DEFENSE AGAINST THE DARK ARTS

A QUANTITATIVE STUDY ON INOCULATION COMMUNICATION AGAINST FAKE NEWS USING FAKE AUTHORITY

ELLEN HAGSTRÖM

ASTRID LINDER

Defense Against the Dark Arts: A Quantitative Study on Inoculation Communication Against Fake News Using Fake Authority

Abstract:

In a digital era, information has never traveled faster. However, the same goes for misinformation and fake news that during recent years has become an issue for societal fundamentals such as elections, public health, and trust in global governance. Prebunking, that stems from inoculation theory, is a forewarning against misinformation that counter misinformation before an individual has been exposed to it. This thesis compared the effects of inoculation messaging on two different COVID-19 misinformation contexts that vary in claimed authority, by measuring credibility, social media engagement, vaccine attitude, and vaccine intention. A scenario experiment was conducted through an online self-completion questionnaire that targeted Swedish young adults between the ages of 18-29. The respondents were randomly divided into two different contexts (non-authority vs. authority) where they were exposed to a fictive social media post that tried to spread fake news. Findings indicate that there were no significant differences between the groups in terms of credibility, social media engagement, vaccine attitude, or vaccine intention. However, higher conspiracy beliefs correlated positively with perceived credibility and the intention to like or share the post – and negatively with vaccine intention.

Authors:

Ellen Hagström (24771)
Astrid Linder (24881)

Tutors:

Patric Andersson, Associate Professor, Department of Marketing and Strategy

Examiner:

Hanna Berg, Research Fellow, Center for Consumer Marketing (CCM)

Bachelor Thesis
Bachelor Program in Business and Economics
Stockholm School of Economics
© Ellen Hagström and Astrid Linder, 2022

Contents

Definitions

Attitude: learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object' (Fishbein & Ajzen, 1985)

Expertise: the extent to which a communicator is perceived to be a source of valid assertions (Hovland et. al, 1953)

Fake Expert: spokespersons who claim to have scientific knowledge but rarely do (Cook et. al, 2017)

Infodemic: too much information including false or misleading information in digital and physical environments during a disease outbreak (WHO, n.d.)

Message Credibility: an individual's judgment of the veracity of the content of communication (Appelman & Sundar, 2016)

Misinformation: any information that turns out to be false (Ecker et. al, 2022)

Vaccine Hesitancy: delay in acceptance or refusal of vaccines despite availability of vaccine services (McDonald, 2015)

Therapeutic Intervention: correction of a myth after the encountering of misinformation (Van Der Linden, 2022)

Trustworthiness: degree of confidence in the communicator's intent to communicate the assertions he considers most valid (Hovland et. al, 1953)

Prophylactic Intervention: prebunking that counters misinformation before an individual has been exposed to it (Ecker et. al, 2022)

1. Introduction

"The Dark Arts are many, varied, ever-changing and eternal. Fighting them is like fighting a many-headed monster, which, each time a neck is severed, sprouts a head even fiercer and cleverer than before. You are fighting that which is unfixed, mutating, indestructible." "Your defenses must therefore be as flexible and inventive as the Arts you seek to undo." (Severus Snape, Harry Potter and the Half-Blood Prince)

In 1998, Andrew Wakefield published a paper on how MMR vaccines caused autism. The problem? The result was a product of an uncontrolled experiment and a very small sample of 12 people (Rao & Andrade, 2011). Wakefield's scientific status has since plummeted, but his ideas continue to be contagious as fake news around vaccines remain a salient societal force. In these circumstances, it was unsurprising that the COVID-19 pandemic triggered a potion of fake news that contributed to polarizing views on the vaccine. However, it's not all doom and gloom since researchers around the world are looking for an antidote to the dark arts of misinformation. This thesis will compare the effects of one of the suggested antidotes – inoculation theory – on two different misinformation contexts that vary in claimed authority.

1.1. Background

1.1.1. Background on the COVID-19 Infodemic

For a pandemic to cease, potent vaccines along with effective campaigns are of importance (Vivion et al, 2022). The amount of people in a population who needs to be vaccinated to achieve herd immunity is not yet known but is estimated to be around 80%-95% of the population (WHO, 2020). In Sweden, mass inoculations against COVID-19 began on the 27th of December 2020, after which the death rates declined. Hence, vaccination proved an effective measure to change the trajectory of the pandemic (Public Health Agency, 2022). However, a recent review shows that the vaccination uptake of the third dose of COVID-19 vaccine has flattened among young people (18-29 years) in Stockholm (Adin-Fares, 2022). Side effects and an "immortality belief" of believing that the risk of being infected is small are mentioned as main reasons for the static trend. At the same time, the fourth dose of vaccine has recently been recommended for Swedish

citizens that are 65 years or older (Public Health Agency, 2022). Vaccine hesitancy, defined by McDonald (2015) as a 'delay in acceptance or refusal of vaccines despite availability of vaccine services', remains a barrier for the desired herd immunity as pointed out by several studies (Roozenbeek et. al 2020; Cascini et. al, 2021; Gorman et. al, 2022).

Along with the pandemic, WHO has warned of the risks of an infodemic which means 'too much information including false or misleading information in digital and physical environments during a disease outbreak' (WHO, n.d.). Misinformation, defined as 'any information that turns out to be false', contributes to polarizing events such as the public health response to COVID-19 (Ecker et. al 2022). Research has also shown that false information spreads faster than true information on social media (Vosoughi et. al, 2018). It has also been noted that it has been increasingly difficult to find communication that challenges one's worldview (Ecker et al, 2022). During the COVID-19 pandemic, false information has spread on everything from the origins of the virus, how its spread, how to cure it, and "who's behind it". Dangerous health advice such as prompts to ingest bleach, along with false conspiracies on how 5G masts can amplify COVID-19 symptoms (Zarocostas, 2020).

Another issue surrounding the infodemic has been misleading information around the COVID-19 vaccine. Today, there is robust evidence that beliefs in COVID-19 misinformation are negatively correlated with vaccine acceptance (Singh et. al, 2022). Several reasons for being skeptic against the vaccine has been listed but has broadly been categorized into three groups: fears of vaccines being unsafe, misinformed ideas, and agreements with conspiracy theories (Gorman et. al, 2021).

1.1.2.   Background on Correction Against Misinformation

Historically, the most traditional approach to correction of misinformation has been *therapeutic* intervention, which means a correction of a myth after the encountering of misinformation (Van der Linden, 2022). However, scholars have warned of a so-called "backfire effect", meaning that it might as well amplify the belief in the myth after the correction (Lewandowsky et al, 2012; Swire-Thompson, 2020). The backfire effect does however remain contested as other studies have failed to replicate the results, especially

regarding corrections of misinformation about vaccinations (Haglin, 2017). Despite this, there is scientific consensus that therapeutic interventions have certain limitations. Firstly, there is a scalability problem as debunking corrections rarely reach a large group (Chido-Amajuoyi et al, 2019). Secondly, people seem to continue to make conclusions based on falsehoods, even after therapeutic intervention. This is called "continued influence of misinformation", something that meta-analyses of *therapeutic* intervention concluded (Chan et. al., 2017; Walter & Tukachinsky, 2020)

Thus, the quest for an antidote to misinformation intensified and other interventions were sought after. One intervention that has been suggested as a candidate is instead *prophylactic* interventions and prebunking that counters misinformation before an individual has been exposed to it (Van der Linden, 2022). The most common framework for the approach is inoculation theory, a theory that has its roots in social and psychological research and explains how attitudes or beliefs can be resistant to intrusion by pre-exposure to weakened forms of attacks (McGuire, 1970). Interest in inoculation theory among social psychologists have dwindled over the years but has recently received new attention as a potential misinformation antidote (Lewandowsky & Van der Linden, 2021).

1.2.   Problem Area

A global pandemic is a challenging context and promoting the COVID-19 vaccine when vaccine hesitancy has been fueled by misinformation is a demanding task. Against this backdrop, the interest in inoculation theory has flourished and it has been acclaimed that the "study and application of inoculation theory has never been more relevant and exciting for social psychologists and communication scholars than it is today" (Compton et. al, 2021). Knowing this it is also argued that the research field is adequate for this thesis in marketing and strategy, categorizing the vaccine as the product, and its communication, the marketing.

However, even as the field has attracted a lot of interest recently, there are many areas that remain unexplored. Especially since research around misinformation and individual predictors for susceptibility to misinformation relies heavily on the context of the 2016 US presidential election (Roozenbeek, 2020). At the same time, it has been predicted that

anti-vaccination beliefs and misinformation will dominate online discourse in the coming decade, if not interrupted (Johnson et. al, 2020). This emphasizes the importance of more extensive research on the area.

1.2.1. Research Gap

There are two main research gaps that this thesis aims to reduce. The first research gap is the role of age regarding misinformation susceptibility. As stated, the context of the 2016 U.S. presidential election has been prominent for misinformation research. In this context, older age has been regarded as a significant predictor to increased belief in misinformation (Guess et. al, 2019). This was also the argument for conducting an inoculation experiment on an older sample in Vivion et. al's (2022) study. Despite this, the predicting value of older age remain contested. In a global study conducted by Roozenbeek et. al (2020), being older was significantly associated with a *lower* susceptibility to misinformation in all countries surveyed except Mexico. As this is not consistent with prior research, it is argued in this thesis that the role of age as a predictor to misinformation susceptibility is a research gap. The second research gap is to investigate the role of fake experts, defined as 'spokespersons who claim to have scientific knowledge but rarely do' – since this is a common misleading strategy that is used to spread fake news (Cook et. al, 2017). The effectiveness of inoculation against fake experts was first tested by Cook et. al (2017) with a promising result but could not be replicated in a later study (Schmid-Petri & Bürger, 2021). Hence, investigating what happens after a *prophylactic* intervention depending on the authority of source of the misinformation message is the second research gap that this thesis aims to reduce.

1.3. Research Purpose and Research Question

The main objective of the thesis is to assess if there is a difference in inoculation treatment's effectiveness depending on the source of the misinformation message as measured by credibility, social media engagement, vaccine attitudes, and vaccine intentions. Context-wise, the topic is health and more precisely, COVID-19. Ultimately, the research question that the thesis aims to address is:

- *Does inoculation treatment vary in effectiveness depending on the misinformation source's authority?*

Additionally, the thesis will explore the role of conspiracy beliefs and how these might either accentuate, or diminish, the effect of inoculation.

1.4. Delimitations

1.4.1. Sample

Since time is defined by the relatively narrow scope of a bachelor thesis, the geographical scope of the thesis has been limited to the boundaries of Sweden. Hence, the data collected will be limited to Swedish young adults even though the subject of the thesis is not itself limited to Sweden. The data collected will also be accessed through a common convenience sample even though a sample based on a national quota would have been of higher quality. Furthermore, the sample has been limited to young adults between 18-29 years. Delimiting in this fashion was a conscious choice that was made on the basis on what has already been stated: partly because of the static vaccine trend among this age group in Stockholm as commented by Adin-Fares (2022), and partly because there was research indicating that young adults who are more exposed to social media are more susceptible to misinformation (Roozenbeek, 2020).

1.4.2. GDPR and Ethical Considerations

GDPR and ethical considerations were of great importance for this thesis. The subject is related to the topic of health, something that is classified as sensitive personal data in the "SSE Policy on the processing of personal data in students' individual projects" (OGC Guidance, 2020). For this reason, time was allocated to make sure that the experiment was conducted in an ethical manner. Furthermore, it was stressed that the data collected was handled in content with GDPR (EUR-Lex, 2016). Considering this, the authors of the thesis chose to limit the amount of background variables in the questionnaire to the ones that were the most necessary for the study, while excluding background variables that were unnecessary. From an ethical standpoint, it is also important to acknowledge that certain questions in the questionnaire were rephrased to avoid data collection on the respondents' individual health conditions.

1.5.   Expected Contribution

Despite the contemporary boost of research around prebunking as a method, the research field is to be regarded as novel. Therefore, this thesis mainly aims to contribute by conducting a niched experiment that explores what happens after inoculation treatment depending on the authority of the source of the misinformation message in a non-established setting by investing young adults between 18-29 in the geographical context of Sweden. With that being noted, the authors are aware of the limitations of the thesis and want to point to the fact that the thesis will not contribute to whether inoculation theory is efficient in general. In 1993, Eagly and Chaiken published the book "Psychology of Attitudes" that is now viewed as a classic publication within psychology and marketing (Compton et. al, 2021). In the review, they stated that while the biological analogy on which inoculation theory is built is clever, many questions around inoculation theory are still unanswered (Eagly & Chaiken, 1993). These questions will remain despite this thesis being made, but hopefully the thesis can contribute to a reduction of the research gaps of age and authority that were mentioned earlier.

2. Theoretical Framework

2.1.   Literature Review Approach

For this study, the authors have adopted a positivist research tradition, meaning "an epistemological position which is informed by an objectivist ontological position". The logic of positivist social science is deductive, and hypotheses have been generated on basis on what is already known (Bell et. al, 2022).

Replicability of the study, and the methodology through which literature has been found and reviewed, is of paramount importance. For the study, the main databases that were used were HHS Library, Scopus Review, and Taylor & Francis Online by using the following keywords: *prebunking *inoculation theory *covid-19 *misinformation *disinformation *fake experts *credibility *attitude *anti-vaccination *conspiracy. The approaches for the different sections of the theoretical framework are compiled in Table 1.

