Information Behavior towards False Information and "Fake News" on Facebook

The Influence of Gender, User Type and Trust in Social Media

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Abstract

In this paper, we present a survey study with 119 participants conducted in German, which investigates respondents' Facebook behavior. In particular, the survey provides insight into how the individual factors gender, user type and trust in social media influence information behavior with respect to false information on Facebook. Our participants' Facebook use is predominantly passive, the trust in social media is mediocre and most users claim to encounter false information on a weekly basis. If the truthfulness of information is verified it is mostly done by checking alternative sources and for the most part, users do not react actively to false information on Facebook. Of the different categories of Facebook users studied, more active and intensive users of Facebook (posters and heavy users) encounter false information the most. These users are the only user group to report posts with false information to Facebook or interact with the post. Participants with higher trust in social media tend to check the comments of a post to verify information.

Keywords: false information; fake news; social media; gender; user type; trust in social media

1 Introduction

Social media is becoming an ever more important part of the web. 65% of all American adults use social media (Perrin, 2015) and although the influence of social media is lower in Germany by comparison, it remains substantial with 48% of all web users in Germany reporting at least occasional social media use, with the figure increasing to 81% if only younger users are considered (Poushter, 2016). In light of these high usage numbers, substantial research literature exists dealing with how and why social media is used (e.g., Lee & Ma, 2012; Park, Kee, & Valenzuela, 2009). Social media has also been subject to frequent criticism. The World Economic Forum labelled the propagation of false information on social media as one of the top ten trends as early as 2014. Research in information science has examined this subject, for example, in the contexts of particular events, such as the 2010 earthquake in Chile (Mendoza, Poblette, & Castillo, 2010) and the Boston Marathon Bombing (Starbird et al., 2014). Recently, fake news behavior during the Covid-19 pandemic has been studied (Montesi, 2020) and the rise of this phenomena has led to various research in information science (cf. Chiluwa & Samoilenko, 2019). An active research topic in the area of false information is the prediction of the credibility of information using data mining methods (Fletcher, Schifferes, & Thurman, 2020). The source of false information – man or algorithm – has drawn some research interest, as well (Zimmer et al., 2019a, 2019b).

With the user-centered turn (Dervin & Nilan, 1986), personal and individual factors are regarded as very important to achieve a holistic view of a subject in information science. The individual factors personality and gender have been verified as important influencing factors in information seeking (Schmidt & Wolff, 2015, 2016; Schmidt, 2016), user interface aesthetics (Schmidt & Wolff, 2017, 2018), usability testing (Schmidt, Wittmann, & Wolff, 2019) and general social media behavior (Correa, Hinsley, & De Zuniga, 2010), however very little work has investigated how these factors interact with false information. Marret's and Joshi's (2009) work goes in this direction by analyzing correlations of the motivation and the normative influence on the propagation of false rumors in online forums. Chen and Sin (2013) examined the influence of gender and personality on the sharing of false information on the web. Although research on false information propagation on the web is limited, the results published so far hint that individual

factors are important and warrant further investigation. As individual factors, the study presented here examines gender, user type and the degree of trust in social media. Although gender could not be proven as relevant influencing factor in recent research, further analysis is justified since gender has been verified as important influencing factor in several research areas in information behavior (Venkatesh & Morris, 2000; Schmidt & Wolff, 2015). We referred to the distinction between lurkers and posters, as well as heavy and light users to analyze user type and information behavior towards false information in the context of social media. The final individual factor is the "trust in social media". Johnson and Williams (2010) discovered that social media is the media channel that is trusted least. Jackob (2010) showed that the trust in social media influences how the social media platform is used. These results lead us to believe that trust in social media can also be an influencing factor on handling false information in social media. Further, the focus of current research relies heavily on the active act of false information propagation (Chen & Sin, 2013; Chen et al., 2015). The passive perception of false information is also an important part of information behavior towards false information and was examined closer in our study. Furthermore, post-perception behavior has not yet been analyzed. Our study tries to close this gap by also investigating the reaction and verification behavior after encountering false information. We also integrate the concept of mis- and disinformation in our research questions. Misinformation is false information that is shared without knowledge about the falsehood. Disinformation is shared with deceptive intention and knowledge about the falsehood (Karlova & Fisher, 2013). This taxonomy can lead to more differentiated results. We chose to study the social media platform Facebook and used a survey to learn about user behavior and perceptions. By analyzing known factors as well as unknown nuances, we gained new insights for the research area of false information.

2 Related work

Although research about individual differences in social media is still rare, information science has dealt with the general phenomenon of social media for some time. For example, theoretical works have formulated definitions and taxonomies (Ellison, 2007; Kaplan & Haenlein, 2012). Ellison (2007)

defines a social network as a web service and interconnected system one can create a profile and user lists as well as communicate and share information. The social network used in this study, *Facebook*, is a prototypical example. Empirical work deals with the question of who uses the social network (Lenhart, 2009), how much time is spent doing so (ibid.; Raacke & Bonds-Raacke, 2008) and in which way social media is used (Lenhart, 2009). These and similar factors have also been analyzed in the context of group-specific influences. Park, Kee, and Valenzuela (2009) examined the reasons for participation in Facebook-groups among college students. The primary reasons are socialization, entertainment, self-promotion and gathering information. Women living outside the city of the university, however, were found to use the groups significantly more for gathering information than men. Correa, Hinsley, and De Zúñiga (2010) showed that people who are open for new experiences, as well as more extraverted people use social media more frequently. Emotional stability, on the other hand, is a rather negative predictor for social media usage. The influence of personality on social media use interacts with gender and age, with the relationship being especially strong for young, extraverted users. However, men with lower emotional stability use more social media. Lee and Ma (2012) examined explicitly sharing information in social networks. They showed that persons that use social networks primarily for information seeking, socialization and self-promotion also tend to share news more than users with other motivations. Similar to our study the individual intensity of active participation in the social network was operationalized and it was proven that this intensity correlates with the intention to share news.

