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# Disinformation and Science

## A survey of the gullibility of students with regard to false scientific news

STUDY

Panel for the Future of Science and Technology

European Science-Media Hub

EN

# Disinformation
# and Science

## A survey of the gullibility of students with regard to false scientific news

The main aim of this report is to present and discuss the results of a survey concerning perspectives on fake news among undergraduate university students in central Europe and northern Italy. The survey was carried out in spring 2020, during the coronavirus pandemic. An online questionnaire was used. The report is therefore the product of what could be achieved under highly unusual circumstances and should serve as a pointer for further studies.

Misinformation is always troubling, especially in science. Scientists feel distressed when public understanding diverges from the truth. Intentional disinformation (fake news), however, is not always the cause of misinformation. The report discusses the causes related to social trust and types of media consumption.

The sample of the study consisted of several hundred bachelors or masters students from each participating country. Half of the students were recruited from social sciences areas and the other half of the sample were recruited from natural sciences areas. The method of approaching the students was online questioning. One university was chosen from each participating country, and the link to the questionnaire was sent by that university's administration to the students. The response to the questionnaire was naturally anonymous and voluntary.

The questionnaire consisted of four parts. The first part presented several typical fake news announcements from the field of the natural and social sciences. (e.g. 'there has never been a landing on the Moon'; 'homosexuality can be cured by genetic engineering'). In the second part, true news announcements were applied as a control. In the third part, we tested the effect of the fake news by measuring the level of agreement or rejection. In the fourth part, social psychological, social and demographic data, including social trust, social media usage and general news consumption, were gathered. Responses were stored in an online data file and analysed by multivariable statistical means, such as principal component, factor and cluster, and multiple regression analysis.

Respondents in more or less all countries have shown resistance against falsehood in scientific communication, casting doubt over false news headlines. The students accepting headline news as evidence-based true statements and simultaneously rejecting fake headline news in each country outnumbered the scientific communication non-believers. However, the content of the individual headline news mattered. False or true, headline news referring to specific spheres of human existence, such as gender and sexuality, incited more interest than news concerning more neutral problems of society and nature. The central issue was social trust, which can provide a solution to help people emerge from the mess created by the new information ecosystem that creates information bubbles and crushes reliable and responsible sources of information.

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**ADMINISTRATOR RESPONSIBLE**

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# Executive summary

## On the survey

Citizens living in modern democratic societies are frequently faced with the dilemma of whether to support or reject true or false news concerning climate change, vaccinations, genetically modified agricultural products, nanotechnology, artificial intelligence applications, and other issues. This study aims to provide some data concerning the reception of news, including fake news, in the science field among university students in Austria, Czechia, Croatia, Hungary, northern Italy and Slovakia.

When we began to plan our research into science fake news in several European countries in the autumn of 2019, we could not foresee that several months later the communication field where falsehood rules would literally become lethal on an unprecedented scale. Our initial aim was just to study the influences destabilising the public sphere in the field of scientific communication.

Our goal was to reveal patterns of misinformation and disinformation in central European countries, hoping that the results from these states bridging western and eastern, and northern and southern Europe would be useful indicators for improving the specific field of science communication throughout Europe.

In each of the countries concerned, online survey research was carried out addressing humanities and science university students in the spring of 2020. The questionnaire consisted of 12 news headlines in science, and the students had to assess each one according to the level of truth they felt that it contained.

To assess the competence of the respondents, we inserted four true items of science news in the list offered to the subjects, assuming that those recognising the true headline news would be less ready to accept the fake headline news, compared with those who were unable to recognise the truth in the non-fake science news items.

Eight fake headline news items and four true headline news items were presented in the questionnaire. In the case of each headline news item, the respondents had to rate, according to a four-point scale, how likely or unlikely the news item was to be true or false, according to their judgement.

The list of the fake science news items is as follows:

> *CERN has already created small black holes in Switzerland.*
> *Gender studies are increasing the number of transgender people.*
> *Global warming is not supported by data.*
> *Homosexuality can be cured by genetic engineering.*
> *The refugee crisis is the main cause of the European economic crisis.*
> *The difference in intelligence between racial groups has undoubtedly been proven.*
> *Vaccination against measles, mumps and rubella (MMR) causes autism.*
> *There has never been a landing on the Moon.*

As we can see, some of the news items came from the natural sciences field, such as those about black holes, rejection of global warming on the grounds that it is not substantiated by data, the treatment of homosexuality by genetic engineering, or the alleged causal relationship between vaccination and autism. Other items reflected false statements concerning the social sciences, such as migration, an intelligence gap between races, or disbelief that moon landings have occurred.

In the list of the fake science news items, four true news were inserted. The list of true headline news was as follows:

*Economic inequality is rising in the world.*
*Life expectancy is lower in eastern than in western Europe.*
*Water has been found on Jupiter's moon, Europa.*
*Today, earthquakes cannot be predicted.*

Apart from items of false and true science news, the questionnaire consisted of questions concerning media consumption, social trust and basic information on the socio-demographic background of the respondents.

## Summary of the results

The surveys carried out among university students in Austria, Croatia, Czechia, Hungary, Italy and Slovakia have shown that the tendency to believe in unreliable scientific statements is present everywhere in the countries under study. Certainly, this result is not surprising. Misinformation is part of the human condition. The fight is not new, between evidence-based and reliable statements of reality and false statements motivated by stupidity, malignancy or slanderous hostility.

Chart 1 – Distribution of respondents according to how many false (N=8) statements are accepted, and how many true statements (N=4) are rejected (by country, scale mean)
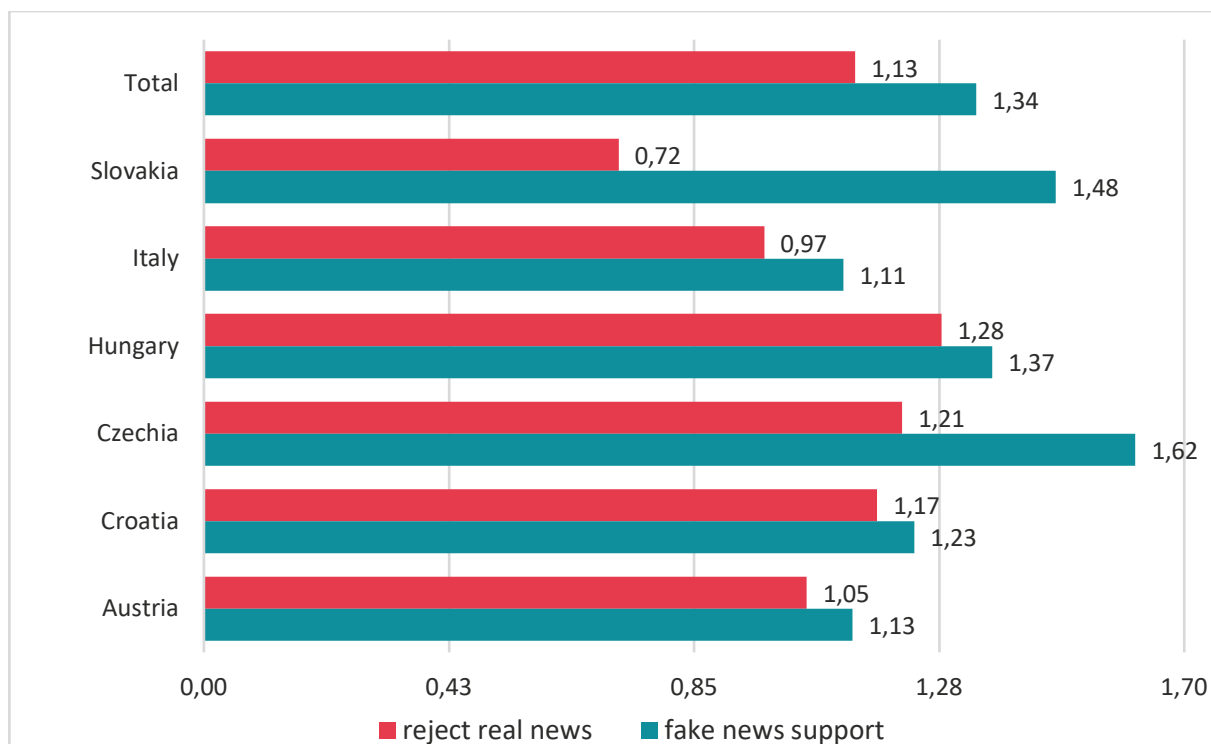


Gullibility is two-fold. Credulous persons reject true science news, while simultaneously accepting the fake. Chart 1 shows that disbelief in true science news is generally less frequent than belief in false news. The pattern is the same in all countries.

Chart 2 shows the proportions of consistently credulous and non-credulous persons in each sample, including proportions of hybrid types of persons who equally accept fake and true news or equally reject both types of news. As we can see, most of the students in Austria, Italy and Slovakia were not

credulous at all. The proportion of non-gullible students was somewhat less in Croatia and Hungary, and was surprisingly low in Czechia.

Chart 2 – Distribution of respondents by four consistency types of acceptance of fake news and rejection of true news by country (%)
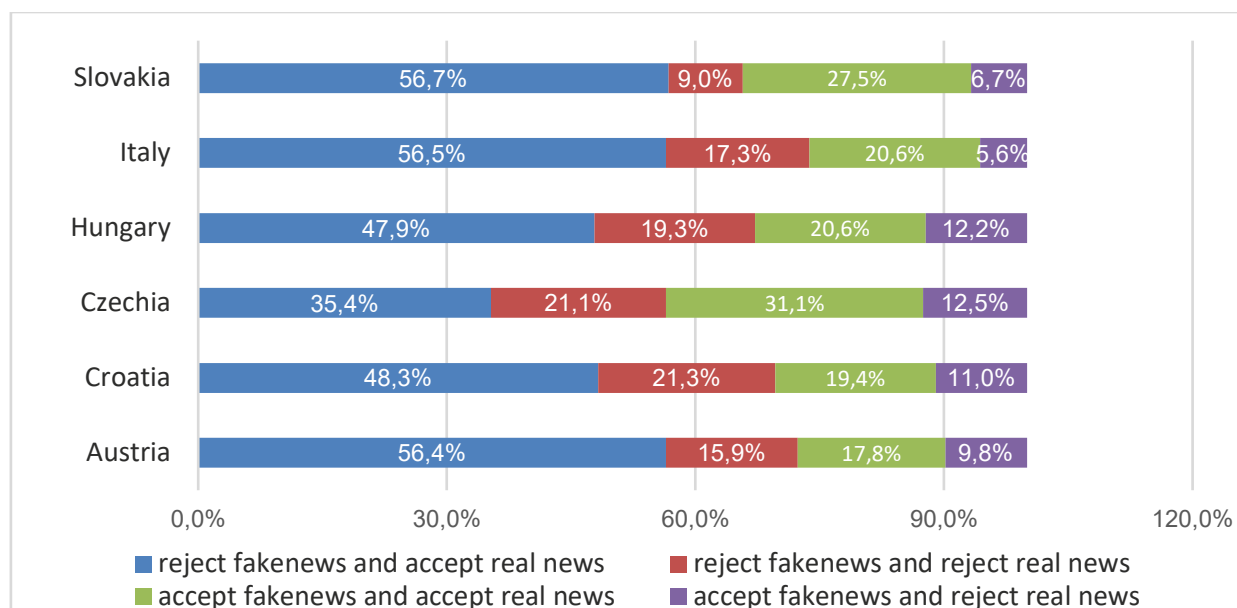


The good news is that respondents in more or less all countries have shown resistance against falsehood in scientific communication, casting doubt over false news headlines. The students accepting headline news as evidence-based true statements and simultaneously rejecting fake headline news in each country outnumbered the scientific communication non-believers. However, the content of the individual headline news mattered. False or true, headline news referring to specific spheres of human existence, such as gender and sexuality, incited more interest than news concerning more neutral problems of society and nature.

