

Understanding the Effect of Private Data in Disinformation Propagation

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Abstract

Two of the major issues society is currently facing are Privacy threats from data collection by digital platforms, and the quick and large-scale propagation of disinformation on the same platforms. What if the first problem further fuels the second? Specifically, we hypothesize that private data, such as demographics, interests, and psychological and physiological states could be used to expose people to certain disinformation, resulting in higher engagement, and ultimately enabling an adversary to propagate disinformation more efficiently and effectively. This abstract details the experiment design to test this hypothesis and initial findings.

1 Introduction

Technologies collect large quantities of personal and potentially sensitive data, such as information about individuals' demographics, behavioral patterns, (dis)interests, etc [3, 7, 11]. We investigate whether this personal information can be used to "target" individuals with disinformation, to elicit desired outcomes, such as increasing the likelihood of believing the information or further propagating it to others, or both. We hypothesize that individuals targeted with disinformation based on a particular property (such as gender, interests, personality traits, etc.) will exhibit different reactions compared to those who do not possess that property. Considering the association between such properties and the susceptibility to believe fake news [6, 14, 22, 24, 25], it is probable that by serving different disinformation to different groups of people based on their possessed properties, an adversary can propa-

gate disinformation much more *effectively* and *efficiently* than broadcasting the same message to the entire population. We test this assumption by targeting based on personal interests.

Intuitively, targeting individuals based on their interests or hobbies may lead to reduced trust in disinformation, as their prior knowledge on the subject might make them skeptical [27]. However, numerous studies indicate that the opposite is often the case. Due to the processing advantage of familiar information, familiarity with the topic may lead to the impression that the information is true [12, 13]. If targeting is possible, then groups of the population that are generally found to be resilient to disinformation, such as highly educated individuals [9] and young adults [6], can be misled by false information that resonates with their personal characteristics and interests. Moreover, as extended reality [8, 23, 35] and personalized AI-based systems [4, 31, 32] continue to advance, the level of interpersonal engagement becomes increasingly immersive and scalable [30]. These cheap, fast, scalable systems heavily depend on user data [16, 19, 29] and are able to create personalized content [17], this could empower adversaries to automate the creation of targeted disinformation and potentially surpass the speed and efficacy of humans [10], posing difficulties in combating disinformation.

Although targeted disinformation and targeted advertising [15] or recommender systems [26] share a common foundation (leveraging individuals' data to target them), they differ in their underlying purposes. The latter aims to deliver personalized content (e.g. advertisements, recommendations), while the former exploits personal data to craft disinformation. Thus, people may appreciate personalized ads or recommendations [18], but deception through personalized content is unlikely to be desired. As a first step towards understanding the effect of targeted disinformation, we designed a study examining whether individuals can be targeted based on their topical interests. The findings will inform future research on both privacy and disinformation, by identifying population groups who are the most vulnerable to specific types of disinformation and open the discussion on platform policy regarding private data collection and targeted content delivery.

2 Experimental Design

By majority voting, three authors selected 20 news articles from a list curated by three other authors. All the articles in the list were published within two weeks before the experiment day; 10 were published in high (The New York Times, The Guardians) [21] and the other 10 in low-credible (Express.co.uk, DailyWire) [34] platforms (identified based on NewsGuard's reliability score [33]). Since we used recent articles, to minimize the chance of them being familiar to the participants, they were not fact-checked. However, the low-credible sources selected for this study tend to publish false news [5], the opposite is true for the high-credible sources. We focused on articles related to health and entertainment. The choice of these topics was driven by their significance and relevance in today's context. Another selection criterion was the potential victim: believing false news related to health will most likely harm the consumer, while for entertainment the subjects may be victimized (e.g., loss of reputation).

At the beginning of the experiment, participants indicated their level of interest in health or entertainment topics, as well as the frequency with which they follow news related to these topics. We also inquired about the types of news sources they follow and the frequency with which they do so. Based on this information, we can determine whether they follow traditional (Radio/Television) or online sources in their daily lives.

Each participant then read ten articles either from low-credible or high-credible sources (random assignment); Five articles about health and the other five about entertainment. Article sources were kept secret from the participants. Using a five-point Likert scale, participants entered their beliefs regarding the truthfulness of each news article, their inclination to share the news, and their level of surprise upon encountering the news. The last question will provide hints about a participant's level of knowledge regarding the context or topic of the news. If someone exhibits less surprise in response to a particular news item, it indicates a higher level of familiarity with the news context.