Regarding the concept of false information, theoretical as well as empirical research in information science can be found. Theoretical works deal with the definition and classification of false information (Fallis, 2009; Alexander & Smith, 2010; Karlova & Lee, 2011). Instead of referring to these sophisticated reflections, we refer to a simpler but gainful definition by Karlova and Lee (2013), who divide false information into misinformation (false information shared without knowledge about the falsehood) and disinformation (false information shared with deceptive intentions).

Empirical research on false information in social networks has typically focused on isolated catastrophic events. Mendoza, Poblete, and Castillo (2010) analyzed the information propagation on Twitter during the earthquake in Chile. They notice that mis- and disinformation is indeed shared but can be identified because it is less intensively shared and the truthfulness is

doubted in retweets. Starbird et al. (2014) performed a similar study concerning the Boston Marathon Bombing. Again, the creation and propagation of mis- and disinformation was shown. They identified crowd-based correction procedures; however, these corrections were less effective than the propagation intensity and speed of the false information propagation. Leeder (2019) presents a study of college students' fake news handling behavior. They identified that students were unable to evaluate their own skills in detecting fake news but found correlations between the identification of fake news and specific critical evaluation strategies.

Research about the influence of individual and group-specific factors on the propagation of false information in the online-context is rare so far. Marret and Joshi (2009) examined the propagation of rumors and information in online-forums about sports. They analyzed several individual factors like the user type by differing between posters (active participants of the forum that post and answer frequently) and lurkers (passive user that mostly just read the online forum). Moreover, extrinsic and intrinsic motivations, as well as normative influence were studied. In a survey study with 471 participants, they were able to show that the motivation to share information and rumors differ between posters and lurkers. Posters are influenced by all three motivational factors while lurkers are mainly influenced by extrinsic motivation and normative influence. Marret and Joshi show that the user type can have an impact on handling false information and the analysis of this factor can lead to more sophisticated results in this research area. This idea is picked up in our study. Chen and Sin (2013) examined explicitly the influence of person-related factors on the motivation to share misinformation. As person-related factors they chose gender and personality, operationalized with the know Big-5-model. They conducted a survey study with 171 college students. More than two thirds of the participants affirm to having shared false information. Gender did not show any relevant results for these relationships. Regarding personality, extraverted participants tend to share misinformation more likely to socialize with others.

3 Research questions

In this section, we formulate our main research question. We focus our research solely on the platform Facebook. We motivate this decision by the

fact that Facebook remains by far the most popular social network in Germany where the study was conducted.[1] The research questions are structured by the independent variables: the individual factors

- gender,
- user type,
- and trust in social media.

We further refer to the user type by the more precise term *Facebook-usage*. Facebook-usage is on the one hand operationalized by the intensity and frequency of the active and passive Facebook-usage ("heavy user" and "light user") – we will refer to this concept as *Facebook-intensity*. On the other hand, we distinguish between active participation (posters) and more passive reception (lurkers) – this concept will be named *Facebook-user-type.*

Trust in social media is operationalized by various statements. The higher the trust in social media the more informative, accurate, truthful, reliable and essential social media is regarded.

Our dependent variables are the passive and active handling of false information, the estimation of the proportion of mis- and disinformation and the verification- and reaction behavior when confronted with false information. Handling false information is operationalized analogue to Facebook-usage by differentiating between active and passive interactions as well as by regarding the frequency of consumption and interaction, this time with false information.

To integrate the taxonomy of mis- and disinformation we also collect data about the assessment of the proportion of both types to false information. In doing so, we want to gain first insights from the perspective of users concerning this taxonomy.

The verification behavior is divided in different possible verification actions possible on the web to verify the truthfulness of suspected false information. The reaction behavior is also divided in different actions one can perform on Facebook to react to false information. All factors are operationalized by single or multiple questionnaire items. More details on the operationalization follows in the next sections. To get a holistic view, interactions between the independent variables were analyzed as well. We structure the research questions by the primary independent variables into the categories G (gender), F (Facebook-usage) and T (trust in social media). Each research question consists of one or multiple hypotheses depending on the various

1 https://gs.statcounter.com/social-media-stats/all/germany

variables/questionnaire items that are examined via this research question. Please note that we also take a look at interactions between the independent variables.

Gender:

- G-RQ1: There is a relationship between gender and Facebook-usage.
- G-RQ2: There is a relationship between gender and trust in social media.
- G-RQ3: There is a relationship between gender and handling false information.
- G-RQ4: There is a relationship between gender and the estimation of the proportion of mis- and disinformation.
- G-RQ5: There is a relationship between gender and the verification behavior.
- G-RQ6: There is a relationship between gender and the reaction behavior towards false information.

Facebook-usage:

- F-RQ7: There is a relationship between Facebook-usage and trust in social media.
- F-RQ8: There is a relationship between Facebook-usage and handling false information.
- F-RQ9: There is a relationship between Facebook-usage and the estimation of the proportion of mis- and disinformation.
- F-RQ10: There is a relationship between Facebook-usage and the verification behavior.
- F-RQ11: There is a relationship between Facebook-usage and the reaction behavior towards false information.