The central issue was social trust, which can provide a solution to help people emerge from the mess created by the new information ecosystem that creates information bubbles and crushes reliable and responsible sources of information. Chart 3 shows that the level of interpersonal trust appears to be higher in Austria and Hungary and lower in Croatia, Czechia, Italy and Slovakia. Nevertheless, even the highest scores of trust are rather low, demonstrating a general unwillingness among our respondents to be open and trustful in turning towards and communicating with unfamiliar people.

Chart 3 – Would you say that most people can be trusted, by country (mean values on seven-point scale)
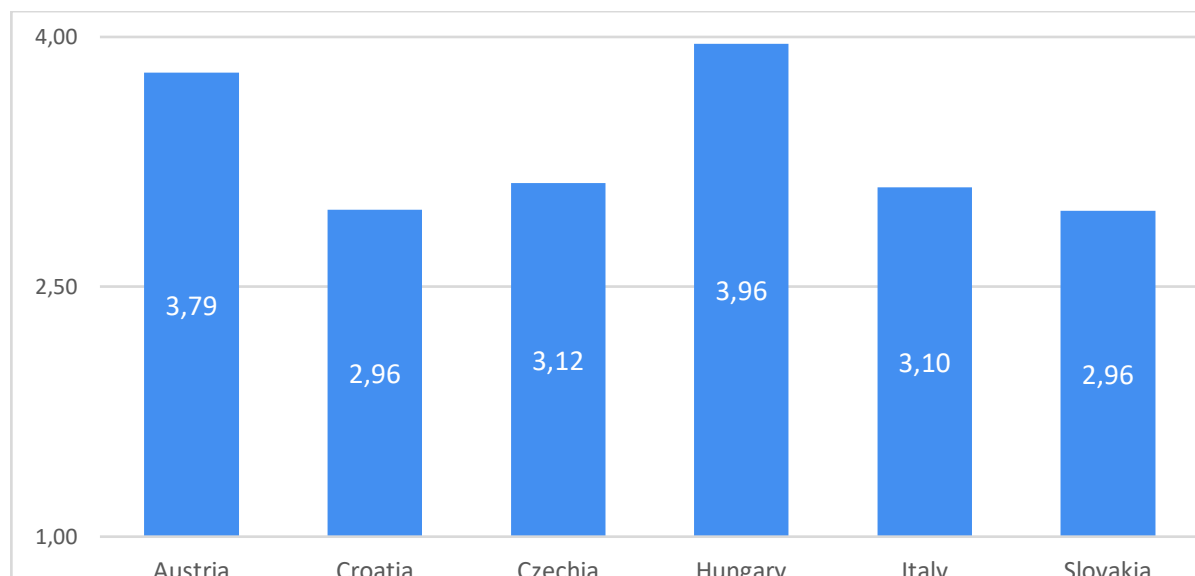


Misinformation is not new, but the information ecosystem within which it is now spreading is new. Charts 4 and 5 reveal the discrepancy between the level of trust and frequency of usage of the individual media sources of news. The more the respondents trust the media the less they use them, and, conversely, the more they use them, the less they trust them. The public sphere has evolved into a completely new phase, where information filtering mechanisms no longer exist. The producers of messages disseminated through social media can broadcast news unchecked by any scientific authority. We have entered a world of public communication where truth plays no role in substantiating the content of the statements.

Chart 4 – Trust in different media sources by country (mean values on seven-point scale)



**Slovakia**
- trustworthy news from social media: 2,65
- trustworthy news from print media: 4,40
- trustworthy news from television/radio: 4,44

**Italy**
- trustworthy news from social media: 2,41
- trustworthy news from print media: 4,51
- trustworthy news from television/radio: 4,23

**Hungary**
- trustworthy news from social media: 2,92
- trustworthy news from print media: 3,94
- trustworthy news from television/radio: 3,50

**Czechia**
- trustworthy news from social media: 3,15
- trustworthy news from print media: 4,31
- trustworthy news from television/radio: 4,23

**Croatia**
- trustworthy news from social media: 2,52
- trustworthy news from print media: 3,69
- trustworthy news from television/radio: 3,82

**Austria**
- trustworthy news from social media: 2,66
- trustworthy news from print media: 5,35
- trustworthy news from television/radio: 5,42

Legend:
- trustworthy news from social media
- trustworthy news from print media
- trustworthy news from television/radio

Chart 5 – Consuming news from different sources by country (%)

| | Austria | Croatia | Czechia | Hungary | Italy | Slovakia |
|---|---|---|---|---|---|---|
| Internet | 0,78 | 0,78 | 0,87 | 0,86 | 0,641129 | 0,78 |
| Printed Media | 0,56 | 0,13 | 0,50 | 0,16 | 0,548387 | 0,41 |
| Blog, Vlog | 0,10 | 0,07 | 0,31 | 0,21 | 0,116935 | 0,22 |
| Social Media | 0,77 | 0,79 | 0,85 | 0,85 | 0,75 | 0,92 |
| Television | 0,57 | 0,49 | 0,72 | 0,59 | 0,758065 | 0,69 |
| Radio | 0,39 | 0,29 | 0,34 | 0,33 | 0,270161 | 0,51 |

Democracy in Europe cannot survive unless facts and fables are separated on the basis of proven evidence. The final question of our questionnaire was about the respondents' opinion concerning the nature of the future direction of their country and Europe. As we can see in Chart 6, the opinions of the students in the individual countries were far from unanimous. Respondents from Austria and Slovakia stand out as most satisfied with the course of their own country as well as with that of Europe, while respondents from Hungary and Italy seem the most pessimistic. In all countries except Austria, the course taken by Europe is seen more positively than the course taken by their own country.

Chart 6 – Europe and the home country are going in the right direction (by country, %)

| | Austria | Croatia | Czechia | Hungary | Italy | Slovakia |
|---|---|---|---|---|---|---|
| things are going in the right direction in Europe? | 54,0% | 46,8% | 57,2% | 38,0% | 16,8% | 59,0% |
| things are going in the right direction in the home country | 61,5% | 27,9% | 40,0% | 22,8% | 22,3% | 53,9% |

VIII
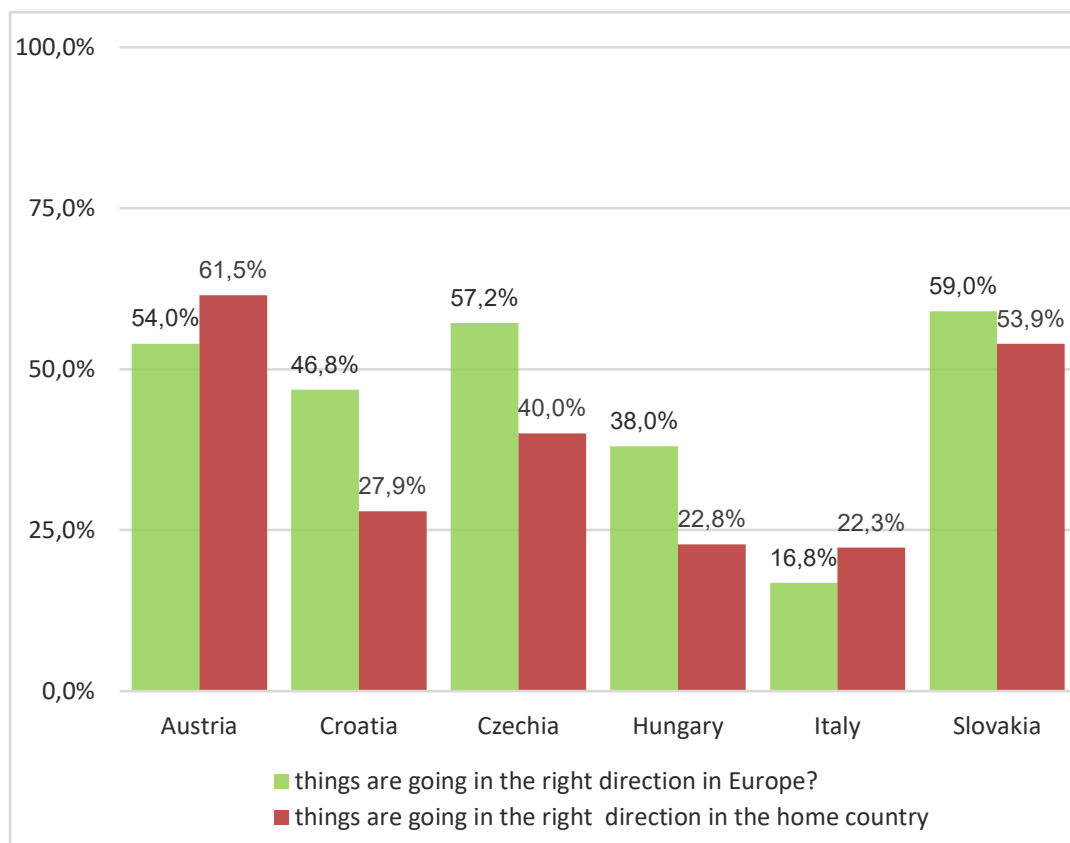
In the midst of our research, Europe was hit by the coronavirus pandemic, which underlined the radically new aspects of our information ecosystem that magnifies the most controversial points of the public sphere. Falsehood has literally become a lethal problem on a scale not previously seen.

Pandemics affecting our health will come and go, but the pandemic of misinformation will stay with us. The lesson we can learn from our results is that in order to grapple with the 'infodemic' there is a need to enhance the public's level of trust in science. We have shown that the consumers and producers of social media should be trained to use fact-checking mechanisms enabling them to distinguish between true and false information. Furthermore, misinformation consumed by credulous persons should be distinguished from disinformation that is manufactured intentionally to cause havoc.

Myths can no longer serve as a means of construction of reality. Real knowledge, by contrast, lies in recognising information produced by trustworthy sources. Science communication, however, does not guarantee against inaccuracies and errors. Real wisdom is the art of doubting, and this is what Europeans should be taught.

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# 1. Introduction

The spread of misinformation in human societies is definitely not new. Changing social and economic realities in the 21st century, such as growing economic inequalities, migration, the rise of filter bubbles, incivility and 'flaming' engendered by social media, and a decrease in trust in society's elites, have increased the spread of misinformation and disinformation worldwide. 'Fake news' has become the symbol of the recently emerged mega-trend of the spread of misinformation in postmodern societies.

This study will consider the spread of misinformation in science, which has parallels with misinformation practices in politics. Studies on misinformation in political and scientific communication have found surprisingly similar patterns of credulity, although investigations of scientific issues such as evolution, vaccine mandates or stem cell research have shown that, compared with the audiences of political communication, audiences of scientific communication are less prone to antagonising their opponents (Scheufele, Krause, 2019).

## 1.1. Knowledge and belief

Information processing by individuals does not of course occur in a vacuum. In the course of socialisation, children develop representations of the natural and social world gradually, consisting of a mix of faith, knowledge and doubt formed by experience, communication and learning. The developmental process in its entirety is bound to language acquisition. Heidegger asserted that human beings rose up from animal existence by means of language, enabling them to construct the cultural and spiritual world that connects them with each other in time and space, beyond the constraints of the eternal present that imprisons inhabitants of the animal kingdom. Heidegger also points out that 'language is the house of being' that sets the horizon in the individual for processing information coming from nature and society (Heidegger, 1947). Without language, no knowledge of the external world would be possible.

Knowledge about scientific facts is part of life for individuals living in modern societies. Knowledge of the natural and social world in scientific terms in modern society originates as a result of education in institutions such as schools, universities, as well as exposure to mass and social media.

Science, however, cannot be taken as the single source of information about social and natural reality. Reliable information about reality is frequently replaced by misinformation from sources other than scientists and science journalism. Misinformation, however, can be corrected. On the other hand, there is a kind of misinformation that cannot be considered simply a result of lack of knowledge about the facts proven by scientists. Misinformation that contains intentionally false information is known as disinformation, and there is no doubt that fake science news falls into this category.

