

# TBD\*

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### Abstract

With the growing ubiquity of deepfake technology, here comes one more channel for the spread of misinformation. We reproduce Soubhik Barari (2021) paper and identify several additional demographic traits contributing to the persuasion power of deepfake on political defamation through its material effect on feeling manipulation in a RCT field experiment on the 2020 Presidential election. We find little evidence that deepfake videos have a unique ability to shift viewers' perceptions on politicians. Apart from partisanship, education, and other socioeconomic factors identified by the original paper, we discover that income and internet usage would also significantly impact the candidate's affective appeal to the news feed viewer.

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\*Code and data are available at: [https://github.com/yangg1224/Political\\_Deepfake\\_Videos.git](https://github.com/yangg1224/Political_Deepfake_Videos.git).

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# 1 Introduction

Political misinformation stems the spread of proper knowledge and threatens the electorate’s ability to evaluate politicians’ public credibility [ref: ]. Since the advent of popular deep learning technology that enables the fabrication of deepfake videos, concerns have been aroused about their defamation effect on the target politicians.

Soubhik Barari (CITATION) examines the news feed intervention through two Randomized Controlled Trial field experiments on the 2020 U.S. Democratic presidential election to investigate the persuasion power of deepfake. In the first experiment, Soubhik Barari (CITATION) exposes participants to one of five different forms of false media treatment including deepfaked videos and compares viewer’s deceptive level and affective response. In the second experiment, Soubhik Barari (CITATION) measures the viewer’s ability to discriminate between a feed of 8 real and fake videos. Soubhik Barari (CITATION) finds that the marginal deceptive and affective effects of a deepfaked political scandal are insignificant relative to other false media. In addition, subgroups aged above 65, with partisanship, holding ambivalent sexist views, being highly educated, constrained by cognitive resources, or with little political knowledge are more susceptible to deepfake misinformation.

Using replication dataset and code provided by Soubhik Barari (CITATION), we re-implement the first experiment to further study the persuasion power of deepfake through the channel of its affective manipulation on viewer’s political perception. We review the media heterogeneity via t-tests between alternative false media with the deepfake video. We analyse the heterogeneity in affective response by viewer traits with a multiple linear regression model. Feature selection is performed via the Random Forest classifier to select the top 20 relevant variables into our model input.

Our findings about differential effects by media are consistent with Soubhik Barari (CITATION) that the degree of detriment from deepfake video is no different from false audio or text in terms of deception and affective impression. For the linear regression statistical inference, in addition to the socioeconomic features identified by the original paper (age, party identification, sexism, cognitive ability, and education), we find that demographic traits of household income, internet usage, and region play an important part in influencing viewer’s affective response to the involved politician as well. Ethical concerns about deepfake experiments are addressed by an extensive post-experiment debrief to educate participants about deepfake media. During modelling design, location information is proxied by region and zip code was excluded from the model to avoid privacy leakage. Internal validity is ensured by stratified sampling and randomized intervention in the experiment as well as having controlled confounders and sufficient sample size for modelling. The external validity of the study is enhanced by the use of customized deepfake contents and running two waves of experiment in different time periods. Due to the limitation in the topic itself, U.S. presidential election, the research result cannot be generalized to outside of the U.S.

Deepfake technology has the potency to sway viewer’s belief on their political understanding and in turn exert real impact in altering viewer’s sentiment towards the targeted politician. Consequently, deepfake and other false media can dispute politician’s credibility and even manipulate election results. Given that heterogeneity in affective response is observed for subgroups with different levels of internet usage and cognitive reflection, which are intervenable characteristics in information processing for viewers, we can reduce deepfake’s deceptive potential by intervening via information provision and promoting public digital literacy.

The remainder of the paper is constructed as follows. Section 2 describes the dataset, experiment design, and exploratory data analysis on feature visualization. Section 3 outlines the reproduced experiment models,

which is designed to discover relationships between features and the target variable. Section 4 summarizes the model results according to evaluation criteria. Finally, Section 5 discusses our research findings and provides directions for future research.

## 2 Data

### 2.1 Dataset features

The paper intends to replicate the experimental report by Soubhik Barari, Christopher Lucas, and Kevin Munger. We are going to analyze the dataset collected by their experiment. The survey dataset records 5,750 observations with 100 variables. In this case, we focus on the top 20 most important features related to the favorability towards the Democratic politician Elizabeth Warren. It covers viewer traits on demographic, socioeconomic status, and political related positions that are immutable or intervenable characteristics to deepfakes' misinformation. The authors hypothesized several risky subgroups that may be differentially susceptible to deepfakes. That included the following categories of media consumers: \* Age Group \* Directional motivated reasoning \* Evaluation driven by negative stereotypes \* Constraints on cognitive resources or knowledge \* Political knowledge \* Digital literacy In particular, they divide respondents into two age groups: below 65 and above 65. Ambivalent Sexism evaluates negative stereotypes towards women on a scale of 1 to 5. PID shows the party identification of Republican, Independent, or Democrat. Polknow is scaled to be within 0 to 1, reflecting respondents' political knowledge that might influence public attitudes and opinions. Treat records one of the six treatment conditions in the experiment: deepfake video, false media in audio, text, skit, campaign attack ad, or control. Exp\_1\_prompt collects information about the intervention: received information and received no information on deepfake prior to the newsfeed experiment. Internet\_usage aims to collect information about the frequency of using the internet per week. Meta\_OS indicates the platforms of internet access, namely either mobile devices or desktop. The dataset also includes additional demographic information such as gender, income and education. Educ identifies subjects into four categories by educational level including <High school, High school, College, and Postgraduates. Similarly, HHI divides participants into six groups on the basis of their income including <\$25k, \$25k-\$49k, \$50k-\$74k, \$75k-\$99k, \$100k-\$150k, and >\$150k. In addition, they recorded the post\_favor\_Warren, ranging from 0 to 100 as the effective response to Warren after subjects receive the news feed treatment.

### 2.2 Population, frame, and sample

The sampling population included all citizens in the US. A total of 17,501 national representatives were recruited in the survey experiment on the Lucid survey research platform. To qualify for the experiment, all observations should complete quality checks which consist of randomly dispersed attention checks and technology checks. 629 respondents failed the front-end pre-treatment attention check; in order words, the gender or age that they entered did not match up with the demographic characteristics. Finally, only 5,750 of 17,501 subjects passed a series of quality checks and completed the survey experiment. ## Experiment in the paper They first created a collection of realistic deepfake with industry partners. At the early stage of the experiment, some of the participants received a brief informational message reminding them of the existence of deepfake. During the experiment, all participants obtained a news feed in a natural environment setting where the experience of scrolling on the Facebook news feed was replicated. They watched or listened to posts about Elizabeth Warren, one of the 2020 democratic primary candidates. With the fixed order and the content of these media, the news feed scenario design primarily minimized the influence of alternative characteristics other than the intervention on the final results. Participants accessed two conditions before and three conditions after watching a video. During the experiment, participants were randomly exposed to one of the five different fictitious scandals, namely that respondents were able to watch or listen to five possible defamation strategies: incivility toward an in-party member, incivility toward an out-party member, a past controversy, a novel controversy, or political insincerity. They chose Elizabeth Warren to be the target for the political scandal of the 2020 democratic election because she is a salient politician who is more valid than those

politicians with low profiles. Also, she is not slated for re-election until 2024 which minimized the influence of the 2020 election. Finally, as a female candidate, she is more likely to be involved in non-political deepfakes.

## what is good and bad about the data The experiment is very well-designed in experiment treatment settings. To receive a rich answer to the experiment, they conducted the experiment in a realistic setting. Deepfake was combined with authentic campaign news to replicate a natural news-browsing experience. They provided a series of realistic deepfake videos with a sufficient sample size. In terms of the external validity, the deepfakes used in the experiment are high-quality face-swap videos of a single elite depicted in a number of slightly different scandals that they have produced to be maximally deceptive. Since the experiment involved five media conditions, it can also be used for analyzing the interaction effect across a number of comparable media. In terms of how to gauge the persuasion power of deepfake, they isolated the measurement of deception and affect from a single clip. Furthermore, they compared the attitudinal effects of a single deepfake to its related textual, audio, and un-deepfake video counterparts in order to investigate the relative influence deepfake has on political misinformation compared to other traditional media. One of the major drawbacks is that the original survey dataset consists of too many missing values. According to Appendix A, more than 40 variables involve missing data. To be more precise, there are 15 attributes containing more than 1,000 missing values such as `script`, `believed_funny`, `believed_offensive`, and `PID_presurvey`, four of which have over 4,000 incomplete data such as `comments` and `PID_learner`. In addition, although the experiment was anonymous, the geographical information such as zip and regions of the participants was still recorded in the dataset.

