification scheme based on the two dimensions facticity and the intention to deceive: the SHPT model. This SHPT classification scheme consists of Satire, Hoaxes, Propaganda, and Trusted news (Rashkin et al., 2017). Another method is proposed by Rubin, Chen and Conroy (2015), who categorize fake news by looking at the intention of the sender. The sender can spread fake news as a sense of humour, to create hoaxes or as serious fabrication. Brunvand (1998), as cited in Rubin et al. (2015), describes a hoax as "a relatively complex and large-scale fabrication" (p.3). Serious fabrications refer to "fraudulent journalistic writing" (Rubin et al., 2015, p.3). Fake news can also be categorized based on the type of source, such as social satire sources, anonymous, and fake sources (Berghel, 2017). In addition, fake news appears to be shorter, uses simpler words, and might have a longer title which already delivers the message of the article (Egelhofer & Lecheler, 2019).

Therefore, this research uses news articles with a high level of intention to deceive, based on a low level of facticity. This matches the definition of Tandoc et al. (2019). In addition, the news articles that will be used

can be classified as hoaxes, according to the SHTP classification model of Rashkin et al. (2017). A complete overview of how scholars defined fake news can be found in Table 2.

Table 2: definitions of fake news

Authors	**Definitions of fake news**
Hartley (1996)	A type of information that combines reality with gossips, such as satire and gossip tabloids.
(Combert & Grant, 2018; Tandoc, Lim & Ling, 2017; Waisbord, 2018; Wang et al., 2019; Tandoc et al. (2019); Allcot and Gentzkow (2017)	Fabricated stories without or with a low level of a factual basis that is intended to misinform people. *It went viral and mimics the layout of actual news.*
Egelhofer and Lecheler (2019)	Fake news represents a fundamental shift in the attitude of people and politicians towards journalism and how news is obtained online. It is not the right term for every falsehood in the news. It should only be used in a political setting of describing a crisis in democracy.

Fake news affecting brand attitude

Chen and Cheng (2019) note in their literature review that there is not much research available on the topic of fake news within the setting of how it affects brands. However, brands are also affected by fake news on social media. It also becomes clear that it still has a strong impact on brands. For instance, Chen and Cheng (2019) show that more than 20% of American communication professionals mentioned that their brand reputation was affected by the spread of fake news. Similarly, Pepsi its stock value decreased with 4% after fake news was spread about its CEO (Berthon, Treen & Pitt, 2018).

Brands rely on the trust of customers for online engagement (Bianchi, Andrews, Wiese & Fazal-E-Hasan, 2017). However, trust in a brand can be affected by fake news (Chen & Cheng, 2019). In addition, the spread of fake news is a risk for the attitude of customers towards brands and their relationships with brands (Berthon, Treen, and Pitt, 2018). The literature review of Wu, Ngai, Wu and Wu (2020) indicates that fake news influences several other brand aspects as well. It can influence the decision to purchase or not, and overall sales (Petrescu, O'Leary, Goldring & Mrad, 2018; Dellarocas, 2006). Furthermore, Borges-Tiago et al. (2020) demonstrated how trust in a brand also influences to what extent users realise that fake news is fake news. Similarly, Chen and Cheng (2019) conducted a research on fake news about a brand. According to this research, the effect of fake news depended on the persuasion knowledge theory that was applied. If participants were aware that the news was fake, there was no significant change in brand trust. The researchers encouraged further research on this topic. This current research takes a similar approach. However, it measures the impact of fake news on the implicit brand attitude instead of the explicit brand attitude.

In addition, brands are disadvantaged by fake news because it does not just mislead people, it also draws attention away from actual news (Tandoc et al., 2019). Fake news about businesses outperformed actual news on several occasions (Vosoughi et al., 2018). The human attraction towards unique information might cause the farther, faster, deeper, and broader spread of fake news (Vosoughi et al., 2018). However, companies can have two different roles in the fake news process. One specific type of fake news for brand is fake online reviews. Brands might publish own positive fake reviews or publish negative reviews about competitors (Wang, Gu & Xu, 2018), or they might be victimized by the spread of fake news (Berthon & Pitt, 2018; Chen & Cheng, 2019). In short, brands can have

two roles. They can be victimized by fake news or they can use fake news to look better. However, this study focusses only on fake news that victimizes companies.

Nevertheless, it is not easy for brand to battle fake news because it is created on a massive scale. Fake news is not only shared on social media but also on dedicated websites. So, even when an individual takes the trouble to Google a claim on social media, he might come across websites with the same fake news (Tandoc et al., 2019; Tandoc et al., 2017b). These website often copy the names of actual news media (Egelhofer and Lecheler, 2019). These websites are not intended for a long relationship with readers but focus on short term gains. Which makes sense from the perspective of Cook, Ecker and Lewandowsky (2015), as discussed in Egelhofer and Lecheler (2019), who describe that the first exposure to fake news already results in misperceptions.

Consumers their perspective on fake news

Credibility is commonly defined as the extent to which individuals evaluate information as trustworthy, believable, and accurate (Schmierbach & Hirsch, 2012; Appelman & Sundar, 2016; Viviani & Pasi, 2017). Similarly, O'Keefe (1990), as described in Westerman et al. (2014), describes it as the judgement of an individual regarding the validity of the information. Metzger et al. (2010) argue that traditional cues for credibility might not be suitable for online credibility. Traditional cues tend to derive from an authority, such as an expert or organization. This is not the case with online information.

The online world is complex

Assessing the credibility of messages on social media is more difficult than in offline media (Viviani & Pasi, 2017; Sin, 2016). This is due to 4 reasons. First, traditional newspapers work with journalist and editors who functioned as information gatekeepers. News articles would be published after a check on the credibility (Viviani & Pasi, 2017; Sin, 2016). There still might appear disinformation in newspapers if something was missed but there was an additional check. Social media users are exposed to unfiltered information. They have to function as their own gatekeepers (Sin, 2016). Second, a news article on social media has multiple sources (Viviani & Pasi, 2017). A user might share an article of the Facebook account of a news publisher. This example contains three sources: Facebook, the Facebook user, and the news publisher. This makes it complex to assess the credibility of the source. Third, it is easier to put manipulated information on social media (Viviani & Pasi, 2017). Fourth, social media provide more anonymity (Sin, 2016).

To make it more complicated, fake news can result in a wrong judgement regarding the truth of information by a social media user, even after being told that it was fake. Egelhofer and Lecheler (2019) explain disinformation still affects the attitude after the news has been corrected. This is caused by the fact that, while being debunked, it is still in the memory of the person. Similarly, news that was initially presented as fake news, might be perceived later on as true (Brashier & Marsh, 2020). This is an implicit process (also see: Shaping associations and attitudes – in the theoretical background). This leads to the **first hypothesis**:

- H0: exposure to fake news does not influence the implicit brand attitude
- H1: exposure to fake news influences the implicit brand attitude

Using irrational cues

Users tend to assess the credibility of information on social media with subjective cues (Lee, 2015; Sin, 2016; Metzger et al., 2010). These include the article its length, the design of the site, and the online name of the editor. This might be due to the principle of least effort (Case, 2005, as explained in Sin, 2016). People tend to rely on cues that require the least effort instead of cues of quality (Lee, 2015; Metzger et al., 2010; Hocevar, Flanagin, & Metzger, 2014). Furthermore, social media

users even actively share messages if they appear attractive or can be used in a conversation, instead of the accuracy of the information taken into account (Sin, 2016). Almost half of social media users share news stories (Bhandari, 2018). To make matters more complex, social media users tend to trust online sources more if it is recommended by others (Metzger et al., 2010; Hocevar et al., 2014). This is also called the bandwagon effect (Lin, Spence, Lachlan, 2016). Lin et al. (2016) found that social media users also use the cues authority of the source and its identity.