Table 1. Overview of Literature Review Coverage (Bell et. al, 2022)

2.1	Classic theory where it was relevant to emphasize the most widely cited publications.	Central/pivotal
2.2	Classic theory where it was relevant to emphasize the most widely cited publications.	Central/pivotal
2.3	Classic theory where it was relevant to emphasize the most widely cited publications.	Central/pivotal
2.4	Classic theory where it was relevant to emphasize the most widely cited publications.	Central/pivotal
2.5	Classic theory where it was relevant to emphasize the most widely cited publications.	Central/pivotal
2.6.	Consensus in research field, hence relevant the most topical publication.	Central/pivotal
2.7	A limited field of research, enabling a more exhaustive coverage of existing research.	Relatively exhaustive

2.2.   Inoculation Theory

Inoculation has been called "the grandparent theory of resistance to attitude change" (Eagly & Chaiken, 1993) and is built on a medical analogy. When taking an annual flu shot, a weakened version of the influenza virus is injected into the body and pre-exposes the immune system for a future attack. The pre-exposure is weak enough to avoid an infection, but strong enough to create resistance (McGuire, 1964, Compton, 2013). The same way an annual flu-shot exposes the immune system by building resistance (antibodies), to future challenges, prebunking can create mental antibodies by helping the mind build resistance (McGuire, 1964). Prebunking is a type of pre-emptive intervention against misinformation that helps people recognize and resist subsequently encountered misinformation. The method of prebunking can vary in sophistication, but extensive inoculation intervention generally relies on two elements (Ecker et. al, 2022):

1. Warning recipients of the threat of misleading persuasion
2. Identification of the techniques used to mislead or the fallacies that underlie the false arguments to refute forthcoming misinformation
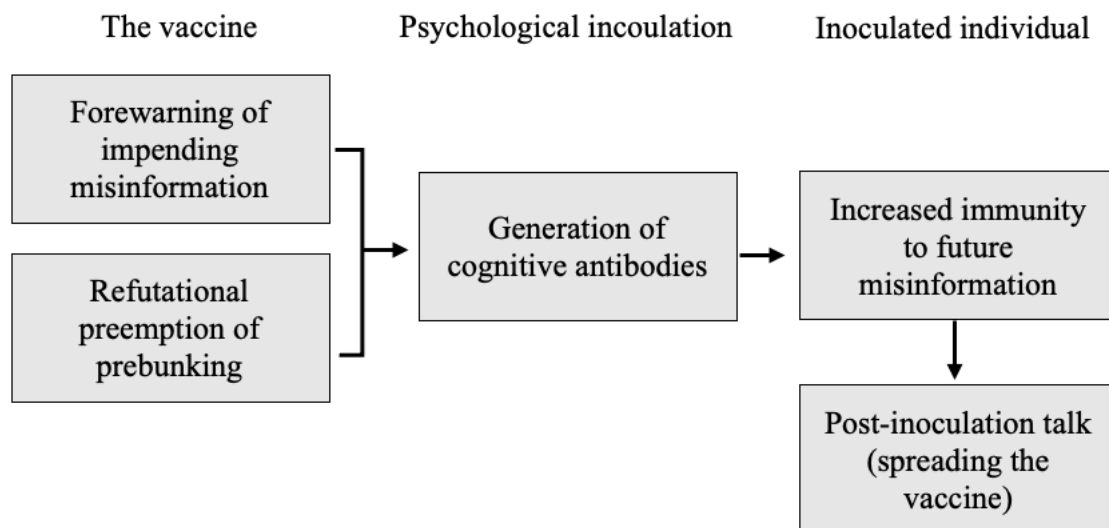

Figure 1. An illustration of inoculation intervention (Ecker et. al, 2022)

The two main fields of critique directed against inoculation theory are:

- Questions of timing and decay
- Questions on whether inoculation treatment is effective in changing someone's attitude

In the 60's, McGuire believed that people who had been inoculated needed time between the pretreatment before the resistance occurs (McGuire, 1964). This is an assumption that has been questioned as Banas and Rainas (2010) found that the resistance declined after two weeks in a meta-analysis of 54 cases testing the effectiveness of inoculation theory. The model's impact on attitude has also been disputed. As Compton noted, when discussing Banas and Rainas' findings, he stated that "just as people cannot be inoculated against a disease they already have, people cannot be inoculated against a position they already hold" and encourages scholars to identify the valence of the test person's attitudes prior to inoculation experiments (Compton, 2013).

2.3. Authority

A cornerstone in persuasive communication is authority. The importance of authority has most notably been emphasized in Cialdini's six principles of persuasion when studying social influence and marketing. As discussed by Cialdini (2001), a study from 1955 found that by dressing a man in markers of authority such as a suit in tie – the number of pedestrians that followed him across the street despite red lights increased by 350 percent. The same pattern occurs in marketing and is a reason for why sale offers communicates authority such as "four out of five doctors would recommend…", and so on. However, authority is a two-edged sword and appearance of authority can influence despite a lack of true expertise. For example, when actor Robert Young played a famous physician in a TV show in the 70's, he also managed to claim the health benefits of decaffeinated coffee in a debatable ad. Ultimately, his appearance of authority influenced the consumers, even though the health claim was phony (Cialdini, 2001). In this thesis, "authority" is used as the degree of potential persuasion, including false authority claims. Hence, the opposite of authority will be referred to as "non-authority" throughout the thesis.

2.4. Credibility

Another cornerstone of persuasive communication is credibility. Credibility stems all the way back to Aristotle, who claimed that *ethos* – the character of the speaker – "is the most potent of all the means to persuasion" when discussed by Stiff & Mongeau (2002). Something that is important when discussing credibility is a that it is a *perceptual* variable, implying that the recipient's perception of a source determines the extent to which persuasion occurs and that credibility is the perceived expertise and trustworthiness that a sources enable to engender in a target audience (Stiff & Mongeau, 2002). Expertise is defined as 'the extent to which a communicator is perceived to be a source of valid assertions', and trustworthiness as the 'degree of confidence in the communicator's intent to communicate the assertions he considers most valid' (Hovland et. al, 1953).

2.4.1. Credibility and Attitude

There are extensive amount of research suggesting that perceived source credibility affects attitude (Stiff & Mongeau, 2002). Hovland & Weiss (1951) found that high-credibility sources contributed more to attitude change than low-credibility sources. However, the opposite pattern has been found when recipients initially agree with the message presented. In that case, low-credibility sources have been more persuasive in terms of changing attitude (Bochner & Insko, 1966). Lastly, timing seems to be a factor that also needs to be accounted for. In a meta-analysis O'Keefe (1987) found that when sources are identified prior to the message, high-credibility sources are more effective in terms of persuasion than low-credibility sources.

2.5. Vaccine Attitude

Vaccination behavior can be said to play out on a spectrum, ranging from those who have the highest demand and accept all vaccines with no doubt, to those who have the lowest demand and refuse all vaccines with no doubt (MacDonald, 2015). Over the years, different models that classifies psychological antecedents for vaccination have resulted in the 5A model that looks at vaccine behavior as less binary (vaccine hesitant or non-vaccine hesitant). According to the 5A model, there are five categories that affect whether an individual chooses to vaccinate or not (Betsch et. al, 2018)

Table 2. The 5A model: Taxonomy for the determinants of vaccine uptake

Determinant	Description
Acceptance	Individuals accept, question, or refuse vaccination
Access	Ability of individuals to be reached by, or to reach, recommended vaccines
Awareness	Knowledge (need for/availability of vaccines)
Activation	Degree to which individuals are nudged towards vaccination uptake
(Social) awareness	Social benefits

A main assumption underlying the thesis stems from the *Theory of Reasoned Action* (TRA). According to the theory, beliefs affect attitude which in turn affect behavioral intention and ultimately behavior. Attitude can be defined as 'a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object' (Fishbein & Ajzen, 1975). In this thesis, it is argued that the given object is the vaccine, and the degree of favorable or unfavorable manner, the attitude, is decided through the parameters of the 5A model above (Table 1).

2.6. Vaccine Intention

Furthermore, attitude is closely connected to behavioral intentions (Fishbein & Ajzen, 1975). In the study, behavioral intentions (word-of-mouth intention) is examined when measuring vaccine intentions. To examine this, word-of-mouth is used as a measurement of the respondents' willingness to vaccinate themselves, instead of observing actual behavior.

2.7. Existing Research

2.7.1. Fake News and Social Media Engagement

There is no exact consensus around fake news and the level of engagement that misinformation messages infer. In a study conducted by McGlynn et. al (2020), misinformation tweets about COVID-19 that included fake expert references resulted in

a decreased tweet engagement.[1] The study underscored the importance of citing specific sources when tweeting messages in a health context (McGlynn et. al, 2020).

However, later studies have found the opposite pattern as it has been found that a lower level of truth in a message did not reduce sharing intentions around news regarding COVID-19. In a study conducted by Pennycook et. al (2021), false headlines received a much higher sharing intention than true headlines. The study further points to the fact that many people seem to be willing to share content that they could have identified as false since people do not stop to reflect on their prior knowledge. An approach that is mentioned as a possible intervention against misinformation is inoculation messaging that make people stop and think about what sort of news they have encountered (Pennycook et. al, 2021). This aligns with earlier study conducted by Bode & Vraga (2018) whose findings implied that misinformation corrections on social media are of value in the context of health misinformation. In their experiment, they tested correction mechanisms on a simulated Facebook feed (Bode & Vraga, 2018). However, an experiment conducted by Colliander (2019) emphasized that comments from other users might be more effective in reducing attitudes and intentions to share fake news than disclaimers on social media.

2.7.2. Inoculation Theory and Vaccine Attitudes

Inoculation theory has been tested a few times in the context of vaccine attitudes and intentions. In an experiment with 110 young women, Wong (2016) investigated whether inoculation messages could protect their positive attitudes towards the HPV vaccine. In the study, all participants faced misinformation messages of young women who suffered severe reactions after taking the vaccine. However, inoculation treatments managed to protect their previous positive attitudes while simultaneously generating higher intentions to get the HPV vaccine (Wong, 2016). Similar results have been found earlier this year in the context of COVID-19, where a Canadian study conducted an online survey to investigate intentional effects of inoculation. In a national online experiment, 2500 Canadians aged 50 years and older were investigated and results indicated that prebunking messages protected intentions to get vaccinated (Vivion et. al, 2022).

---

[1] Fake Expert is the misleading strategy referred to as "Authority" in the thesis based on what is mentioned in Section 2.3

A parallel branch of studies has begun to investigate the effects of active inoculations. In 2018, an inoculation simulation game called *BadNews* was launched. In the game, the player faces six different misinformation manipulation techniques such as impersonation, emotion, polarization, conspiracy, discrediting, and trolling – while also incorporating elements of inoculation treatment: (a) forewarning players of the type of content they will be exposed to misleading strategies (b) exposes players to weakened doses of fake news production strategies. The game resulted in fake news items being seen as less reliable (Van Der Linden, 2022). Results have also been replicated in a randomized experiment (Basol et. al, 2021). Lastly, it has been found that the game can confer long-term protection against attacks on one's attitude (Maertens et. al, 2021).

2.7.3. Inoculation Against the Use of Fake Experts

An American study by Cook et. al (2017) investigated the misleading strategy of fake experts in relation to inoculation treatment. The presence of fake experts in the absence of inoculation treatment, resulted in a polarizing effect on the participants' attitudes, but was moderated in the presence of an inoculation message (Cook et. al, 2017). It is however important to note that the results from the Cook et. al (2017) study should be regarded with reservation, as their findings were not replicable in a later study in a German setting. When replicated, Schmid-Petri & Bürger (2021) could only find a small, but insignificant, inoculation effect.

Active inoculation has also tested inoculation's effectiveness against fake experts. A spin-off to the inoculation game *BadNews* is the game *GoViral!* designed its items specifically in relation to COVID-19 related misinformation (Van Der Linden, 2022). One of the misleading strategies that were inoculated against was fake experts, and it was proven that the game significantly improved players ability to detect misinformation (Basol et. al, 2021). It is important to note that an active inoculation treatment through a game is a lengthier version of inoculation, by extent making it more difficult to scale as opposed to lighter-touch inoculations that only uses a warning statement (Pennycook et. al, 2021).

2.8.   Hypotheses Development

The main aim of the thesis is to investigate whether the inoculation treatment's efficiency against COVID-19 misinformation varies with the authority of the source of the message. To answer the research question, hypotheses was generated based on what was already known. Theories around authority suggest that a marker of authority is efficient as a mean of persuasion, and subsequently, this thesis hypothesizes that it will have an impact on the effect of inoculation treatment. First, it is hypothesized that authority will increase the level of perceived credibility of the message and increase the level of social media engagement. Second, it is hypothesized that authority will lead to less positive vaccine *attitudes* and *intentions*. Against the theoretical background, the following has been hypothesized:

> **H1:** The authority group will perceive the message as more credible than the non-authority group after exposure to inoculation treatment
>
> **H2:** The authority group will have a higher intent to engage with the message on social media after exposure to inoculation treatment
>
> **H3:** The authority group will have less positive vaccine *attitudes* than the non-authority group after exposure to inoculation treatment
>
> **H4:** The authority group will have less positive vaccine *intentions* than the non-authority group after exposure to inoculation treatment

3. Methodology

3.1. Scientific Approach

The thesis follows the quantitative scientific approach that is described as "research that emphasizes quantification in the collection and analysis of data". The approach stems from a positivist research tradition mentioned in the theoretical framework (see section 2.1) and accordingly, a deductive method of research was applied (Bell et. al, 2022). The main factor that influenced the method choice was the studies reviewed in the theoretical framework. Central studies within the field of inoculation theory have previously used a quantitative method which influenced the research design choice made by the authors (Wong, 2016; Cook et. al 2017; Maertens et. al 2021; Van Der Linden, 2022; Vivion et. al, 2022)

Given that the study aimed to better understand if inoculation treatment is equally effective regardless the source of message by the measurements of credibility, vaccine attitudes, and vaccine intentions, an online self-completion questionnaire was deemed suitable.[2] The experimental approach was motivated by the wish of testing differences between groups since the online tool Qualtrics allowed us to randomize the two types of stimuli that was used in the questionnaire to the respondents. In the questionnaire, already established scales were used to measure the different variables in the study. Utilizing pre-test measures to test the variables in the study also allowed a screening of the convenience sample that was used in the study, in case that the study implicated different result than in previous studies (Bell et. al, 2022).

3.1.1. Alternative Approaches

It is important to acknowledge that alternative approaches could have been used to answer the research question in the study. For example, the authors could have conducted a content analysis of structured interviews. In that setting, the respondents would have been asked to verbally describe the stimuli presented and their subsequent perception of credibility, social media engagement, vaccine attitudes, and vaccine intentions (Bell et.