## Methodology They used the Lucid survey research platform which is one of the world’s biggest survey panels. It is a platform aiming to provide data-driven knowledge in the workplaces. It delivers powerful answers, inspired by the sentiments of real people (CITATION2). As for the treatment conditions, the experiment randomly paired informational messages about deepfake to one of six conditions. The six conditions included video, audio, text, skit, campaign attack ad, and control which is no clip. In particular, the audio condition consists of the audio recording of the actor making a scandalous announcement. The video condition exploits a deepfake created by the face-swap algorithm in the skit condition. The text condition only keeps the title and subtitle describing the event captured on video. A skit displays an audio recording accompanying a video of the actor impersonates a campaign event in a realistic setting. Campaign attack advertisement subjects are exposed to a real negative campaign ad title, which is an actual campaign stimulus used in the primary election to activate negative emotions towards Warren. The control means no clips presented.

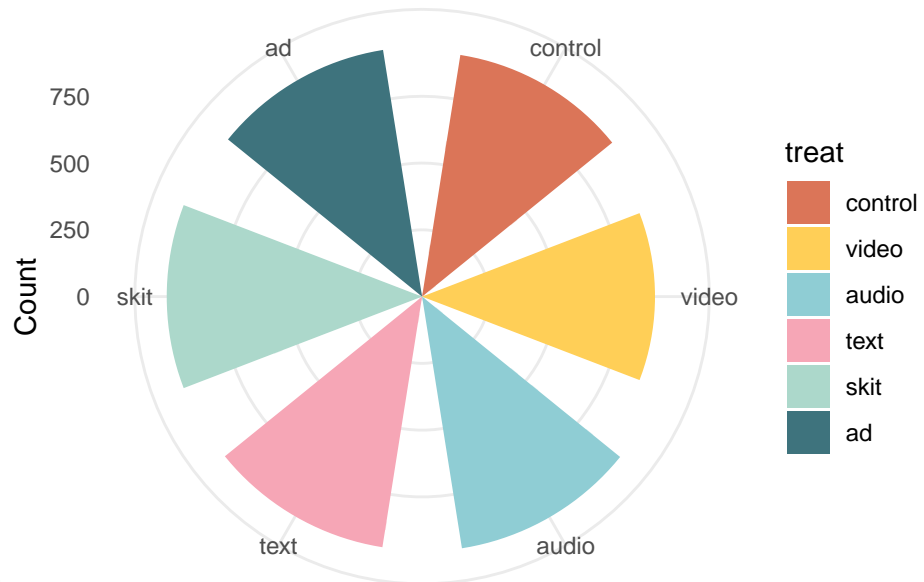
## Sampling/experiment Approach According to the article, the authors used a post-stratification sampling method to correct demographic skews in the sample. Post-stratification refers to the weights being adjusted so that the weighted totals equal to the known population totals. They applied post-stratification weights estimated from the US Census in aspects of education, age, household income, gender, race, and hispanic, and consequently compared the demographic traits of their sample with the demographic trait in the most recent Current Population Survey (CPS). A weighted regression was implemented to guard against measurement error from possible demographic skews. (CITATION 3) To adjust for remaining discrepancies, they generate post-stratification weights via raking to match the CPS marginal population totals.

## Discuss the intervention In this experiment, the intervention is receiving a concise informational message about the existence of deepfakes prior to the news feed treatment. The authors would like to analyze if receiving an information prompt about deepfakes before the news feed will affect the reliability and trustworthiness of all fake news clippings Through this experiment, participants had the opportunity to detect fake media, enclosing a debrief which demonstrates how the deepfake process works. We believe that this experiment will help to educate the public about the growing ubiquity of deepfakes and the potential threat they might pose to information processing for the general public. By understanding how deepfakes function from their low-cost interventions, citizens can effectively prevent the harm caused by the misinformation.

## 2.3 EDA

According to the experiment, there are six treatment conditions including deepfake video, audio, text, skit, campaign attack ad, and control. From figure 1, we can see that the six types of treatments are equally sampled. In other words, in the process of exposure, all media have the same chance of being viewed.

Treat distribution



### treat distribution

The grouped bar chart (Figure 2) below shows the distribution of political parties for four educational levels. We notice that most participants identified themselves as Democrats, followed by the Republicans. Therefore, there are grounds to consider Democrat and Republican as the two major political parties in American society. Among the citizens with college degrees, more than 1,250 citizens identify themselves as Democrats and over 1,000 citizens have a disposition to Republican.

### 2.3.1 education level distribution by PID

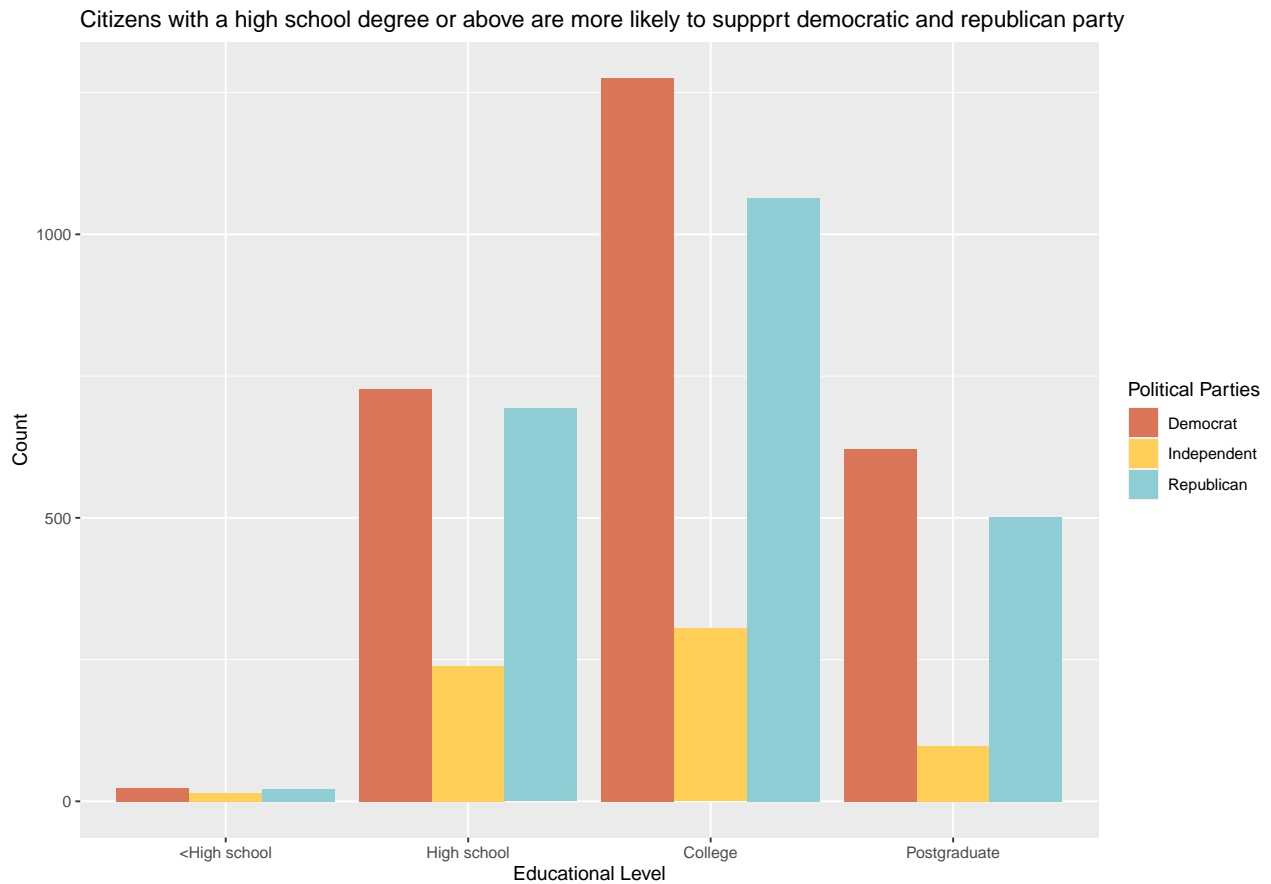
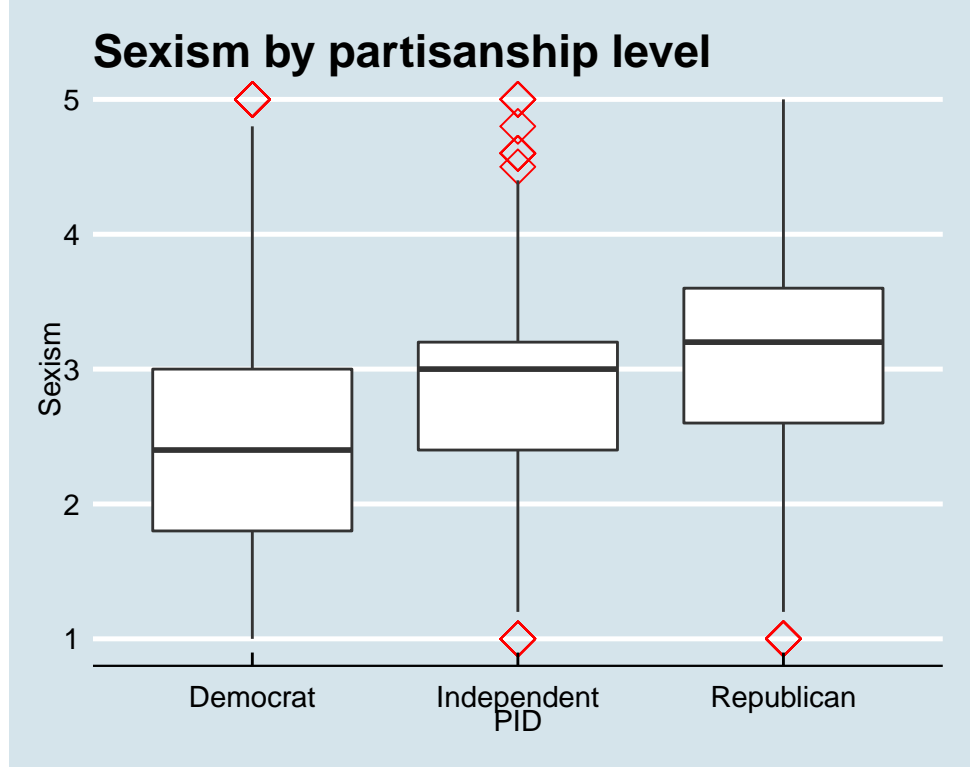