Differences in assessing online credibility

The credibility of online sources differs. Several scholars demonstrated that traditional news media are perceived as more credible than their online counterparts (Bhandari, 2018; Sin, 2016; Viviani & Pasi, 2017). However, there is also a difference between online sites. Schmierbach and Hirsch (2012) demonstrated that stories on the website of The New York Times are perceived as more credible than the same article tweeted by The New York Times. This effect was significant for both genders.

In addition, Visentin, Pizzi, and Pichierri (2019) demonstrate that the online setting in which a brand is presented influences the attitude towards the brand. For instance, companies were perceived more positively when their advertisement was shown on the BBC instead of the same ad on Buzzfeed. This indicates that the setting in which a brand is presented influences the attitude towards it.

Furthermore, there also appears to be a difference among the social media platforms themselves when it comes to how credible information is perceived (Appelman & Sundar, 2016). Similarly, Silverman and Singer-Vine (2016) found that people who use Facebook as their main news source are more likely to evaluate fake news as authentic news. This lead to **hypothesis 2**:

- H0: there is no difference in the effect of fake news on the implicit brand attitude across the different social media platforms
- H1: there is a difference in the effect of fake news on the implicit brand attitude across the different social media platforms

In addition, there appears to be a difference in gender as well. People with a high level of self-efficacy for evaluating information tend to trust online information more (Hocevar et al., 2014). According to the same research, men tend to have a higher level of self-efficacy. This is in line with Lim and Kwon (2010) who demonstrated that male students neglect the risks in using Wikipedia as a source more than female students. However, other research indicates that women have more trouble identifying conflicting information online than men (Sin, 2016). This resulted in **hypothesis 3**:

- H0: there is no difference in the effect of fake news among genders
- H1: there is a difference in the effect of fake news among genders

Furthermore, some scholars found a difference in age as well (Sin, 2016; Brashier & Marsh, 2020). According to Brashier and Marsh (2020), older adults shared fake news during the US elections of 2016 the most. Contradictorily, Sin (2016) argued that the principle of least effort is stronger among younger generations. However, this research does not take age into account as a variable due to the different outcomes in previous research. It is also expected that age is not normally distributed in the dataset.

To summarize, the online credibility of information refers to the extent to which individuals evaluate information as trustworthy, believable, and accurate. Online credibility is complex due to a lack of gatekeepers, multiple sources, and the ease of manipulating information. Social media users use irrational cues, such as website design and the name of the editor. They also tend to share information without being sure of its accuracy. There also appears to be a difference in

perceived credibility among platforms, gender, and age. Furthermore, Table 3 summarizes the hypotheses and shows an overview of the variables and their hypothesized relations.

Table 3: summary of hypotheses

#	H0	H1
1	Exposure to fake news does not influence the implicit brand attitude	exposure to fake news influences the implicit brand attitude
2	There is no difference in the effect of fake news on the implicit brand attitude across the different social media platforms	There is a difference in the effect of fake news on the implicit brand attitude across the different social media platforms
3	There is no difference in the effect of fake news among genders	There is a difference in the effect of fake news among genders
4	There is no difference in the effect of fake news when gender and favourite social media platform are both taken into account	There is a difference in the effect of fake news when gender and favourite social media platform are both taken into account

The effect of these hypotheses and the categorical groups that are used are shown in figure 2 below. It shows that fake news is expected to influence the brand attitude negatively (H1), that the social media platform influences this relationship as a moderator (H2), that gender influences the relationship as a moderator as well (H3), and that there is an interaction between gender and social media platform (H4).

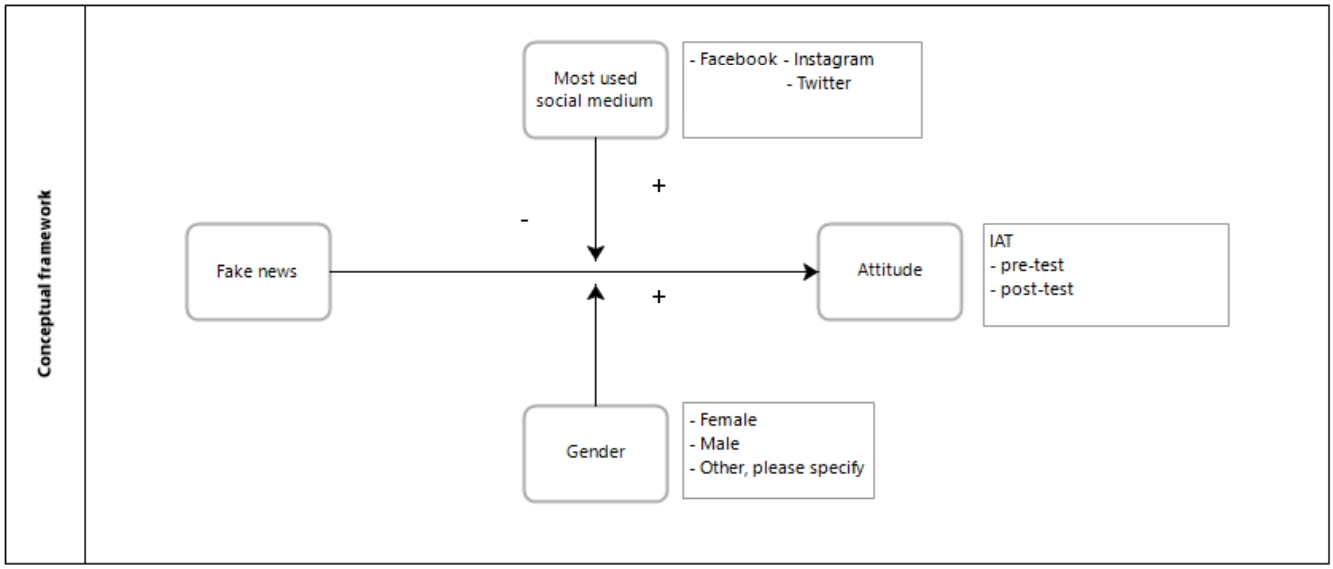

Figure 2: Conceptual framework + categories in the variables

Methodology

This research aims to find out whether exposure to fake news affects the attitude of social media users. Furthermore, there is also a difference expected between the variables of gender and social media platform. To answer these questions, the attitude of participants will be measured implicitly. As shown in the theory section, the implicit attitude is more favourable than the explicit attitude for this research.

Participants

This research collected data through different sources during March and April 2020. The sources include acquaintances of the researcher through LinkedIn, WhatsApp, Reddit and fellow students, colleagues from work, and participants from the Test Subject Pool System SONA from the University of Twente. This resulted in 267 participants in total. However, not every participant met all the requirements of the survey. The research contained a control question to check whether participants read the articles. This was simply done with a multiple choice question regarding the topics of the articles the participants just read. Two participants failed this check.

Research design

The setup of this experiment is as follows. First, each participant starts with a descriptive survey. Second, they continue with the IAT. This IAT measures the initial attitude of the participant towards Coca-Cola. Third, the participants will then be exposed to five fake news articles about Coca-Cola. The amount of five articles is chosen since the illusory truth has an effect after more than three articles (Brashier & Marsh, 2020). Furthermore, existing fake articles will be used. These articles are collected from snopes.com, which is a fact-checking website for fake news (also see: appendix I - usable articles). Fourth, the participants will participate in the IAT again. The second IAT takes place in the same session as the first IAT. This means that the whole experiment will be conducted at once. The results of this second IAT will be compared with the first IAT. The difference between both IATs can be attributed to the exposure of fake news. The exposure to the fake news articles in the experiment is designed to match the real exposure as much as possible.

As pointed out in the literature review, the posts on social media outperform actual news on some occasions. However, the actual visits to these websites are limited. Hence, the articles in this experiment will be shown in the interface of Facebook, Instagram, or Twitter. The participants view the fake news within the context of their favourite social medium (also see: appendix I – mock-ups).