---

[2] Hereby, questionnaire will also be referred to as survey and they will be used interchangeably

al, 2022). There is however an important factor of GDPR and anonymity that steered the decision toward the online questionnaire, given that the thesis handles a sensitive subject. By using the method of an online survey, the authors were able to control the exact wording of the questions to make sure that they were formulated in content with the GDPR framework, and without breaching ethical considerations.

3.2.   Pilot Study

To pretest the questionnaire, a pilot version of the questionnaire was on sent to 24 pilot respondents between the ages of 18-29 years on the 9th of April 2022. As argued by Bell et. al (2022), pilot tests are of importance for all studies, but especially prior to self-completion questionnaires. Of the 24 pilot respondents, six were made into a focus group that were asked to think out loud while responding to the questionnaire. The focus group was instructed to think about the comprehension, flow, length, adherence, technical quality, and overall formulations.

3.2.1.   Pilot Study Insights

After the focus group interview, the question concerning media habits were changed so that respondents could choose more than one option, something that was requested by the focus group. Furthermore, the respondents stated that storytelling should be added prior to the fictive social media post so that the scenario would be easier to visualize, something that was included in the final version. Lastly, comments were also made on the number of items in the questions regarding vaccine attitude and conspiracy beliefs. This was something that the authors did not change based on the benefits of using pre-tested measures that were mentioned in Section 3.1. However, the authors anticipated a higher drop-out rate based on this, since participant dropout can be seen as a function of survey length (Hoerger, 2010).

3.3.   Main Study

3.3.1.   Questionnaire

The survey was made up of six blocks following the introduction. Also, the questions were stated in Swedish since the thesis was delimited to Swedish respondents. The

original idea of the questionnaire was also to test the effect of inoculation vs. absence of inoculation treatment, something that was not investigated in the final survey.[3]

In the first section of the survey, respondents faced an introduction to the survey, its purpose, and estimated completion time. Respondents were also informed about a 1 SEK donation to UNHCR following each completed survey. After the introduction, participants were informed about the GDPR framework that the survey follows and subsequently asked to tick a box stating "Yes, I have read the information above and agree to participate in this study" to give their consent to participating in the study. If respondents instead ticked the box "No, I do not consent to participating in the study", the Qualtrics skip to-logic enabled for these respondents to immediately being sent to the end of the survey to avoid further data collection.

The first block was a warm-up block that was consciously designed to ask questions with a lower threshold to response. In this block, respondents were asked to state their mood, media habits and whether they had read news about COVID-19 during the past week at the date of their response. Following the warm-up block, all respondents received the inoculation message in the second block that warned about misinformation and different misleading strategies that circulate around COVID-19. Following the inoculation messages, respondents were randomly divided into one out of two contexts: authority or non-authority.

---

[3] Due to a technical error in Qualtrics, the randomization of the inoculation message did not work. When the error was discovered, the authors did not have time to collect enough data. The survey flow as it was first intended can be found in Appendix 12.

After the respective misinformation message, block three began with respondents being asked a control question about the content of the message to make sure that they paid attention. Following this, respondents were asked questions regarding the first dependent variable, credibility. The credibility question used three items which were rated on a 7-point Likert scale. In the fourth block, respondents were asked question about their vaccine attitudes by using five items which were rated on a 7-point Likert scale. An additional control item (please tick "I strongly disagree") was also added in the vaccine attitude question. The fifth block covered questions on conspiracy behaviors by using nine items which were rated on a 7-point Likert scale, while also covering demographic background variables. In the last block, respondents were asked to assess the survey in terms of its quality and clarity.
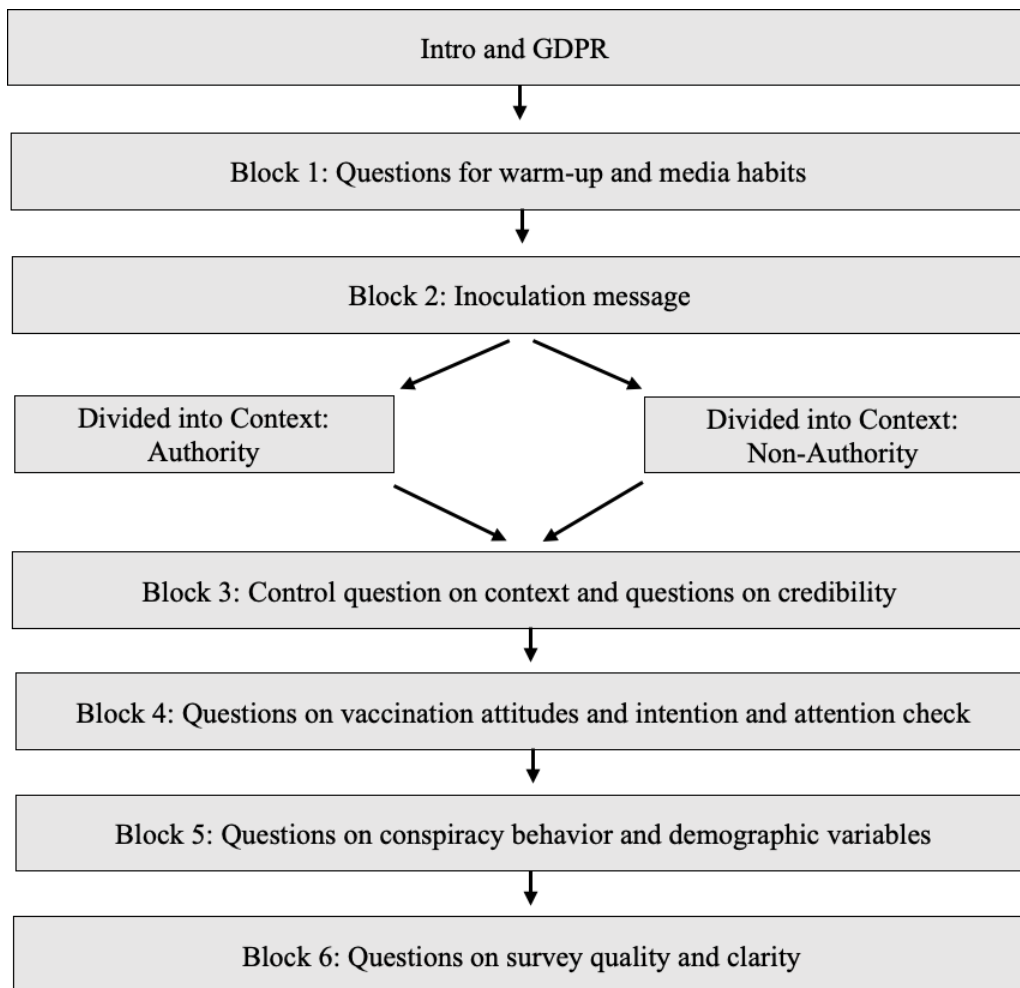

Figure 2. Illustration of the survey flow

3.4. Stimuli Development

As seen in the visualization of the survey flow, all respondents were exposed to an inoculation message in the second block before being randomly divided into two different contexts. The following section will revise the methodology behind the stimuli development of the inoculation message and the contexts of non-authority and authority.

3.4.1. Inoculation Message

In the theoretical framework, it was emphasized that an inoculation treatment can be either active or passive. For the questionnaire, a passive inoculation treatment was chosen over an active inoculation since it was not plausible to control that the respondents had completed an inoculation game, or something correspondent, in the online setting where the experiment took place. To design an effective inoculation message, the authors were inspired by Ecker et. al's (2022) suggestions. As seen in the theoretical framework, the first element of inoculation is to inform the respondent of the risk of being misled. In the questionnaire, this warning initiated the inoculation message by stating that "it is important to know that some people may spread false information (disinformation) in different ways" and that "you may encounter scary claims about the potential lethalness of the COVID-19 vaccine".

 The second element of inoculation was to inform the respondent of the different misleading strategies that can be used to spread false information. After the warning in the inoculation message, respondents could read about three types of misleading strategies: fearmongering ("the vaccine kills people"), cherry-picking information and experts ("Dr. Johansson states that these types of vaccines are risky"), and conformity: using statements as if they are widely accepted ("the vaccine is riskier than an actual COVID-19 infection"). Lastly, the respondents were exposed to the refutation that stated that the risks associated with a COVID-19 infection for the most part is less risky than taking the COVID-19 vaccine. At large, the wording was motivated by Vivion et. al's (2022) experiment. The inoculation treatment in full can be found in Appendix 13.

3.4.2. Contexts

The different contexts in which the misinformation message was presented was inspired by real life tweets that the authors monitored prior to the questionnaire design. Using fictive items were a conscious that was made based on avoiding real life recognition of the items. Using fictive items did also increase the experimental control and manipulation setting as argued in the design of the game *GoViral!* (Maertens et. al, 2021). *GoViral!* was also influential in terms of the design of the fictive misinformation message. For example, icons accompanied the fictive social media post instead of real-life profile pictures.

Before introducing the fictive social media posts, a scenario was introduced to the respondents. They were asked to imagine that they scrolled through their social media feed, and that the message popped up in the feed. This was an addition from the pilot study, as requested by the focus group (Section 3.2.1). The manipulation of the contexts was that the sources of the message differed – one was called "Dr. Johansson" to signal authority, while the other one was simply called "Johansson". Given that the name was anonymous for the respondents, it can be argued that the choice of name should not disrupt the manipulation. The difference in context was also inspired by the *GoViral!* game and their "fake experts" (WHO, 2021). The contexts in full can be found in Appendix 13.

3.5. Scales and Variables

Knowing that the subject of health can be perceived as sensitive, all items were assessed on balanced Likert scales that enabled respondents to choose a neutral answer if they wanted to. To achieve nuance in the responses, 7-point Likert scales were chosen over 5-point Likert scales for the dependent and independent variables. Furthermore, the questions that had multiple items were made to indexes.[4]

---

[4] Indexes were based on a lower limit of Cronbach's alpha < 0.7. If the reliability analysis depicted a higher Cronbach's alpha if an item was deleted, the item was removed. More on this subject in Section 3.8.1.

3.5.1.   Dependent Variables

Credibility

Credibility was measured by using Appelman & Sundar's (2016) scale of message credibility. Message credibility was defined as 'an individual's judgment of the veracity of the content of communication' by asking the respondents: How well do the following adjectives describe the content you just read?[5] The adjectives were: *accurate*, *authentic*, and *trustworthy*. As intended by Appelman & Sundar (2016), the questionnaire used a 7-point Likert scale ranging from 1 (describes very poorly) to 7 (describes very well).

Social Media Engagement

The items for this measure were inspired by a study by DiStaso et. al (2015). Intention to either like a social media post post, share the post, comment the post, or talk about the post offline were the items used. Two of their items ('seek more information' and 'go to the hospital in the future') were excluded for this thesis since they were not appropriate to the research question. Instead, the behavioral intention to 'report the post' was added. DiStaso et. al's (2015) 5-point Likert scale was also translated into a 7-point Likert scale ranging from 1 (very unlikely) to 7 (very likely).

Vaccine Attitude

To measure vaccine attitude, the short 5C scale developed by Betsch et. al (2018) was used. The scale is related to the 5A model that was discussed in the theoretical framework, see Table 2. The instruction was: Please evaluate how much you disagree or agree with the following statements, and items were assessed on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). An example of an item was "I am completely confident that vaccines are safe". An important moderation is that the items, as used in the questionnaire, were slightly moderated in terms of wording to avoid asking respondents about their subjective health status. This resulted in exclusions of "I" in the different items, see Appendix 1.

---

[5] To clarify for the respondents, social media was added after content in the questionnaire: "the content of the social media post you just read"

Vaccine Intention

Vaccine intention was measured by a single question influenced by Vivion et. al's (2022) study that asked respondents: How likely are you to get vaccinated against COVID-19? The question was assessed on a 5-point Likert scale, which in the questionnaire for this thesis was translated into a 7-point Likert scale ranging from 1 (very unlikely) to 7 (very likely). Furthermore, the intention question was rephrased to word-of-mouth: How likely are you to recommend others to get vaccinated against COVID-19?[6]

3.5.2. Independent Variables

Context

The main independent variable is the division into the different contexts of non-authority and authority. Description of this variable can be found under stimuli development, Section 3.4.2.

Conspiracy Beliefs

Conspiracy beliefs was measured by the ACBQ-scale (Adolescent Conspiracy Beliefs Questionnaire) developed by Jolley et. al (2021). The scale was intentionally designed to measure adolescents' conspiracy tendencies, something that was suitable for this thesis given a younger sample. The scale had nine items, e.g. "The government deliberately hides important information from the public", and the instruction was: Please evaluate how much you disagree or agree with the following statements and items were assessed on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Demographic Variables

As already stated, the amount of background variables was limited to not collect excessive data of the respondents. Hence, the variables measured were limited to age, gender, and educational level.

---

[6] This was made based on health being a sensitive topic in the GDPR guidance

3.6.   Data Collection and Analysis

3.6.1.   Data Collection

The questionnaire was distributed between 10th of April and 2nd of May and the number of valid responses was 198. The online self-completion questionnaire was distributed through an anonymous link on Facebook, and the authors also used their own networks consisting of family, friends, former teachers, and colleagues. Distributing the questionnaire to school classes through teacher contacts was a deliberate attempt of increasing the representativeness, but since this opportunity arose through the authors' own networks it can be argued that it is still a convenience sample due to its accessibility. Subsequently, this combats the strength of the data analysis to serve as a general one and the final dataset will be treated as a convenience sample (Bell et. al, 2022).