Trust in social media:

- T-RQ12: There is a relationship between trust in social media and handling false information.
- T-RQ13: There is a relationship between trust in social media and the estimation of the proportion of mis- and disinformation.
- T-RQ14: There is a relationship between trust in social media and the verification behavior.
- T-RQ15: There is a relationship between trust in social media and the reaction behavior towards false information.

4 Methods

To answer the hypotheses of the research questions a survey study was conducted.

4.1 Questionnaire development and participant acquisition

The questionnaire is divided in several parts consisting of self-made questions as well as questions and statements oriented towards questionnaires of recent research. The survey was created with *Google Forms.* We performed a pre-test with five students of information science to test the structure and overall understanding of the questionnaire in two iterations of the survey development. Based on this feedback we improved upon the formulation of some questions and the structure of the questionnaire.

We gathered participants by posting the survey in multiple German Facebook-groups that are focused on the acquisition of participants for online questionnaires. Since these groups are mainly directed towards students performing similar studies, these make up the majority of our sample (see Chapter 5.3.1 for more information about the demographics). The questionnaire was online for one month.

4.2 Questionnaire structure

We describe the structure and content of our questionnaire. An anonymized version of the original German questionnaire as well as an English translation can be found online.[2] Overall, the questionnaire had 42 items including demographic questions. For an overview of the final important variables see Tables 1 and 2.

4.2.1 Demography

In the first part of the questionnaire, basic demographic data is gathered. We collected information on gender, age, education level and profession.

2 https://www.dropbox.com/sh/oum3i6gvbyp4s6u/AAAvwyV607Nwbo-DyMpby4l3a

4.2.2 Facebook-usage

Rosen et al. (2013) developed a questionnaire to capture daily media usage. By carrying out a factor analysis with 942 participants, they were able to identify eleven subscales. One of these subscales deals with the usage of social media. The subscales show a high level of reliability and validity. We chose the "General social media usage subscale" and modified it for our purposes. The items were translated into German. The questions assess frequency concerning several social media activities: calling the Facebook-page (in general, from the smartphone, from work), updating the status, posting photos, browsing through profiles, reading posts, commenting posts, liking posts. These nine questions were extended by a self-formulated question about the sharing of information (e.g., news) because this activity is important in relationship to information behavior towards false information. The frequency of the individual activities is answered by choosing one of eleven selections: never (1) / less than once a month (2) / once a month (3) / multiple times a month (4) / once a week (5) / multiple times a week (6) / once a day (7) / multiple times a day (11) / once per hour (9) / multiple times per hour (10) / all the time (1) (see Rosen et al., 2013). Like Rosen et al. we transform the answers to ordinal numerical values ranging from 1 (never) to 11 (all the time). The classification in lurkers and posters is explained in Chapter 5.1.

4.2.3 Trust in social media

To operationalize trust in social media we developed a questionnaire section that is oriented towards the "Scale to Measure Consumer Skepticism Toward Advertising" (SKEP; Obermiller & Spangenberg, 1998). Although the subject of the questionnaire has no direct relationship with the goal of the present study, it was possible to reformulate the items to the context of trust in social media. The questions were translated into German. Three questions were removed since they were not suitable for our use case. Overall, five statements are formulated in the form of: "social media is an informative / truthful / accurate / reliable / essential source of information". On a 5-point Likert-scale participants could express their approval to the statement from 1 (disagree fully) to 5 (agree fully). By summing the numerical values of all items, we get a metric variable ranging from 5 to 30. The higher this value the higher the trust in social media.

4.2.4 Handling false information

To gather data concerning handling false information we designed a subsection of the survey that uses activities from the Facebook-usage section and reformulates them with false information. We asked how often participants believe to consume, share, "like" or comment false information. As explained in Chapter 4.2.2, items were answered on a scale from 1 (never) to 11 (all the time).

4.2.5 Proportion of mis- and disinformation

To integrate the concept of mis- and disinformation, participants were asked to estimate the proportion of mis- and disinformation to false information on Facebook. Since these terms can be very complex, we presented an explanation of the terms in this subsection of the questionnaire. The proportion of each type was assessed on a 5-point scale ranging from 1 (very low) to 5 (very high). We wanted to gather user-based data concerning these concepts but did not integrate other questions to avoid possible problems in understanding the definitions.

4.2.6 Verification of information

To obtain data about verification behavior when confronted with information assumed false on Facebook, we adopted and adjusted a questionnaire developed by Flanagin and Metzger (2000). They conducted a study about the credibility of information on the Internet and developed a questionnaire about the different ways of verification strategies of information on the internet. We reduced the number of questions and reformulated those remaining, such that they were suitable for a social media context. The chosen verification strategies are: "check the page / credentials / objectives of the poster / check the topicality / use other information sources / check the comments / check if other trusted persons or pages liked or shared the post / check if the information is an objective statement or an opinion / check if the information is complete". Further, we added the verification strategy "examine the comments of the post". Analogue to the original scale of Flanagin and Metzger, survey participants rated the usage of these activities on a scale from 1 (never) to 5 (always).

4.2.7 Reaction to false information

In the final section of the questionnaire, we gathered data about how people react once they are sure they are confronted with false information on Facebook. As no suitable questionnaire could be found, the authors determined four possible reactions regarding the functions of Facebook: "comment to the post and remark the falsehood / share the post and remark the falsehood / report the post to Facebook / unsubscribe the page or person". Similar to the previous section participants had to rate how often they use the proposed reactions when confronted with false information on a scale from 1 (never) to 5 (always).