## 1.2. Psychological determinants of credulity

There is a vast literature on the problem of why individuals become prey to mis/disinformation about science and scientific achievements. People grappling with the complexity of the surrounding world may resort to the means of misinformation/disinformation for a variety of reasons. One cluster of reasons can be linked to gullibility; that is, the tendency to believe propositions unsupported by scientific evidence. The literature on gullibility provides an insight into the distortions of individual information processing stemming from strongly embedded beliefs (Forgas, Baumeister, 2019).

Credulity has always been inherent in the life of human beings. János Makkai, the forgotten Hungarian political scientist, stated in his book on political behaviour that 'the major characteristics of human being distinguishing him from all other known living creatures is the ability to believe'. (Makkai, 1943. 11). Steven Pinker has more recently expressed the same view, stating that human gullibility is has a long history (Pinker, 2018).

In the course of history, science has gradually opened the way to understanding reality by posing and answering the question of 'what is?' in ever expanding areas of existence.

The expansion of scientific knowledge, however, has not been followed by people more generally, who remained uninformed about scientific endeavours. Lacking the means of understanding the world as explained by science, people had to resort to the means of gullibility, pursuing certainty and predictability in a world of uncertainty and unpredictability.

Myers, summarising the results of studies on reasoning based on unsupported evidence, states that there is a fundamental divide between those who base their statements on evidence and those who adhere to dogmatic beliefs inaccessible to scientific arguments. The gullible mind is content with the availability of information, and does not take the reliability and validity of the information into account (Myers, 2019).

As a result of the availability heuristic, people tend to take for granted information that is familiar, repeated and disseminated by similar others, presented in fluent narratives in the media, and free of cognitive dissonance. Scientific information fares less well since it contradicts the facts of apparent reality and demands cognitive effort. The workings of the availability heuristic are accelerated in gullible people by false risk evaluation resulting in exaggerated fears or hopes. The borders between possibilities and probabilities are blurred in gullible people, chasing them into extreme expectations of a miracle or the catastrophic end of the world.

The shallow understanding of reality resulting from gullibility is closely related to a statistical illiteracy that misinterprets the regression toward the mean and does not consider the problems arising from non-representative samples.

Another source of gullibility is the need to reduce the ontological uncertainty of the self by means of self-justification. Furthermore, incredulity is fuelled by the workings of the fundamental attribution error that is the tendency to under-emphasise external explanations of the individual's behaviour and simultaneously to over-emphasise stable or unstable internal explanations.

Results of studies on individual emotional states have demonstrated that anger and fear particularly increase credulity to false news (Forgas, East, 2008). Collective emotional states such as feelings unleashed by panic also exacerbate individuals' gullibility in response to falsehoods and enhance the assimilation of false beliefs into a dogmatic worldview. Moreover, according to results of recent research, disinformation by eliciting feelings of surprise and disgust captures attention more than the truth (Funk, Gottfried, Mitchell, 2017). Those persons inclined to believe falsehoods under the pressure of an emotional state are simultaneously motivated to share disinformation more frequently.

## 1.3. Social determinants of credulity

Falsehoods always fly fast, but in the era of misinformation the pace of spread has accelerated immensely. The above discussion focused specifically on the psychological background of the tendency to prefer misinformation over information based on scientific evidence. We have argued that being misinformed was a function of a person's motivation to believe in falsehoods. Nevertheless, it is impossible to understand the susceptibility of the human mind to prefer falsehood and oppose truth without taking macro-level determinants into account that provide the social background.

Humankind is living in a post-truth era that has revived, in a notable segment of the public, a medieval epistemology that neglects facts and objective evidence. While in the medieval age, due to a general epistemic backwardness, facts were less recognisable and less visible, the disbelief in scientific facts and the dominance of dogma and prejudice in the post-truth era stem from the decline in trust in science. The decrease in public support for science can result partially from flawed science communication that relies on over-confident celebrity scientists selectively promoting particular findings and thus awakening false expectations among non-expert consumers of scientific

information. This practice backfires when the non-expert audience learns that science was not able to deliver the early promises to solve pressing problems. Frustration reduces people's motivation to consume information that challenges the power of strongly entrenched pre-existing beliefs.

The power of pre-existing beliefs manifests itself in the tendency where selective exposure directs attention toward consistent (false) information over inconsistent (true) information. Selective exposure is a general tendency to defend pre-existing beliefs, which occurs in the case of searching information about scientific topics.

Networks established between users of social media platforms, such as Twitter, Instagram or Facebook, are especially ripe for spreading misinformation, due to their homogeneity. These closed networks create 'filter bubbles', making the acceptance of disinformation look 'normal'. Consumers and producers of social media content living in the 'echo chambers' of their own cluster tend to maintain cognitive structures that resist reliable scientific information. Moreover, nodes of insular social networks can lead to the fallacy that falsehood is more prevalent among members of the network than is really the case. Social media is like a double-edged sword; due to its potential to share and discuss views and beliefs within one's chosen audience, social media can be used to enlighten users or misused by nefarious agents to spread rumours and misinformation.

Nefarious agents spreading ambiguous content on social media are not necessarily human, but can also be 'bots', infiltrating Twitter or Facebook and occupying the nodes of insular networks. Falsehoods spread by bots fly faster and reach bigger audiences. One can argue that the distinction between humans and bots does not matter. However, the distinction can be important in terms of fighting disinformation.

A group of key importance concerning the difficulty of communication to convey truth on scientific topics consists of the members of the specific audience for science news. Even when the evidence is clear and the scientific information unequivocal, hostile and uncivil comments following the appearance of science news can suppress the truth and influence readers to doubt the content. Unfortunately, there is not enough evidence as to how hostile news environments (comments, likes, retweets) influence consumers to prefer to ignore science news.

Low levels of media literacy can certainly contribute to the failure of science communication. Media literacy is an aspect of human intelligence that includes accessing, analysing, evaluating and communicating information. In the fight against disinformation and misinformation the ability to evaluate critically is of utmost importance, making a distinction between dated, biased or exploitative sources possible and enabling science news and news-like advertising or fake news to be distinguished.

Human understanding is far from perfect. Effective science communication may, however, increase its perfection.

## 1.4. The study

Citizens living in modern democratic societies are frequently faced with the dilemma of whether to support or reject true or false news concerning climate change, vaccinations, genetically modified agricultural products, nanotechnology, artificial intelligence applications and other issues. This study aims to provide some data concerning the reception of news, including fake news in science, among university students in Austria, Czechia, Croatia, Hungary, northern Italy and Slovakia.

Our goal was to reveal patterns of misinformation and disinformation in central Europe, hoping that the results from this region, bridging western and eastern, and northern and southern Europe, will be useful for improving the specific field of science communication throughout Europe (Szüts, Parti, 1983).

In each of these countries, an online survey was carried out addressing university students of humanities as well as sciences, in spring 2020. We know, of course, that a representative sample would

have served the purposes of this study better, but limits of budget and constraints of time made it impossible to achieve this goal. University students seemed to be an ideal group due to their accessibility in a logistical as well as cognitive sense. The questionnaire consisted of 12 headline news items on science, and the students had to assess each of these according to the their judgement of their representation of the truth, assessing the likelihood of each piece of headline news being true or false according to a four-point scale.

In order to assess the competence of the respondents, we inserted four true science news items in the list offered to them, assuming that subjects recognising the true headline news items would be less ready to accept the fake headline news items as true, compared with those who were unable to recognise the truth in the non-fake science news. Eight fake headline news items and four true headline news items were presented in the questionnaire.

The list of the fake science news items is as follows:

*CERN has already created small black holes in Switzerland.*
*Gender studies are rising the number of transgender people.*
*Global warming is not supported by data.*
*Homosexuality can be cured by genetic engineering.*
*The refugee crisis is the main cause of the European economic crisis.*
*The difference in intelligence between racial groups has undoubtedly been proven.*
*Vaccination against measles, mumps and rubella (MMR) causes autism.*
*Humans never landed on the moon.*

As we can see, some of the news items came from the natural sciences field, such as the items about black holes, rejection of global warming on the grounds that it is not substantiated by data, the treatment of homosexuality by genetic engineering, or the alleged causal relationship between vaccination and autism. Other news items reflected false statements concerning the social sciences, such as migration, the intelligence gap between races, or a disbelief that humans have landed on the moon.

In the list of fake science news items, four pieces of true news were inserted. The list of true headline news items was as follows:

*Economic inequality is increasing in the world.*
*Life expectancy is lower in eastern than in western Europe.*
*Water has been found on Jupiter's moon, Europa.*
*Today, earthquakes cannot be predicted.*

Apart from the items of false and true science news, the questionnaire consisted of questions concerning media consumption, social trust and basic information on the socio-demographic background of the respondents.

# 2. Fake news in social and natural sciences: Survey in Austria

## 2.1. Introduction

The phenomenon of fake news has become widespread and debated heatedly over the past decade (Benkler, Faris, & Roberts, 2018). While different conceptualisations of the phenomenon exist (e.g. Egelhofer & Lecheler, 2018), in one facet it describes the intentional spread of incorrect information – that is, disinformation (e.g. Chadwick & Vaccari, 2019). Disinformation appears in various contexts and related to many different socio-political issues. The rise of disinformation is frequently discussed in relation to the advent and increasing spread of social media (e.g. Allcott & Gentzkow, 2017), in which the production and dissemination of disinformation is easy and may be widespread. At the same time, these studies show that only fractions of the general public would encounter fake news on social media (e.g. Grinberg et al., 2019). In a recent contribution, we discuss the role of traditional mass media in disseminating fake news and argue that through the logics of journalistic production and fact checking processes, traditional media may actually paradoxically play a role in the dissemination of disinformation to the general public (Tsfati et al., 2020). In that vein, a recent study of disinformation and media use in relation to Covid-19 has shown that some mass media may be less successful in countering disinformation than others (Eberl, Lebernegg and Boomgaarden, 2020). Therefore, one focus of the following analysis is on the relationship between media consumption and interest in certain mediated topics and the ability to correctly classify disinformation as such. Here we also explore whether it is use of certain media, or rather trust in the information that is provided by such media, which would explain knowledge about disinformation (e.g. Strömbäck et al., 2020). In a second step, we explore whether and to what degree we can relate the ability to correctly classify disinformation to socio-demographic characteristics. Given the nature of this study, we focus on whether education, and in particular the type of education that students are following, does make a difference to their ability to detect fake news.

The sample for the Austrian part of the study was drawn from students of the social sciences, in particular communication science, and from the natural sciences, physics, at the University of Vienna. The questionnaire, which was a direct translation of the overall project's questionnaire into German and which was then programmed in Qualtrics, was distributed via online teaching platforms, and the study had been approved by the Department of Communication's research ethics board. Unfortunately, and due to the Covid-19 situation that occurred just before the start of the fieldwork, we were not able to reach the target of participants, since we could not reach out to students physically and hence were relying strongly on colleagues to distribute the links (mass e-mails by us were not possible, due to the General Data Protection Regulation (the purpose of the GDPR is to protect the personal data of EU citizens.). Also, we faced a number of dropouts and incomplete questionnaires. Therefore, our estimations below are based on a sample of 264 students. While we emphasise that the descriptive results shown below should not be read as generalisable across the student population, due to the non-random nature of data collection, we nevertheless believe that in particular the bi- and multi-variate analysis are suggestion trends that may also be found across other student samples in the Austrian context.