3.6.2.   Drop-out Analysis

When the questionnaire was closed, 433 respondents had used the link for the survey. However, 70 respondents only completed 5% of the survey which could mean that these respondents only clicked on the link with no intention of completing the questionnaire, or that they did not consent with GDPR. Of the remaining 363 respondents, 98 respondents were excluded since they had not completed the questionnaire (progress < 100). 29 respondents were then excluded since they had not answered correctly on any of the two control questions, after which 236 respondents remained. Lastly, respondents who were not in the age span of 18-29 years older, or whose survey responses exceeded three hours (or less than one minute) were excluded. Hence, the final dataset consisted of 198 respondents.[7]

---

[7] The authors were liberal when filtering completion for questions with many items – respondents who had completed 100% of the survey, but who had not answered each item were included.
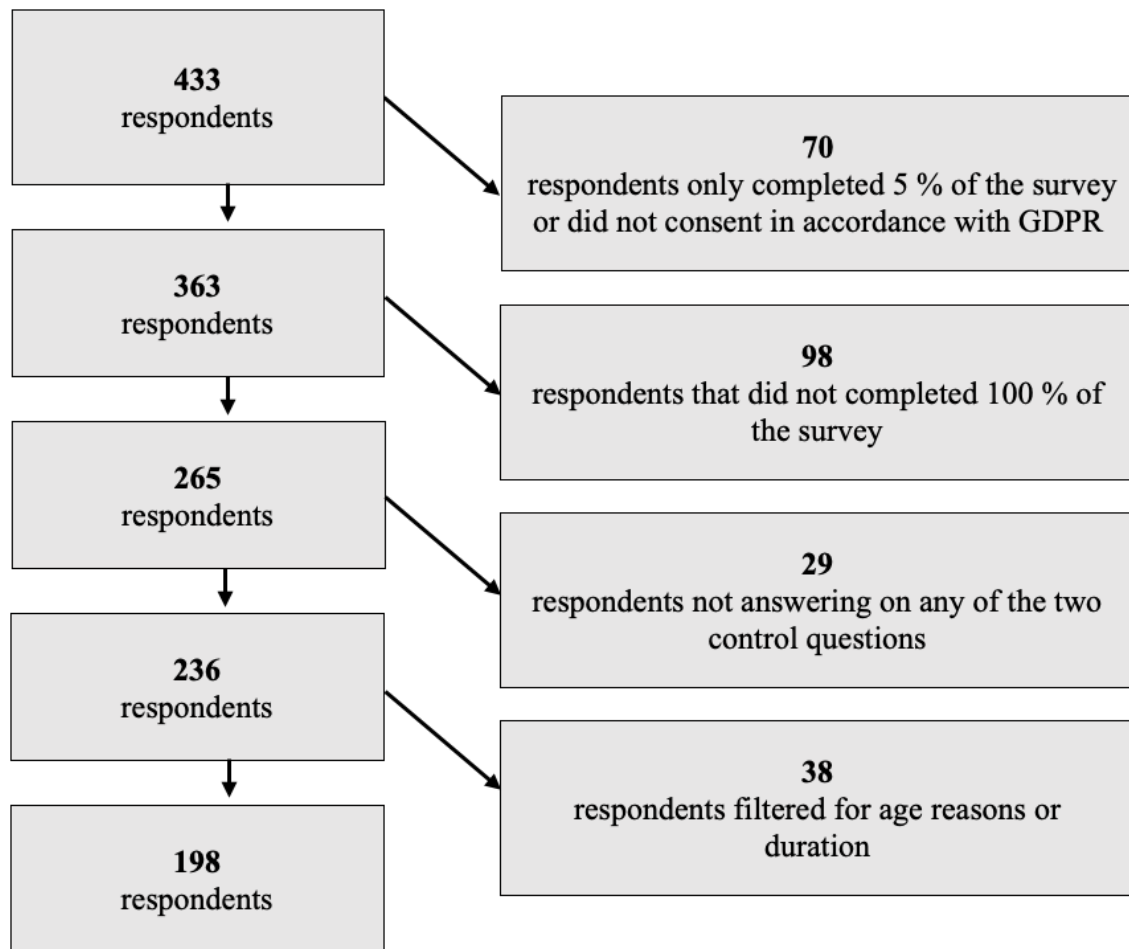
Figure 3. Illustration of questionnaire drop-out

In the final dataset of 198 respondents, most of the respondents were women, and 39.9% of the respondents had high school as their highest completed education. Also, the respondents mainly took part of news through daily papers and social media. Most respondents had also read news about COVID-19 during the past week at the time when they responded to the survey. The descriptive statistics of the final dataset can be found in Appendix 2 and 3.

3.7.　　Data Analysis

To analyze the data, the dataset was exported from Qualtrics into the statistics program IBM SPSS v. 28. First, the authors analyzed descriptive data of the final dataset in terms of demographic variables and of the respondents' media habits as seen above. Furthermore, responses were manually checked to make sure that low-quality answers were removed. After this, hypotheses were tested by independent t-tests. To gain a better understanding for the collected data and the responses, a one sample t-test, a Pearson's correlation test and a linear regression analysis were used.

3.8.　　Reliability and Validity

3.8.1.　　Reliability

Reliability measures the consistency of a measure of a concept meaning that if repeated, should generate the same findings (Bell et. al, 2022). I.e., the repeatability of the results in the thesis. Internal reliability for multi-item measures is measured by Cronbach's alpha, where 0 (no internal reliability) and 1 (perfect internal reliability). A rule of thumb is that the Cronbach's alpha should be > 0.7 to be seen as efficient (Bell et. al, 2022). In the thesis, the context of non-authority versus authority occurred prior to the multi-item measures. Following this, the Cronbach's alpha was measured for both groups individually as depicted in Table 3.

Table 3. Cronbach's alpha for multi-item measures

Variable	Cronbach's alpha	
Respondent group	Non-authority	Authority
Credibility	$\alpha = 0.725$	$\alpha = 0.788$
Social media engagement	$\alpha = 0.426$	$\alpha = 0.496$
Vaccine attitude[8]	$\alpha = 0.569$	$\alpha = 0.547$
Conspiracy beliefs	$\alpha = 0.809$	$\alpha = 0.845$

Note: Despite removing items, Cronbach's α for social media engagement remained < 0.5 which led the authors to analyze the items for this variable separately.

---

[8] Cronbach's alpha for vaccine attitude was < 0.7 despite removing the items that measured "access" and "awareness" (see Table 2). The results of the variable will be treated with cautiousness.

3.8.2. Validity

Validity indicates whether research measures what it sets out to measure, alas, the ability of the thesis to answer its research question (Bell et. al, 2022). External validity, the extent to which the study is generalizable beyond the studied context, and replicability are emphasized by Bell et. al (2022) as fundaments for validity. In the case of this thesis, the validity increases since pre-tested measures and scales have been used. Also, the method is inspired by existing research, which also contributes to external validity and replicability. Despite this, acknowledging that the scales and measures (1) have been translated into Swedish and (2) modified in accordance with GDPR lowers the validity. Furthermore, the convenience sample also lowers the ability to replicate the study.

3.8.3. Survey Judgment

As illustrated in the survey flow, the final block contained questions on the survey quality and clarity. The question measured respondents' general opinion and perception of the questionnaire. All questions were evaluated on a 5-point Likert scale. 68.7% of the respondents thought that the questions were stimulating and 75.3% thought that the response alternatives were easy to understand. Furthermore, 76.3% of respondents thought that the questionnaire was valuable. Lastly, 43.9% did not think that the questions tried to influence them in any direction, see Appendix 4.

4. Results

4.1.   Manipulation Check

Before presenting the results of the thesis, the authors want to emphasize a general issue when exposing respondents to a fictive scenario in a questionnaire setting. When asking respondents to generally assess how realistic the stimuli and the underlying scenario was, 46.8% of the respondents in the non-authority group of (n = 94) did not think that the scenario was realistic (39.4% thought it were). In the authority group of (n = 103), 38.4% of the respondents did not think that the scenario was realistic (44.2% thought it were).[9] The descriptive statistics for the assessment questions can be found in Appendix 5 and 6.

Overall, the question indicates that almost half of the respondents in the non-authority group had a hard time picturing the scenario in front of them, or simply did not think that the scenario and the stimuli presented to them in the questionnaire was realistic enough to be manipulated. This calls for a more conservative interpretation of the results that follow in this section.

4.2.   Analytical Tool

The aim of the thesis was ultimately to investigate if there were any observable differences between the non-authority group and the authority group after both groups receiving the same inoculation treatment when measuring credibility, social media engagement, vaccine attitudes, and vaccine intentions. T-tests were used to determine possible mean differences between the subject groups. Throughout this section, p-values on a significance level of 5% ($p < 0.05$) were used to test the hypotheses.

4.1.   Mean Differences Between Subject Groups

To test mean differences between subject groups, t-tests were conducted for all the dependent variables and the explorative variable of conspiracy belief. As seen in Table 4, there were no significant differences between the means of the groups depending on the

---

[9] (n = 1) respondent was missing from the authority group

33

level of authority of the message. Other takeaways from the t-tests are that messages were not perceived as credible and that people were reluctant to engage with the message on social media in terms of liking the post, sharing the post, commenting the post, talking about the post offline, or reporting the post. Furthermore, vaccine *attitudes* were positive, and vaccine *intentions* were high, for both groups, whereas the level of conspiracy belief were low for both groups.

Table 4. Results of t-test between subject groups

Respondent group	non-Authority n = 94		Authority n = 104				
Variable	M	SD	M	SD	df [10]	p	t
Credibility [a]	2.39	1.67	2.03	1.44	195	0.104	1.64
Liking [b]	1.40	0.90	1.28	0.70	195	0.299	1.04
Sharing	1.11	0.49	1.21	0.74	190	0.271	-1.11
Commenting	1.84	1.28	1.90	1.33	192	0.753	-0.32
Talking	3.61	1.72	3.61	1.79	191	0.997	0.00
Reporting	2.81	1.46	3.05	1.65	192	0.293	-1.05
Vaccine attitude [c]	5.84	0.96	6.03	0.83	195	0.148	-0.23
Vaccine intention [d]	6.31	1.18	6.35	1.08	196	0.815	1.55
Conspiracy belief* [e]	2.29	0.90	2.09	0.89	196	0.110	1.60

Note: * Not a dependent variable in the thesis
[a] 1 being low credibility, 7 being high credibility
[b] 1 being very unlikely, 7 being very likely
[c] 1 being negative, 7 being positive
[d] 1 being very unlikely, 7 being very likely
[e] 1 being low, 7 being high
One sample t-test ensured that both participant groups deviated from the center of the scale with pre-determined test-value (= 4) at a significant level of $p < 0.001$ apart from variable talking that was significant at $p < 0.05$ (Appendix 7).

As seen in Table 4, both groups had a mean of ($M = 3.61$) when asked to assess their intention of talking about the post offline. Given that this was the only variable that did not deviate from the center of the scale at a significant level of 0.1% ($p < 0.001$), it is not possible to rule out that the question might have been more difficult to interpret for the respondents than the other questions. If that was the case, respondents might not have been able to form an opinion and by extent, choosing a value that was on the middle of

---

[10] Variation in degrees of freedom (df) since participant with progress = 100 were included despite missing values on some variables (see drop-out analysis, Section 3.6.2).

the scale. However, the variable significantly differed from the scale at a significance level of 5% ($p < 0.05$) which is why the result will still be interpreted.

4.1.1.   No Significant Difference in Credibility

In the survey, respondents were asked to state how credible they perceived the message by responding to the question: How would you describe the content in the social media post that you just read? Three items (correct, authentic, trustworthy) were assessed on a 7-point Likert scale that ranged from very poorly to very good. The three items were later categorized as an index.
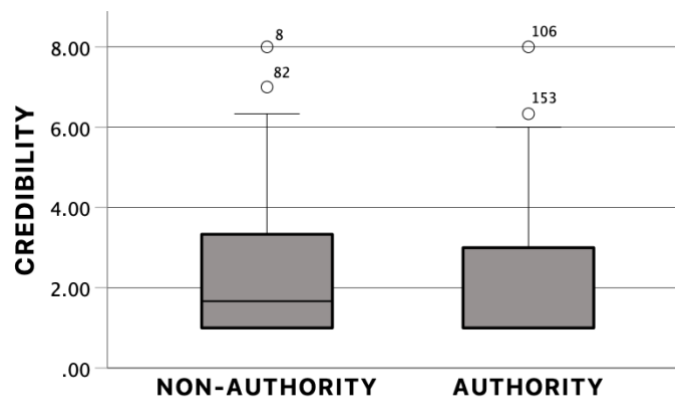

Figure 4. Boxplots depicting level of perceived credibility between subject groups

When investigating whether there was a significant difference in perceived credibility between the groups, the group receiving the message from an authority source perceived the credibility slightly lower than those who did not. However, a t test did not find a statistically reliable difference between the non-authority group ($M = 2.39$, $SD = 1.67$) and the authority group ($M = 2.03$, $SD = 1.44$), $t(195) = 1.64$, $p = 0.104$, $\alpha = 0.05$ as compiled in Table 4. Therefore, the hypothesis **H1** that the authority group would perceive the message as more credible than the non-authority group, was **not empirically supported.**

4.1.2. No Significant Difference in Social Media Engagement

Respondents were asked about their behavioral intentions to the fictious social media post and asked to assess their intention to either like, share, comment the post, talk about the post offline, or report the post on a 7-point Likert scale. As becomes visible in the boxplots below, the different contexts of non-authority and authority yielded similar results.
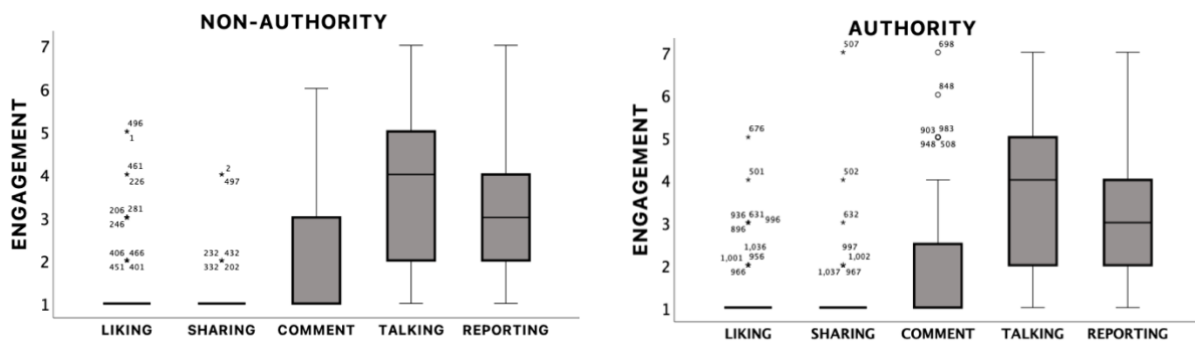

Figure 5. Boxplots depicting level of engagement between subject groups

When reviewing the results, it becomes evident that no significant differences were observed for any of the engagement parameters as seen in Table 4, despite their being slight differences. For example, the non-authority group was slightly more likely to like the post than the authority group. However, both means are very low since it was assessed on a 7-point Likert scale and the non-authority group ($M = 1.40$, $SD = 0.90$) and the authority group ($M = 1.28$, $SD = 0.70$), t(195) = 1.04, $p = 0.299$, $\alpha = 0.05$ displaying a non-significant difference between groups. Therefore, the hypothesis **H2** that the authority group would be more likely to engage with the post than the non-authority group, was **not empirically supported.**

It is worth mentioning that the intention of talking is the highest, in both groups ($M = 3.61$). As mentioned, this could be a consequence of an unclear formulation making the question difficult to interpret for the respondents. However, it could also signal that the respondents are slightly more likely to act on a misinformation message *offline* than *online,* which is something that the authors will comment on in the discussion.