5 Results

The raw data as well as all results are also available online.[3]

5.1 Data preparation and -transformation

To define certain variables for statistical analysis, some gathered data had to be prepared or transformed. The items concerning Facebook-usage were summed to achieve an overall-variable *Facebook-intensity*. This variable can have a value between 11 and 110 and represents the intensity and activity of the Facebook-usage. It is, therefore, possible to distinguish between "heavy user" and "light user" on a metric scale.

To distinguish between lurkers and posters, a variable – *active Facebook-usage* – was defined by summing up only those activities of the Facebook-usage questionnaire that require active interaction and participation on Facebook (update status, post photos, comment posts, "like" something, share posts). By this, we get a value between 5 and 55. We further carried out a median split to classify participants in just one group: lurkers or posters. Median split is an established statistical technique in the social sciences and psychology in similar settings to create dichotomous variables (cf. Iacobucci et al., 2015). The median for the variable *active Facebook-usage* is 14. Every participant above this value is considered a poster; everyone below is classi-

3 https://www.dropbox.com/sh/vnvdvb52ahmpa5g/AABzyuMInbJuR2DjQqOdIBLta

fied as a lurker. By using this definition, posters are Facebook-users that update their status, post photos, comment posts and like something on Facebook in an above-average frequency. We decided upon this method since it divided the sample relatively equal (see Chapter 5.3.2). We refer to the variable differentiating between lurkers and posters as *Facebook-user-type*.

Tables 1 and 2 give an overview of all variables.

Table 1: Overview of the independent variables

Variable-group	Variable	Possible values
gender	gender	male/female
Facebook-usage	Facebook-intensity	11 (low usage rate) – 110 (high usage rate)
	Facebook-user-type	poster/lurker
trust in social media	trust in social media	5 (low trust) – 30 (high trust)

Table 2: Overview of the dependent variables

Variable-group	Variable	Possible values
handling false information	consume false information	1 (never) – 11 (all the time)
	share false information	
	like false information	
	comment false information	
proportion of mis- and disinformation	proportion of misinformation	1 (very low) – 5 (very high)
	proportion of disinformation	
verification of information	check the page	1 (never) – 5 (always)
	check the credentials of the poster	
	check the objectives of the poster	
	checking the topicality of the post	
	use other information sources	
	check the comments	
	check if other trusted persons/pages liked or shared the post	
	check if the information is an objective statement or an opinion	
	check if the information is complete	
reaction to false information	comment the post	1 (never) – 5 (always)
	share the post	
	report the post	
	unsubscribe the poster	

5.2 Statistical procedure

Depending on the analyzed research questions and the used variables, different statistical tests were carried out: *t*-tests for pairwise group comparisons, Spearman's Rho for correlations between ordinal or metric variables and one chi-square test for a relationship between two nominal variables (gender and Facebook-user-type). As level of significance, we chose 0.05. Since we do test multiple hypotheses on the same sample, we correct the level of significance via the Bonferroni-Holm-Method (Holm, 1979). The *p*-values we report are the corrected *p*-values according to this method. We do report non-significant results via descriptive analysis if we found interesting results. Please note however that these results have to be interpreted with caution. All statistical analysis was carried with the Software *IBM SPSS Statistics*.

5.3 Descriptive statistics

5.3.1 Sample

Overall, 119 persons participated in the study with 65 female and 54 male participants. Almost all had a high school degree (114). Most of the participants were students (89). 27 participants were employees and the rest pupils or other. The average age was 25.8 with the youngest person being 19 and the oldest being 62. Most participants were aged between 21 and 27 years ($n = 95$). Only five participants were older than 35 years. Thus, while we managed to acquire many participants from the user group of Facebook in Germany that represents most users according to current statistics[4] (the age group between 19 and 34), we were not able to gather many participants of the age group above 35.

5.3.2 Facebook usage

Table 3 illustrates the descriptive statistics for all variables concerning Facebook usage.

4 https://de.statista.com/statistik/daten/studie/512316/umfrage/anzahl-der-facebook-nutzer-in-deutschland-nach-alter-und-geschlecht/

Table 3: Descriptive statistics for all variables/questionnaire items concerning Facebook usage (main variable is in bold)

Variable	Active/passive	Min	Med	Avg	Max	*Sd*
call Facebook	passive	2	8	7.65	11	1.71
call Facebook on mobile	passive	1	8	6.47	10	2.52
call Facebook from work	passive	1	7	6.39	10	2.45
update status	active	1	2	1.88	10	1.24
post photos	active	1	2	1.86	6	0.77
general browsing	passive	1	5	5.12	10	2.05
read posts	passive	2	8	6.85	10	1.96
comment posts	active	1	3	3.33	10	2.08
like posts	active	1	6	5.13	10	2.24
share posts	active	1	2	2.40	9	1.64
active Facebook-usage	–	5	14	14.61	41	6.35
Facebook-intensity	–	16	49	47.08	82	12.50

Facebook is visited on average multiple times a day ($M = 7.65$, $Sd = 1.71$). With a mean value of 6.47, it is visited less frequently with the smartphone. The value represents the statement "multiple times a week". In a similar frequency Facebook is called while being on work ($M = 6.39$, $Sd = 2.45$). The most frequent activities on Facebook are passive, e. g. reading posts ($M = 6.84$, $Sd = 1.96$) or browsing through profiles and photos ($M = 5.12$, $Sd = 2.05$). Participants state to perform more active activities rather rarely, most of the time less than once a month, e.g., sharing posts ($M = 2.40$, $Sd = 1.64$), updating the status ($M = 1.88$, $Sd = 1.24$) and posting photos ($M = 1.86$, $Sd = 0.77$). Only the activity to like posts is performed more frequently, on average multiple times a week ($M = 5.13$, $Sd = 2.24$).