## 2.2. Results

We set out by considering different ways into addressing whether our respondents were able to detect and correctly classify the statements provided to them as correct or incorrect. In total, there were eight incorrect statements and four correct statements provided to the respondents. Respondents were asked to judge the likelihood of a statement being true on a four-point scale and were also able to tick a "don't know" option. Considering the latter, we show that shares of "don't know" answers differ significantly between the statements (see Table 1). While for most statements less than five per cent of the respondents indicated that they would not know (with particularly low shares for the statements

on race and intelligence, landing on the moon and climate change data) there are a number of statements for which these are much higher. This was more so for the true statements, especially regarding water on Jupiter moon and life expectancy differences, but also the false statements regarding the CERN and vaccination showed higher values of "don't know". We then considered mean values of judging the likelihood that statements are true, excluding the "don't know's". We do find that overall respondents were able to differentiate false (upper part of the table) and true statements (lower part of the table). There are, however, two interesting (but non-significant) deviations from this pattern relating to the gender studies and the earthquake statements. Finally, we recoded the responses in a way that those who answered 'very unlikely' or 'unlikely' for the incorrect statements and those who answered 'likely' or 'very likely' for the correct statements were getting a score for 'correctly classified' the information. This allows looking at the share of respondents that were able to correctly classify the statements as true or false information (alpha for scale reliability is .73). Overall respondents did fairly well when it comes to the incorrect statements, with a minimum of close to 80 per cent of respondents classifying six of the eight statements as incorrect. It is noteworthy that the CERN and the gender studies statements were least frequently classified as incorrect. For the true statements in particular the earthquake and the Jupiter statement were apparently difficult to detect as true.

Table 1 – Descriptive information on the detection of (dis)information

| | Mean (High=More Likely True) | % 'don't know' | % Correctly classified |
|---|---|---|---|
| F. Genetic Modification Homosexuality | 1.25 | 2.8 | 89.0 |
| F: Race and Intelligence | 1.31 | 0.4 | 88.6 |
| F: No Landing on the Moon | 1.34 | 1.6 | 86.4 |
| F. No Data Climate Change | 1.48 | 1.6 | 83.3 |
| F: Vaccination and Autism | 1.59 | 7.5 | 77.7 |
| F: Refugee and Economic Crisis | 1.72 | 2.4 | 78.0 |
| F: CERN Black Hole | 1.92 | 5.9 | 69.7 |
| F: Gender Studies Transsexuality | 2.16 | 4.3 | 57.6 |
| T: Earthquake Prediction | 2.09 | 5.9 | 26.9 |
| T: Water on Europe/Jupiter | 2.87 | 17.0 | 56.1 |
| T. Social Inequality | 3.59 | 3.5 | 85.2 |
| T. Life Expectancy Differences | 3.21 | 11.0 | 75.4 |

We continue using the correct classification as a central variable in the remainder of the results section. Summing up the scores for the individual variables yields a score for each respondent that indicates how many statements that respondent was able to correctly classify as either correct or incorrect. Chart 1 shows the frequencies of that sum score variable. We see that only around seven per cent of our respondents were able to correctly classify all twelve statements. However, a vast majority of respondents has at least nine statements correctly classified (around 67 per cent). Less than four percent failed to correctly classify any of the statements (and it needs to be discussed whether these purposely answered wrongly).

Chart 1 – Frequencies of respondents correctly classifying statements

## % of respondents

Nr correctly classified
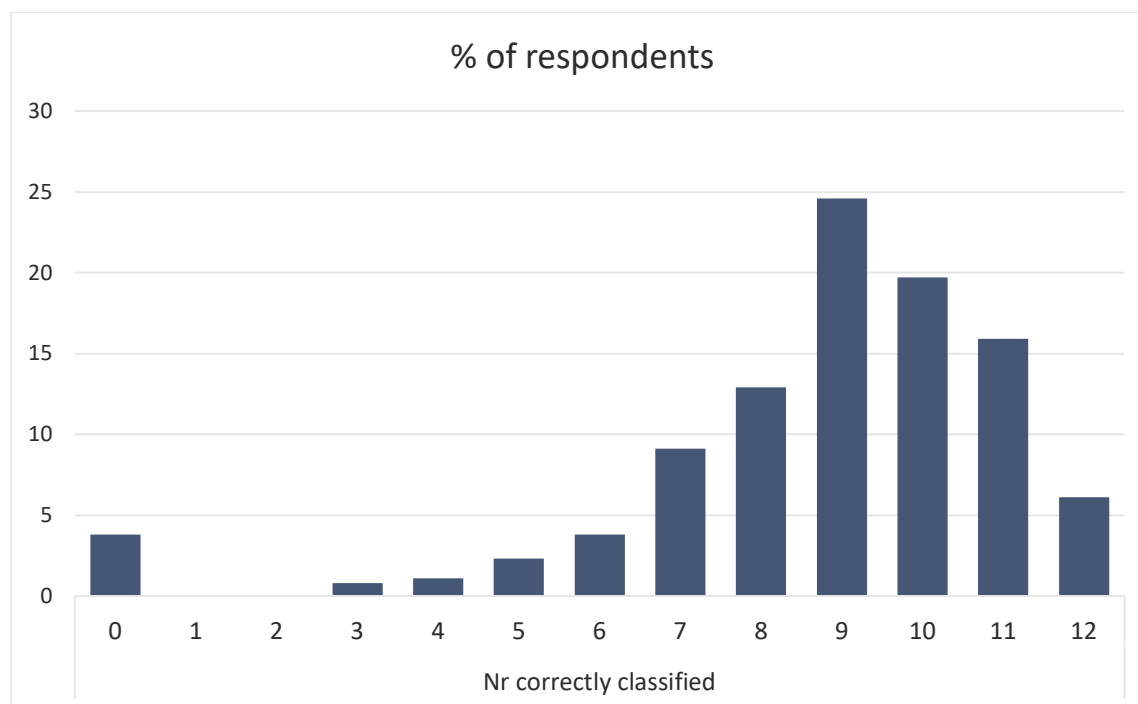
To assess whether we can detect a pattern in the judgements of statements being true or false we computed an exploratory factor analysis excluding the 'don't know' answers. Results are provided in Table 2. While the analysis reveals three different factors with Eigen values higher than one, it is hard to find a substantial pattern in those factors. The first factor seems to include those statements which were most certainly classified as incorrect (but see the 'don't know' score for vaccination). But most certainly there is no differentiation into factors that would relate for instance to natural science versus social phenomena or the like. Therefore, we decided to now further take into account the factor analysis and continued with the overall sum score of correctly classified information as dependent variable.

Table 2 – Factor analysis of statement assessments, structure matrix, Principle Components Analysis with Oblimin Rotation

| | Factor 1 | Factor 2 | Factor 2 |
|---|---|---|---|
| F: Vaccination and Autism | .745 | | |
| F. No Data Climate Change | .734 | -.315 | |
| F: No Landing on the Moon | .701 | | |
| F: Refugee and Economic Crisis | .664 | | .309 |
| F. Genetic Modification Homosexuality | .642 | | |
| F: Race and Intelligence | .575 | | |
| F: CERN Black Hole | .300 | .686 | |
| T: Water on Europe/Jupiter | | .618 | |
| T. Life Expectancy Differences | | .500 | |
| T: Earthquake Prediction | | | -.672 |
| F: Gender Studies Transsexuality | | | .625 |
| T. Social Inequality | | | .557 |
| **Eigen values** | **3.14** | **1.39** | **1.33** |
| **Explained Variance %** | **26.15** | **11.58** | **11.09** |

Finally, before turning to the potential relation between disinformation classification and media usage and socio-demographics, we consider whether respondents indicated that they had already know any of the headlines and whether that made a difference for their ability to correctly classify the information. While only three percent said that they had heard about all headlines before, some 30 per cent reported they had never heard about any of the headlines and 67 per cent had heard about some. Reported knowledge, however, did not matter for the ability to correctly classify, with an ANOVA showing no significant differences between the three groups.

In the next section, we turn to the question of a possible relationship between media use, respondents' interest in certain news topics, their trust in news media and their ability to correctly classify (dis)information. To that end, we report descriptive information regarding out sample's media use and topic interest in Chart 2. Using social media and online news is most common among the respondents, with print and TV news consumption still being considerable. International, national and political news generate most interest, with however considerable shares also for local news, science and technology news and news about arts and culture. The high score for health news may be due to the fact that data have been collection during Covid-19.

Chart 2 – Share of respondents using certain media and being interested in certain news topics
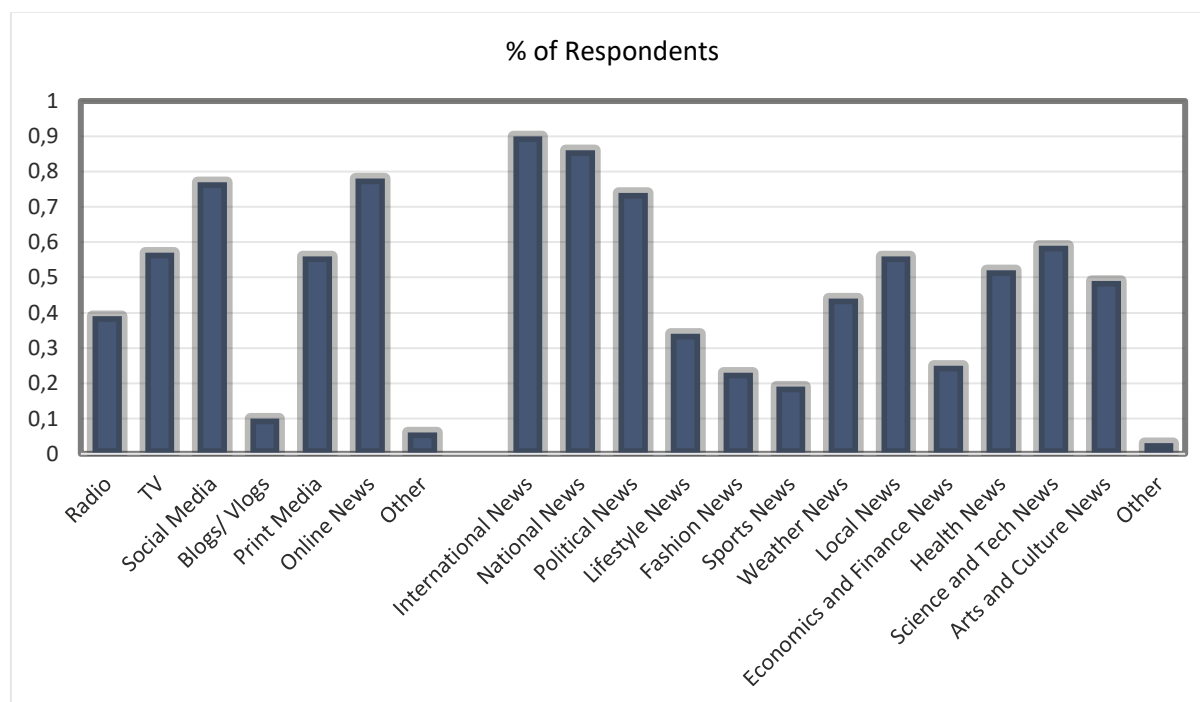


Looking at the relationship of media use and topical interests[1] with correctly classifying (dis)information, we show the mean differences in the sum score of correctly classified statements between users and non-users of certain media, respectively between respondents who are interested or not in certain topics. Asterisks next to the categories in the charts indicate significant differences as outcomes of ANOVAs (* $p < .05$; ** $p < .01$; *** $p < .001$).

Results (Chart 3a) show that those who report to use TV, social media, print media and online news are more likely to correctly classify the statements. This does not confirm the assumption that social media are more likely to disinform. Media consumption overall appears to be related to higher levels of informedness.

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[1] The original question was: In the following, we will ask you questions about your news consumption habits. Where do you get the news? (checkboxes), the possible answers could be yes or no. The options were: Radio, Television, Social Media (Facebook, Instagram, Pinterest, Snapchat…), Blog, Vlog, Print Media (newspapers, magazines), internet (e.g. Google News), Other.