How the IAT works

The IAT uses two targets and contradicting attributes. The targets could exist out of a company and a competitor. This research revolves around the changes in attitude towards Coca-Cola. Pepsi will be used as a competitor. Hence, this research uses the targets 'Coca-Cola' and 'Pepsi´. The actual preference does not matter for this research. It merely focusses on the shift in preference. Regarding the contradicting attributes, this research uses the company values of Coca-Cola as attributes. An overview of these traits can be found in appendix I - attributes. The idea behind the IAT is that participants combine certain attributes faster with a target if that combination is more in line with the participants their implicit association with the target. One IAT takes approximately five minutes. The seven steps within the IAT are explained by Carpenter et al (2018):

> "Participants place hands on the keyboard and complete seven blocks of stimuli sorting trials. In each trial, a word or image appears on the screen representing a category or target. The participant sorts the stimulus by pressing a key with the designated hand(…). During the sorting, stimuli alternate between target trials(…)and category trials…(p7)."

Measurement

The measurement instruments for the dependent and independent variable are both constructed based on the literature review. The independent variable, which is fake news exposure, will be used as manipulation. The moderating variables are gender and social media platform. The researcher uses fake news articles that were actually spread, with baring the definition as it derived from the literature review in mind: ***low factual information which is intended to deceive others. It also mimics the layout of actual news.*** Participants will not be told on beforehand that they will be exposed to fake news. This matches exposure in a real setting the most. In a real setting, social media users are not informed that an article is fake.

The dependent variable, which is the attitude, will be measured with the IAT. The IAT measures differences in how fast people makes certain associations. This variable is measured as a ratio. The pre-test creates a starting point between -1 and 1. A score of 1 suggests a full preference for the tested brand, and -1 a full preference for the alternative brand. The post-test measures the attitude after exposure. The difference within a subject can be attributed to the exposure. This outcome is also measured as a ratio. The complete overview of the variables and their measurements is presented in Table 4.

Table 4: concept, definition, and measurement

Concept	Definition	Measure	Reference
Attitude	The implicit associations of an individual after being exposed to an object. Which leads to attention, understanding, or interacting with the object.	A **ratio** variable created with the IAT. It tests the preference of the participants twice. This results in a score between -1 and 1. The outcome falls within one of the following groups: 0 – ,15 indicates little to no preference; ,15 – ,35 slight preference; ,35 – ,65 moderate preference; >,65 strong preference.	Carpenter et al. (2018), Greenwald (1998), Greenwald (2003), Alba & Hutchinson (1987) Mitchell & Olson (1981), Ajzen & Fishbein (1977), Fazio (2001)
Fake news	Low factual information which is intended to deceive others. It also mimics the layout of actual news. They often copy the names of actual news media.	The used fake news articles mimic the layout of actual news by imitating the in general perceived as trusted 'Business Insider'. The account that is used in the screenshots is a fake profile called 'Business Outsider'. The lay-out of the article matches the environment of the social media platform that the participant uses the most. The used articles were actually spread on social media as hoaxes. These were retrieved from fact-checking website snopes.com.	Tandoc et al. (2019), Allcot and Gentzkow (2017), Tandoc et al. (2017)
Gender	The identification with being a male, a female, or neither.	**Nominal** variable in the descriptive survey with the three options 'male', 'female', and 'other'.	Oxford Dictionary (n.d.)
Most used social media platform	The social media platform on which the participants spend most of their time on.	A **nominal** variable in the descriptive survey with the three options 'Facebook', 'Instagram', and 'Twitter'.	Bhandari (2018), Sin (2016), Viviani and Pasi (2017), Schmierbach and Hirsch (2012),

		It used to measure whether the (potential) change in attitude towards a brand differs among the most used social media platforms.	Visentin et al. (2019), Appelman and Sundar (2016), Silverman and Singer-Vine (2016)
News perception	The judgement regarding the truth of information by a social media user. Whether an article is perceived as factual or fake by participants.	A **dichotomous** variable in the descriptive survey. Participants are asked to evaluate the articles they saw as 'factual' or 'fake'. During the analysis, the researcher creates an **ordinal** variable by adding up the amount of articles perceived as 'factual' by each participant. This variable can be used as a covariate within the repeated-measure ANOVA. It can be used to measure whether the (potential) change in attitude towards a brand differs among those who perceived the articles as fake and those who perceived the articles as factual.	Egelhofer and Lecheler (2019), Brashier and Marsh (2020).
Manipulation check	A check to test whether participants actually read the news articles. This is required to make sure the data contains valuable data regarding their performed actions.	A **nominal** variable in the descriptive survey. It checks whether participants read the articles. This multiple choice question asks participants what the topics were of the articles they just read. Two of the three options contain random words, such as 'Eminem', 'Apple', and 'Lamp'. The third covers the topics of the articles participants were exposed to.	Hoewe (2017)

Data collection

The data were collected in March 2020 and April 2020 through an online survey on Qualtrics. Both the IATs were loaded into Qualtrics with the help of iatgen (Carpenter et al., 2018). Iatgen has an online interface for creating IATs. The iatgen also generates an export file which can be uploaded to Qualtrics. Participants do not have to leave Qualtrics for the fake news articles or the IATs. This might reduce the number of participants that stop during the experiment with an IAT with approximately 15% (Wang-Jones et al., 2017).

Data analyses

The IAT consists out of seven blocks. Not every block is useful as an outcome for the analyses. Some blocks are designed to make the participants familiar with the procedures of the IAT. The raw results from Qualtrics can be uploaded in iatgen. Iatgen performs a clean-up on the raw data and provides clean data for analyses in SPSS.

<u>Clean-up process</u>

First, the data is removed if it took a participant more than 10 seconds for assigning an attribute. Second, participants who reacted in more than 10% faster than 300 milliseconds are also removed. Iatgen then provides outcomes of several tests for the cleaned data. The software iatgen identified three participants with excessive speed during the IAT. Hence, these participants were left out as well. Finally, hypothesis 2 also requires that

participants provided on which social media platform they spend most of their time online. Similarly, hypothesis 3 requires the gender of participants. Participants who did not fill any of these in were listwise deleted.

Below follows Table 5. It provides an overview of how participants can be clustered in groups after the clean-up. This is after checking the control question and excluding participants with excessive speed during the IAT or with missing values. These groups are shaped by combining the variables of gender and social media usage. During the clean-up, it also became clear that the gender 'other' and the social media platform 'Twitter' had to be dropped from the analysis. These did not match the criteria of having at least 30 participants in each group. Ultimately, the total number of participants used in this research is 197. The distribution of their age can also be found in Table 5.

Table 5: descriptive statistics gender, platform, valid data entries, and age

		Valid			Invalid		Total
	Gender	Facebook	Instagram	Total	Twitter	Missing	
Valid	Male	32	45	77	9		86
	Female	30	90	120	4		124
	Total	62	135	**197**	13		210
Invalid	Missing					55	55
	'Other' gender		1	1	1		2
Total		62	136	198	14		267

Table 5: descriptive statistics gender, platform, valid data entries, and age (continued)

	Facebook	Instagram
Male	30,34 (SD = 9,036)	25,31 (SD = 6,914)
Female	29,4 (SD = 9,907)	21,38 (SD = 3,238)

Analysis after clean-up: paired sample t-test

The data contains two D-scores. One from the pre-test and one from the post-test. The D-scores derived from the same participants. Hence, the paired samples t-test can be used to measure if there is a significant change in the attitude after being exposed to fake news.

Analysis after clean-up: ANOVA

As mentioned before, the survey for the data collection includes questions regarding the gender and their most used social media platform. These variables will be included in an n-way Analysis of Variance (n-way ANOVA). This analysis can be conducted with the SPSS function ´General Linear Model´. The n-way ANOVA will only be conducted after testing the assumptions that the error terms are normally distributed, and are uncorrelated. This will be tested with the Levene's test.