4.1.3. No Significant Difference in Vaccine Attitudes

Respondents' vaccine attitudes were measured by using the short 5C scale developed by Betsch et. al (2018). Later, the items were made into an index. As mentioned in the reliability analysis (Section 3.8.1), two of the items were removed to achieve a higher Cronbach's alpha. Despite this, the Cronbach's alpha was below the limit of 0.7, implying that this result should be interpreted more cautiously. In the boxplot below, it becomes visible that both groups had a very positive attitude towards the COVID-19 vaccine in general.

Figure 6. Boxplots depicting vaccine attitudes between subject groups

As depicted in Figure 6, a *t* test did not find a statistically reliable difference between the non-authority group ($M = 5.84$, $SD = 0.96$) and the authority group ($M = 6.03$, $s = 0.83$), $t(195) = -0.23$, $p = 0.148$, $\alpha = 0.05$ as compiled in Table 4. Following this, the hypothesis **H3,** that the authority group would have less positive vaccine *attitudes* than the non-authority group was **not empirically supported.** Rather, the opposite tendencies were identified as the non-authority group had a slightly less positive attitude against the COVID-19 vaccine (even though this small difference was non-significant).

4.1.4. No Significant Difference in Vaccine Intention

Intention to vaccinate against COVID-19 vaccine was assessed by asking the question: Would you recommend others to vaccinate against COVID-19? The question consisted of one item only, where respondents were asked to state their intention on a 7-point Likert scale ranging from very unlikely to very likely.
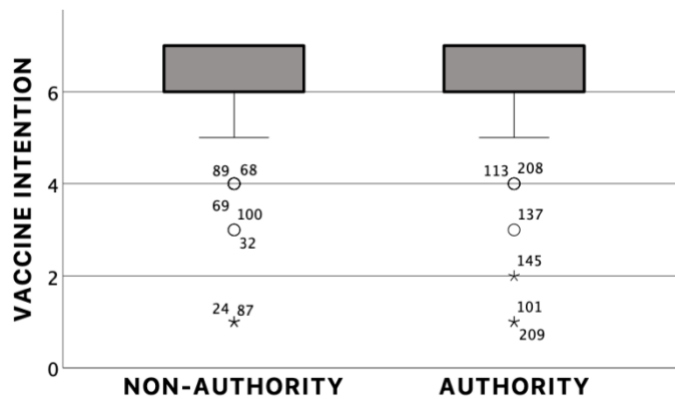
Figure 7. Boxplots depicting vaccine intention between subject groups

When comparing the differences in vaccine intention, the means in the groups were almost identical. The non-authority group ($M = 6.31$, $SD = 1.18$) and the authority group ($M = 6.35$, $s = 1.08$), $t(196) = 1.55$, $p = 0.815$, a = 0.05 as compiled in Table 4. Hence, the hypothesis **H4,** that the authority group would have less positive vaccine *intentions* than the non-authority group was **not empirically supported.**

An aspect that is worth commenting when reviewing this result is how high the intention to recommend the COVID-19 vaccine to someone was in this specific sample, since the means were ($M > 6$) for both groups on a 7-point scale where 7 indicated the highest intention to vaccinate. This high vaccine intention for the COVID-19 vaccine is another thing that the authors will return to in the discussion.

4.2.   Pearson's Correlation Test

To explain how the collected data was associated with the results, a Pearson's correlation test was conducted to examine correlations between the dependent variables and independent variables group, gender, and conspiracy beliefs. To examine the potential correlations, the gender variable was recoded into "man" and "woman" and thus excluded ($n = 3$) respondents. A significant *positive* relationship was found between conspiracy beliefs, liking, and sharing, whereas a significant *negative* relationship was found between conspiracy beliefs and vaccine attitudes and vaccine intentions. The correlation

was significant at a significance level of 1% ($p < 0.001$), and the result of the test is found in Appendix 8.

4.3.   Linear Regression Analysis

To further investigate the relationship between the dependent variables and the independent variables group, gender, and level of conspiracy beliefs, linear regressions were also conducted. Interaction variables (group * conspiracy beliefs) and (gender * conspiracy beliefs) were coded prior to the analysis. Five out of the eight regressions (credibility, liking, sharing, vaccine attitude, vaccine intention) yielded a significant regression equation, and for the significant regressions, conspiracy beliefs significantly contributed to the models for credibility, liking, sharing, and vaccine intentions (Appendix 9).[11] Both the Pearson's correlation test and the linear regressions strengthen the result that conspiracy beliefs influenced the dependent variables, but that neither group nor gender influenced the dependent variables.

4.4.   Additional Tests to Investigate Conspiracy Correlation

As seen in Pearson's correlation test and the linear regression, conspiracy beliefs correlate with five of the dependent variables and have predicting value for four of the dependent variables. However, as clearly illustrated by Dreber-Almenberg & Johannesson (2018), false positive results are common, which makes it crucial to look at the underlying tendencies for the conspiracy correlation and its predictive value.

To further investigate the underlying tendency of significant correlation between conspiracy and the dependent variables, the authors chose to look closer at the nature of the correlation between conspiracy beliefs and the four dependent variables (credibility, liking, sharing, vaccine intention) that yielded significant results in both Pearson's correlation test and had predicting value in the linear regression analysis. As seen in Table 5, only ($n = 1$) in each of the participant groups scored high consequently on conspiracy beliefs, and ($n = 3$) scored high in total. Due to the very small sample of respondents who

---

[11] Insignificant regressions can be found in Appendix 10

scored high on conspiracy beliefs ($n < 30$), a t-test to detect differences in mean was not possible.[12]

Table 5. Descriptive statistics of respondents with high vs. low conspiracy beliefs

| Respondent group | non-Authority | | Authority | |
| | n = 94 | | n = 104 | |
Variable	*n*	*M*	*n*	*M*
Credibility				
Conspiracy high	1	4.00	1	3.00
Conspiracy low	91	2.34	101	1.95
Liking				
Conspiracy high	1	5.00	1	2.00
Conspiracy low	91	1.32	100	1.23
Sharing				
Conspiracy high	1	4.00	1	2.00
Conspiracy low	87	1.05	100	1.12
Vaccine intention				
Conspiracy high	1	3.00	1	4.00
Conspiracy low	92	6.36	101	6.42

Note: Conspiracy was recoded into low (range 1-4) and high (range 5-7)

When visualizing the relationship between conspiracy beliefs and the dependent variables credibility, liking, sharing, and vaccine intention through scatterplots, it becomes visible that there is a tendency to a regression line, albeit not a distinct one as seen in Figure 8. A similar pattern was found for the other three dependent variables (Appendix 11).

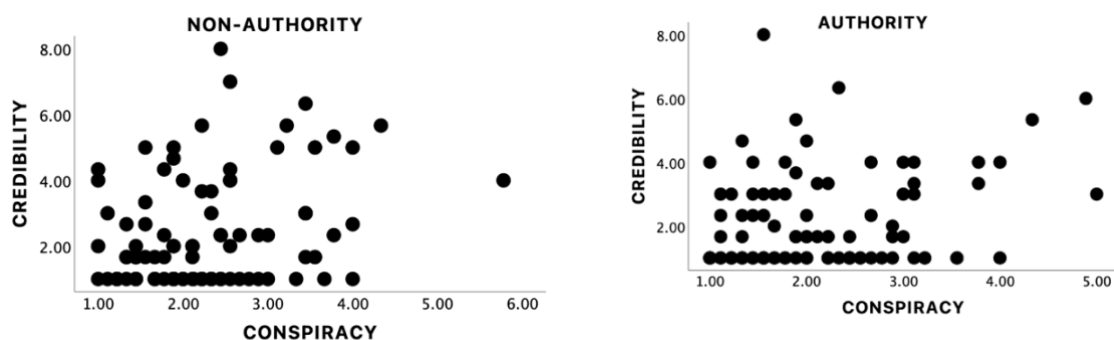**Figure 8.** Scatterplot over conspiracy correlation with credibility

---

[12] Non-parametric tests were also excluded due to the very small sample size of $n = 1$ person in each group. Instead, the respondents were treated as outliers in the dataset.

Knowing that the correlation between conspiracy beliefs and the dependent variables credibility, liking, sharing, and vaccine intention was weak, the authors wanted to ensure that the correlation still existed without the outliers. To test this, the outlier values that scored high on conspiracy beliefs were excluded and complementary Pearson's correlation test and linear regressions were run. The result of the correlational analysis indicates that even without the outlier values, there is a significant relationship between conspiracy beliefs and these four dependent variables (Table 6).

Table 6. Pearson's correlation tests for dependent variables after excluding conspiracy outliers

Variable	*M*	*SD*	1	2	3	4
1. Credibility	2.14	1.51	1			
2. Conspiracy	2.11	0.79	0.20** (0.29)	1		
1. Liking	1.27	0.68	1			
2. Conspiracy	2.11	0.79	0.31** (0.47)	1		
1. Sharing	1.09	0.30	1			
2. Conspiracy	2.11	0.79	0.16** (0.46)	1		
1. Vaccine Intention	6.39	1.03	1			
2. Conspiracy	2.11	0.79	-0.24** (-0.35)	1		

Note: Dependent variable in **bold** & ** Correlation is significant at the 0.01 level (2-tailed)
In parentheses, correlation values from Table 7. where outlier values were included

To examine whether conspiracy beliefs also have predictive value after the outliers were removed, a second linear regression was also conducted. As seen in Table 7, conspiracy beliefs still had a predictive value without the outliers. The implication of this finding is that there is a positive relationship between a higher level of conspiracy beliefs and the intention to perceive a misinformation credible, or, to like and share a misinformation message on social media. Furthermore, there is a negative relationship between a higher level of conspiracy beliefs and the intention to recommend others to get vaccinated against COVID-19.[13]

---

[13] A Mediation Analysis (MA) was excluded based on Fiedler et. al's (2011) findings on what mediation analysis cannot do.

Table 7. Linear regression for dependent variables after excluding conspiracy outliers

| Variable | Unstandardized | | R^2 | F | D-W |
	B	Std. Error			
Credibility	1.33	0.51	**0.03**	7.79*	2.27
Conspiracy	0.38*	0.14			
Liking	0.71	0.13	**0.09**	19.85**	1.82
Conspiracy	0.27**	0.06			
Sharing	0.96	0.06	**0.02**	4.72*	2.03
Conspiracy	0.06**	0.03			
Vaccine Intention	7.05	0.21	**0.118**	11.78**	2.03
Conspiracy	-0.31**	0.09			

Note: * Significant at $p < 0.05$, ** Significant at $p < 0.001$

4.5. Summary of Hypotheses

Despite there being slight differences between subject groups, the data did not support the hypotheses empirically as summarized in Table 9.

Table 9. Summary of Hypotheses

H1	The authority group will perceive the message as more credible than the non-authority group after exposure to inoculation treatment	Not supported
H2	The authority group will have a higher intent to engage with the message on social media after exposure to inoculation treatment	Not supported
H3	The authority group will have less positive vaccine *attitudes* than the non-authority group after exposure to inoculation treatment	Not supported
H4	The authority group will have less positive vaccine *intentions* than the non-authority group after exposure to inoculation treatment	Not supported

5. Discussion

The aim of this thesis was to assess whether there was an observable difference in inoculation treatment's effectiveness depending on the source of the misinformation message as measured by credibility, social media engagement, vaccine attitudes, and vaccine intentions. To navigate the thesis, a subsequent research question was formulated*: Does inoculation treatment vary in effectiveness depending on the misinformation source's authority?*

Based on the main theories used in the thesis, and existing research, four hypotheses were generated. Out of the four hypotheses, none were empirically supported. Hence, the main findings of the thesis are that in a post-inoculation setting, the authority of the source of the misinformation message will not significantly impact perceived credibility, social media engagement, vaccine attitudes, or vaccine intentions. However, conspiracy beliefs were shown to positively correlate with perceived credibility of the message as well as liking and sharing the post. Conspiracy beliefs were also shown to negatively correlate with the intention of recommending others to get vaccinated against COVID-19.

5.1. Conclusions and Implications

5.1.1. Credibility

Credibility is ultimately dependent on perception and given that something is *perceived* as high credibility, the persuasive influence increases. Both groups perceived the credibility of the fictive social media post as low, which implies that persuasion was unlikely to occur in both the non-authority group and the authority group. This aligns with the study by McGlynn et. al (2019) that emphasized the role of citing specific sources in a health context – something that none of the fictive posts had. Failing to reject the null hypothesis implies that the sample could easily detect the misinformation regardless of (false) authority in a post-inoculation setting. Scoring high on conspiracy belief did however correlate positively with credibility, indicating that the message *can* be perceived as credible depending on one's worldview.

5.1.2. Media Engagement

It was hypothesized that the misinformation message from the false authority would increase the engagement with the post. This pattern could not be found in the results, indicating that the respondents in the sample for both groups were reluctant to either like, spread, or comment the post. Something interesting was that the sample also scored relatively low on the intention of reporting the post, indicating an overall passiveness to fake news online. To the contrary, the intention that people was relatively most likely to undertake, was talking about the post offline, suggesting that it might be slightly easier to discuss fake news in real life than to engage with the post at the time of encounter. Worth mentioning is however that the respondents' general engagement level to social media was not measured, which is something that the authors would like to have analyzed further for a more nuanced conclusion to what was observed.