Using a median split as discussed in Chapter 5.3.2, the sample could be equally divided in lurkers and posters. 65 participants are lurkers and 54 are posters according to our definition using median split. With a value of 14, the median for active Facebook-usage is relatively low. The reason for this is that Facebook is rarely used active. Therefore, posters in our study are also persons that participate *in rather low levels* on Facebook in an active way by sharing or commenting occasionally.

5.3.3 Trust in social media

The results concerning the items about trust in social media point to an average degree of trust (see Table 4).

Table 4: Descriptive statistics for all variables/questionnaire items concerning trust in social media

Variable	Min	Med	Avg	Max	*Sd*
social media is informative	1	3	2.81	5	0.86
social media is truthful	1	2	2.03	5	0.91
social media is reliable	1	2	1.87	5	0.96
social media is accurate	1	2	2.11	4	0.96
social media is essential	1	3	2.76	5	1.13
overall: trust in social media	6	14	14.33	24	3.99

The highest agreement is found for the statement that social media are informative ($M = 2.81$, $Sd = 0.86$) and essential ($M = 2.76$, $Sd = 1.13$). The lowest agreement is found for the statement that social media are a reliable information source ($M = 1.87$, $Sd = 0.96$). The summed overall-variable points to an average trust and a moderate skepticism towards social media ($M = 14.33$, $Sd = 3.99$).

5.3.4 Handling false information

Descriptive statistics concerning dependent variables are summarized in Table 5.

A mean value of 4.87 shows that participants are confronted with false information on Facebook on average multiple times a month to multiple times a week ($Sd = 2.17$). However, the active interaction with false information is very low. More than 75% state that they would never share false information ($M = 1.36$, $Sd = 0.83$). Similar numbers can be found for liking ($M = 2.10$, $Sd = 1.32$) or commenting false information ($M = 1.66$, $Sd = 1.06$). The majority of participants assume to like or comment false information less than once a month or even never at all.

Table 5: Descriptive statistics for all dependent variables/questionnaire items

Variable-group	Variable	Min	Med	Avg	Max	*Sd*
handling false information	consume false information	1	4	4.87	11	2.17
	share false information	1	1	1.36	6	0.83
	comment false information	1	1	1.66	6	1.06
	like false information	1	2	2.10	8	1.32
proportion of mis- and dis-information	proportion of misinformation	1	4	3.56	5	0.98
	proportion of disinformation	1	3	3.06	5	1.00
verification of information	check the page	1	3	3.09	5	1.17
	check the credentials of the poster	1	3	2.56	5	1.18
	check the objectives of the poster	1	3	2.80	5	1.24
	check the topicality of the post	1	3	3.10	5	1.00
	use other information sources	1	4	3.49	5	1.11
	check the comments	1	3	3.31	5	1.14
	check if other trusted persons/ pages liked or shared the post	1	2	2.32	5	1.10
	check if the information is an objective statement or an opinion	1	4	3.40	5	1.13
	check if the information is complete	1	3	2.92	5	1.08
reaction to false information	comment the post	1	1	1.82	5	1.4
	share the post	1	1	1.30	4	0.70
	unsubscribe the poster	1	3	3.25	5	1.18
	report the post	1	2	2.03	5	1.18

5.3.5 Mis- and disinformation

Concerning the estimation of the proportion of mis- and disinformation to false information, the data shows that this proportion is estimated as equally distributed (see Table 5). The proportion of misinformation is estimated as slightly higher ($M = 3.56$, $Sd = 0.98$) than the proportion of disinformation ($M = 3.06$, $Sd = 1.00$). This means that overall, our participants believe that half of all false information on Facebook is misinformation (therefore mistakenly false) and the other half is disinformation (therefore shared with knowledge about the falsehood).

5.3.6 Verification of information

It is shown that the most frequent verification activities are using other information sources ($M = 3.49$, $Sd = 1.11$) as well as checking if the post is an objective statement or an opinion ($M = 3.40$, $Sd = 1.12$). Occasionally activities like checking the comments of the post ($M = 3.31$, $Sd = 1.14$) or reviewing the topicality are carried out ($M = 3.11$, $Sd = 1.01$). Very rarely participants examine if other known and trusted persons liked or shared the post ($M = 2.32$, $Sd = 1.10$).

5.3.7 Reaction to false information

The analysis of the questions about the reaction to false information confirms a known pattern (Table 5). Participants state to very rarely to never comment ($M = 1.82$, $Sd = 1.04$), share ($M = 1.30$, $Sd = 0.7$) or report a post ($M = 2.03$, $Sd = 1.18$). The only activity that is performed rather often is unsubscribing ($M = 3.25$, $Sd = 1.18$). However, in regard to the mean value, this activity is also only carried out occasionally. Once again, this activity is a more passive way of responding to false information.