If the Levene´s test is significant, the F-test will be used to test the hypotheses by looking at the significance of:

- The overall effect of exposure and the other usable variables on the attitude:

$$F = \frac{(SSx1 + SSx2 + SSx1x2)/DFn}{SSerror/DFd}$$

DFn = (C1 – 1)+(C2 – 1)+(C1 – 1)(C2 – 1) = 2+2+4 = 8
DFd = N – C1C2 = N -4

- The interaction effect of exposure and the other usable on the attitude:

$$F = \frac{SSx1x2/DFn}{SSerror/DFd}$$

DFn = (C1 – 1) (C2 – 1) = 2x2 = 4
DFd = N – C1C2 = N - 4

- The main effect of each usable variable on the attitude.

$$F = \frac{SSx1/DFn}{SSerror/DFd}$$

DFn = C1 – 1 = 2 and 2
DFd = N – C1C2 = N - 4

Results

Assumptions and preparation tests

This research investigated four different hypotheses. These will be discussed in the following section. However, there is another step before testing the hypotheses. The hypotheses were tested with the repeated-measure ANOVA. The ANOVA has several assumptions that had to be met first. The dependent variable should be a scale, the independent variables should be categorical, and the data should be approximately normally distributed. The sphericity assumption was not relevant since the research became a 2 by 2 experiment after the drop-out of the platform Twitter and the gender 'other'. The suited types of variables (scale and categorical) matched the criterium. However, the normality of the data had to be tested. An initial inspection covered the skewness and kurtosis level of the pre-test and post-test data. These results are presented in Table 6. The skewness is between the limits of -1 and 1, and Kurtosis is between the limits of -2 and 2. This indicates a data distribution that might be perceived as normally distributed. In addition, the Kolmogorov-Smirnov test and the Shapiro-Wilk test were conducted as well. These results are also presented in Table 6. The values of these tests were significant. This indicates that the data is not normally distributed. Ultimately, the decision was taken to continue with the ANOVA. This choice was made since the dataset contains groups with more than 30 participants. In this case, the ANOVA is rather robust when it comes to violating this assumption of normal distribution (Henseler, 2019).

Table 6: normality tests Kolmogorov-Smirnov and Shapiro-Wilk

	Kolmogorov-Smirnov[a]			Shapiro-Wilk				
	Statistic	df	Sig.	Statistic	df	Sig.	Skewness	Kurtosis
Pretest Dscore	,070	197	,020	,967	197	,000	-,408	-,632
Posttest Dscore	,052	197	,200*	,984	197	,028	-,119	-,714

The second step, before testing the hypotheses, was to establish whether the D-score values in the pre-test and the post-test value differs from 0 (no preference) in both cases. Each participant had a D-score value between -1 and 1. The closer to -1 indicates a preference towards Pepsi and the closer to 1 indicates a preference for Coca-Cola. 0 indicates no preference. A one-sample t-test was conducted to check whether there is an implicit preference in both tests. The results are presented in Table 7 and Table 8.

Table 7: t-test for establishing a significant difference from 'no preference'

	N	Mean	Std. Deviation	Std. Error Mean
Pre-test Dscore	197	,304	,429	,031
Post-test Dscore	197	,186	,418	,030

Table 8: t-test for establishing a significant difference from 'no preference' (continued)

	t	df	Sig. (2-tailed)	Mean (Difference)	95% Confidence Lower	Upper
Pre-test Dscore	9,949	196	,000	,304	,244	,364
Post-test Dscore	6,239	196	,000	,186	,127	,245

Table 7 and 8 show that the participants (N = 197) have a preference for Coca-Cola in the pre-test (M = ,304, SD = ,429) instead of having no preference, **t(196) = 9,949, p <,001**. A value between ,15 and ,35 is categorized as a slight preference (Greenwald

et al., 2003). In addition, it is can be noted with 95% CI that the actual value lies between 0, 244 and 0,364. Table 7 and 8 also show that participants (N = 197) had a slighter preference for Coca-Cola in the post-test (M = ,186, SD = ,418) instead of having no preference, **t(196) = 6,239, p <,001**. The post-test value has decreased but remains between ,15 and ,35, indicating a slight preference (Greenwald et al., 2003) With a 95% CI, the actual value lies between 0, 127 and 0,245. This indicates that participants remained to have a slight preference for Coca-Cola in the post-test. It is 95% certain that the strength of the preference became significantly lower. However, this will be tested with the repeated-measure ANOVA. To summarize, it can be concluded that the pre-test and the post-test are both significantly different than 0 (no preference). There is a brand preference for Coca-Cola in both cases. The brand preference in the post-test appears to be lower than in the pre-test.

Testing the hypotheses

As mentioned above, the hypotheses were tested with the repeated-measure ANOVA. However, some assumptions had to be met before testing the hypotheses. One assumption of the repeated-measure ANOVA is to have normally distributed data and normally distributed error terms. Both assumptions are met. The standardized residuals of the pre-test and the post-test were plotted in a Q-Q plot. These indicate a normal distribution for both tests. The Q-Q plots can be found in appendix II – Q-Q plots. Finally, the Levene's test was conducted to test whether there is an equal variance across the groups. The outcome of the Levene's test is presented in Table 9. The results show that the Levene's test is non-significant in each case at a significance level of ,05 (Levene, 1960). Hence, all assumptions are met for the repeated-measure ANOVA.

Table 9: Levene's test

		Levene Statistic	df1	df2	Sig.
Pretest Dscore	Based on Mean	2,562	3	193	,056
Posttest Dscore	Based on Mean	2,471	3	193	,063

The results of the repeated-measure ANOVA are presented in Table 10. The data in Table 10 contains the values from the Greenhouse-Geisser test, which is the most conservative test. The values for the other tests, such as 'Sphericity Assumed' provided the same values. The Mauchly's Sphericity Test itself could not be used since the research design became a 2x2 experiment after dropping Twitter and the gender 'other'. The complete table with all the tests is attached as appendix II – Repeated-measure ANOVA.

Table 10: results repeated-measure ANOVA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Observed Power
Attitude	,561	1	,561	4,070	,045	,021	,519
Attitude * SM	,148	1	,148	1,076	,301	,006	,178
Attitude * GNDR	,681	1	,681	4,942	,027	,025	,599
Attitude * GNDR * SM	,001	1	,001	,005	,944	,000	,051
Error(Attitude)	26,604	193	,138				

Table 10 shows that the attitude, without the variables of gender and social media platform, is significantly different in the post-test than in the pre-test **(F(1,193) = 4,070, p = ,045)**. This indicates that the category means are not equal in the pre-test and post-

test. Hence, hypothesis 1a is rejected. Exposure to fake news does influence the implicit attitude of participants towards a brand. The partial eta squared explains the strength of the effect of exposure to fake news on change in the attitude towards a company (Universiteit van Amsterdam, 2014). The partial eta squared is ,021, this indicates a weak effect (Universiteit van Amsterdam, 2014). Finally, the observed power is ,519. The observed power indicates the power of the test with the assumption that the effect size for the sample is the same as the effect size for the population. The widely accepted threshold for the statistical power is ,8 (Henseler, 2019).

Contrarily, there seems to be no relation when the variable social media platform is added **(F(1,193) = 1,076, p = ,301)**. Hence, hypothesis 2a cannot be rejected. It appears that there is no difference among the social media platforms when it comes to how much the attitude towards a brand changes due to fake news. The partial eta squared is ,006 and the observed power is ,519. However, as mentioned before, it is not significant. So, it cannot be concluded that there is an effect.

However, the power increases when the variable gender is added **(F(1,193) = 4,942, p = ,027)**. Hence, hypothesis 3a can be rejected. There is a difference in gender, regarding how much the attitude towards a brand changes due to exposure to fake news (see also the following section). The partial eta squared is ,027. This means that the variables of gender and attitude have together a stronger effect on how exposure to fake news on change in the attitude towards a company. However, it remains a weak effect (Universiteit van Amsterdam, 2014). Finally, the observed power is ,599.

On the opposite, the power decreases and becomes non-significant when the three variables are all included **(F(1,193) = 0,005, p = ,944)**. It can be concluded that there seems to be no interaction between the variables social media platform and gender, whilst influencing the attitude after exposure to fake news. The partial eta squared is <,001 and the observed power is ,051. As mentioned before, it is also not significant. So, it cannot be concluded that there is an effect.