Figure 3 uses the box plot method to show sexism by partisanship. As we can see from the chart, voters in the Republican party have the most number of sexists, which also explains one potential reason why their support rate is relatively lower for Warren. Next comes the Independent party. People's sexism level is approximately level 3. At last, people in the Democratic party mostly hold the fairest attitude about sexism. ### sexism



by education level

Figure 4 demonstrates internet usage frequency by educational level, devices, and age groups respectively. Participants with college education level are the most frequent internet users (more than 5 days per week), followed by people with high school education and people with postgraduate education. In addition, the dataset also shows desktop devices are more popular than mobile devices in terms of how participants' access the internet. People younger than 65 will use the internet more often than those older than 65.

## 2.4 internet usage frequency by education level

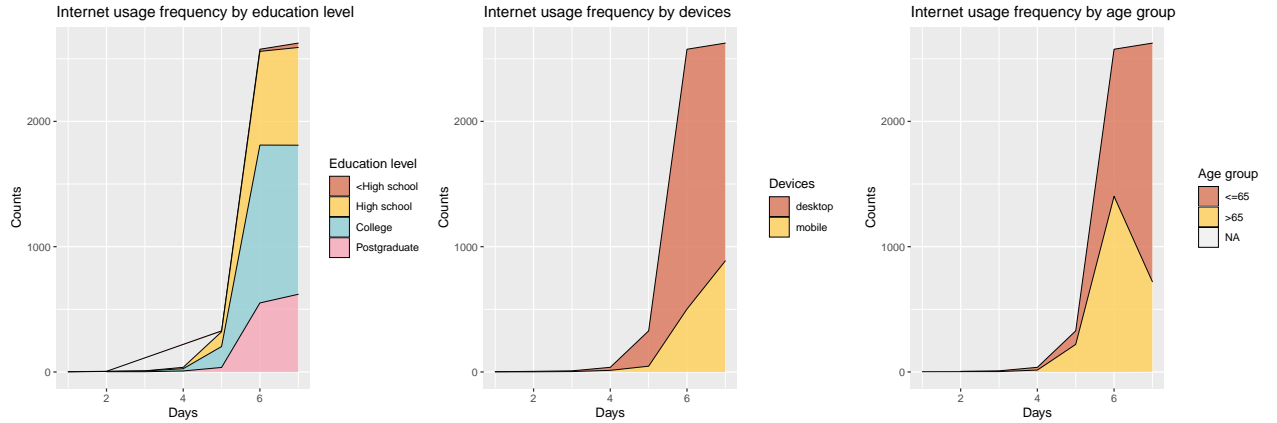
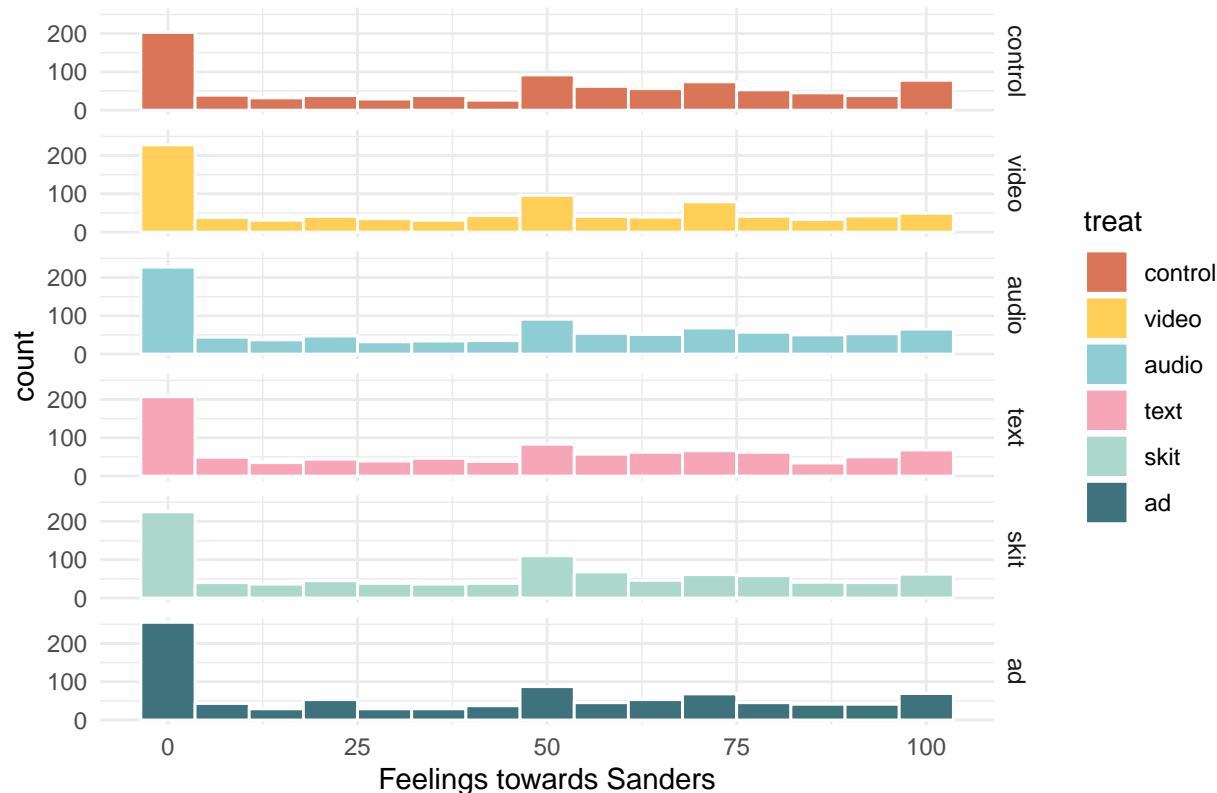