5.1.3. Vaccine Attitude

There are three factors that makes it difficult to draw any conclusions based on the variable. Firstly, Compton (2021) discussed the importance of implying respondents' attitudinal valence prior to an inoculation experiment, which this thesis did not. Secondly, the variable also had a Cronbach's alpha lower than < 0.7, which indicates that the reliability is contested. A third factor of error stems from the moderation of the scale that was made to content with the GDPR framework. The moderation made the scale more objective, and less subjective, which might have made it more difficult to form an overall opinion of the items for the respondents.

5.1.4. Vaccine Intention

Both groups had a high intention to recommend others to vaccinate against COVID-19, which could signal that the inoculation treatment was effective in protecting intentions since both groups had a high intention despite being exposed to fake news. However, it is difficult to rule out that this could also be a direct result of the sample having positive intentions in general and that they did not perceive the misinformation message as credible enough to be persuaded. Conspiracy beliefs were also found to correlate negatively with intention to vaccinate.

5.2.   Limitations

As all other studies, this thesis has its strengths and weaknesses. A substantial critique against the thesis is the methodology through which data was collected. Subject-wise, the thesis handles a polarizing issue, but the data was collected through a convenience sample whose inherent flaw is its bias and lack of representativeness (Bell et. al, 2022). Ultimately, there is an inherent antagonism between the sample that was used and what the thesis aimed to explore. This, since the risk of only investigating one side of the spectra cannot be eliminated – rather, the findings point to a high level of homogeneity in the sample. An alternative approach to the thesis would have been to use a subject that is less polarizing since the prerequisites for using a convenience sample would have been more suitable. Had the authors used a less sensitive subject, there would have been less moderations of the measurement scales in content with GDPR too, something which would have enabled a better comparison between this thesis, and other research in adjacent areas.

There are, however, other possible reasons for the findings, or non-findings, in the thesis. As mentioned in the theoretical framework, Schmid-Petri & Bürger (2021), could not replicate Cook et. al's (2017) findings regarding inoculation's effectiveness against fake expert in a German setting. Furthermore, Vivion et. al (2022) found that inoculation treatment could confer protection against vaccine intentions but failed to reveal significant results regarding vaccine attitudes. Moving forward, the *BadNews* game had significant results in conferring long-term protection against misinformation, but not short-term protection as concluded by Maertens' et. al (2021), which indicates that the research field lacks a standardized practice around inoculation. Some of the research design choices were thus made based on findings whose results are still investigated.

5.2.1.   Technical Error and Its Consequences

As was mentioned in footnote 3, and as seen in Appendix 12, the intended aim of the thesis was to make a 2x2 between-subjects design experiment where not only non-authority vs. authority was measured, but also inoculation treatment vs. no inoculation treatment. No data was collected on these two groups due to a technical error, which lowers the external validity substantially, since a flaw in the method makes it difficult to

generalize the method in the thesis beyond its context in a replicated experiment. Furthermore, the thesis deviated more from the intended purpose of contributing with suggestions communication and marketing strategies for the vaccine as the thesis weighted more towards the role of fake news and psychology.

5.2.2. The Role of Conspiracy Beliefs

In the thesis, conspiracy beliefs were shown to have a significant impact on four of the dependent variables. However, when using a relatively small sample of 198 respondents, the impact of coincidences become higher. When interpreting the results, this should be taken into consideration, despite the significance that was shown.

Final Words

Despite no observable differences in this thesis, the authors still believe that contemporary and future communication scholars and marketers can benefit from better understanding the role, and threat, of misinformation. Hence, becoming better at the defense against the dark arts.

To end the thesis the same way it started:

> "The truth." Dumbledore sighed. "It is a beautiful and terrible thing, and should therefore be treated with great caution." (Dumbledore, Harry Potter and the Half-Blood Prince)

6. References

Adin Fares, N. (2022, February 18). Tre av tio unga vuxna i Stockholm är ovaccinerade. https://www.dn.se/sverige/tre-av-tio-unga-vuxna-i-stockholm-ar-ovaccinerade/

Ajzen, I., & Fishbein, M. (1975). A Bayesian analysis of attribution processes. *Psychological bulletin, 82(2),* 261. https://psycnet.apa.org/doi/10.1037/h0076477

Appelman, A., & Sundar, S. S. (2016). Measuring message credibility: Construction and validation of an exclusive scale. *Journalism & Mass Communication Quarterly, 93(1),* 59-79. https://doi.org/10.1177%2F1077699015606057

Banas, J. A., & Rains, S. A. (2010). A meta-analysis of research on inoculation theory. *Communication Monographs, 77(3),* 281-311. https://doi.org/10.1080/03637751003758193

Basol, M., Roozenbeek, J., Berriche, M., Uenal, F., McClanahan, W. P., & Linden, S. V. D. (2021). Towards psychological herd immunity: Cross-cultural evidence for two prebunking interventions against COVID-19 misinformation. Big Data & Society, *8(1), 20539517211013868.* https://doi.org/10.1177/20539517211013868

Bell, E., Bryman, A., & Harley, B. (2022). *Business Research Methods* (4th ed.) Oxford University Press.

Betsch, C., Schmid, P., Heinemeier, D., Korn, L., Holtmann, C., & Böhm, R. (2018). Beyond confidence: Development of a measure assessing the 5C psychological antecedents of vaccination. *PloS one, 13(12), e0208601.* https://doi.org/10.1371/journal.pone.0208601

Bode, L., & Vraga, E. K. (2018). I do not believe you: How providing a source corrects health misperceptions across social media platforms. *Information, Communication & Society, 21(10),* 1337-1353. https://doi.org/10.1080/1369118X.2017.1313883

Bochner, S., & Insko, C. A. (1966). Communicator discrepancy, source credibility, and opinion change. *Journal of Personality and Social Psychology, 4(6),* 614. https://psycnet.apa.org/doi/10.1037/h0021192

Cascini F., Pantovic A., Al-Ajlouni Y., Failla G., Ricciardi W. (2021). Attitudes, acceptance and hesitancy among the general population worldwide to receive the COVID-19 vaccines and their contributing factors: A systematic review. *EClinicalMedicine. Oct; 40:101113.* https://doi.org/10.1016/j.eclinm.2021.101113

Chan M.S., Jones C.R., Hall Jamieson K., Albarracín D. (2017). Debunking: A Meta-

Analysis of the Psychological Efficacy of Messages Countering Misinformation. *Psychol Sci. 2017 Nov;28(11):*1531-1546. doi: 10.1177/0956797617714579.

Chido-Amajuoyi OG., Yu RK., Agaku I., Shete S. Exposure to Court-Ordered Tobacco Industry Antismoking Advertisements Among US Adults. *JAMA Netw Open. 2019;2(7):e196935.* doi:10.1001/jamanetworkopen.2019.6935

Cialdini, R. B. (2001). Harnessing the Science of Persuasion. *Harvard Business Review, 79(9),* 72-79. https://www.jstor.org/stable/26059056

Colliander, J. (2019). "This is fake news": Investigating the role of conformity to other users' views when commenting on and spreading disinformation in social media. *Computers in Human Behavior, 97*, 202-215. https://doi.org/10.1016/j.chb.2019.03.032

Compton, J. (2013). Inoculation theory. *The SAGE handbook of persuasion: Developments in theory and practice, 2,* 220-237.

Compton, J., van der Linden, S., Cook, J., & Basol, M. (2021). Inoculation theory in the post-truth era: Extant findings and new frontiers for contested science, misinformation, and conspiracy theories. *Social and Personality Psychology Compass, 15(6), e12602.* https://doi.org/10.1111/spc3.12602

Cook, J., Lewandowsky, S., & Ecker, U. K. (2017). Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence. *PloS one, 12(5), e0175799.* https://doi.org/10.1371/journal.pone.0175799

DiStaso, M. W., Vafeiadis, M., & Amaral, C. (2015). Managing a health crisis on Facebook: How the response strategies of apology, sympathy, and information influence public relations. *Public Relations Review, 41(2),* 222-231. https://doi.org/10.1016/j.pubrev.2014.11.014

Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes.* Harcourt Brace Jovanovich College Publishers.

Ecker, U.K.H., Lewandowsky, S., Cook, J. et al. (2022). The psychological drivers of misinformation belief and its resistance to correction. *Nat Rev Psychol* 1, 13–29, https://doi.org/10.1038/s44159-021-00006-y

EU General Data Protection Regulation (GDPR): Regulation (EU) 2016/679 of the European Parliament and of the Council. (2016). https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32016R0679

Fiedler K., Schott M., Meiser T. (2011). What mediation analysis can (not) do. *Journal of Experimental Social Psychology*, *Volume 47; Issue 6,* 1231-1236, https://doi.org/10.1016/j.jesp.2011.05.007

Gorman M. J., Gorman E. S, William S., Gregorian N., Scales A. D. (2022). Implications of COVID-19 Vaccine Hesitancy: Results of Online Bulletin Board Interviews. *Frontiers in Public Health. Volume 9.* https://doi.org/10.3389/fpubh.2021.757283

Guess A., Nagler J., Tucker J. (2019). Less than you think: Prevalence and predictors of

fake news dissemination on Facebook. *Sci Adv. 2019 Jan 9;5(1): eaau4586.* doi: 10.1126/sciadv.aau4586.

Haglin K. (2017) The limitations of the backfire effect. *Research & Politics. July.* doi:10.1177/2053168017716547

Hoerger, M. (2010). Participant dropout as a function of survey length in Internet-mediated university studies: Implications for study design and voluntary participation in psychological research. *Cyberpsychology, behavior, and social networking, 13(6)*, 697-700. https://doi.org/10.1089/cyber.2009.0445

Hovland, C. I., & Weiss, W. (1951). The influence of source credibility on communication effectiveness. *Public opinion quarterly, 15(4),* 635-650. https://doi.org/10.1086/266350

Hovland, I. C., Janis, L. I., & Kelley, H. H. (1953). *Communication and persuasion; psychological studies of opinion change*. Yale University Press.

Jolley, D., Douglas, K. M., Skipper, Y., Thomas, E., & Cookson, D. (2021). Measuring adolescents' beliefs in conspiracy theories: Development and validation of the Adolescent Conspiracy Beliefs Questionnaire (ACBQ). *British Journal of Developmental Psychology*, 39(3), 499-520. https://doi.org/10.1111/bjdp.12368

Johnson, N.F., Velásquez, N., Restrepo, N.J., Leahy R., Gabriel N., El Oud S., Zheng M., Manrique P., Wuchty S., Lupu Y. (2020). *The online competition between pro- and anti-vaccination views. Nature 582*, 230–233. https://doi.org/10.1038/s41586-020-2281-1

Lewandowsky, S., & van der Linden, S. (2021). Countering misinformation and fake news through inoculation and prebunking. *European Review of Social Psychology, 32(2)*, 348–384. https://doi.org/10.1080/10463283.2021.1876983

Lewandowsky S., Ecker U.K.H., Seifert C.M., Schwarz N., Cook J. (2012). Misinformation and Its Correction: Continued Influence and Successful Debiasing. *Psychological Science in the Public Interest. 2012;13(3):*106-131. doi:10.1177/1529100612451018

MacDonald NE; SAGE Working Group on Vaccine Hesitancy. (2015). Vaccine hesitancy: Definition, scope and determinants. *Vaccine. Aug 14;33(34):*4161-4. https://doi.org/10.1016/j.vaccine.2015.04.036

Maertens, R., Roozenbeek, J., Basol, M., & van der Linden, S. (2021). Long-term effectiveness of inoculation against misinformation: Three longitudinal experiments. *Journal of Experimental Psychology: Applied, 27(1), 1.* https://doi.org/10.1037/xap0000315

McGlynn, J., Baryshevtsev, M., & Dayton, Z. A. (2020). Misinformation more likely to use non-specific authority references: Twitter analysis of two COVID-19 myths. *Harvard Kennedy School (HKS) Misinformation Review*. https://doi.org/10.37016/mr-2020-37

McGuire, W. J. (1970). Vaccine for brainwash. *Psychology Today, 3(9),* 36.

McGuire, J. W. (1964). Some Contemporary Approaches. *Advances in Experimental Social Psychology, volume (1)*, 191-229. https://doi.org/10.1016/S0065-2601(08)60052-0

O'keefe, D. J. (1987). The persuasive effects of delaying identification of high-and low-credibility communicators: A meta-analytic review. *Communication Studies, 38(2),* 63-72. https://doi.org/10.1080/10510978709368231

Pennycook, G., & Rand, D. G. (2021). The psychology of fake news. *Trends in cognitive sciences, 25(5),* 388-402. https://doi.org/10.1016/j.tics.2021.02.007

Pfau, M., Roskos-Ewoldsen, D., Wood M., Yin S., Cho J., Lu K., & Shen L. (2003) Attitude Accessibility as an Alternative Explanation for How Inoculation Confers Resistance, *Communication Monographs, 70:1,* 39-51. https://doi.org/10.1080/715114663

Public Health Agency. (2022, May). *Vaccinationen mot covid-19 gör skillnad.* folkhalsomyndigheten.se/smittskydd-beredskap/utbrott/aktuella-utbrott/covid-19/vaccination-mot-covid-19/till-dig-som-ar-ovaccinerad/vaccinationen-mot-covid-19-gor-skillnad/

Rao, T. S., & Andrade, C. (2011). The MMR vaccine and autism: Sensation, refutation, retraction, and fraud. *Indian journal of psychiatry*, 53(2), 95–96. https://doi.org/10.4103/0019-5545.82529

Roozenbeek J., Schneider R. C., Dryhurst S., Kerr J., Freeman L. J. A., Recchia G., van der Bles A., van der Linden S. (2020) Susceptibility to misinformation about COVID-19 around the world, *R. Soc. open sci.7,* http://doi.org/10.1098/rsos.201199

Rowling, J. K. (2014). *Harry potter and the half-blood prince.* Bloomsbury Childrens Books.