To summarize, exposure to fake news seems to influence the brand attitude. The variable gender strengthens this relationship. The variable favourite social media platform does not. However, it must be noted that the power of the direct relation is ,519. The power increases to ,599 when the variable of gender is added. Nevertheless, in both cases the threshold for the statistical power is ,8 (Henseler, 2019). Hence, it appears that the statistical power is not high enough. Therefore, the role of the variable gender was explored further.

A deeper inspection of the role of gender

Gender appears to play a role in how fake news affects the attitude towards a brand. The researcher plotted the effect for both genders separately (see: figure 3). The interaction of gender appears to be a non-crossover dis-ordinal interaction. It did not qualify as a crossover dis-ordinal interaction since the estimated marginal mean of women is just above the estimated marginal mean of men in the post-test. Furthermore, it also appears that there is barely an effect of exposure to fake news on the implicit brand preference of men.

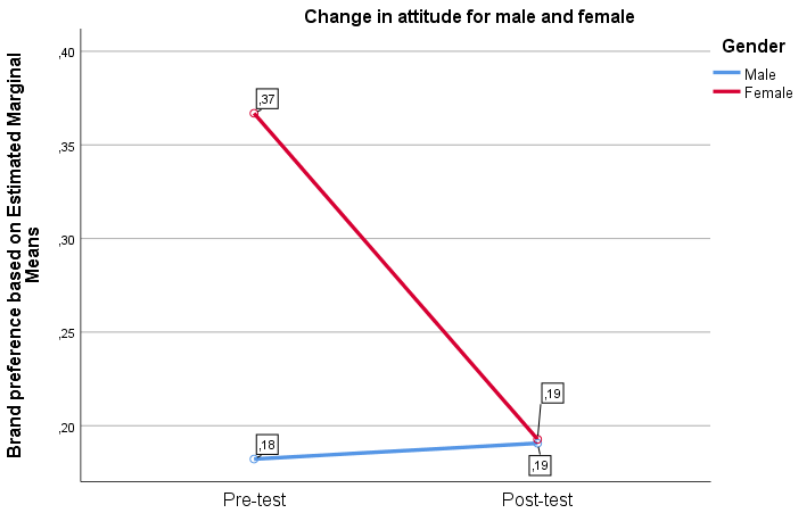

Figure 3: how fake news affects the brand attitude of men and women differently

Therefore, the researcher conducted the repeated-measure ANOVA two extra times. One time with only male participants and one time with only the female participants. This should provide clarity on whether fake news affects brand preference significantly for both genders or only for females. Of course, the assumptions were tested once again. These Q-Q plots are also attached as appendix II - Q-Q plots. The Levene's test with only male participants shows that the pre-test values were significant. However, this was not harmful to the ANOVA analysis because the groups have comparable sizes (Facebook N = 32, Instagram N = 45). The Levene's test for men and women can be found in appendix II - Role of gender. The repeated-measure ANOVA with only male participants is presented in Table 11 below. The table shows that the attitude, without the variable social media platform, is not significantly different in the post-test than in the pre-test **(F(1,75) = 0,019, p = ,892)**. Hence, it appears that exposure to fake news does not influence the implicit attitude of male participants towards a brand. The partial eta squared is <,001 and the observed power is ,052. As mentioned before, it is also not significant. In addition, the conclusion is the same when the variable social media platform is added **(F(1,75) = 0,540, p = ,465)**. The partial eta squared is then ,007 and the observed power is ,112. So, in both cases it cannot be concluded that there is an effect.

Table 11: repeated-measure ANOVA with only male participants

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Observed Power
Attitude	,003	1	,003	,019	,892	,000	,052
Attitude * SM	,077	1	,077	,540	,465	,007	,112
Error(Attitude)	10,764	75	,144				

The Levene's test with only female participants can also be found in appendix II - Role of gender. The results of it show that both the pre-test and post-test were non-significant. Hence, the repeated-measure ANOVA can be conducted again. Something interesting happens when the test contains female participants only. These results are presented in Table 12. The results show that the attitude, without the variable social media platform, is significantly different in the post-test than in the pre-test **(F(1,118) = 10,171, p = ,002)**. It

appears that exposure to fake news influences the implicit attitude of female participants negatively towards a brand. The partial eta squared is ,079. This indicates, a bit stronger, but still a weak effect (Universiteit van Amsterdam, 2014). The observed power is ,886. Just as before, the relation becomes non-significant when the variable social media platform is added **(F(1,75) = 0,528, p = ,469)**. The partial eta squared is then ,004 and the observed power is ,111. In this case, it cannot be concluded that there is an effect.

Table 12: repeated-measure ANOVA with only female participants

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Observed Power
Attitude	1,365	1,000	1,365	10,171	,002	,079	,886
Attitude * SM	,071	1	,071	,528	,469	,004	,111
Error(Attitude)	15,840	118	,134				

Furthermore, the relationship between fake news and brand attitude of women passes the threshold of ,8 observed power (Henseler, 2019). This was tested with four widely used power tests. These are Roy's Greatest Characteristic Root, Wilk's Lambda, Pillai's Criterion, and Hotelling's Trace. Every test provided an observed power of ,886. The complete table can be found in appendix II - Observed power.

Knowing that the articles are fake

Participants were also asked how they evaluate each article they were exposed to. They labelled each article as fake or factual. These answers were then recoded into a new variable with the number of articles perceived as factual (value between 0-5 articles perceived as real). This variable was added as a covariate. Interestingly enough, there is no significant relationship found. **(F(1,193) = 0,952, p = ,331).** The partial eta squared was ,005 and the observed power ,163. Hence, it cannot be concluded that there is an effect. The table is attached as appendix II – Perceived as factual. This implies that there is no significant difference in the effect of fake news on the brand attitude between those who know that the articles were fake and those who do not.

Conclusion and discussion

The final section of this research contains the conclusion and the discussion. The conclusion section reflects on the research question and answers every hypothesis. The discussion section reflects on the research, its set-up, and it provides suggestions for follow-up research.

Conclusion

This research investigated 4 hypotheses. These will be presented here, as well as the outcomes.

Hypothesis 1

- H0: exposure to fake news does not influence the implicit brand attitude
- H1: exposure to fake news influences the implicit brand attitude

Based on the conducted research, H0 has to be rejected. The repeated-measure ANOVA demonstrates that there is a relationship between exposure to fake news and brand attitude. Nevertheless, it must be noted that the statistical power was rather low (,519), and that exposure to fake news only explains 2,1% of the variance in the implicit attitude (partial eta squared = ,021). The partial eta squared is the ratio of variance associated with an effect, plus that effect and its associated error variance.

The fact that fake news affects brand attitude might be explainable with the presented theories in the theoretical background: the Limited capacity model of message processing (Lang, 2000) and Prominence-interpretation theory of Web

credibility (Fogg, 2003). These theories explain that people do not invest their full capacities in processing online information (Metzger et al., 2010).

Hypothesis 2

- H0: there is no difference in the effect of fake news on the implicit brand attitude across the different social media platforms
- H1: there is a difference in the effect of fake news on the implicit brand attitude across the different social media platforms

H0 of the second hypothesis has to be accepted. The repeated-measure ANOVA did not provide evidence to conclude that the effect of fake news differs across social media platforms.

Hypothesis 3

- H0: there is no difference in the effect of fake news among genders
- H1: there is a difference in the effect of fake news among genders

The third hypothesis provided the most interesting results of this research. Based on the research, H0 can be rejected. The first repeated-measure ANOVA showed that there is a difference between men and women in how exposure to fake news influences the brand attitude. Just as with hypothesis 1, the statistical power was quite low (,599), and the exposure to fake news only explains 2,5% of the variance in the implicit attitude (partial eta squared = ,025), indicating a weak effect.