Online Survey: We conducted the experiment through an online survey ($N = 230$) created by Qualtrics [2] and promoted by Prolific [1]. The participants have provided informed consent prior to participating in the survey. At the end of the survey, we asked for their feedback on the overall study. The study was approved by the institutional review board.

3 Findings

Participants: The median completion time was 9.3 minutes and the participants were paid 1.8\$ for their time. Some responses (10%, N=23) were discarded because they contained incorrect answers to at least one attention check question. Nearly half of the participants (49.27%, N=102) were exposed to low-credible news articles, while the remaining participants (50.73%, N=105) were presented with high-credible

news articles. The details of the demographic information are provided in A.1.

Effect of predictors: Our statistical analysis indicates that the level of interest in *entertainment topics* can significantly predict the belief score ($F(1, 99) = 8.13, p < 0.01$) for high-credible entertainment news. Individuals highly interested in entertainment topics are less inclined ($M = 1.56, SD = 0.269$) to share articles from low-credible sources compared to individuals who are less interested ($M = 1.86, SD = 0.313$) in such topics ($d = 1.03, p < 0.05$). Conversely, for entertainment news from high-credible sources, individuals with a higher interest in that topic tended to believe the articles more ($M = 3.55, SD = 0.168$) compared to those with a lower interest ($M = 3.40, SD = 0.194, d = -0.83, p < 0.01$). Also, how surprising an article was to the participants negatively correlated with the belief score, for both low-credible ($r = -0.28, F(1, 100) = 8.24, p < 0.01$) and high-credible ($r = -0.29, F(1, 99) = 13.13, p < 0.001$) articles. On the other hand, low-credible articles were *more* likely to be shared if they surprised the reader ($r = 0.41, p < 0.0001$).

For articles related to health, there was no significant association between interest and belief. However, how frequently one follows health-related news predicted the likelihood to share such articles from *low-credible* sources ($F(1, 99) = 4.93, p < 0.05$). Post-hoc comparison [28] revealed that individuals who frequently follow health-related news ($M = 0.420, SD = 0.262$) are more likely to share low-credible health news compared to those who do not regularly follow health-related news ($M = 0.613, SD = 0.212, d = 0.81, p < 0.01$). Finally, the share score positively correlated to the surprise score for both low-credible ($r = 0.40, p < 0.0001$) and high-credible ($r = 0.57, p < 0.0001$) articles.

4 Discussion and Conclusion

Our hypothesized relationship between topical interest and belief in a piece of information was only partially supported: for entertainment-related news from high-credible sources. The null result for the low-credible articles could be attributed to the skewed sample, as most of the participants reported relying on high-credible news sources for their news consumption, and only one participant reported obtaining news from low-credible sources. However, consistent with previous research [20], our findings demonstrate that people are more likely to share news articles, whether low-credible or not, when the content is unexpected or surprising to them. This suggests that the element of surprise plays a significant role in influencing people's sharing behavior, regardless of the credibility of the news. Moving forward, we are planning future studies by actively recruiting individuals who follow low-credible news sources.

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Gender	Participants percentage
Female	44% (N=91)
Male	53.1% (N=110)
Non-binary/third gender	2.9% (N=6)
Age-range	
18 – 24	16.9% (N=35)
25 – 34	37.7% (N=78)
35 – 44	22.7% (N=47)
45 – 54	15.5% (N=32)
55 – 64	5.8% (N=12)
65+	1.4% (N=3)
Literacy level	
High School	39.1% (N=81)
Bachelor's Degree	38.2% (N=79)
Master's Degree or Above	17.4% (N=36)
Others	5.3% (N=11)

Table 1: Summary of participants' demographic traits.

- Which of the following do you use for getting news? (Multiple answers are possible)
 - Printed newspaper
 - Radio
 - Television
 - Social network site (Twitter, Facebook etc.)
 - Website or app (Dailywire, The New York Times etc.)
 - Do not get news from any platform
 - Other (text box)
- How often do you use these as a source of news? (Bi-partisan Report, DailyWire, Express.co.uk, Independent Journal Review, New York Times, Politico, The BBC, Dailycaller, The Guardian, The Wall Street Journal). For each news source, we used the same point scale.
 - Never
 - Rarely
 - Sometimes
 - Very often
 - Always
- How interested are you in these topics? (Books, Celebrity News, Cooking, General Health, Gardening, Healthy diet, Fitness and Exercise, Movies/TV Series, Music, Travel, Medical Science, Science and Technology). For each news topic, we used the same point scale.
 - Not at all