Chart 3a – Differences by media use, %



| | Radio | | TV * | | Social Media ** | | Blogs/Vlogs | | Print Media ** | | Online News *** | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| | 8,96 | 8,60 | 8,99 | 8,40 | 8,96 | 8,02 | 8,65 | 8,75 | 9,14 | 8,22 | 9,16 | 7,21 | 9,53 | 8,70 |
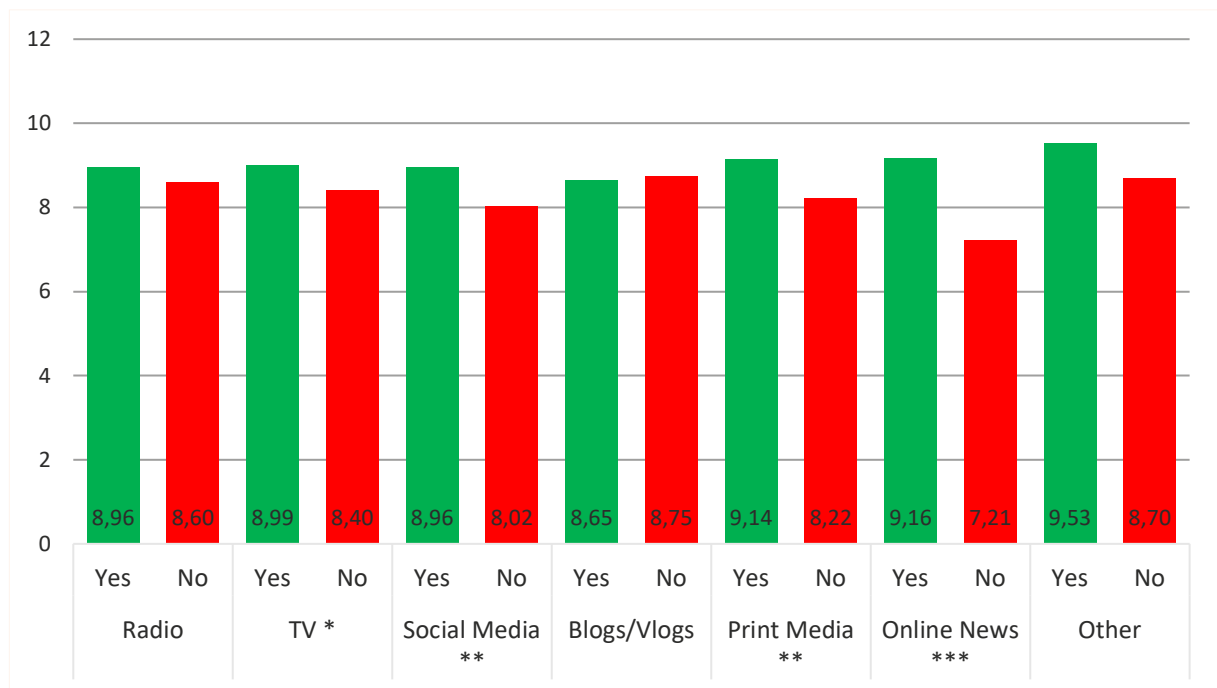
For topical interests[2] our analyses reveal that in particular interest in international, national and political news is related to higher shares of correctly classified information. But also interest in science and technology news and in arts and culture news, and to a lesser degree in local and weather news relates to the ability to correctly classify the statements, as shown in Chart 3b and 3c.

Chart 3b – Mean differences by topic interest



| | International News *** | | National News *** | | Political News *** | | Lifestyle News | | Fashion News | | Sports News | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No |
| | 9,15 | 4,92 | 9,17 | 6,13 | 9,3 | 7,12 | 8,64 | 8,8 | 8,43 | 8,83 | 9,09 | 8,65 |

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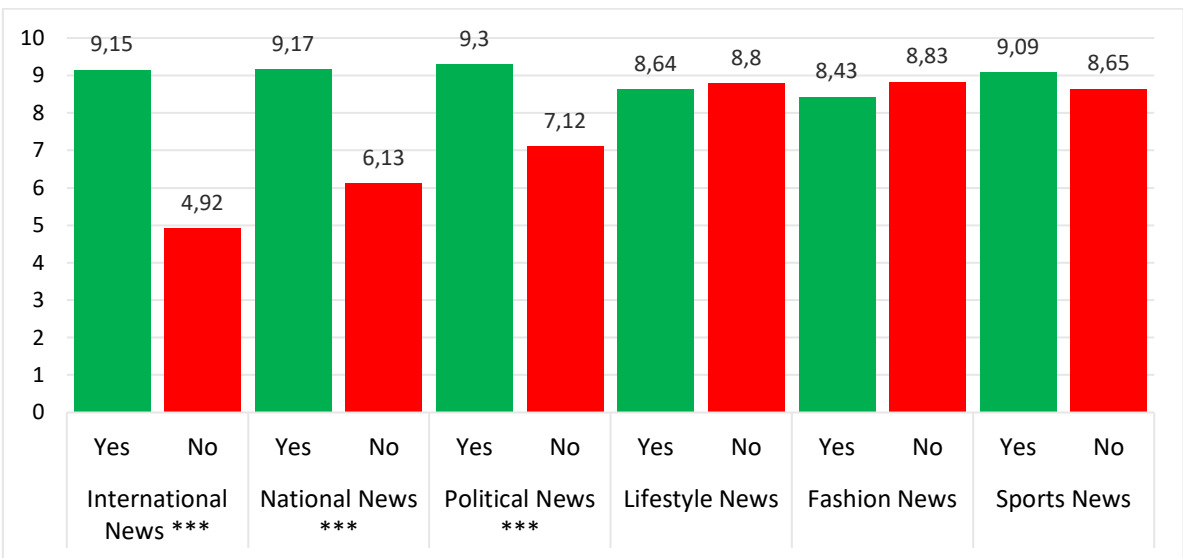
[2] The original question was: What kind of news are you interested in? (checkboxes), the possible answers could be yes or no. The options were: International news, National news, Political news, Lifestyle news, Fashion news, Weather news, Local news, Business and financial news, Health news, Educational news, Art and cultural news.

Chart 3c – Mean differences by topic interest
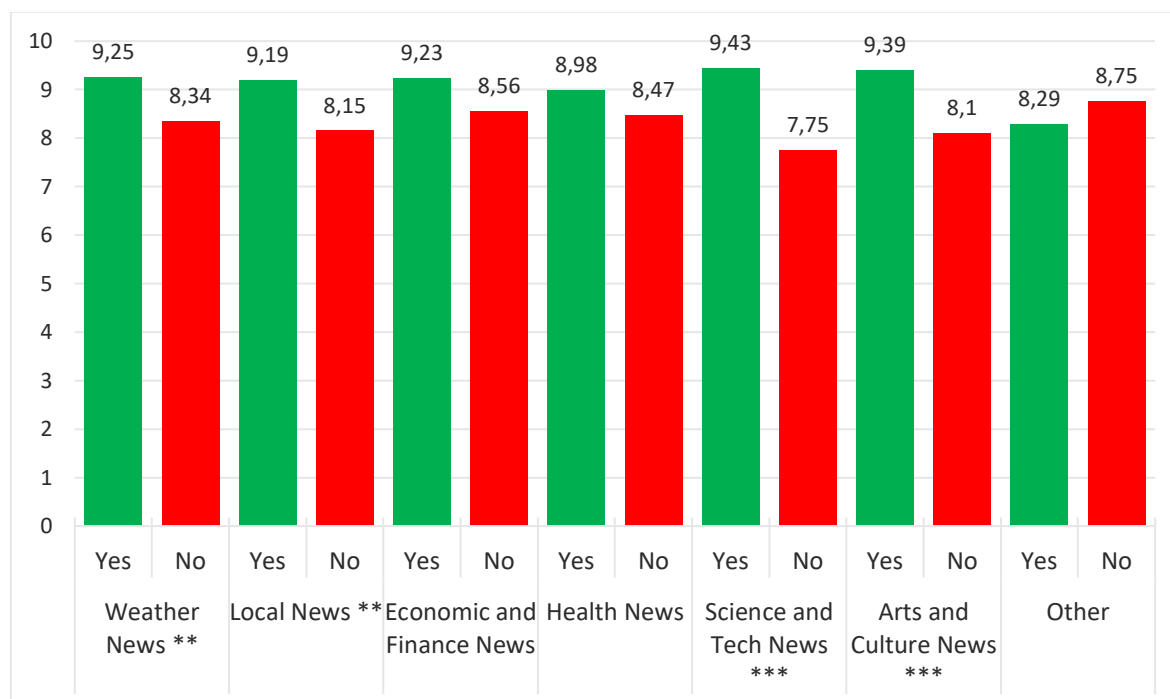


Hence, in sum we can conclude that following media of almost any kind, and also interest in traditional, hard news media topics contributed to a higher likelihood of correctly identifying disinformation and correct information. This is interesting in light of the fact that most respondents would see social media as a main source of fake news, as shown in Chart 4. A striking 79 % of respondents said that social media were the main source of information, with blogs/vlogs scoring second with only 12 %. Mainstream media are not really seen as a source of disinformation, with online news scoring highest among the more traditional news sources. The results for social media are interesting in light of the fact that above we showed that using social media actually related to respondents being better informed.

Chart 4 – Sources of fake news
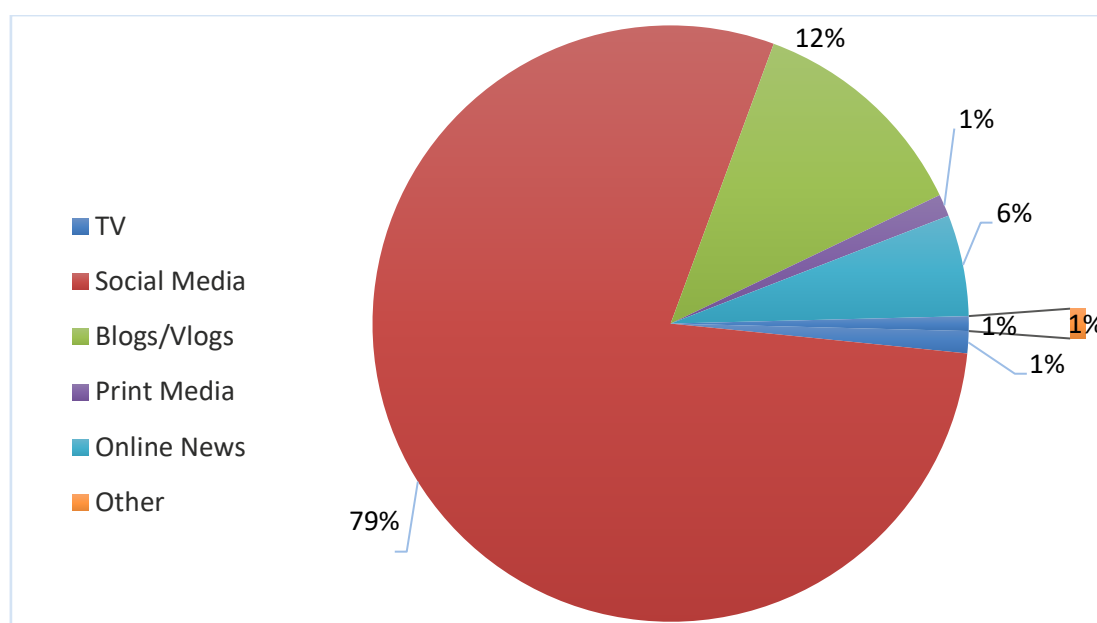
We now turn to assessing whether characteristics of our student sample mattered for the ability to correctly classify (dis)information. Therefore, and given the possible assumption that natural science students are better in classifying related topics and vice versa for social science students, in Chart 5 we compare the two student groups (natural vs. social sciences in our case) by looking at share of students who correctly classified the statements as either correct or incorrect. Asterisks next to the statements in the chart indicate significant differences as outcomes of ANOVAs (* $p < .05$). Overall, the natural science students perform somewhat better than the social science students, and this appears to be particularly true for statements close to the natural sciences (with the exception of the statement on economic consequences of refugees). Differences were particularly pronounced for the CERN and the earthquake statements. Only on the homosexuality statements did social science students appear to score better, but the difference was just not significant.