Figure 1: internet usages

Figure 5 illustrates the distribution of feeling towards Elizabeth Warren after receiving different news feed treatments. We realize that there is no significant difference in the distribution of affective response. The x-axis stands for the affective response towards Elizabeth Warren, ranging from 0 to 100. No matter what treatment subjects were exposed, a certain number of participants rated their feeling towards Warren as

0, along with a number of people who voted 50. It is worth mentioning that deepfake videos do increase the negative sentiment towards Elizabeth Warren compared to the control group. ### post favor by treat

Distribution of feelings towards Warren in six different conditions



#

## FEATURE SELECTION

Before building our model, feature selection is conducted on the selected dataset variables. In general, feature selection has the following advantages: \* Enhance the understanding between features and feature importances \* Reduce features overfitting and features dimensionality to improve the model accuracy Feature importance plays a vital role in predictive modelling projects. It can provide insights on data, models, and how to reduce dimensionality and select features, thereby improving efficiency and effectiveness of the model prediction.

Random Forest is the chosen method for our feature selection model because it can handle multi-dimensional data and output feature importance according to maximized information gain in node splitting. The random forest algorithm forms a series of classification methods that rely on a combination of several decision trees. According to the guideline from Liaw, the random forest algorithm is optimized via three parameters in our project: we set `ntree=500` (the number of trees), `mtry=all` the variables in FS dataset divided by 3 (the number of predictors randomly tested at each node) and `node size=5` (the minimal size of the terminal node).

The slip plot [crossref] shows the feature selection results. As we can see, PID partisanship is the most vital variable to affect the sentiment score towards Warren. As we know, partisanship is one of the most important factors affecting voters' voting. In us, there is a large group of fanatic political supporters. They don't care about who is the candidate, or what those candidates' ideas are. They just vote for the right party. Warren is a representative of the Democratic Party, so voters who are optimistic about the Democratic Party are willing to give higher sentiment scores. On the other hand, people who are in the Republican party and the Independent party would not support Warren.

Next important variable comes to **sexism**. Lovenduski mentioned that "Women remain significantly under-represented in political life." A big reason behind this is that people still associate toughness and leadership qualities with men. "Female marginalisation is hardwired into the traditional institutions within which



politics takes place.” Of course, things have two sides. American feminists also let Warren have a large number of loyal female supporters.

We are interested to find the variable “HHI” (household income) plays an important role in Warren’s sentiment score. Before we go to see the regression model result, we are guessing people with higher annual income care more about the candidate’s attitudes towards economic development. Because they might have their investment in different industries which will be affected. In addition, income is usually correlated with education level. People with higher income tend to have more general knowledge and thus are less likely to be fooled by deepfake.

The last two top five variables which have high feature importance are **age over 65** and **political knowledge**. The year 65 is like a threshold. While younger people would have more open ideas, older people usually have more conservative political ideas and slow to follow technology trends. Therefore, they might be more susceptible to false information fabricated by new technology such as deepfake. Older people generally stand in different positions and hold different expectations, therefore their sentiment score might vary a lot.

Finally, we decided to drop variables with lower than feature importance value of 0.5 to reduce dimensions for the regression model. So, **quality**, **script\_loans**, and **hispanic** would be dropped and the remaining 20 features will go into the regression model.

## 2.5 MULTIPLE LINEAR REGRESSION

We are using RStudio to run the multiple linear regression model. The following reasons explain why we decide to choose multiple linear regression: \* It account for all of the potentially important factors in one model \* It leads to a more precise understanding of the relationship between dependent variables and independent variables \* It is able to identify outliers or anomalies in the dataset.

One-hot encoding needs to be implemented to transform categorical textual variables to dummies since multiple linear regression can only take in numeric variables. All these steps are implemented by the [lm] package.

The results of the regression model will be detailed in the next section. We are focusing on three model parameters for variable interpretation and performance evaluation.

R squared : R-squared is a measure of the goodness of fit of the model. A larger R-squared indicates a closer fit of the model to the data. It is used as an optimality criterion in parameter selection and model selection. P-value: P-value is used to describe the occurrence possibility of the extreme outcome when the null hypothesis is true. If the p-value is small, it means that the probability of occurrence of the null hypothesis to be true is very small. And if it does occur, we have a reason to reject the null hypothesis. In short, the smaller the p-value, the more significant the result. Usually the threshold for significant p value is set to 0.05. Regression coefficient: The sign of the regression coefficient describes whether there is a positive or negative correlation between each feature variable and the dependent variable (Warren affective score). A positive coefficient means that as the value of the independent variable increases, the average value of the affective score also tends to increase. A negative coefficient indicates that as the independent variable increases, the affective score tends to decrease.

## 3 Model

$$\begin{aligned} \hat{Y} = & \hat{\beta}_0 + \sum_{a=other}^{a=male} \hat{\beta}_a * Gender_a + \sum_{b=High\ school}^{b=Postgraduate} \hat{\beta}_b * educ_b + \sum_{c=HHI25K-HHI49K}^{c=HHI>150K} \hat{\beta}_c * HHI_c + \sum_{d=Ethnicity:white}^{d=Ethnicity:black} \hat{\beta}_d * Ethnicity_d \\ & + \sum_{e=Region:Northeast}^{e=Region:West} \hat{\beta}_e * Region_e + \hat{\beta}_f * I_{WaveID} + \hat{\beta}_g * I_{Meta:OSmobile} + \hat{\beta}_h * I_{Age>65} + \sum_{i=PID:Independent}^{i=PID:Republican} \hat{\beta}_i * PID_i \end{aligned}$$

Table 1: Average deception level of each media format

Average Deception Level
3.135187

$$\begin{aligned}
& +\hat{\beta}_j * \text{Ambivalent Sexism} + \hat{\beta}_k * \text{Polknow} + \sum_{l=\text{treat:video}}^{\text{treat:ad}} \hat{\beta}_l * \text{Treat}_l + \sum_{m=\text{script:bidenshit}}^{\text{script:lgbtq}} \hat{\beta}_m * \text{Script}_m + \hat{\beta}_n * \text{I}_{exp\_1\_prompt: info} \\
& + \hat{\beta}_o * \text{post\_dig\_lit} + \hat{\beta}_p * \text{Internet\_usage} + \hat{\beta}_q * \text{CRT} + \epsilon
\end{aligned}$$

## 4 Result

### 4.1 Two-Sample T-test results

#### 4.1.1 Deception Level

In the descriptive analysis aspect, Table 1, shown below, illustrates the average deception level of each media format. The result shows that although deepfake videos have an average deception level of 3.23 out of 5, it is lower than the average level of audio(3.35) and text(3.30). Audio has the highest average deception level, and skit (2.57) has the lowest average deception level.

In the statistical analysis aspect, unpaired two-sample t-tests were applied to test whether deepfake videos are statistically different from other media formats at the deception level. The results from Table 2 to Table 4 show that only the difference in the deception level between video and skit is significant ( $p < 0.01$ ). The p-values for comparing video and text, video and audio are larger than 0.05, which means there is not sufficient evidence to support that video is different from the audio or text. In other words, videos do not differ from audio or text significantly.