A visual inspection of the plot indicated that the relationship might even be non-significant for men. Hence, the repeated-measure ANOVA was conducted again for male and female participants separately. These results indicate that there is no significant relationship for men between exposure to fake news and the implicit brand attitude. However, there is a strong significant relationship for women. The statistical power increased strongly (,886), and the exposure to fake news explains 7,9% of the variance in the implicit brand attitude (partial eta squared = ,079). Once again, it must be mentioned that a value between 0 and .1 indicates a weak effect (Universiteit van Amsterdam, 2014).

Hypothesis 4

- H0: there is no difference in the effect of fake news when gender and favourite social media platform are both taken into account
- H1: there is a difference in the effect of fake news when gender and favourite social media platform are both taken into account

H0 of hypothesis 4 has to be accepted. The conducted research did not provide evidence for rejecting H0. There appears to be no significant relationship between the variables when both gender and social media platform are taken into account.

Discussion

This research aimed to investigate whether fake news can influence the implicit brand attitude. Not all the hypotheses were supported. For instance, it was expected that the social media platform also plays a role in influencing the brand attitude by fake news. This appears to not be the case but there seems to be a significant relationship with gender as a moderating variable. However, the current research was not able to establish a significant relationship for men at all. The results imply that fake news influences the brand attitude of women only. This is partially in line with research from other scholars, who are divided about the differences in gender for trusting online information. Sin (2016) indicated that women have more trouble identifying conflicting information online than men. On the other hand, Hocevar et al. (2014) and Lim and Kwon (2010) argued that men trust online information more than women and that men tend to neglect the risks of Wikipedia more than women. Hence, this research fits partially with some previous studies. Whilst it was not investigated, the difference might be caused by

the scope of the research. The previous-mentioned scholars investigated online news in general. This research focussed only on news on social media.

Furthermore, the repeated-measure ANOVA was conducted again with the factual perception of the articles as a covariate. There was no significant difference found between people who were aware that articles were fake and those who were not. This might be explained by previous research, such as from Egelhofer and Lecheler (2019). That research explained that fake news can affect the attitude even after debunking fake news. The cause of this phenomenon is that people still have the article in their memory.

The results lead to a practical implication as well. It was already known that social media firestorms can disturb the image of a brand (Hansen, Kupfer, & Henning-Thurau, 2018). However, fake news can have a similar effect according to this research. Technological developments created an environment in which everyone with a mobile phone and internet can go viral with fake news (Comber & Grant, 2018). This is caused by the speed, scale, and massive consumption of easily accessible fake news on social media (Waisbord, 2018). These first-hand experience posts on social media are not verified by journalists, but can still reach many people (Tandoc et al., 2019). Research by Facebook and Stanford indicates that posts continue to spread on Facebook after being labelled as fake news. Whilst a new post mentioning that the original post was fake often does not go viral (Friggeri, Adamic, Eckles, & Cheng, 2014). This implies that Social Media Managers should tackle fake news seriously. It is not sufficient to post a rectification. Even if participants are aware that the news is fake, it can still influence the attitude of those exposed to it. Further research is needed to create the best practise for companies to do so.

Limitations

The limitations of this research should be mentioned as well. The design of the conducted experiment revolves around the IAT. The major advantage of the IAT is that it measures the implicit brand attitude. Participants do not have the time to give a socially desired answer. However, it also has a disadvantage. The IAT works with a pre-programmed list of associations. As mentioned by Carpenter et al. (2019), this means that it does not reflect the spontaneous associations of participants. To ensure that the data were valuable nevertheless, this research used the brand values of the used company as associations. Therefore, it was still possible to conclude to what extent fake news impacts the desired brand attitude. Carpenter et al. (2019) also agree that the IAT is a useful tool, as long as researchers are aware of the abovementioned disadvantage.

The short-term testing is another aspect that should be taken into account whilst interpreting the outcomes. Hansen et al. (2018) demonstrated that there is a difference in the short-term and long-term effects. Companies face more often a short-term negative brand perception. This research design contained a pre-test and post-test with a few minutes between both. Hence, the outcomes should only be generalized to the short-term effects of fake news on brand attitude. The research does not answer what the long-term effects are on the brand attitude. In addition, several participants mentioned they had initially trouble with placing ‘exclusive’ as a negative association. The term was supposed to represent the opposite of ‘inclusive’, which is one of the positive associations. Fortunately, the IAT design includes two testing rounds to get familiar with the words and the set-up before the actual measured test took place. Nevertheless, it is suggested to change ‘exclusive’ into ‘not inclusive’ if the study is reproduced.

Further research

This research focussed on the effect of fake news on the implicit brand attitude. It did not provide guidelines for social media users on how to distinguish fake news from actual news. However, it might be another step into this process. As mentioned before, many scholars focus on automated approaches to recognize fake news. The attitudinal implications of exposure to fake news is a topic with little attention. This research encourages other scholars to dig further into this topic. Therefore, this research also provides several topics that might be fruitful for further research. First, this research investigated changes in the implicit brand attitude towards a well-known brand in the FMCG industry. Previous research indicates that the effect of brand attitude on brand equity differs among industries (Schivinski & Dabrowski, 2016). Hence, it might be interesting to rerun the experiment within other industries and different company sizes.

Second, previous research indicated that repeated exposure to information also leads to higher perceived credibility (Egelhofer & Lecheler, 2019; Brashier & Marsh, 2020). This is also known as the illusory truth effect. This research focussed on the short-term. However, it is recommended to conduct a longitudinal research to investigate whether fake news has a long-term effect on the implicit brand attitude.

Third, the amount of engagement with a post was not taken into account in this research. It might be interesting to do a similar experiment in which the engagement is controlled and manipulated. Previous research indicates that this has an effect on how news is perceived online. Social media users trust online sources more if it is recommended by others (Metzger et al., 2010; Hocevar et al., 2014). This phenomenon is known as the bandwagon effect (Lin, Spence, Lachlan, 2016).

Forth, this study focussed only on fake news that victimized brands. However, companies can be victims or they can use fake news to look better (Wang et al., 2018). It might be interesting to investigate whether fake news that makes a company look better also has an effect on the implicit brand attitude.

Finally, further research might also focus on investigating best practices for Social Media Managers to debunk fake news. Previous research indicates that rectifying fake news is not enough. The fake news information is still present in the memory of those exposed to it (Egelhofer & Lecheler, 2019; Brashier & Marsh, 2020).

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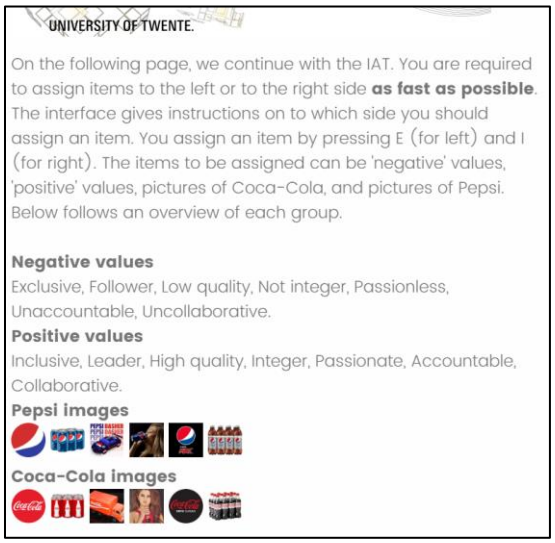
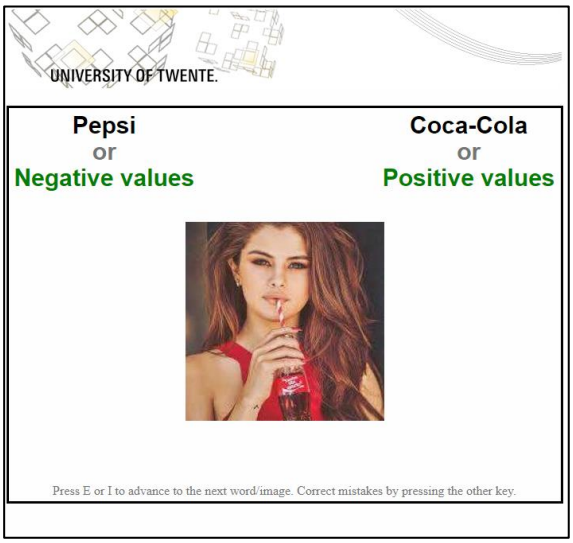
Appendix

Appendix I – the IAT

The programming of both the IAT and the survey is finished. The survey, in which the IAT is used twice (pre-test and post-test), can be found here.