5.4 Inference statistics

In the following section we present the results for the inference statistics structured according to research questions. All significant results concerning the main independent variables are also presented in Tables 6–8. All results and data online are also available online.[5]

5.4.1 Gender and Facebook-usage (G-RQ1)

We performed a *t*-test to identify significant differences between men and women concerning the way and intensity of Facebook-usage. Every single activity was analyzed in regard to the frequency of usage. No significant differences were found. On a descriptive level, women click more often the like-button on posts ($M = 5.66$, $SD = 1.97$) than men do ($M = 4.5$, $SD = 2.4$), $t(117) = 2.84$, $p = 0.095$. Rounded and transferred to the used scale, this means that men use the like-button on average once per week while women like

5 https://www.dropbox.com/sh/vnvdvb52ahmpa5g/AABzyuMInbJuR2DjQqOdIBLta

posts once a day. Facebook-usage is very homogenous across the genders. We examined the relationship between gender and the groups of lurkers and posters with a chi-square test of independence, but this also shows no significant result according to the corrected *p*-values ($\chi 2(1, n = 119) = 2.78$, $p = 0.81$). While the proportion of lurkers (31) and posters (34) is almost equal among women, lurkers are overrepresented (34) while there are fewer posters (20) among men.

5.4.2 Gender and trust in social media (G-RQ2)

An independent samples *t*-test could not prove any significant differences concerning trust in social media. This result is found for the overall variable as well as all the single statements. Women and men have a homogenous mediocre trust in social media (see Chapter 5.3.3).

5.4.3 Gender and handling false information (G-RQ3)

All questions of the questionnaire subsection of handling false information were used to perform a *t*-test to find significant differences between the genders. It can be stated, that women believe more so than men to consume (women: $M = 5.03$, $SD = 2.12$; men: $M = 4.68$, $SD = 2.24$), comment (women: $M = 1.74$, $SD = 1.28$; men: $M = 1.56$, $SD = 0.72$), share false information (women: $M = 1.43$, $SD = 0.99$; men: $M = 1.28$, $SD = 0.60$) and like false information more frequently (men: $M = 2.32$, $SD = 1.45$; women: $M = 3.35$, $SD = 1.07$). However, the differences were not significant. It was already shown that women hit the like-button on posts more often than men do. Therefore, this circumstance also occurs in relationship to false information.

5.4.4 Gender and mis- and disinformation (G-RQ4)

A *t*-test shows that there is no significant difference in the estimation of the proportion of misinformation to false information on Facebook. Women estimate the proportion of misinformation ($M = 3.74$, $SD = 0.87$) slightly higher than men ($M = 3.35$, $SD = 1.07$), $t(117) = 2.14$, $p = 1.0$). In regard to the estimation of the proportion of disinformation, the results are almost equal.

5.4.5 *Gender and the verification of information (G-RQ5)*

T-Tests on all frequency statements of verification activities prove that there are no gender-specific differences. Men and women behave almost the same in verifying information on Facebook.

5.4.6 *Gender and the reaction to false information (G-RQ6)*

Similar to the verification of information no significant results were found concerning the reaction to false information. The behavior is again homogenous.

5.4.7 *Facebook-usage and trust in social media (F-RQ7)*

All significant correlations concerning Facebook-intensity are summarized in Table 6.

Table 6: Significant correlations of Facebook-intensity

Variable-group	Facebook-intensity correlation with …	*r*	Corrected *p*-value
trust in social media	trust in social media	0.33	< 0.001
	social media is informative	0.32	< 0.001
	social media is reliable	0.26	< 0.001
	social media is accurate	0.29	< 0.001
handling false information	share false information	0.31	0.032
	comment false information	0.39	< 0.001
	like false information	0.33	< 0.001

A significant correlative relationship between the intensity of Facebook-usage and trust in social media is verified, $r(117) = 0.33$, $p < .001$. We also analyzed the isolated sub-items of trust in social media and were able to identify that this relationship is significant for the statements to consider social media informative, $r(117) = 0.32$, $p < .001$, reliable, $r(117) = 0.26$, $p < .001$, and accurate, $r(117) = 0.29$, $p < .001$. The other two statements (essential, truthful) show rather weak correlations.

The *t*-test to find differences between posters and lurkers in social media shows no significant result.

5.4.8 Facebook-usage and handling false information (F-RQ8)

All active interactions with false information show significant correlation with the intensity of Facebook-usage. The more Facebook is used the more likely and frequent it is that someone has shared, $r(117) = 0.31$, $p = 0.032$, liked, $r(117) = 0.33$, $p < .001$, or commented, $r(117) = 0.39$, $p < .001$, false information. For the general confrontation with false information this relationship is however not significant, $r(117) = 0.15$, $p = 0.81$.

By separating between lurkers and posters via the variable Facebook-usertype, we were able to specify these findings with *t*-tests. All significant results concerning these group-based comparisons and the dependent variables are illustrated in Table 7.

Table 7: Significant results for group-based comparisons between posters and lurkers for all dependent variables

Variable-group	Facebook-intensity differences with …	Facebook-intensity: avg		*t*-value	Corrected *p*-value
		Poster	Lurker		
handling false information	share false information	1.67	1.10	−3.58	0.032
	comment false information	2.20	1.20	−4.23	< 0.001
	like false information	2.64	1.65	−5.37	< 0.001
reaction to false information	comment the post	2.20	1.50	−3.80	< 0.001
	report the post	2.44	1.70	−3.55	0.032

There are significant differences between posters and lurkers in sharing (posters: $M = 1.67$, $SD = 1.1$; lurkers: $M = 1.1$, $SD = 0.36$; $t(117) = -3.58$, $p = 0.032$), liking (posters: $M = 2.64$, $SD = 1.52$; lurkers: $M = 1.65$, $SD = 0.93$; $t(117) = -5.37$, $p < .001$) and commenting false information (posters: $M = 2.20$, $SD = 1.32$; lurkers: $M = 1.20$, $SD = 0.40$; $t(117) = -4.23$, $p < .001$). However, similar to Facebook-intensity, for this analysis no significant result concerning the general passive consumption of false information is found.