Table 2: T test: Deception level of video vs audio

estimate1	estimate2	p.value	conf.low	conf.high	method	alternative
3.228438	3.348243	0.0538155	-0.2415774	0.0019682	Welch Two Sample t-test	two.sided

Table 3: T test: Deception level of video vs text

estimate1	estimate2	p.value	conf.low	conf.high	method	alternative
3.228438	3.304207	0.2244956	-0.1980699	0.0465321	Welch Two Sample t-test	two.sided

Table 4: T test: Deception level of video vs skit

estimate1	estimate2	p.value	conf.low	conf.high	method	alternative
3.228438	2.574586	0	0.5024785	0.8052267	Welch Two Sample t-test	two.sided

#### 4.1.2 Affect Level

The unpaired two-sample t-tests were utilized to investigate whether there is a different emotional impact on the target elite between deepfake videos and other conditions, including different deepfake formats and control groups that have no clip at all.

The result of comparing the deepfake video and the control group in Table 5 demonstrates that the video condition will cause a negative sentimental effect from respondents to Elizabeth Warren. The 95% confidence interval shows that the true difference in means is between -1.35 and -7.72. Given the p-value less than 0.05, the difference between the two groups is significant.

Table 5: T test: Affect level of video vs control

estimate1	estimate2	p.value	conf.low	conf.high	method	alternative
41.27797	45.81395	0.005278	-7.721219	-1.350748	Welch Two Sample t-test	two.sided

Similarly, the same analysis has been done for the rest unpaired two-sample t-tests. In our study, we used a 5% significance level. Table 6 shows the test result of how deepfake videos and texts impact audiences' feelings. The result shows that the difference in affect level between video (Mean = 41.28) and text (Mean=44.22) was not significant given the p-value is greater than 0.05.

#### 4.1.3 T test2

Table 6: T test: Affect level of video vs text

estimate1	estimate2	p.value	conf.low	conf.high	method	alternative
41.27797	44.2234	0.0652461	-6.077025	0.1861569	Welch Two Sample t-test	two.sided

#### 4.1.4 T test3

Table 7 shows the test result of how deepfake videos and audios impact audiences' feelings. The difference in affect level between video (Mean = 41.28) and audio (Mean=43.93) was not significant given the p-value is greater than 0.05.

Table 7: T test: Affect level of video vs audio

estimate1	estimate2	p.value	conf.low	conf.high	method	alternative
41.27797	43.92593	0.0997404	-5.80127	0.5053586	Welch Two Sample t-test	two.sided

#### 4.1.5 T test 4

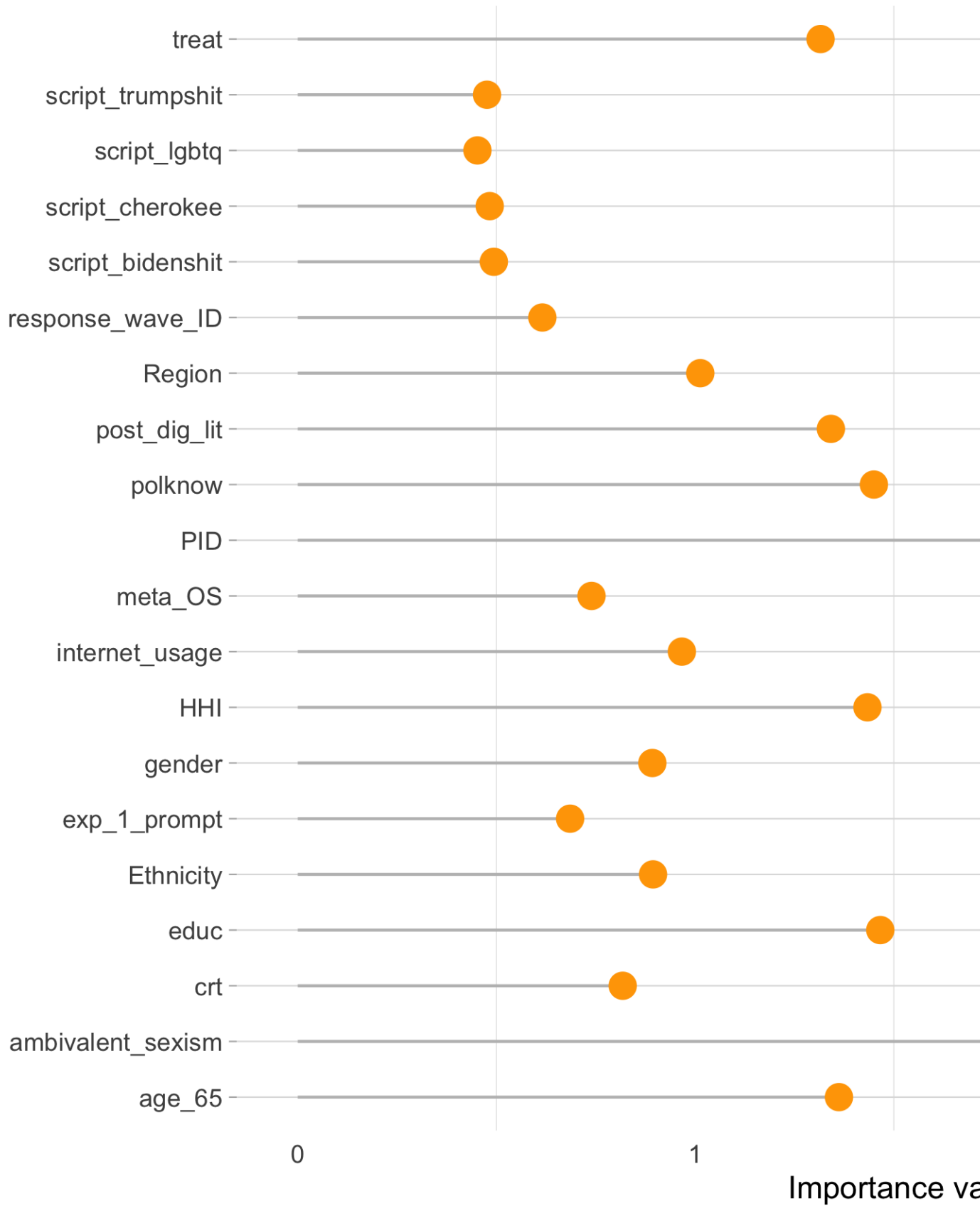
Table 8 shows the test result of how deepfake videos and skit impact audiences feeling. The difference in affect level between video (Mean = 41.28) and skit (Mean=43) was not significant given the p-value is greater than 0.05.

Table 8: T test: Affect level of video vs skit

estimate1	estimate2	p.value	conf.low	conf.high	method	alternative
41.27797	43	0.2772717	-4.829684	1.385625	Welch Two Sample t-test	two.sided



## 4.2 Feature selection



### 4.2.1 Model Results

Multiple linear regression was applied to use the top 20 important explanatory variables generated from the random forest model to predict the affect level.

As shown in the summary table, only 9 variables are significant ( $p < 0.05$ ) to the affect level to Elizabeth Warren which are postgraduate education level is; income ranging in \$100k to \$150k; living in the Northeast of US; whether age older than 65; partisan; ambivalent sexism; and treat is advertisement.

In this model, the intercept represents the average affect level for the reference group which includes the following characteristics:

- Gender: Female
- Education Level: lower than high school degree
- Income: Less than \$25K
- Ethnicity: Asian
- Region: Midwest
- Response\_wave\_ID: SV\_OxlqWIOfO10wuYI
- Device: Desktop
- Age group: Less than 65 years old
- Partisan: Democrat
- Media condition: Control
- Prompt: Control