Schmid-Petri, H., & Bürger, M. (2021). The effect of misinformation and inoculation: Replication of an experiment on the effect of false experts in the context of climate change communication. *Public Understanding of Science, 09636625211024550.* https://doi.org/10.1177%2F09636625211024550

Singh K., Lima G., Cha M., Cha C., Kulshrestha J., Ahn Y.Y., Varol O. (2022) Misinformation, believability, and vaccine acceptance over 40 countries: Takeaways from the initial phase of the COVID-19 infodemic. *PLoS ONE 17(2): e0263381.* https://doi.org/10.1371/journal.pone.0263381

Stiff, B. J., & Mongeau, A. P. (2002). *Persuasive Communication.* Guilford Press.

Stockholm School of Economics. (2020). *SSE Policy on the processing of personal data in students' individual projects.* Stockholm School of Economics, Office of the General Counsel.

Swire-Thompson B., DeGutis J., Lazer D., Searching for the Backfire Effect: Measurement and Design Considerations. *Journal of Applied Research in Memory and Cognition, Volume 9, Issue 3,* 286-299. https://doi.org/10.1016/j.jarmac.2020.06.006

Vivion M., Sidi A. E., Betsch C., Dionne M., Dubé E., Driedger S. M., Gagnon D.,
Graham J., Greyson D., Hamel D., Lewandowsky S., MacDonald N., Malo
B., Meyer B. S., Schmid P., Steenbeek A., van der Linden S., Verger P.,
Witteman H., Yesilada M., Canadian Immunization Research Network
(CIRN). (2022) Prebunking messaging to inoculate against COVID-19
vaccine misinformation: an effective strategy for public health, *Journal of
Communication in Healthcare*,
https://doi.org/10.1080/17538068.2022.2044606

Van der Linden, S. (2022) Misinformation: susceptibility, spread, and interventions to
immunize the public. *Nat Med 28*, 460–467. https://doi.org/10.1038/s41591-
022-01713-6

Vosoughi, S., Roy, D., & Aral, S. (2018). The spread of true and false news
online. *Science, 359(6380),* 1146-1151. doi:10.1126/science.aap9559

Walter N, Tukachinsky R. (2017). A Meta-Analytic Examination of the Continued
Influence of Misinformation in the Face of Correction: How Powerful Is It,
Why Does It Happen, and How to Stop It? *Communication Research.
2020;47(2):*155-177. doi:10.1177/0093650219854600

Wong, N. C. (2016). "Vaccinations are safe and effective": inoculating positive HPV
vaccine attitudes against antivaccination attack messages. *Communication
Reports, 29(3),* 127-138. https://doi.org/10.1080/08934215.2015.1083599

World Health Organization. (2020, December). *Coronavirus disease (COVID-19): Herd
immunity, lockdowns and COVID-19*. Coronavirus disease (COVID-19):
https://www.who.int/news-room/questions-and-answers/item/herd-
immunity-lockdowns-and-covid-19

World Health Organization. (2021, September). *What is Go Viral?*
https://www.who.int/news/item/23-09-2021-what-is-go-viral

World Health Organization. *Infodemic.* https://www.who.int/health-
topics/infodemic#tab=tab_1

Zarocostas J. (2020) How to fight an infodemic. *The Lancet 395*, 676.
doi:10.1016/S0140-6736(20)30461-X

7. Appendices

Appendix 1. Moderation of wording in short 5C scale

Original items
I am completely confident that vaccines are safe.
Vaccination is unnecessary because vaccine-preventable diseases are not common anymore.
Everyday stress prevents me from getting vaccinated.
When I think about getting vaccinated, I weigh benefits and risks to make the best decision possible.
When everyone is vaccinated, I don't have to get vaccinated, too.
Moderated items
Vaccines are safe.
Vaccination is unnecessary because vaccine-preventable diseases are not common anymore. (No moderation)
Everyday stress is a hinder for getting vaccinated.
It is important to weigh benefits and risks to decide to get vaccinated or not.
When everyone is vaccinated, it is less important to get vaccinated.

Appendix 2. Overview of demographic variables

	N	*n*	% of total sample
Variable	198		
Gender			
Female		113	57.1%
Male		82	41.4%
Non-binary		1	0.5%
Unsure		2	1%
Age			
18-21		82	41.4%
22-25		91	46%
26-29		25	12.5%
Education			
Primary school		36	18%
High school		79	39.9%
Post-secondary*		9	4.5%
University		52	26.3%
Graduate		21	10.6%
Missing		1	0.5%

Note: Percentages might not add up to 100% due to rounding errors

*Not college or university

Appendix 3. Overview of media habits

Variable	N 198	*n*	% of total sample
News Outlet			
Daily papers		114	57.6%
Other social media		101	51.0%
TV channels		96	48.5%
Evening papers		88	44.4%
YouTube		62	31.3%
Facebook		61	30.8%
Authorities		56	28.3%
Radio channels		46	23.2%
Twitter		40	20.2%
Local papers		29	14.6%
Other news outlets		17	8.6%
Other online sites		17	8.6%
Don't read news online		5	2.5%
Had read news about COVID-19 during the last week at response date			
Yes		135	68.2%
No		63	31.8%

Note: Percentages covering news outlets do not add up to 100% since the question was of multiple-choice format where respondents were allowed to select more than one choice

Appendix 4. Survey judgment

	Completely disagree	Probably disagree	Unsure	Probably agree	Completely agree
The questions were stimulating	2.5%	10.1%	17.2%	41.9%	26.8%
The response alternatives were easy to comprehend	3.5%	7.6%	12.6%	35.4%	39.9%
The study felt meaningful	3.0%	4.5%	14.6%	36.4%	39.9%
Some of the questions were intentionally trying to influence my responses in a certain direction	19.2%	24.7%	27.8%	17.7%	9.1%

Note: The percentages will not add up to = 100% due to missing values

Appendix 5. Manipulation check non-authority context

Non-authority group	Completely disagree	Partly disagree	Probably disagree	Unsure	Probably agree	Partly agree	Completely agree
Did you perceive the scenario with Johansson and the social media post that you were exposed to as realistic?	25.5%	9.6%	11.7%	13.8%	9.6%	18.1%	11.7%

Note: The percentages will not add up to = 100% due to missing values

Appendix 6. Manipulation check authority context

Authority group	Completely disagree	Partly disagree	Probably disagree	Unsure	Probably agree	Partly agree	Completely agree
Did you perceive the scenario with Johansson and the social media post that you were exposed to as realistic?	16.3%	15.4%	6.7%	16.3%	18.3%	9.6%	16.3%

Note: The percentages will not add up to = 100% due to missing values

Appendix 7. One-sample t-tests with test value (= 4)

Participant Group	non-Authority n = 94			Authority n = 104		
Variable	*t*	*df*	*Mean Difference*	*t*	*df*	*Mean Difference*
Credibility	-9.27	92	-1.61**	-13.95	103	-1.98**
Liking	-27.93	92	-2.60**	-39.47	103	-2.72**
Sharing	-55.93	88	-2.89**	-38.41	102	-2.79**
Commenting	-15.98	89	-2.16**	-16.04	103	-2.10**
Talking	-2.15	88	-0.39*	-2.24	103	-0.39*
Reporting	-7.72	89	-1.19**	-5.90	103	-0.95**
Vaccine attitude	18.58	92	1.84**	24.91	103	2.03**
Vaccine intention	18.93	93	2.31**	22.21	103	2.35**
Conspiracy belief*	-18.32	93	-1.71**	-21.98	103	-1.91**

Note: ** Significant at $p < 0.001$

Appendix 8. Pearson's correlation tests for dependent variables

Variable	*M*	*SD*	1	2	3	4
1. Credibility	2.20	1.56	1			
2. Group	0.53	0.50	-1.12	1		
3. Gender	0.42	0.49	-0.07	-0.05	1	
4. Conspiracy	2.18	0.89	0.29**	-0.11	-0.08	1
1. Liking	1.34	0.80	1			
2. Group	0.53	0.50	-0.07	1		
3. Gender	0.42	0.49	-0.05	-0.05	1	
4. Conspiracy	2.18	0.89	0.47**	-0.11	-0.08	1
1. Sharing	1.17	0.63	1			
2. Group	0.53	0.50	0.08	1		
3. Gender	0.42	0.49	-0.04	-0.05	1	
4. Conspiracy	2.18	0.89	0.46**	-0.11	-0.08	1
1. Commenting	1.88	1.31	1			
2. Group	0.53	0.50	0.02	1		
3. Gender	0.42	0.49	0.12	-0.05	1	
4. Conspiracy	2.18	0.89	0.10	-0.11	-0.08	1
1. Talking	3.61	1.76	1			
2. Group	0.53	0.50	0.00	1		
3. Gender	0.42	0.49	0.03	-0.05	1	
4. Conspiracy	2.18	0.89	0.07	-0.11	-0.08	1
1. Reporting	2.94	1.56	1			
2. Group	0.53	0.50	0.10	1		
3. Gender	0.42	0.49	-0.02	-0.05	1	
4. Conspiracy	2.18	0.89	0.10	-0.11	-0.08	1
1. Vaccine Attitude	5.94	0.89	1			
2. Group	0.53	0.50	0.10	1		
3. Gender	0.42	0.49	-0.07	-0.05	1	
4. Conspiracy	2.18	0.89	-0.31**	-0.11	-0.08	1
1. Vaccine Intention	6.33	1.13	1			
2. Group	0.53	0.50	0.82	1		
3. Gender	0.42	0.49	-0.45	-0.05	1	
4. Conspiracy	2.18	0.89	-0.35**	-0.11	-0.08	1

Note: Dependent variable in **bold** & ** Correlation is significant at the 0.01 level (2-tailed)

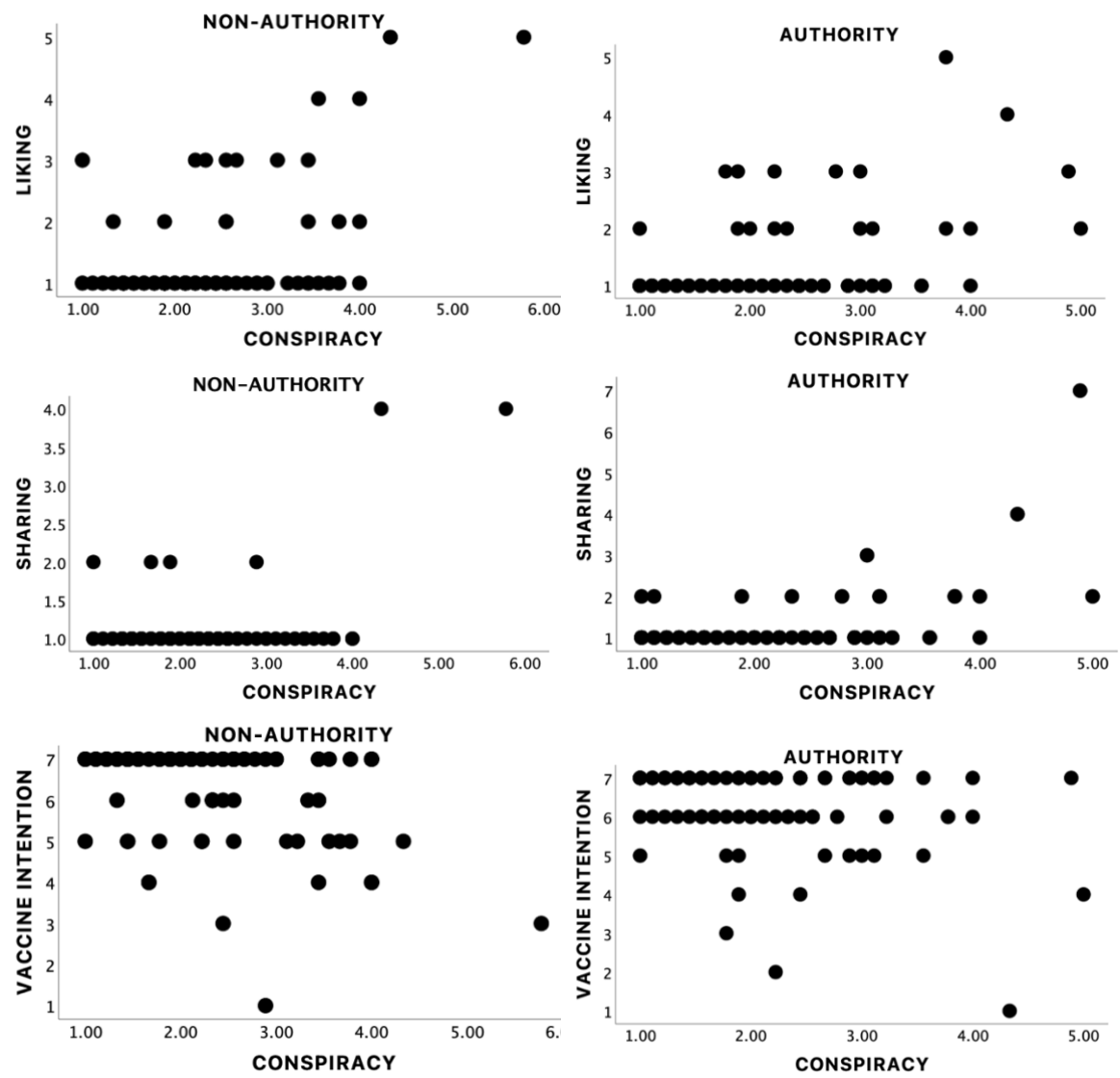**Appendix 9.** Linear regressions for dependent variables