The attributes

The following traits will be used (Greenwald, 1998). These are also used by (Stefanutti et al., 2012) to compare Coca-Cola and Pepsi.

Good	Bad
- Inclusive	- Exclusive
- Leader	- Follower
- High quality	- Low quality
- Integer	- Not integer
- Passionate	- Passionless
- Accountable	Unaccountable
- Collaborative	- Uncollaborative

The targets

The following images will be used to represent Coca-Cola and Pepsi.

Usable articles

The articles that will be used come from fact-checking website www.snopes.com. The following articles will be used as fake news articles:

Title	Link
Coca-Cola Dissolves Teeth	https://www.snopes.com/fact-check/coke-dissolves-teeth/
Coca-Cola Contains Cocaine	https://www.snopes.com/fact-check/cocaine-coca-cola/
Coca-Cola Coax Worms Out of Pork	https://www.snopes.com/fact-check/coke-adds-life/
Human Waste Reportedly Found in Coca-Cola Cans in Northern Ireland Bottling Plant	https://www.snopes.com/news/2017/03/30/human-waste-found-coke-cans/
Coca-Cola recalls bottles of its Dasani brand water due to the presence of aquatic parasites	https://www.snopes.com/fact-check/dasani-recalled-clear-parasite/

Mock-ups

Below are three examples of the mock-ups shown. All mock-ups contain the same value on the variables: 'source/posted by', 'likes'/'retweets'/'upvotes', 'comments', and 'shares' (all in a red squares). The interface language for all screenshots is English.

Example 1: Dasani recall on Instagram

Example 2: Cocaine in Coca-Cola on Facebook

Example 3: Raw pork and worms on Twitter

Appendix II – SPSS tests and tables

Repeated-measure ANOVA

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power[a]
Attitude	Sphericity Assumed	,561	1	,561	4,070	,045	4,070	,519
	Greenhouse-Geisser	,561	1,000	,561	4,070	,045	4,070	,519
	Huynh-Feldt	,561	1,000	,561	4,070	,045	4,070	,519
	Lower-bound	,561	1,000	,561	4,070	,045	4,070	,519
Attitude * GNDR	Sphericity Assumed	,681	1	,681	4,942	,027	4,942	,599
	Greenhouse-Geisser	,681	1,000	,681	4,942	,027	4,942	,599
	Huynh-Feldt	,681	1,000	,681	4,942	,027	4,942	,599
	Lower-bound	,681	1,000	,681	4,942	,027	4,942	,599
Attitude * SM	Sphericity Assumed	,148	1	,148	1,076	,301	1,076	,178
	Greenhouse-Geisser	,148	1,000	,148	1,076	,301	1,076	,178
	Huynh-Feldt	,148	1,000	,148	1,076	,301	1,076	,178
	Lower-bound	,148	1,000	,148	1,076	,301	1,076	,178
Attitude * GNDR * SM	Sphericity Assumed	,001	1	,001	,005	,944	,005	,051
	Greenhouse-Geisser	,001	1,000	,001	,005	,944	,005	,051
	Huynh-Feldt	,001	1,000	,001	,005	,944	,005	,051
	Lower-bound	,001	1,000	,001	,005	,944	,005	,051
Error(Attitude)	Sphericity Assumed	26,604	193	,138				
	Greenhouse-Geisser	26,604	193,000	,138				
	Huynh-Feldt	26,604	193,000	,138				
	Lower-bound	26,604	193,000	,138				

a. Computed using alpha = ,05

Mauchly's Test of Sphericity

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Atittude	1,000	,000	0	.	1,000	1,000	1,000

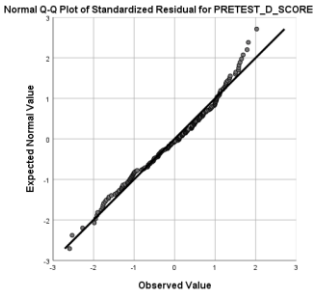
Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

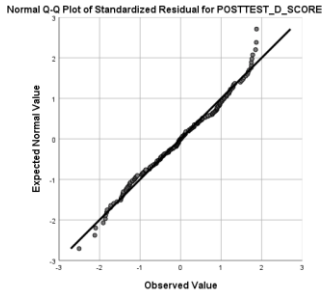
a. Design: Intercept + GNDR + SM + GNDR * SM
Within Subjects Design: Atittude

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

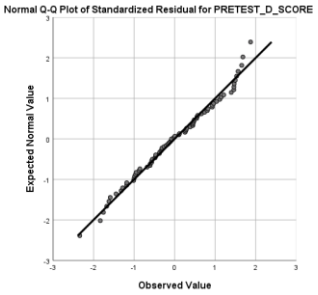
Q-Q plots

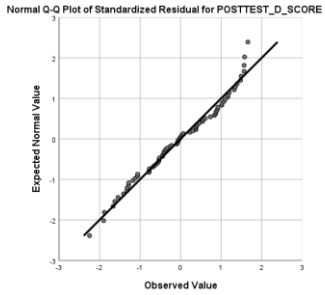
Total pre-test and post-test



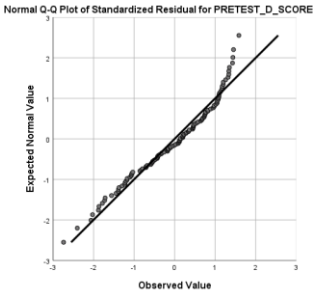


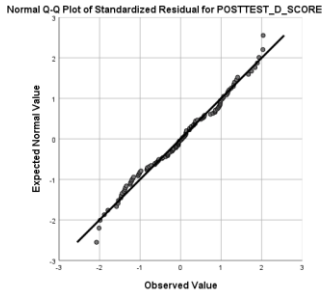
Male pre-test and post-test





Female pre-test and post-test





Role of gender

Levene's test male

		Levene Statistic	df1	df2	Sig.
Pretest Dscore	Based on Mean	4,947	1	75	,029
	Based on Median	4,515	1	75	,037
	Based on Median and with adjusted df	4,515	1	73,622	,037
	Based on trimmed mean	4,945	1	75	,029
Posttest Dscore	Based on Mean	,365	1	75	,547
	Based on Median	,325	1	75	,570
	Based on Median and with adjusted df	,325	1	74,436	,570
	Based on trimmed mean	,387	1	75	,536

Levene's test female

		Levene Statistic	df1	df2	Sig.
Pretest Dscore	Based on Mean	,367	1	118	,546
	Based on Median	,350	1	118	,555
	Based on Median and with adjusted df	,350	1	118,000	,555
	Based on trimmed mean	,400	1	118	,528
Posttest Dscore	Based on Mean	2,088	1	118	,151
	Based on Median	2,045	1	118	,155
	Based on Median and with adjusted df	2,045	1	117,788	,155
	Based on trimmed mean	2,058	1	118	,154

Observed power

Test	Value	F	Hypothesis df	Error df	Sig.	Observed Power
Pillai's Trace	,079	10,171[b]	1,000	118,000	,002	,886
Wilks' Lambda	,921	10,171[b]	1,000	118,000	,002	,886
Hotelling's Trace	,086	10,171[b]	1,000	118,000	,002	,886
Roy's Largest Root	,086	10,171[b]	1,000	118,000	,002	,886