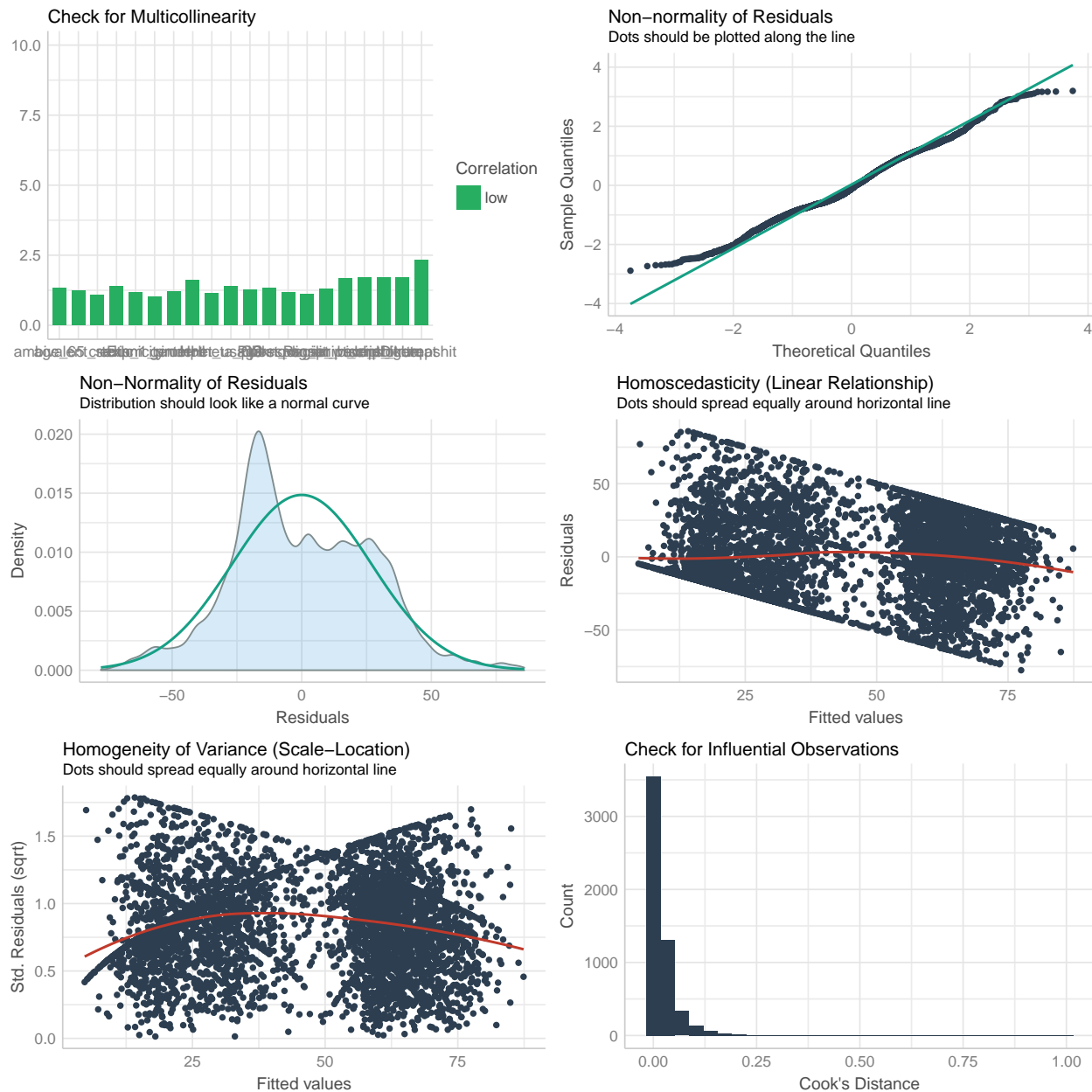
```
## Loading required namespace: qqplotr
```

```
## For confidence bands, please install 'qqplotr'.
```

```
## 'geom_smooth()' using formula 'y ~ x'
```

```
## 'geom_smooth()' using formula 'y ~ x'
```

```
## 'stat_bin()' using 'bins = 30'. Pick better value with 'binwidth'.
```



The coefficient for Postgraduate is 9.32, suggesting that the average affect level from people whose education level is postgraduate is on average 9.32 units higher than people whose education level is less than high school level, holding other variables constant.

The coefficient for HHI\$100k to \$150k is 3.90, suggesting that the average affect level from people whose income are in the range of \$100k to \$150k is on average 3.90 units higher than people whose income are less than \$25k, holding other variables constant.

The coefficient for HHI > \$150K is 4, suggesting that the average affect level from people whose income are in the range of \$100k to \$150k is on average 4 units higher than people whose income are less than \$25k, holding other variables constant.

The coefficient for RegionNortheast is 3.89. The average affect level from people who live in the Northeast in the US is 3.89 units higher than people who live in Midwest in the US, holding all other variables unchanged.

The coefficient for people older than 65 is -4.36. When other variables are unchanged, the average affect level from people who order than 65 is average 4.36 units lower than those less than 65.

The coefficient for the variable, PIDIndependent, is -26.69. Holding other variables constant, the Independent gives the feeling scores are on average 26.69 units lower than the scores given by the Democrats.

The coefficient for the variable, PIDRepublican, is -39.52. Holding other variables constant, the average feeling score from the people who are Republican is on average 39.52 units lower than the people who are Democrats.

The coefficient for Ambivalent Sexism is -4.06, suggesting that one unit increase in ambivalent sexism score is associated with 4.06 units decrease in affect level, holding other variables constant.

The coefficient for treataudio is -2.82, suggesting that the average affect level from people whose media condition is audio is on average 2.82 units lower than people whose media condition is control, holding other variables constant.

The coefficient for treatskit is -2.85, suggesting that the average affect level from people whose media condition is audio is on average 2.85 units lower than people whose media condition is control, holding other variables constant.

The coefficient for treated is -3.84, suggesting that the average affect level from people whose media condition is advertisement is on average 3.84 units lower than people whose media condition is control, holding other variables constant.

The coefficient for Internet Usage is 1.12, suggesting that one unit increase in internet usage is associated with 1.12 units increase in affect level, holding other variables constant.

#### **4.2.2 Model Assessment Results**

The summary table above shows that the R-square value for the multiple linear regression model is 0.39, which means about 39% of the variation in the dependent variable(affect level) can be explained by the multiple linear regression model.

In addition, in the Scale-Location plot (Figure 3 in Appendix), an approximately horizontal line is shown, which means the residuals are randomly distributed and have constant variance. The Normal QQ-plot (Figure 4 in Appendix) shows almost all the residuals match the diagonal line, meaning the residuals are normally distributed. The Residual versus Leverage plot (Figure 5 in Appendix) shows that there is no evidence of outliers, and none of the points come close to having both high residual and leverage.



Table 9: Regression results

	Model 1
(Intercept)	69.872*** (6.448)
gender.L	-1.560 (4.824)
gender.Q	-0.969 (2.806)
educHigh school	-1.207 (3.606)
educCollege	0.709 (3.605)
educPostgraduate	9.317** (3.693)
HHI\$100k-\$150k	3.904** (1.757)
HHI>\$150k	4.007** (1.939)
HHI\$25k-\$49k	-0.919 (1.041)
HHI\$50k-\$74k	-0.208 (1.172)
HHI\$75k-\$99k	0.057 (1.151)
HHIN/A	-4.947* (2.920)
EthnicityBlack	3.113 (2.459)
EthnicityOther	-1.064 (2.643)
EthnicityWhite	0.563 (1.921)
RegionNortheast	3.891*** (1.106)
RegionSouth	0.453 (0.988)
RegionWest	0.923 (1.164)
response_wave_IDSV__eyxdeXOuISXzakt	-1.306 (0.945)
meta_OSmobile	-1.269 (0.987)
age_65>65	-4.357*** (0.847)
PIDIndependent	-26.689*** (1.222)
PIDRepublican	-39.521*** (0.856)
ambivalent_sexism	-4.064*** (0.477)
polknow	1.333 (1.724)
treatvideo	-2.531 (1.551)
treataudio	-2.817* (1.530)
treattext	-1.725 (1.555)
treatskit	-2.850* (1.527)
treatad	-3.838*** (1.274)
script_bidenshit	-1.680 (1.406)
script_trumpshit	-2.132 (1.394)
script_cherokee	-1.145 (1.401)
script_lgbtq	0.647 (1.401)
exp_1_promptinfo	0.763 (0.731)
post_dig_lit	-3.950 (2.775)
internet_usage	1.120* (0.582)
crt	-0.893 (1.639)
Num.Obs.	5468
R2	0.386
R2 Adj.	0.382
AIC	51582.2
BIC	51839.8
Log.Lik.	-25752.077
F	92.263