Variable	Unstandardized		R^2	F	D-W
	B	Std. Error			
Credibility	1.11	0.51	**0.065**	3.68*	2.20
Group	0.03	0.58			
Gender	0.22	0.59			
Conspiracy	0.60*	0.21			
Group ∗ Conspiracy	-0.14	0.25			
Gender ∗ Conspiracy	-0.19	0.26			
Liking	0.35	0.24	**0.200**	10.67**	1.84
Group	0.23	0.28			
Gender	-0.11	0.28			
Conspiracy	0.45**	0.10			
Group ∗ Conspiracy	-0.12	0.12			
Gender ∗ Conspiracy	0.03	0.12			
Sharing	0.54	0.20	**0.220**	11.84**	1.64
Group	-0.25	0.22			
Gender	0.08	0.23			
Conspiracy	0.25*	0.08			
Group ∗ Conspiracy	0.19	0.10			
Gender ∗ Conspiracy	-0.02	0.10			
Vaccine Attitude	6.35	0.29	**0.095**	5.07**	2.15
Group	0.26	0.33			
Gender	0.30	0.33			
Conspiracy	-0.19	0.12			
Group ∗ Conspiracy	-0.07	0.14			
Gender ∗ Conspiracy	-0.23	0.15			
Vaccine Intention	7.17	0.36	**0.118**	6.18**	2.04
Group	-0.19	0.41			
Gender	0.56	0.41			
Conspiracy	-0.33*	0.15			
Group ∗ Conspiracy	0.03	0.18			
Gender ∗ Conspiracy	-0.34	0.18			

Note: * Significant at $p < 0.05$, ** Significant at $p < 0.001$

Appendix 10. Excluded linear regressions due to insignificant regression equation

Commenting	1.58	0.45	**0.01**	1.20	1.88
Group	-0.29	0.52			
Gender	0.19	0.52			
Conspiracy	0.05	0.19			
Group ∗ Conspiracy	0.17	0.22			
Gender ∗ Conspiracy	0.08	0.23			
Talking	3.11	0.61	**-0.00**	0.91	1.80
Group	0.66	0.70			
Gender	-0.71	0.70			
Conspiracy	0.19	0.26			
Group ∗ Conspiracy	-0.27	0.30			
Gender ∗ Conspiracy	0.39	0.31			
Reporting	2.97	0.54	**0.11**	1.42	1.77
Group	-0.09	0.61			
Gender	1.10	0.62			
Conspiracy	-0.04	0.23			
Group ∗ Conspiracy	0.10	0.27			
Gender ∗ Conspiracy	-0.54	0.28			

Appendix 11. Scatterplots over conspiracy correlation with liking, sharing, and vaccine intention

Appendix 12. Intended survey design

Intro and GDPR

↓

Block 1: Questions for warm-up and media habits

Block 2: Inoculation message		Block 2: No Inoculation message

Divided into Context: Authority	Divided into Context: Non-Authority		Divided into Context: Authority	Divided into Context: Non-Authority

Block 3: Control question on context and questions on credibility

↓

Block 4: Questions on vaccination attitudes and intention and attention check

↓

Block 5: Questions on conspiracy behavior and demographic variables

↓

Block 6: Questions on survey quality and clarity

Appendix 13. Questionnaire that was used in the survey

Block 1 – Intro och GDPR

Enkät om vaccinkommunikation – berätta vad du tycker!

Hej där!

Du kommer snart att svara på en enkät som är del av kandidatprojektet i marknadsföring på Handelshögskolan i Stockholm. Syftet med undersökningen är att undersöka unga vuxnas upplevelse av kommunikation kopplad till COVID-19 vaccinet.

Nu har du chansen att dela med dig om **vad du tycker** samtidigt som du hjälper oss att bidra med kunskap inom området. Enkäten är kort och tar bara 5 minuter att genomföra!

För varje besvarad enkät kommer vi att donera 1 SEK till FN:s flyktingorgan (UNHCR) för att hjälpa Ukraina.

Du kan starta enkäten när du är redo – vi är så glada över att du vill medverka!

Vänligen,
Astrid L (24881@student.hhs.se)
Ellen H (24771@student.hhs.se)

All information i denna undersökning behandlas i enlighet med GDPR-ramverket. Läs informationen nedan:

Sekretess

Allt som du säger eller anger i undersökningen kommer att hållas strikt konfidentiellt och endast hållas tillgängligt för handledare och kursadministrationen.

Säker lagring av data

All data kommer att lagras på ett säkert sätt av SSE och kommer att raderas permanent när examensarbetet är klart Inga personnummer kommer att publiceras Denna uppsats, skriven av studenter, kommer inte att innehålla någon information tillgänglig för att identifiera dig som deltagare i undersökningen.

Dina rättigheter i samtycke med GDPR

Du är mer än välkommen att besöka https://www.hhs.se/sv/om-oss/data-skydd/ för att läsa mer och få information om dina rättigheter relaterade till dina personuppgifter.

◯ Jag har tagit del av informationen ovan och samtycker som deltagare i studien. Vänligen fyll i dina initialer och dagens datum som underskrift givet att du svarat på alternativet "Jag har tagit del av informationen ovan och samtycker som deltagare i studien".

```
┌─────────────────┐
│                 │
│                 │
└─────────────────┘
```

◯ Jag samtycker inte till att deltaga i studien

Block 2 – Uppvärmningsfrågor

Hur känner du dig just nu?

◯ Glad   ◯ Ledsen
◯ Nöjd   ◯ Orolig
◯ Exalterad   ◯ Arg
◯ Rastlös   ◯ Annat (specificera tack)

På vilka appar eller webbplatser tar du del av nyheter om vad som händer i svenska samhället och runtom i världen?

☐ Dagstidningars appar/webbplatser (t.ex. DN, SvD, GP)　　☐ Facebook

☐ Kvällstidningars appar/webbplatser (t.ex. Aftonbladet, Expressen)　　☐ Twitter

☐ Lokaltidningars appar/webbplatser　　☐ Andra sociala medier

☐ Tv-kanalers (med nyheter) appar/webbplatser　　☐ Läser inte nyheter på nätet

☐ Radiokanalers (med nyheter) appar/webbplatser　　☐ Annat ställe på nätet:

☐ Myndigheters appar/webbplatser

☐ Andra nyhetssajters/nyhetsmagasins appar/webbplatser:

☐ Youtube

Har du läst nyheter om COVID-19 den senaste veckan?

○ Ja
○ Nej

Block 3: Inokulering

63

Randomiserad i block 3 - Inokuleringsbudskapet

Vänligen läs följande meddelande noggrant:

Att vilja vara välinformerad är bra. Det är också viktigt att veta att vissa personer kan sprida falsk information (desinformation) på olika sätt.

Falsk information om risken med vaccinet – cirkulerar på nätet. Du kan stöta på skrämmande påståenden om den **potentiella dödsrisken med att få COVID-19 vaccinet.**

Dessa falska påståenden tenderar att förlita sig på följande tekniker för att vilseleda dig:

- Skrämselteknik med chockerande påståenden som: till exempel "Vaccinet dödar människor"!
- Ta information från experter och använda dem ur sitt sammanhang: till exempel "Doktor Johansson säger att den här typen av vacciner är riskabla"
- Att presentera falska påståenden som om de är giltiga och accepterade av alla: till exempel "Vaccinet är mer riskabelt än en COVID-infektion"

Sanningen är att det mesta vi gör är förknippat med en viss risk; ändå låter vi inte små risker förlama oss av rädsla. Även om vi inte kan eliminera risker helt, väljer vi den mindre risken där det är möjligt. De flesta skulle till exempel hoppa in i sin bil för att undvika en skogsbrand, även om risken för en dödlig bilolycka inte kan uteslutas. Likaså är **riskerna förknippade med en COVID-infektion är för de flesta människor mycket högre än risken förknippad med en vaccination.**

Block 4 - Manipulation

Randomiserade i block 4 – Experimentellt tillstånd Alfa

Föreställ dig att du scrollar igenom dina sociala medier och att detta meddelande dyker upp i ditt flöde. Vänligen ta in budskapet noggrant, **detta är enda gången som du kommer att se det.**

Dr Johansson
@drjohanssonofficiell

Ny studie gör chockerande upptäckt: COVID-vaccin DÖDAR två personer för varje tre räddade liv.

65

Randomiserad i block 4 – Experimentellt tillstånd Beta

Föreställ dig att du scrollar igenom dina sociala medier och att detta meddelande dyker upp i ditt flöde. Vänligen ta in budskapet noggrant, **detta är enda gången som du kommer att se det.**

Johansson
Postat i: gruppen om vaccin

Ny studie gör chockerande upptäckt: COVID-vaccin DÖDAR två personer för varje tre räddade liv.

Block 5 - Frågor om manipulationen

Vilket budskap försöker sociala medie-posten som du precis läste förmedla?

◯ Dödlighet som en risk med vaccin mot COVID
◯ Dödlighet som en risk med vaccin mot TBE
◯ Dödlighet som en risk med vaccin mot svininfluensan

Hur skulle du beskriva innehållet i sociala medie-posten som du precis läste?

	Beskriver mycket dåligt	Beskriver ganska dåligt	Beskriver nästan dåligt	Beskriver varken bra eller dåligt	Beskriver nästan bra	Beskriver ganska bra	Beskriver mycket bra
Korrekt	◯	◯	◯	◯	◯	◯	◯
Autentiskt	◯	◯	◯	◯	◯	◯	◯
Trovärdigt	◯	◯	◯	◯	◯	◯	◯

Skulle du kunna tänka dig att vidta följande åtgärd efter att ha läst sociala-medie posten?

	Nej, absolut inte	Nej, i stort sett inte	Nej, troligen inte	Tveksam	Ja, troligen	Ja, i stort sett	Ja, absolut
Gilla inlägget	◯	◯	◯	◯	◯	◯	◯
Dela inlägget	◯	◯	◯	◯	◯	◯	◯
Kommentera inlägget	◯	◯	◯	◯	◯	◯	◯
Prata om inlägget offline	◯	◯	◯	◯	◯	◯	◯

	Nej, absolut inte	Nej, i stort sett inte	Nej, troligen inte	Tveksam	Ja, troligen	Ja, i stort sett	Ja, absolut
Anmäler inlägget	○	○	○	○	○	○	○

Skulle du vilja kommentera ditt svar på föregående fråga? (Valfritt)

[   ]

Block 6: Post-manipulation

På basis av vad du vet sedan tidigare och sociala medie-inlägget du fick se ber vi dig nu att svara på följande frågor.

Vänligen utvärdera hur mycket du instämmer eller inte instämmer med följande påståenden.

	Instämmer absolut inte	Instämmer i stort sett inte	Instämmer troligen inte	Tveksam	Instämmer troligen	Instämmer i stort sett	Instämmer absolut
Vaccin är säkra.	○	○	○	○	○	○	○
Vaccination är onödigt eftersom sjukdomar som kan förebyggas med vaccin inte är vanliga längre.	○	○	○	○	○	○	○
Vardagsstress är ett hinder för att vaccinera sig.	○	○	○	○	○	○	○

	Instämmer absolut inte	Instämmer i stort sett inte	Instämmer troligen inte	Tveksam	Instämmer troligen	Instämmer i stort sett	Instämmer absolut
Det är viktigt att väga fördelar och risker för att göra beslutsfattande möjligt när man funderar på att vaccinera sig.	○	○	○	○	○	○	○
När alla är vaccinerade är det mindre viktigt att vaccinera sig.	○	○	○	○	○	○	○
Det är viktigt att du är uppmärksam när du deltar i denna studie. Vänligen kryssa i "Instämmer absolut inte"	○	○	○	○	○	○	○

Skulle du rekommendera andra att vaccinera sig mot Covid-19?

Nej, absolut inte	Nej, i stort sett inte	Nej, troligen inte	Tveksam	Ja, troligen	Ja, i stort sett	Ja, absolut
○	○	○	○	○	○	○

Block 6: Demografiska variabler

Avslutningsvis så följer några korta frågor om dig. Vi vill att du ska notera att **sociala medie-budskapet du såg var fiktivt och att du deltagit i ett experiment för studien.**

Vad är din allmänna åsikt om trovärdigheten kring scenariot om Johansson och sociala medie-posten du fick se?

	Instämmer absolut inte	Instämmer i stort sett inte	Instämmer troligen inte	Tveksam	Instämmer troligen	Instämmer i stort sett	Instämmer absolut
Scenariot var realistiskt	○	○	○	○	○	○	○

Vänligen utvärdera hur mycket du instämmer eller inte instämmer med följande påståenden.

	Instämmer absolut inte	Instämmer i stort sett inte	Instämmer troligen inte	Tveksam	Instämmer troligen	Instämmer i stort sett	Instämmer absolut
Regeringen döljer medvetet viktig information från allmänheten.	○	○	○	○	○	○	○
Regeringen övervakar människor i hemlighet.	○	○	○	○	○	○	○
Vissa politiska grupper har hemliga planer som inte är bra för samhället.	○	○	○	○	○	○	○
Vissa sjukdomar har skapats av regeringen för att användas som vapen.	○	○	○	○	○	○	○
Regeringen känner ofta till terroristattacker och låter dem hända.	○	○	○	○	○	○	○

	Instämmer absolut inte	Instämmer i stort sett inte	Instämmer troligen inte	Tveksam	Instämmer troligen	Instämmer i stort sett	Instämmer absolut
Regeringar har medvetet spridit sjukdomar i vissa grupper av människor.	○	○	○	○	○	○	○
Hemliga grupper kontrollerar människors sinnen utan att de vet.	○	○	○	○	○	○	○
Hemliga sällskap kontrollerar politiker och andra ledare.	○	○	○	○	○	○	○
Hemliga sällskap påverkar många politiska beslut.	○	○	○	○	○	○	○

Hur gammal är du? (Vänligen svara genom att skriva ett nummer, ex. "25")

[   ]

Vilket är ditt kön?

○ Man
○ Kvinna
○ Icke-binär
○ Annat alternativ
○ Osäker
○ Vill ej svara

Vilken är din högsta avslutade utbildning?

◯ Grundskola eller motsvarande

◯ Gymnasieexamen eller motsvarande

◯ Eftergymnasial utbildning, ej högskola eller universitet

◯ Studier vid högskola/universitet

◯ Examen från högskola/universitet

Block 7: Manipulationscheck

Vad är din allmänna åsikt om denna undersökning och studie?

	Instämmer absolut inte	Instämmer troligen inte	Tveksam	Instämmer troligen	Instämmer absolut
Frågorna var stimulerande	◯	◯	◯	◯	◯
Svarsalternativen var lätta att förstå	◯	◯	◯	◯	◯
Undersökningen kändes meningsfull	◯	◯	◯	◯	◯
Några av frågorna hade för avsikt att påverka mina svar i en viss riktning	◯	◯	◯	◯	◯

Powered by Qualtrics