A Appendix

A.1 Demographic Information

A.2 Survey Questions

Preference and interest related question

Types of news sources	Participants exposed to low-credible articles	Participants exposed to high-credible articles
Traditional news outlet	34	24
Only Low credible Sources	1	1
Only High credible Sources	52	61
Both low and high-credible sources	15	19

Table 2: Count of Participants Reporting their Preferred News Sources

- Slightly
 - Moderately
 - Very
 - Extremely
- How frequently do you keep up with news related to these topics? (Books, Celebrity News, Cooking, General Health, Gardening, Healthy diet, Fitness and Exercise, Movies/TV Series, Music, Travel, Medical Science, Science and Technology). *For each news topic, we used the same point scale.*
 - Never
 - Rarely
 - Sometimes
 - Very often
 - Always
- News article related question**
- Then we show 10 either low or high-credible news to the participants. Each news article holds four questions.
- Do you believe this news to be true or false?
 - I know this is false
 - This might be false
 - I don't know
 - This might be true
 - I know this is true
- Would you consider sharing this news (For example, on social media or in a conversation)?
 - Definitely No
 - Probably No
 - Undecided
 - Probably Yes
 - Definitely Yes
- How surprising was the news to you?
 - Not at all
- Slightly
 - Moderately
 - Very
 - Extremely
- Have you seen this news previously somewhere else?
 - Yes
 - No
 - I am not sure

Demographic question

- What is your work industry?

- Agriculture
- Business and Finance
- Entertainment
- Education
- Information Services
- Food Services
- Hotel Services
- Legal Services
- Publishing
- Military
- Unemployed
- Other (text box)
- Prefer not to disclose

- How old are you?

- Under 18
- 18-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old
- 55-64 years old
- 65+ years old
- Prefer not to disclose

- How do you describe yourself?
 - Male
 - Female
 - Non binary/third gender
 - Prefer not to disclose
- What is your highest level of education?
 - Master's degree or above
 - Bachelor's Degree
 - Highschool
 - Other (text box)
 - Prefer not to disclose

['Big, Historical Things': Orlando Bloom Says Katy Perry Will Be Singing At King Charles III Coronation](#)



Hollywood star Orlando Bloom gushed about his fiancée singer Katy Perry when he talked about how she's been present at "big, historical things" and would again be when she performs at King Charles III's coronation celebration. The 46-year-old actor spoke to Entertainment Tonight in Las Vegas at Sony Pictures' presentation at CinemaCon 2023, and he couldn't help but brag about his "girl" being part of the coronation concert for the king on May 7—despite the fact that he would not get to be there with her.

['This S*** Has To Stop': Comedian Rob Schneider Says Stop Making Girls Compete Against Trans-Identifying Men](#)



Comedian Rob Schneider called on parents, coaches, and biologically female athletes to "refuse to play against" biologically male trans athletes, saying this "s*** has to stop." The 59-year-old actor tweeted on Thursday to his 1.5 million followers a clip of North Carolina high school female volleyball star Payton McNabb who was spiked in the face by a trans-identifying male player in a game and suffered a concussion and more.

[Woody Harrelson Said He Wasn't Fazed By Backlash From 'SNL' Monologue: 'I Don't Look At That S***'](#)



Woody Harrelson isn't too concerned about the backlash he received following his "Saturday Night Live" monologue in February, which included criticism of COVID vaccine mandates. "Well, people told me it was, shall we say, 'trending.' No, I don't look at that s***," the 61-year-old actor told Esquire during a recent interview when asked about the controversy surrounding his monologue.

['There's Not A Place For Me': 'Yellowjackets' Star Won't Compete For Emmy Because Of Gendered Acting Categories](#)



"Yellowjackets" star Liv Hewson said the actor won't compete for an Emmy award for the role of Vanessa "Van" Palmer on the hit Showtime series because of gendered acting categories. The 27-year-old Australian actor said there was not an available category that would fit, opting instead to simply bow out of this year's Primetime Emmys despite being eligible in the main acting races, Variety reported.