\* p &lt; 0.1, \*\* p &lt; 0.05, \*\*\* p &lt; 0.01

## 5 Results

## 6 Discussion

### 6.1 First discussion point

### 6.2 Second discussion point

### 6.3 Third discussion point

### 6.4 Weaknesses and next steps

## A Appendix

### A.1 missing value

```
## Loading required package: colorspace
```

```
## Loading required package: grid
```

```
## VIM is ready to use.
```

```
## Suggestions and bug-reports can be submitted at: https://github.com/statistikat/VIM/issues
```

```
##
```

```
## Attaching package: 'VIM'
```

```
## The following object is masked from 'package:datasets':
```

```
##
```

```
##     sleep
```

```
## Warning in plot.aggr(res, ...): not enough vertical space to display frequencies
```

```
## (too many combinations)
```

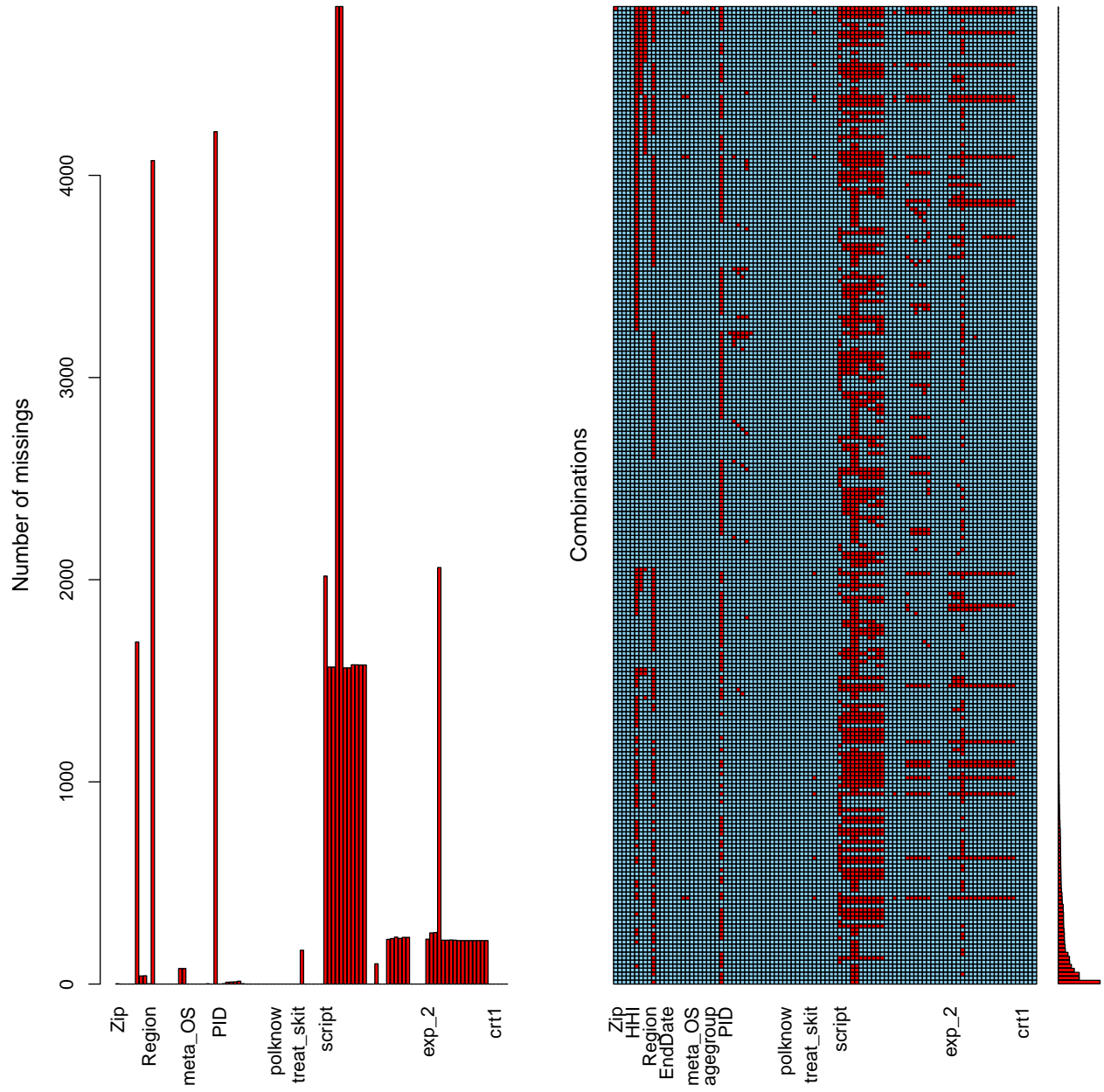


Figure 2: Missing value Visualization

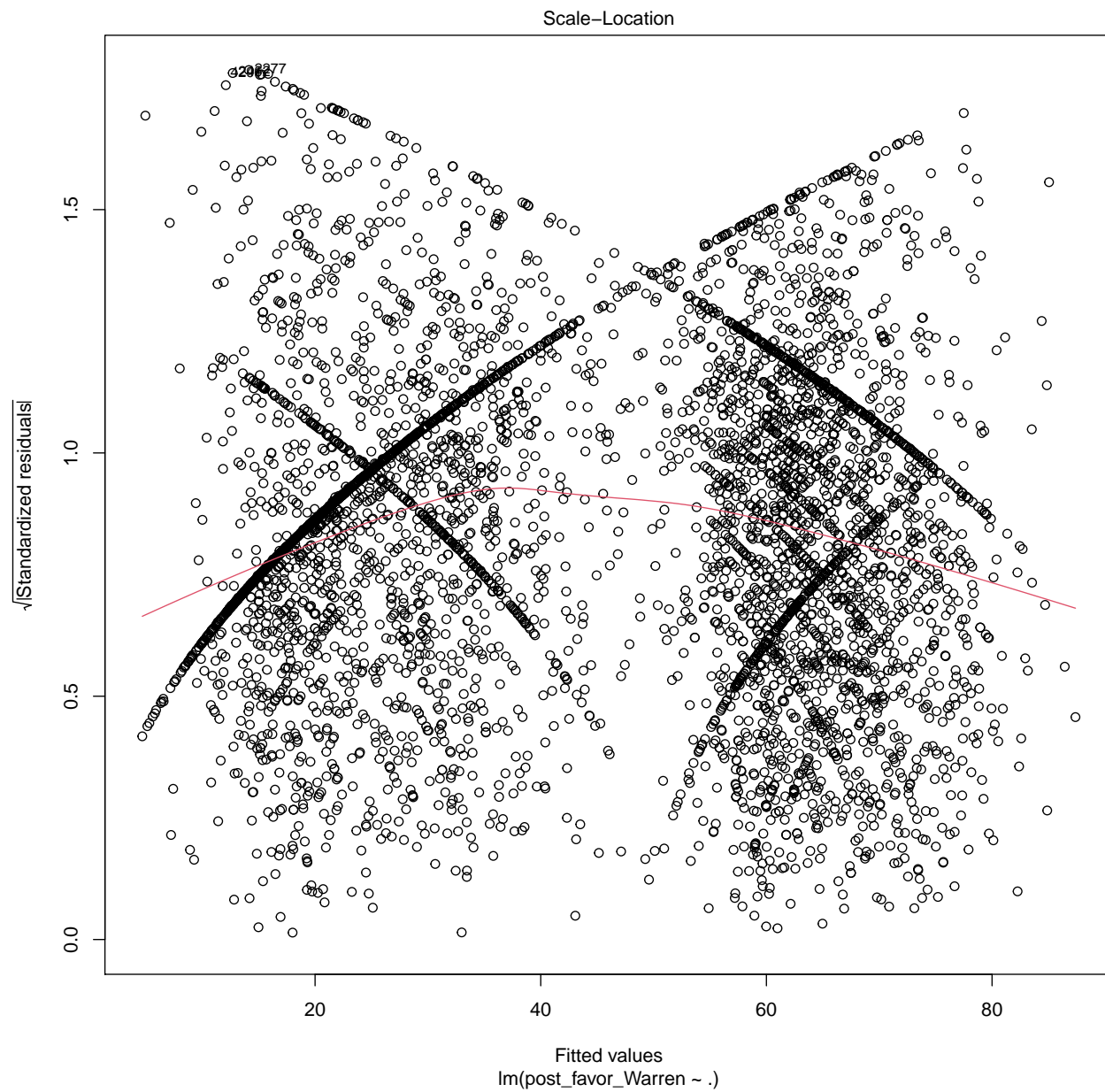


Figure 3: Scale-Location plot

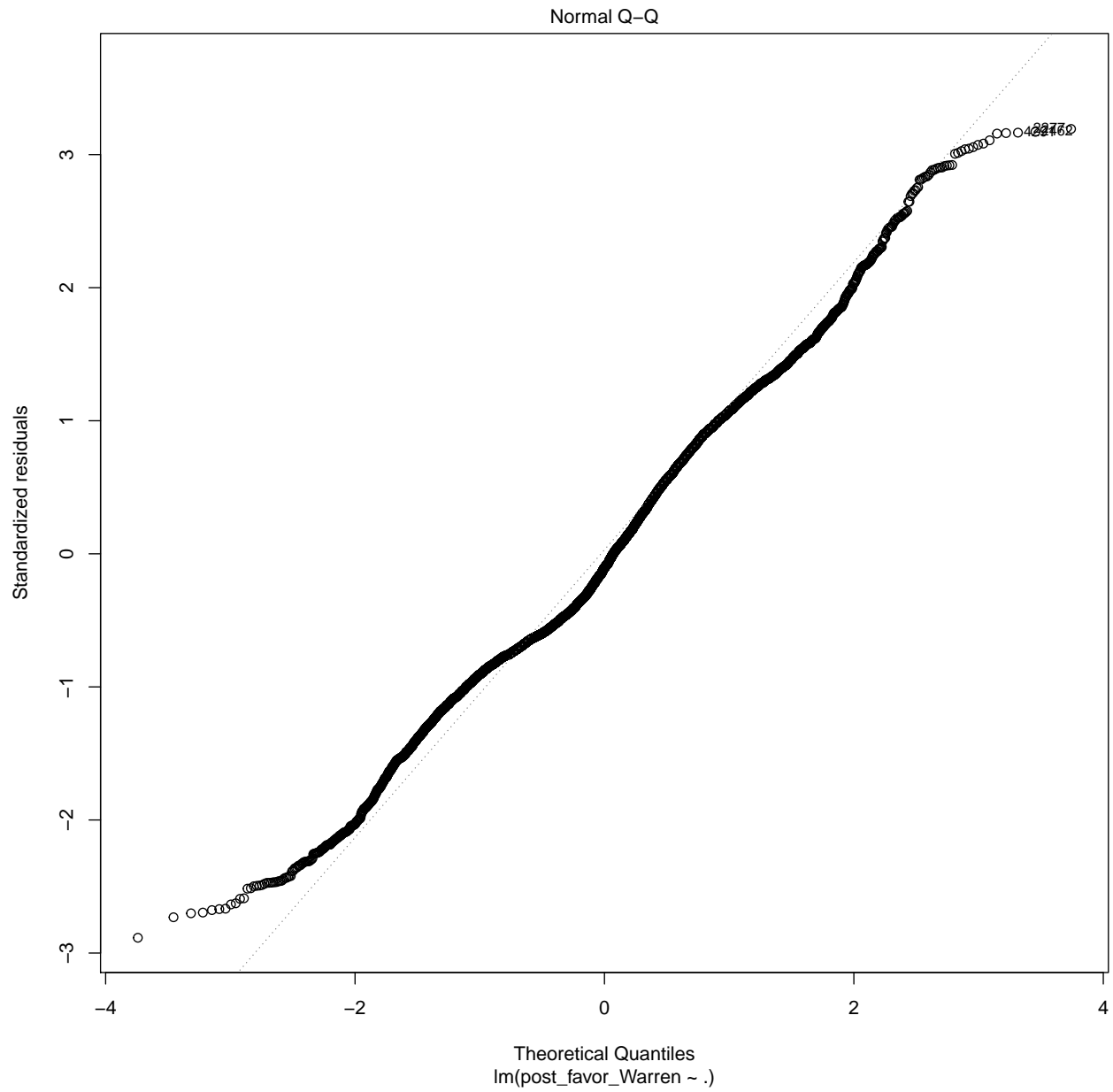


Figure 4: Normal QQ-plot

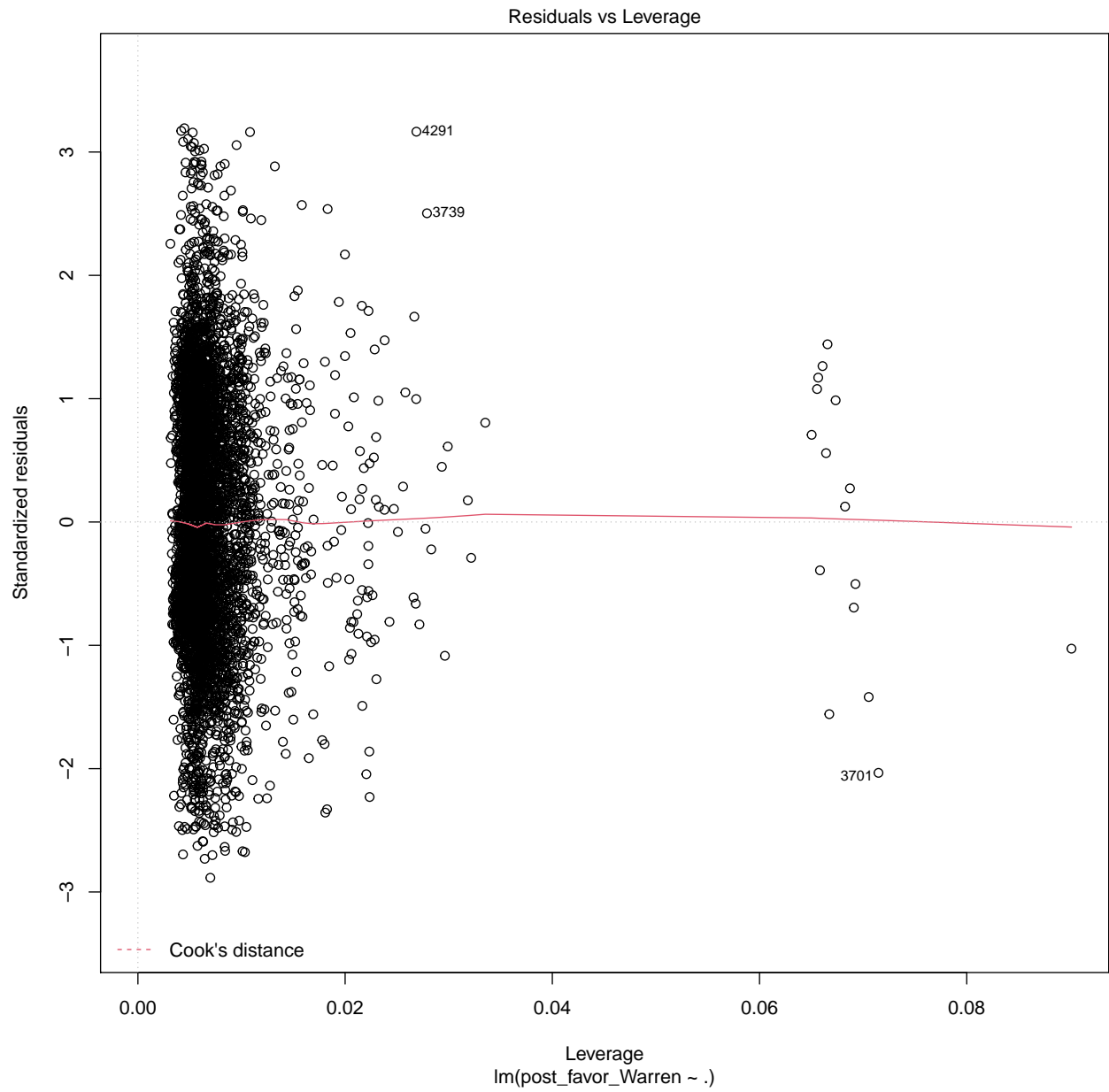


Figure 5: Residual versus Leverage plot

## B References