5.4.9 Facebook-usage and mis- and disinformation (F-RQ9)

No significant correlation between the estimation of the proportion of disinformation and the intensity of Facebook-usage is found, $r(117) = 0.2$, $p = 0.48$. Regarding lurkers and posters no significant differences in the estimation neither for misinformation nor for disinformation are shown as well.

5.4.10 Facebook-usage and the verification of information (F-RQ10)

We did not find significant results concerning the verification of information and differences between the Facebook-usage measured via intensity or differing between posters and lurkers.

5.4.11 Facebook-usage and the reaction to false information (F-RQ11)

For the reactions to false information, we found no significant correlations based on the degree of Facebook-intensity.

Nevertheless, we did find significant results for the reaction to false information when comparing lurkers to posters (Table 7). There is a significant difference for the statements to comment to posts with false information (posters: $M = 2.2$, $SD = 1.17$; lurkers: $M = 1.5$, $SD = 0.8$; $t(117) = -3.8$, $p < .001$) or report them to Facebook (posters: $M = 2.44$, $SD = 1.28$; lurkers: $M = 1.7$, $SD = 0.97$; $t(117) = -3.55$, $p = 0.032$). These activities are done significantly more often by posters than by lurkers.

5.4.12 Trust in social media and handling false information (T-RQ12)

Spearman's correlation coefficient proves that the overall trust in social media correlates negatively with the statement to consume false information, $r(117) = -0.19$, $p = 0.52$. However, this result is not significant but shows descriptively that participants with low degree of trust in social media claim to be confronted more often with false information than participants with a higher trust in social media. Regarding the single items of the questionnaire about trust in social media, we can identify precisely which statements lead to the assessment to be confronted with false information more frequently. Moderately strong and also significant correlations are found for the statements that posts on social media platforms are truthful, $r(117) = -0.38$, $p < 0.001$ and reliable, $r(117) = -0.28$, $p = 0.04$. If participants specifically had doubts concerning these attributes and social media, they affirm to be confronted with false information more often.

5.4.13 Trust in social media and mis- and disinformation (T-RQ13)

No significant results between the trust in social media and the estimation of mis- and disinformation were found.

5.4.14 Trust in social media and verification of false information (T-RQ14)

Correlations between the trust in social media and the frequency of performed verifications strategies for information assumed false were examined. For one verification activity a significant relationship is found (Table 8). It is a positive and moderately strong correlation with the activity to check the corresponding comments of a post to verify if the information is true or false, $r(117) = 0.32$, $p < .001$. Participants with higher trust in social media use this method significantly more often to verify information. For all the other verification strategies, the results show no significance.

Table 8: Significant correlations of trust in social media

Variable-group	Trust in social media correlation with …	*r*	Corrected *p*-value
handling false information	check the comments	0.32	< 0.001

5.4.15 Trust in social media and reaction to false information (T-RQ15)

None of the reaction activities correlate significantly with the variable representing the overall trust in social media. In addition, when analyzing the subitems there are also no significant results present. The strongest correlation is however between the statement to view social media as truthful and reporting posts to Facebook as a reaction to false information, $r(117) = -0.24$, $p = 1.0$.

6 Discussion

In the following section, the results are interpreted and put in context considering the research area. We also discuss implications for future research.

6.1 Overall results

The descriptive results, in addition to the analysis of the independent variables, provide insights for the research field of social media and false infor-

mation. The main activities considering Facebook-usage are passive activities like reading posts and browsing through profiles and photos. Regarding the average Facebook-usage, a user is considered a poster according to our definition using median split if she only interacts with Facebook actively *at all*, e.g., sharing posts and updating her profile. Trust in social media is mediocre. Indeed, participants doubt the accurateness of the information shared on social media. This verifies previous research about media usage that showed that in comparison social media platforms are less trusted than other media channels (Johnson & Williams, 2010). The reason for this low trust level might have to do with the finding that users believe themselves to be confronted with false information up to multiple times a week. However, our participants assume that they do not share or interact actively with this false information. It is uncertain how accurate these estimations are. Eventually these results are due to under-reporting of undesirable behavior, which is a known bias in self-report studies (Neeley & Cronley, 2004). The proportion of mis- and disinformation is considered even. Based on our results participants believe that false information on Facebook comprises overall of 50% misinformation and 50% disinformation. Future research can analyze this finding in more detail by examining if this subjective perception is actually true. Regarding the verification behavior, it is noticeable that the main verification strategy is to use other sources of information. This is very likely connected with the felt frequent consumption of false information on social media as well as the low degree of trust in social media. Considering the reaction to false information, we discovered that active participation and interaction is rather seldom. Users barely comment or share false information remarking it as false. Participants also barely report false information to Facebook, although it being an anonymous activity. Therefore, Facebook as well as research should strive to find methods to motivate users to react actively to false information. By this way, the propagation of false information can be better prevented. The only very frequent reaction is to unsubscribe the poster or Facebook-page. Knowing this, it might be possible to detect false information automatically. Further research about this topic is necessary to prevent false information propagation.