Chart 5 – Share of correct answers for each statement by studies



| Statement | Social Sciences, Arts and Humanities | Natural Sciences or Technical Studies |
|---|---|---|
| Earthquake * | 22,02 | 40,48 |
| Jupiter * | 52,98 | 70,24 |
| Moon | 88,1 | 94,05 |
| Vaccination * | 77,38 | 88,1 |
| Race | 92,26 | 92,86 |
| Refugee and Economic * | 76,79 | 90,48 |
| Life Expectancy | 78,57 | 77,38 |
| Social Inequality | 89,29 | 89,29 |
| Homosexuality | 94,05 | 89,29 |
| Climate Change * | 83,93 | 92,86 |
| Gender Studies | 57,74 | 63,1 |
| CERN * | 67,26 | 82,14 |
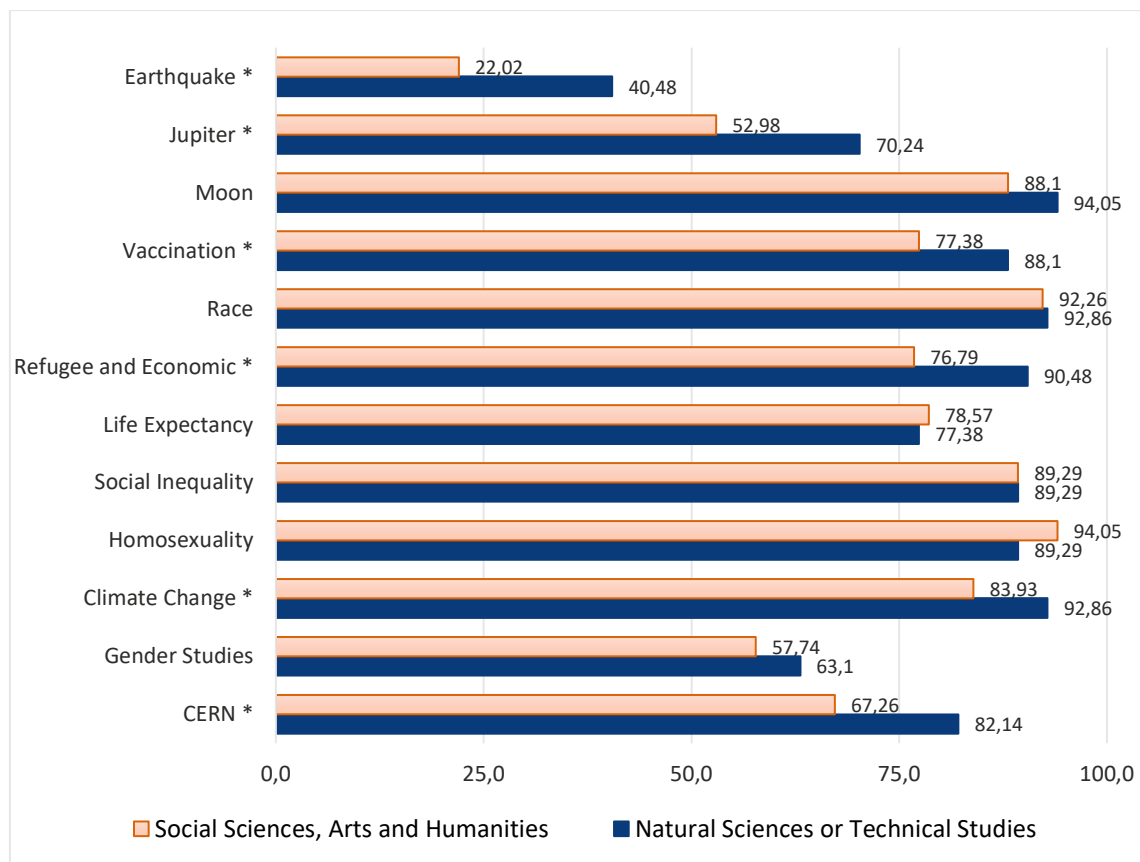
Before finally turning to a multivariate model, we provide descriptive information on two other aspects of the questionnaire that we also include below in the regression model. Trust in people in general, and in different types of news outlets was measured on a seven-point scale, ranging from little to a lot of trust. Results show that traditional media, print (M=5.43) and TV (M=5.35), are most trusted sources, and trusted also more than people in general (M=3.79) and social media (M=2.66) or online news (M=3.04).

When it comes to people assessments of where their own country and Europe are heading, we see overall optimism, a bit more so for Austria than for Europe (see Table 3). However, it should also be noted that a striking 30 % of respondents thought that situations in both Austria and Europe would become worse. This results also must be seen in light of the Covid-19 crisis.

Table 3 – Crosstab of direction Austria and Europe

| | | Direction Austria | | Total |
|---|---|---|---|---|
| | | Good | Bad | |
| Direction Europe | Good | 45.6 % | 8.3 % | 54.0 % |
| | Bad | 15.9 % | 30.2 % | 46.0 % |
| Total | | 61.5 % | 38.5 % | 100.0 % |

We finally put the bivariate relationships discussed above to a more robust and conservative text by utilizing an OLS linear regression model, shown in Table 4. The dependent variable is again the sum score of correctly classified statements. The model stepwise includes socio-demographic variables, including area of studies, future expectations for Austria and Europe, knowledge of fact-checking sites and trust in sources, use of media and interest in news topics. For the latter we only included those variables that showed significant effects in the bivariate relationships above.

Overall, only few significant factors emerge. Area of study does matter, with natural science students performing significantly better, at least until topical interest is included in the final model. Parents with academic degree only become marginally important in that final model. Also, those respondents who think the direction Austria is taking is good perform significantly better. Of the trust variables it was only trust in TV and radio that emerges as a positive significant predictor. Social media trust was negatively related in Model 3, but that relationship loses significance in the subsequent models. Media consumption does not matter in the multivariate model. But interest in political news and, somewhat surprisingly, in arts and culture news, remain significantly explaining the ability to correctly classify information.

## 2.3. Concluding remarks

Respondents in our sample were well versed in correctly classifying most of the statements provided as either correct or incorrect, but also showed some variation when it came to making such an assessment at all, as indicated by the 'don't know' answers to the statements. In the multivariate test of relationships it remained that overall natural science students, those who trust mainstream TV and radio news, those who are interested in politics and arts and culture and those who think Austria is taking a good direction, appear to be better able to correctly classify correct information as correct, and incorrect information as incorrect. We again emphasise that these results should not be generalised to the wider population, where some of these relationships may look very different compared to our student sample.

Table 4 – Multivariate regression model

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | | Model 5 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Beta | Std. Error | Beta | Std. Error | Beta | Std. Error | Beta | Std. Error | Beta | Std. Error |
| (Constant) | | .724 | | .820 | | 1.165 | | 1.217 | | 1.327 |
| Female | -.105 | .278 | -.087 | .276 | -.076 | .268 | -.061 | .273 | -.103 | .274 |
| Gender X | .090 | .894 | .090 | .887 | .084 | .856 | .093 | .871 | .059 | .842 |
| Age | .020 | .021 | .026 | .021 | .029 | .021 | .021 | .021 | .005 | .021 |
| Social Sciences/ Arts and Humanities | -.178* | .267 | -.198** | .266 | -.160* | .273 | -.155* | .279 | -.127 | .290 |
| Parent academic degree | .065 | .219 | .070 | .217 | .072 | .210 | .087 | .214 | .127* | .207 |
| Direction Europe | | | -.052 | .255 | -.052 | .248 | -.060 | .250 | -.099 | .243 |
| Direction Austria | | | .184* | .261 | .191* | .253 | .193** | .254 | .217** | .248 |
| Know Fact Checking Sites | | | | | -.045 | .217 | -.050 | .220 | -.040 | .213 |
| Trust in People | | | | | .100 | .077 | .094 | .078 | .075 | .076 |
| Trust News TV/ Radio | | | | | .260** | .135 | .276** | .137 | .285** | .137 |
| Trust News Print | | | | | -.079 | .143 | -.099 | .145 | -.138 | .145 |
| Trust News Social Media | | | | | -.149* | .122 | -.133 | .130 | -.123 | .125 |
| Trust Online News | | | | | -.056 | .112 | -.056 | .115 | -.008 | .113 |
| TV | | | | | | | -.083 | .227 | -.112 | .220 |
| Social Media | | | | | | | -.057 | .307 | -.052 | .302 |
| Print Media | | | | | | | .025 | .220 | -.039 | .217 |
| Online News | | | | | | | -.008 | .292 | -.070 | .285 |
| International News | | | | | | | | | .098 | .458 |
| National News | | | | | | | | | .102 | .372 |
| Political News | | | | | | | | | .135* | .264 |
| Weather News | | | | | | | | | .096 | .217 |
| Local News | | | | | | | | | -.038 | .228 |
| Science and Tech News | | | | | | | | | .089 | .257 |
| Arts and Culture News | | | | | | | | | .140* | .228 |
| Adjusted R2 | | .061 | | .081 | | .149 | | .145 | | .216 |

Note:* p < .05; ** p < .01; *** p < .001

# 3. Fake news in social and natural sciences in Croatia

## 3.1. Research methodology and sample

Between 15 March and 1 May 2020, we conducted an online survey among 608 students at the University of Zagreb: 235 natural and technical sciences students, and 373 from social sciences and humanities students. Therefore, we have modified (weighted) the data file in order to meet the expectance of the proportion of social science and natural science students to be 50 to 50 %, and for the gender ratio to be close to 50 % to 50 %.

The composition of our sample is as follows:

Table 1

| Gender | N | % |
|---|---|---|
| Male | 218 | 35.9 |
| Female | 389 | 64.1 |
| Total | 606 | 100.0 |

Table 2

| Age | N | % |
|---|---|---|
| 18-20 | 135 | 22.2 |
| 21-23 | 245 | 40.5 |
| 24-26 | 100 | 16.5 |
| 27-30 | 37 | 6.1 |
| 30+ | 88 | 14.6 |
| N/A | 1 | .1 |
| Total | 605 | 99.9 |

Table 3

| Do any of your parents have a university degree? | N | % |
|---|---|---|
| yes | 309 | 50.9 |
| no | 297 | 49.1 |
| Total | 606 | 100.0 |

## 3.2. Results

Here we present our data base and the most important and interesting results.

Figure 1 – Discernment between true and false headlines (%)

| Statement | very unlikely | unlikely | likely | very likely | I don´t know |
|---|---|---|---|---|---|
| Today earthquakes can be not predicted. | 0,30 | 0,23 | 0,25 | 0,13 | 0,08 |
| They found water on Europe the moon of Jupiter. | 0,12 | 0,13 | 0,24 | 0,21 | 0,29 |
| There has never been landing on the Moon. | 0,60 | 0,16 | 0,06 | 0,07 | 0,11 |
| The vaccine against measles, mumps and rubella causes autism. | 0,66 | 0,12 | 0,06 | 0,03 | 0,13 |
| The difference of intelligence between racial groups has been proven beyond doubt. | 0,62 | 0,14 | 0,08 | 0,09 | 0,08 |
| Refuge crisis is the main cause of the economic crisis in Europe. | 0,43 | 0,32 | 0,10 | 0,06 | 0,09 |
| Life expectancy is lower in eastern Europe than in Western. | 0,12 | 0,17 | 0,29 | 0,25 | 0,18 |
| Economic inequalities are rising in the world. | 0,05 | 0,06 | 0,26 | 0,59 | 0,0 |
| Homosexuality can be cured by genetic engineering. | 0,66 | 0,16 | 0,0 | 0,05 | 0,08 |
| Global warming is unsupported by data. | 0,64 | 0,15 | 0,09 | 0,08 | 0,04 |
| Gender studies increase the number of transsexual people. | 0,56 | 0,16 | 0,14 | 0,07 | 0,08 |
| CERN in Switzerland already created small black holes. | 0,41 | 0,19 | 0,16 | 0,06 | 0,18 |

Some of the statements are false, and some are true. From the set consisting of four true headline news, it is interesting that more than half of the students do not know that we cannot predict earthquakes. Around 30 % do not believe that the life expectancy in eastern European countries is lower than in western European countries.