Perceived as real

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[a]
Atittude	Sphericity Assumed	,752	1	,752	5,477	,020	,027	5,477	,644
	Greenhouse-Geisser	,752	1,000	,752	5,477	,020	,027	5,477	,644
	Huynh-Feldt	,752	1,000	,752	5,477	,020	,027	5,477	,644
	Lower-bound	,752	1,000	,752	5,477	,020	,027	5,477	,644
Atittude * PERC_REAL	Sphericity Assumed	,131	1	,131	,952	,331	,005	,952	,163
	Greenhouse-Geisser	,131	1,000	,131	,952	,331	,005	,952	,163
	Huynh-Feldt	,131	1,000	,131	,952	,331	,005	,952	,163
	Lower-bound	,131	1,000	,131	,952	,331	,005	,952	,163
Atittude * GNDR	Sphericity Assumed	,856	1	,856	6,239	,013	,031	6,239	,700
	Greenhouse-Geisser	,856	1,000	,856	6,239	,013	,031	6,239	,700
	Huynh-Feldt	,856	1,000	,856	6,239	,013	,031	6,239	,700
	Lower-bound	,856	1,000	,856	6,239	,013	,031	6,239	,700
Error(Atittude)	Sphericity Assumed	26,622	194	,137					
	Greenhouse-Geisser	26,622	194,000	,137					
	Huynh-Feldt	26,622	194,000	,137					
	Lower-bound	26,622	194,000	,137					

a. Computed using alpha = ,05

Appendix III – SPSS syntax

```
*Gender initial.
FREQUENCIES VARIABLES=GNDR
  /STATISTICS=RANGE MINIMUM MAXIMUM MODE
  /ORDER=ANALYSIS.

*Age initial.
FREQUENCIES VARIABLES=AGE
  /STATISTICS=RANGE MINIMUM MAXIMUM STDDEV MEAN MEDIAN
  /FORMAT=NOTABLE
  /ORDER=ANALYSIS.

*Exclude control question answered wrongly.
USE ALL.
COMPUTE filter_$=(TOPICS = 1).
VARIABLE LABELS filter_$ 'TOPICS = 1 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

*Combining gender with social media.
CROSSTABS
  /TABLES=GNDR BY SM
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT
  /COUNT ROUND CELL.

*Control question, Twitter and Other excluded.
USE ALL.
COMPUTE filter_$=((GNDR<=2) AND ((SM=1) OR (SM=3)) AND (TOPICS=1)).
VARIABLE LABELS filter_$ '(GNDR<=2) AND ((SM=1) OR (SM=3)) AND (TOPICS=1) (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

*Combining gender (M/F) with social media (FB/INS).
CROSSTABS
  /TABLES=GNDR BY SM
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT
  /COUNT ROUND CELL.

*Age used participants.
FREQUENCIES VARIABLES=AGE
  /STATISTICS=RANGE MINIMUM MAXIMUM STDDEV MEAN MEDIAN
  /FORMAT=NOTABLE
  /ORDER=ANALYSIS.

*Pre-test and post-test with no variables (different from 0).
```

```
T-TEST
  /TESTVAL=0
  /MISSING=ANALYSIS
  /VARIABLES=PRETEST_D_SCORE POSTTEST_D_SCORE
  /CRITERIA=CI(.95).

*Repeated ANOVA with no variables, with gender, and with social media.
GLM PRETEST_D_SCORE POSTTEST_D_SCORE BY GNDR SM
  /WSFACTOR=Atittude 2 Repeated
  /METHOD=SSTYPE(3)
  /SAVE=ZRESID
  /PLOT=PROFILE(Atittude*GNDR) TYPE=LINE ERRORBAR=NO MEANREFERENCE=NO YAXIS=AUTO
  /PRINT=ETASQ OPOWER HOMOGENEITY
  /PLOT=RESIDUALS
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=Atittude
  /DESIGN=GNDR SM GNDR*SM.

*Q-Q plot of standardized residuals - error terms.
PPLOT
  /VARIABLES=ZRE_1 ZRE_2
  /NOLOG
  /NOSTANDARDIZE
  /TYPE=Q-Q
  /FRACTION=BLOM
  /TIES=MEAN
  /DIST=NORMAL.

*Control question, Twitter and Other excluded. Male only.
USE ALL.
COMPUTE filter_$=((GNDR=1) AND ((SM=1) OR (SM=3)) AND (TOPICS=1)).
VARIABLE LABELS filter_$ '(GNDR=1) AND ((SM=1) OR (SM=3)) AND (TOPICS=1) (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

*Repeated ANOVA for male with no variables, and with social media.
GLM PRETEST_D_SCORE POSTTEST_D_SCORE BY SM
  /WSFACTOR=Atittude 2 Repeated
  /METHOD=SSTYPE(3)
  /SAVE=ZRESID
  /PRINT=ETASQ OPOWER HOMOGENEITY
  /PLOT=RESIDUALS
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=Atittude
  /DESIGN=SM.

*Q-Q plot of standardized residuals - error terms male only.
PPLOT
  /VARIABLES=ZRE_3 ZRE_4
  /NOLOG
```

```
  /NOSTANDARDIZE
  /TYPE=Q-Q
  /FRACTION=BLOM
  /TIES=MEAN
  /DIST=NORMAL.
```

***Control question, Twitter and Other excluded. Female only.**

```
USE ALL.
COMPUTE filter_$=((GNDR=2) AND ((SM=1) OR (SM=3)) AND (TOPICS=1)).
VARIABLE LABELS filter_$ '(GNDR=2) AND ((SM=1) OR (SM=3)) AND (TOPICS=1) (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
```

***Repeated ANOVA for female with no variables, and with social media.**

```
GLM PRETEST_D_SCORE POSTTEST_D_SCORE BY SM
  /WSFACTOR=Atittude 2 Repeated
  /METHOD=SSTYPE(3)
  /SAVE=ZRESID
  /PRINT=ETASQ OPOWER HOMOGENEITY
  /PLOT=RESIDUALS
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=Atittude
  /DESIGN=SM.
```

***Q-Q plot of standardized residuals - error terms female only.**

```
PPLOT
  /VARIABLES=ZRE_5 ZRE_6
  /NOLOG
  /NOSTANDARDIZE
  /TYPE=Q-Q
  /FRACTION=BLOM
  /TIES=MEAN
  /DIST=NORMAL.
```

***Control question, Twitter and Other excluded.**

```
USE ALL.
COMPUTE filter_$=((GNDR<=2) AND ((SM=1) OR (SM=3)) AND (TOPICS=1)).
VARIABLE LABELS filter_$ '(GNDR<=2) AND ((SM=1) OR (SM=3)) AND (TOPICS=1) (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.
```

***Repeated ANOVA with gender, and articles perceived as real as covariate.**

```
GLM PRETEST_D_SCORE POSTTEST_D_SCORE BY GNDR WITH PERC_REAL
  /WSFACTOR=Atittude 2 Repeated
  /METHOD=SSTYPE(3)
  /PRINT=ETASQ OPOWER HOMOGENEITY
  /PLOT=RESIDUALS
```

```
  /CRITERIA=ALPHA(.05)
  /WSDESIGN=Atittude
  /DESIGN=PERC_REAL GNDR.
```

***Age statistics for each platform, male only.**

```
USE ALL.
COMPUTE filter_$=((GNDR=1) AND ((SM=1) OR (SM=3)) AND (TOPICS=1)).
VARIABLE LABELS filter_$ '(GNDR<=2) AND ((SM=1) OR (SM=3)) AND (TOPICS=1) (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

DATASET ACTIVATE DataSet1.
MEANS TABLES=AGE BY SM
  /CELLS=MEAN COUNT STDDEV.
```

***Age statistics for each platform, female only.**

```
USE ALL.
COMPUTE filter_$=((GNDR=2) AND ((SM=1) OR (SM=3)) AND (TOPICS=1)).
VARIABLE LABELS filter_$ '(GNDR<=2) AND ((SM=1) OR (SM=3)) AND (TOPICS=1) (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

DATASET ACTIVATE DataSet1.
MEANS TABLES=AGE BY SM
  /CELLS=MEAN COUNT STDDEV.
```