[Two Twitter Accounts Suspended Over Pirating Smash Hit 'Super Mario Bros. Movie' — After 9 Million Watch For Free](#)



Two Twitter accounts have been suspended for sharing a pirated copy of the box office smash "The Super Mario Bros. Movie" — which just passed the \$1 billion mark in global ticket sales — but the suspensions did not come before millions were able to watch at least a portion of the movie for free. One account, @vidsthatgohard, shared the full movie — separated into two parts — to 1.1 million followers. According to a report from Forbes, the quality of the illegal film was fairly decent — save for some hiccups regarding the aspect ratio — and the tweets including the pirated video were left up on the social media platform for hours before Twitter took any action.

[New study finds medicinal cannabis could 'safely' relieve cancer pain](#)



Scientists say the drug could become a "safe" treatment option for some cancer patients as an alternative to opioids. Recreational cannabis is currently illegal in the UK, classified as a class B drug. Medicinal cannabis is still not widely available either, only legal in specific circumstances such as in severe cases of epilepsy. However, for a number of years, various groups have advocated for the health benefits of the drug.

[Woman's 'contact lens' problem turned out to be 'invisible' incurable condition](#)



Rebecca-Louise Seddon woke up partially blind one morning, which terrified her. She booked an urgent eye test. Eye specialists, however, prompted the 29-year-old to go to A&E. "When I went to Specsavers, I thought it was a contact lens thing," Rebecca-Louise, from Milnrow, Rochdale, said. After four weeks in the hospital, it became clear to the beautician what had led to an earlier incident. Weeks before losing some of her vision, Rebecca-Louise had experienced a sudden tingling on the left side

[Common pill used to treat HIV could cure dementia, new study finds](#)



Scientists believe repurposing the medication could reverse memory loss in older adults. Dementia affects more than 55 million people worldwide, with numbers expected to grow in the coming decades. It is a syndrome associated with the progressive decline of the brain, causing problems such as memory loss, personality changes, and mobility issues. Currently, there is no known cure for dementia.

[Air pollution could cause irregular heartbeat within hours, new study warns](#)



The risk of arrhythmias could occur several hours after exposure to air pollution and persist for 24 hours, according to new research. A poor diet is perhaps the best-known risk factor for heart problems. However, a new study warns that the air you breathe could also play a role. Worryingly, the research team suggested that air pollution could trigger heart arrhythmias within hours of exposure.

['Miracle' NASA sleeping position could ease health issues from arthritis to circulation](#)



The specially designed sleeping position could also help with muscle and joint pain, insomnia, snoring, and acid reflux alongside other conditions. There are multiple benefits from getting a good night's sleep. And there are different ways to achieve it, whether by reducing our caffeine intake and screen time before bed or setting aside enough time for eight hours of shut-eye. But experts say there's a unique sleeping position that can not only improve the overall quality of your sleep but combat the symptoms of certain health conditions.

Figure 1: Low-credible news articles

[Cleopatra was light-skinned. Egypt tells Netflix in row over drama](#)



The casting of a black actor in an upcoming docudrama has angered groups in Egypt who say it is 'a falsification of Egyptian history'. In Queen Cleopatra, a new four-part drama-documentary made by Netflix, the title role is played by Adele James, an actor of mixed heritage – a move that has enraged Egyptian experts who insist the pharaonic leader had "white skin and Hellenistic characteristics".

[Eva Green wins high court battle over collapse of a sci-fi film](#)



Eva Green wins high court battle over the collapse of sci-fi film Actor wins legal case against producers, with judge ruling she is entitled to a million-dollar fee. Eva Green has hailed her victory over what she described as a group of men who tried to use her as a scapegoat, after winning a bruising legal battle over the collapse of a sci-fi film. The actor had sued White Lantern Films and SMC Specialty Finance for a \$1m (£802,000) fee that she said she was owed. However, she faced a counter-claim alleging she pulled out of the making of A Patriot, which collapsed in 2019 and breached her contract.

[Contaminated Meat is the Surprising Cause of Some UTIs](#)



Scientists are pointing to a surprising cause of some urinary tract infections: E. coli bacteria in meat. A new study used statistical modeling to estimate that E. coli, commonly known as the bacteria behind many food-borne illnesses, may account for up to 10 percent of all urinary tract infections. That's a relatively small fraction of overall UTIs, but enough to intrigue, and in some cases concern, experts. The new study looked at chicken, turkey, and pork in particular, as previous studies suggested that these foods can become contaminated with the type of E. coli that could induce a UTI. Over the last two decades, scientists have increasingly viewed food as a potential source of infection; the new study highlights just how pervasive these food-borne UTIs may be.