6.2 Gender

We did not find evidence that gender is a relevant influencing factor for the majority of research questions. Through descriptive analysis, we recognized

that women tend to be posters rather than lurkers and actively participate on Facebook. Women also use the like-button more frequent than men do. The increased usage of the like-button is also reflected when analyzing the way false information is handled. Here as well, women affirm to like false information more often than men do. Overall, we identified that women believe to be confronted with false information as well as to actively interact with false information slightly more often than men do. Future research should examine if this finding is based on a subjective estimation of women or if women are indeed confronted more often with objectively false information. Further, women estimate the proportion of misinformation higher than men do. However, none of these descriptive findings proved to be significant according to corrected *p*-values. We can state that the behavior between the genders regarding false information on Facebook is rather similar and homogenous according to our data. The missing influence of gender was already proven in previous studies (Chen & Sin, 2013) and is verified in the present study.

6.3 Facebook-usage

Facebook-usage was examined by differing between lurkers and posters (Marret & Joshi, 2009) and by using the intensity and frequency of Facebook-usage as individual variable. By this way, we were able to gain important insights. The intensity and frequency of Facebook-usage correlates with the trust in social media. It is not clear whether the frequent usage increases the degree of trust or whether persons with high trust in social media tend to use Facebook more intensively. The separation between posters and lurkers could not prove any significant results concerning Facebook-usage and trust in social media. The results about handling false information prove that the higher the Facebook-usage the more likely it is to be confronted with false information and to interact with false information. This finding verifies that, according to our participants, false information is indeed a part of Facebook. The general way of Facebook-usage is carried over to the way false information is handled. Participants that interact more actively with Facebook also affirm to interact more actively with false information than more passive users do. Depending on the general behavior (active or passive) participants believe to consume false information regularly. In combination with the results about trust in social media, this result is counterintuitive. Although more active and frequent Facebook-users assume to consume more false information, they also show higher levels of trust in social media. This para-

dox finding should be research object for future studies. The estimation of the proportion of mis- and disinformation shows no relevant relationships with Facebook-usage. Regardless of the user type, the proportion is estimated as even. Posters tend to react more actively to false information than lurkers and claim to comment posts with false information or even report them to Facebook. Overall, heavy users and posters tend to actively react to false information. At the same time this is also a problem for identifying false information in a social network because only a special and smaller user group reports and comments false information. In this context, it is especially alarming that even the anonymous activity of reporting is not popular with passive users when confronted with false information. Apart from unsubscribing, they rather tend to not react at all to false information. Future research has to find possibilities to better integrate the passive user group in detecting false information.

6.4 Trust in social media

We were able to find some punctual significant results concerning the variable trust in social media. While we did not find a significant correlation between this variable and the impression to consume false information, we did find that the more users doubt the truthfulness and reliability of Facebook posts the more they report to be confronted with false information. The relationship is rather obvious. The more one doubts the information on Facebook the more skeptical about social media she or he gets. An alternative explanation might be that this is a form of "self-fulfilling prophecy". Someone is skeptical towards social media and tends to believe subjectively to be confronted more often by false information. Subsequent studies might gather qualitative data to answer abstract research questions like this more precisely. It is necessary for future research to discover if skeptical persons indeed are confronted by more false information or their doubt just leads to the subjective impression of consuming more false information. It is also possible that more skeptical persons pay more attention to false information and therefore are confronted more often while persons with high trust levels are more likely to overlook them. Regarding the verification and reaction behavior, trust in social media is not an important influencing factor. Solely for verification strategies we identified that trust in social media correlates with the verification activity to check the comments of a post. Apparently, higher trust in

social media is extended to higher trust in the participants of the social network and their statements.

7 Limitations

Several limitations of the study restrict the value and interpretation of the data, but also offer possibilities for subsequent studies. Compared to other studies the number of participants (119) is rather low (Chen & Sin, 2013; Marret & Joshi, 2009) and due to the nature of our recruitment process, we have an overrepresentation of younger students and way fewer regular employees in our sample. While the age group between 18 and 34 years represents the core group of Facebook in Germany, the sample is not fully representative since we were not able to gather enough participants for the age group above 35 who still represents an important chunk of Facebook users.[6] Thus, our interpretations are mostly representative for younger students but not German Facebook users in general. Further, note that the study was conducted in Germany, so nationality-specific biases are possible. Future studies with bigger sample sizes and samples that are more international can gather insights that are more meaningful.

The fact that the majority of participants use Facebook rather passively might be problematic interpreting results considering the Facebook-usage. By using a median split and assigning participants with even low levels of activity as posters, the differentiation between these groups might be skewed. We rather recommend in future work to use metric scales similar to the variable Facebook-intensity in our work to deal with this problem.

Lastly, the focus of this study relies on the survey and analysis of quantitative data. The analysis of qualitative data, e.g., by using open questions or interview-techniques, can add value to the research area by identifying the underlying motivations and reasons behind several findings.

6 https://de.statista.com/statistik/daten/studie/512316/umfrage/anzahl-der-facebook-nutzer-in-deutschland-nach-alter-und-geschlecht/

8 Conclusion

The presented study contributes to the research field of false information on Facebook. Overall, we prove that users believe to be confronted with false information and fake news regularly and that the trust in social media platforms is mediocre. We also analyzed the actual verification and reaction behavior when confronted with false information. Another focus of this study is the analysis of the influence of individual factors. Important results were found for the factors user type (Facebook-usage) and trust in social media. Gender was not proven as relevant influencing factor. Future research can pick up several impulses of this study and gather data that is more detailed by using qualitative methods. False information in social networks is a problem that should concern society as a whole.

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