As for the false headlines, around 20 % of respondents cannot differentiate between true and false headlines. Almost 13 % of the respondents do not believe that mankind has landed on the Moon. Almost 17 % do not believe in global warming, and even 20 % think that scientists have created small black holes at CERN in Switzerland. Some 15 % of students, via their beliefs, express certain dislike for other and different people. Close to 17 % of them believe in the genetic superiority of certain racial groups, and more than 20 % believe that genetic engineering can 'cure homosexuality'. Around 16 % see the migrant crisis as the major European problem.

Table 4

| Have you ever heard about these issues before? | N | % |
|---|---|---|
| yes | 120 | 19.8 % |
| some of them | 464 | 76.6 % |
| no | 22 | 3.6 % |

Respondents from Croatia claim that they have already heard about most (20 %) or some of the statements (76 %) listed in the survey. In Table 6 we present the most common media that are the major source of news for the students included in this survey.

As expected, the internet is the primary source of news for our respondents. As seen in Figure 2, almost 80 % of students get their news from the internet, and from social media (78.3 %). The second most common source of information is the television (almost half of the students use TV as a source of news). Other media are less used as a source of information: radio 29 %, print media 13 %. Blog or vlog 6.4 %.
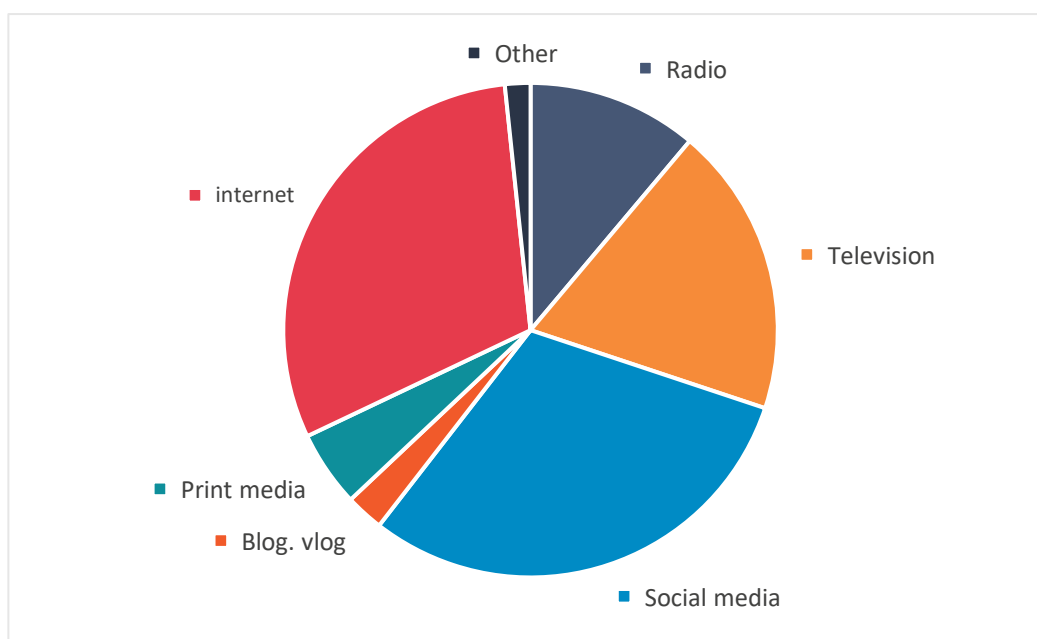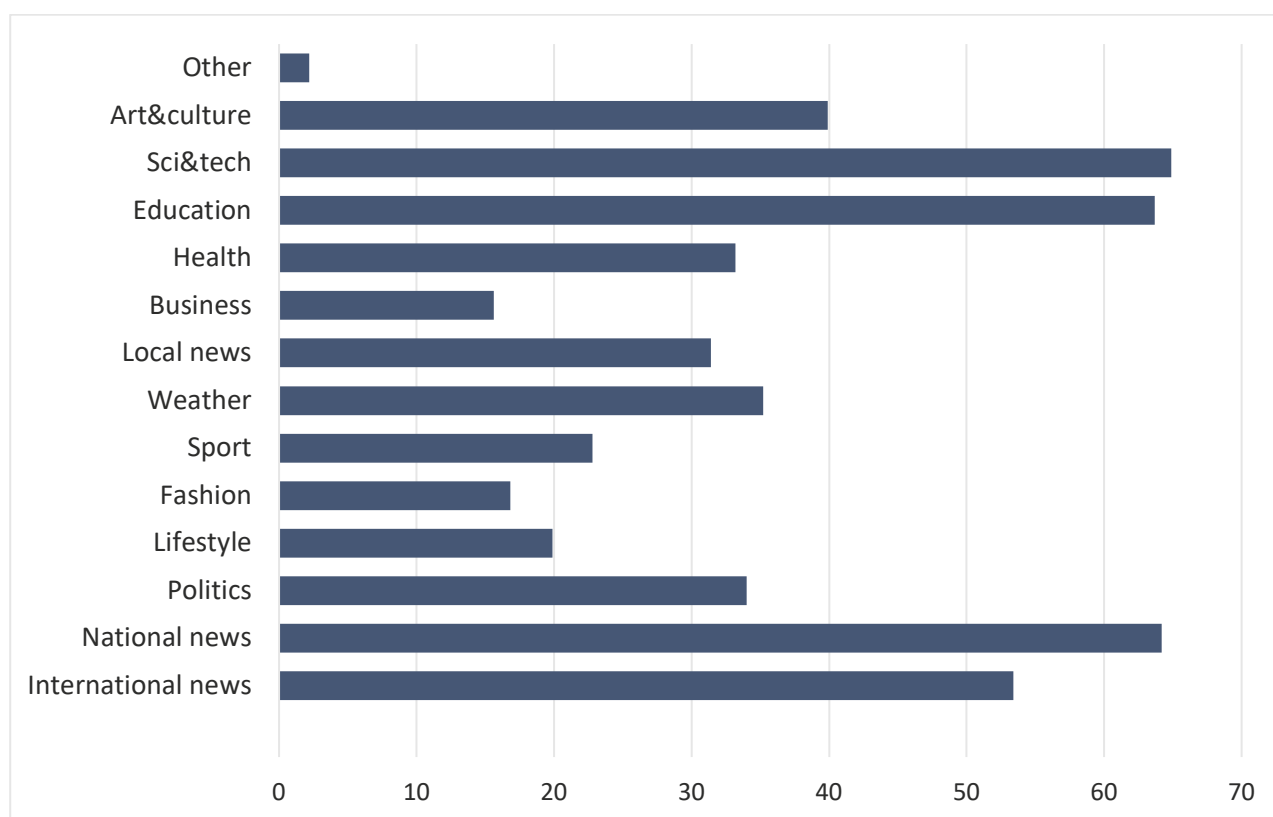
Figure 2 – News sources (%)

Figure 3 – Interest in news topics (%)



As seen from Figure 3, one third of respondents show interest in political news. Around one third is interested in health, weather and local news. Roughly two thirds of Croatian students find science and art and culture to be interesting news topics.

Around one half (53.4 %) of students included in the survey is interested in international news; 64.2 % in national news, and 63.7 % of respondents express interest in news about education.

More than one third of students (36 %) are acquainted with fact-checking pages, and one third of them are using those pages. This is presented in Tables 5 and 6.

Table 5

| Do you use any fact-checking page? | N | % |
|---|---|---|
| yes | 78 | 12.9 |
| sometimes | 135 | 22.3 |
| no | 393 | 64.8 |
| Total | 606 | 100.0 |

Table 6

| Would you say that most people can be trusted, or that you must be careful in dealing with people? | N | % |
|---|---|---|
| you must be careful | 129 | 21.3 |
| 2 | 126 | 20.8 |
| 3 | 140 | 23.0 |
| 4 | 95 | 15.6 |
| 5 | 90 | 14.9 |
| 6 | 18 | 3.0 |
| most people can be trusted | 8 | 1.4 |
| Total | 606 | 100.0 |

Some 42 % students believe that one must be careful in dealing with other people. A minority of the respondents (less than 5 %) say that most people can be trusted.

Table 7

| How trustworthy would you say the news from television/radio are? | N | % |
|---|---|---|
| cannot be trusted | 41 | 6.7 |
| 2 | 70 | 11.5 |
| 3 | 128 | 21.1 |
| 4 | 151 | 25.0 |
| 5 | 155 | 25.6 |
| 6 | 60 | 9.9 |
| definitely trusted | 2 | ,3 |
| Total | 606 | 100,0 |

Around 18 % respondents have a very limited trust in media in television and radio. But 10 % of them consider radio and TV very trustworthy.

Table 8

| How trustworthy would you say the news from print media are? | N | % |
|---|---|---|
| cannot be trusted | 48 | 8.0 |
| 2 | 68 | 11.2 |
| 3 | 137 | 22.6 |
| 4 | 162 | 26.7 |
| 5 | 151 | 25.0 |
| 6 | 37 | 6.1 |
| definitely trusted | 3 | .5 |
| Total | 606 | 100.0 |

Table 9

| How trustworthy would you say the news from social media are? | N | % |
|---|---|---|
| cannot be trusted | 109 | 18.0 |
| 2 | 213 | 35.1 |
| 3 | 179 | 29.5 |
| 4 | 80 | 13.2 |
| 5 | 23 | 3.8 |
| 6 | 2 | .4 |
| Total | 606 | 100.0 |

Most of the students think that news from social media cannot be trusted. On the other hand, as seen from Table 8, more of them believe that news from print media can be trusted (around 30 %).

Table 10

| Do you think that things are going in the right or in the wrong direction in Europe | N | % |
|---|---|---|
| Going right | 287 | 47.3 |
| Going wrong | 320 | 52.7 |
| Total | 606 | 100.0 |

Table 11

| Do you think that things are going in the right or in the wrong direction in Croatia? | N | % |
|---|---|---|
| Going right | 175 | 28.8 |
| Going wrong | 431 | 71.2 |
| Total | 606 | 100.0 |

A large proportion (almost half of respondents) think that things in Europe are going in the right direction, but more than two thirds (71 % roughly) think that things in Croatia are going in the wrong direction.

# 4. Fake news in social and natural sciences: Survey in Czechia

## 4.1. Research methodology and sample description

Data gathering took the form of face-to-face interviews (F2F), which were performed at the pre-selected universities in Czechia. The sampling procedure covered the universities in Prague (the capital), as well as the regional universities. Trained interviewers asked respondents to participate, and posed the pre-defined questions and recorded the respondents' answers in the questionnaires. Fieldwork took place in February 2020.