[Ed Sheeran, Accused of Copying Marvin Gaye, Testifies He Wrote His Song](#)



The pop singer Ed Sheeran took the witness stand Tuesday at a closely watched copyright trial in which he stands accused of copying his ballad "Thinking Out Loud" from Marvin Gaye's "Let's Get It On," and told a jury that he and a collaborator had written their song based on their own experiences. Appearing at federal court in Manhattan in a dark suit and blue tie, with his red hair tousled, Mr. Sheeran testified that he and his co-writer, Amy Wadge, had created "Thinking Out Loud" independently.

[Steven Spielberg: 'No film should be revised' based on modern sensitivity](#)



Director has criticized the practice of re-editing older films while expressing remorse over removing guns in a later edition of ET. Steven Spielberg has criticized the idea that older films should be re-edited to appease modern sensibilities. Speaking at Time's 100 Summit in New York City, the 78-year-old filmmaker expressed regret over taking out guns from a later release of his 1982 sci-fi blockbuster ET: The Extra-Terrestrial. In the 20th anniversary edition, agents saw their firearms replaced with walkie-talkies. "That was a mistake," he said on stage. "I never should have done that. ET is a product of its era. No film should be revised based on the lenses we now are, either voluntarily, or being forced to peer through." In 2011, Spielberg had already explained that the guns would be returning for the 30th-anniversary release, explaining that he was "disappointed" in himself.

[Study Shows the Staggering Cost of Menopause for Women in the Work Force](#)



Menopause costs American women an estimated \$1.8 billion in lost working time per year, according to a Mayo Clinic study published this week. The paper examined how hot flashes, night sweats, mood swings, and the myriad other complaints associated with this time of life affect women in the workplace. It's the largest study of its kind to have been done in the United States. Researchers surveyed more than 4,000 participants at four Mayo Clinic sites in Minnesota, Arizona, Florida, and Wisconsin. Roughly 15 percent said they had either missed work or cut back on hours because of their menopause symptoms, which the study classified as "adverse work outcomes." Those who reported the very worst symptoms were 16 times more likely to report such outcomes than those with the least severe symptoms. A little over 1 percent said that their symptoms had become so debilitating that they either quit their jobs or were laid off in the preceding six months.

[Researchers Identify Possible New Risk for Breast Cancer](#)



Scientists have long known that dense breast tissue is linked to an increased risk of breast cancer in women. A study published on Thursday in JAMA Oncology adds a new twist, finding that while breast density declines with age, a slower rate of decline in one breast often precedes a cancer diagnosis in that breast. Scientists at Washington University in St. Louis analyzed breast density changes over a 10-year period in 10,000 women who were free of cancer when the study started. Some 289 women were diagnosed with breast cancer at that time; the study compared changes in their breast tissue to those in 658 similar women who did not develop breast cancer.

[Bilingual May 'Shave Off' Dementia, Study Suggests](#)



People who spoke two languages daily in their youth tended to score higher on memory tests later in life, the researchers found. Speaking two languages provides the valuable ability to make connections between them. A new study suggests that this cognitive benefit may also come with another benefit: improved memory in later life. Studying hundreds of older patients, researchers in Germany found that those who reported using two languages daily from a young age scored higher on tests of learning, memory, language, and self-control than patients who spoke only one language.



A new study has linked snoozing of 30 minutes or more with increased BMI and blood pressure. The study, published in the journal Hypertension, found that a single nap is generally reckoned to last between 10 and 20 minutes. A catnap is a bit longer, say 20 to 25 minutes. A decent Spanish siesta could be 30 minutes or more. A study published last year found that people who napped for 30 minutes or more had higher BMIs and non-hypertensives, those who took snoozes of 30 minutes or longer were more likely to have a higher waist mass index. It's just as possible that being overweight makes you sleepy, but the study does suggest a link between longer naps and higher blood pressure and a variety of conditions related to heart disease and diabetes.

[Not how white men fight: Tucker Carlson text reportedly worried Fox bosses](#)



For Fox host allegedly described Trump supporters as being "a mess," while finding himself rooting for the mob. A racist text message allegedly sent by the former Fox News host Tucker Carlson set off alarm bells at the top of the network and ultimately contributed to his firing. The text, which has since resurfaced in the New York Times, in Dow Jones' definition, was sent to Fox's bull in the Ring Twitter handle in full, included the line: "It's not how white men fight." The message allegedly shows Carlson describing how he saw a group of Trump supporters beat up an "Arftha kid", or ardent counter-protesters.

Figure 2: High-credible news articles