The analysed sample is composed of 512 individuals (valid cases). Its characteristics are described in the following charts (1-3).
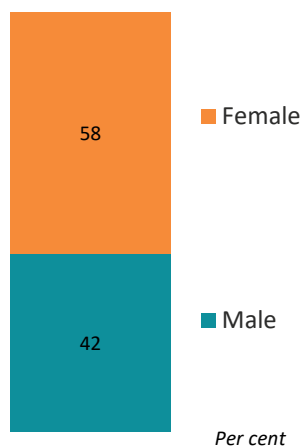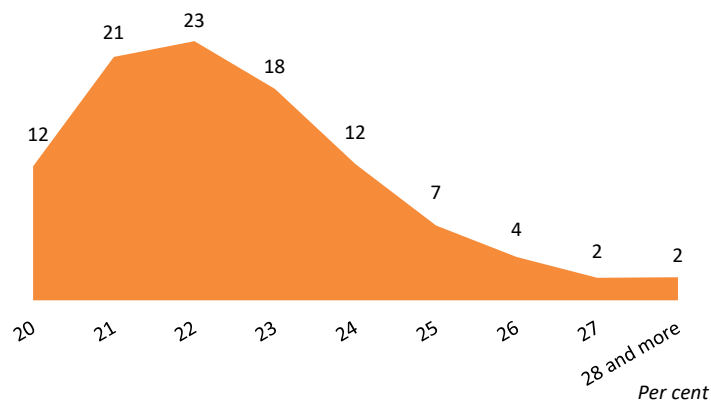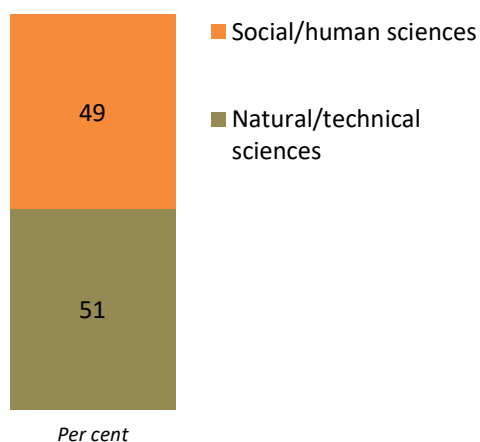
Chart 1 – Gender

Chart 2 – Age



Source: INESAN (2020, N=512, N=505)

Chart 3 – What discipline do you study?



Source: INESAN (2020, N=512, N=510)

## 4.2. Results

### 4.2.1. Fake-news recognition

As the aggregated results for all the university students questioned reveal (Chart 4), the students, in general, are inclined to believe more of the true headlines than the false ones. Among the true headlines, there is no clear difference in the field of the headline when both human/social science and natural/science headlines' credibility are ordered alternately. However, there is a difference between the first two pairs of headlines; while those focusing on Jupiter's moon and life expectancy were deemed quite evident as likely only by a narrow margin. It is interesting that the refugee crisis still resonates today among university students, where over a third of the respondents wrongly perceive this event as a main cause of the economic crisis in Europe. The last four statements are obviously rather correctly perceived as false.

Chart 4 – To what extent you think these news items are likely or unlikely to be true?
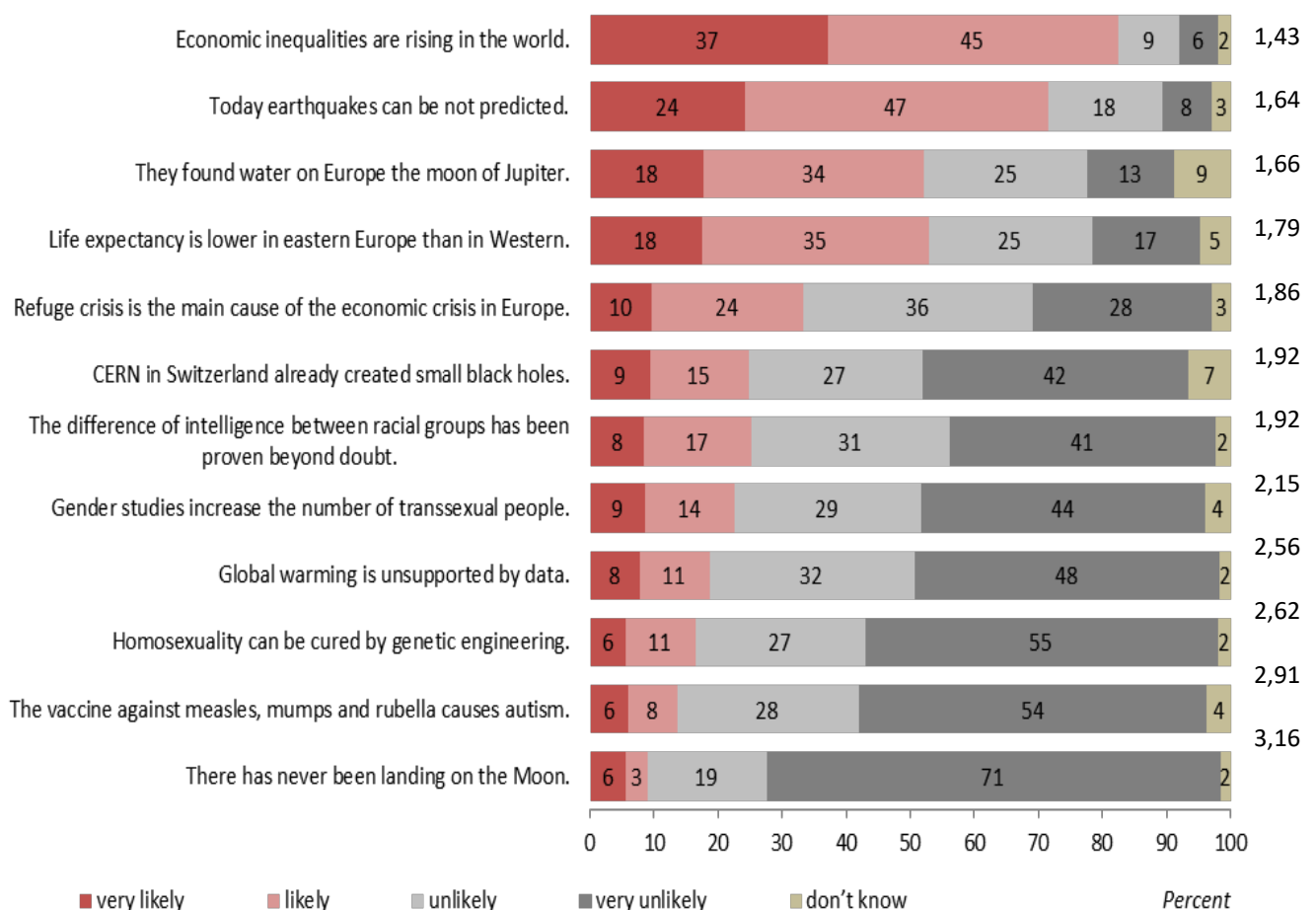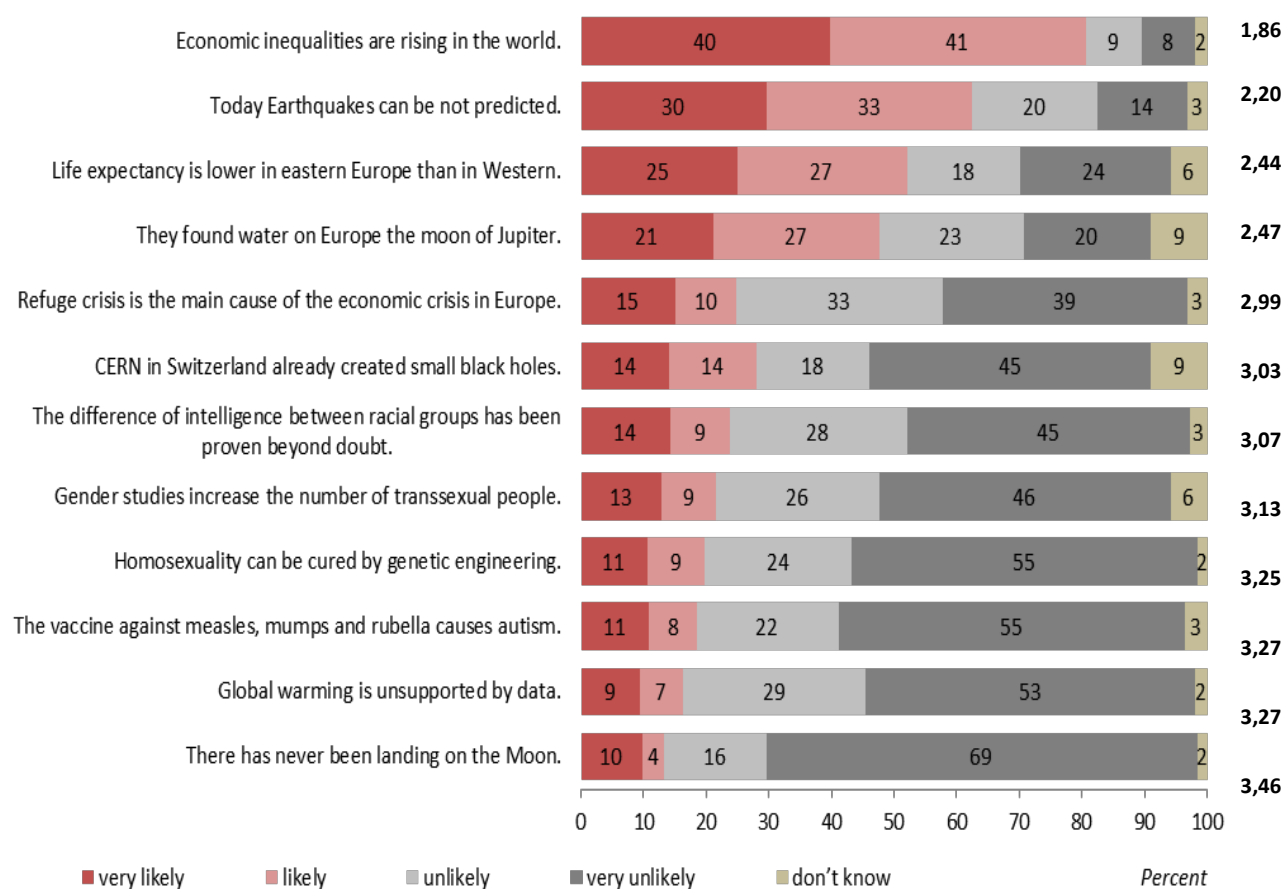


Source: INESAN (2020, N=510/505/506/508/508/506/503/505/507/504/509/506;
N (mean)=500/490/461/484/493/473/491/485/498/494/490/498)

Note: Mean: 1=very unlikely, 4=very likely (without the answer 'don't know')

Students of the natural and technical sciences, in general, gave more credibility to the true headlines than the false ones (Chart 5). Although less than half of these students perceived the likelihood of water being found on Jupiter's moon to be high, this may be due to their willingness to admit they simply do not know (9 %) whether to believe this headline or not (however, this share of 'do not know' answers is same among social/human science students – see below). The same share of 'don't know' answers was present among the answers to the fake news about black holes.

Chart 5 – To what extent you think these news items are likely or unlikely to be true? (Natural/technical sciences)

| News item | very likely | likely | unlikely | very unlikely | don't know | Mean |
|---|---|---|---|---|---|---|
| Economic inequalities are rising in the world. | 40 | 41 | 9 | 8 | 2 | 1,86 |
| Today Earthquakes can be not predicted. | 30 | 33 | 20 | 14 | 3 | 2,20 |
| Life expectancy is lower in eastern Europe than in Western. | 25 | 27 | 18 | 24 | 6 | 2,44 |
| They found water on Europe the moon of Jupiter. | 21 | 27 | 23 | 20 | 9 | 2,47 |
| Refuge crisis is the main cause of the economic crisis in Europe. | 15 | 10 | 33 | 39 | 3 | 2,99 |
| CERN in Switzerland already created small black holes. | 14 | 14 | 18 | 45 | 9 | 3,03 |
| The difference of intelligence between racial groups has been proven beyond doubt. | 14 | 9 | 28 | 45 | 3 | 3,07 |
| Gender studies increase the number of transsexual people. | 13 | 9 | 26 | 46 | 6 | 3,13 |
| Homosexuality can be cured by genetic engineering. | 11 | 9 | 24 | 55 | 2 | 3,25 |
| The vaccine against measles, mumps and rubella causes autism. | 11 | 8 | 22 | 55 | 3 | 3,27 |
| Global warming is unsupported by data. | 9 | 7 | 29 | 53 | 2 | 3,27 |
| There has never been landing on the Moon. | 10 | 4 | 16 | 69 | 2 | 3,46 |

Percent

■ very likely   ■ likely   ■ unlikely   ■ very unlikely   ■ don't know
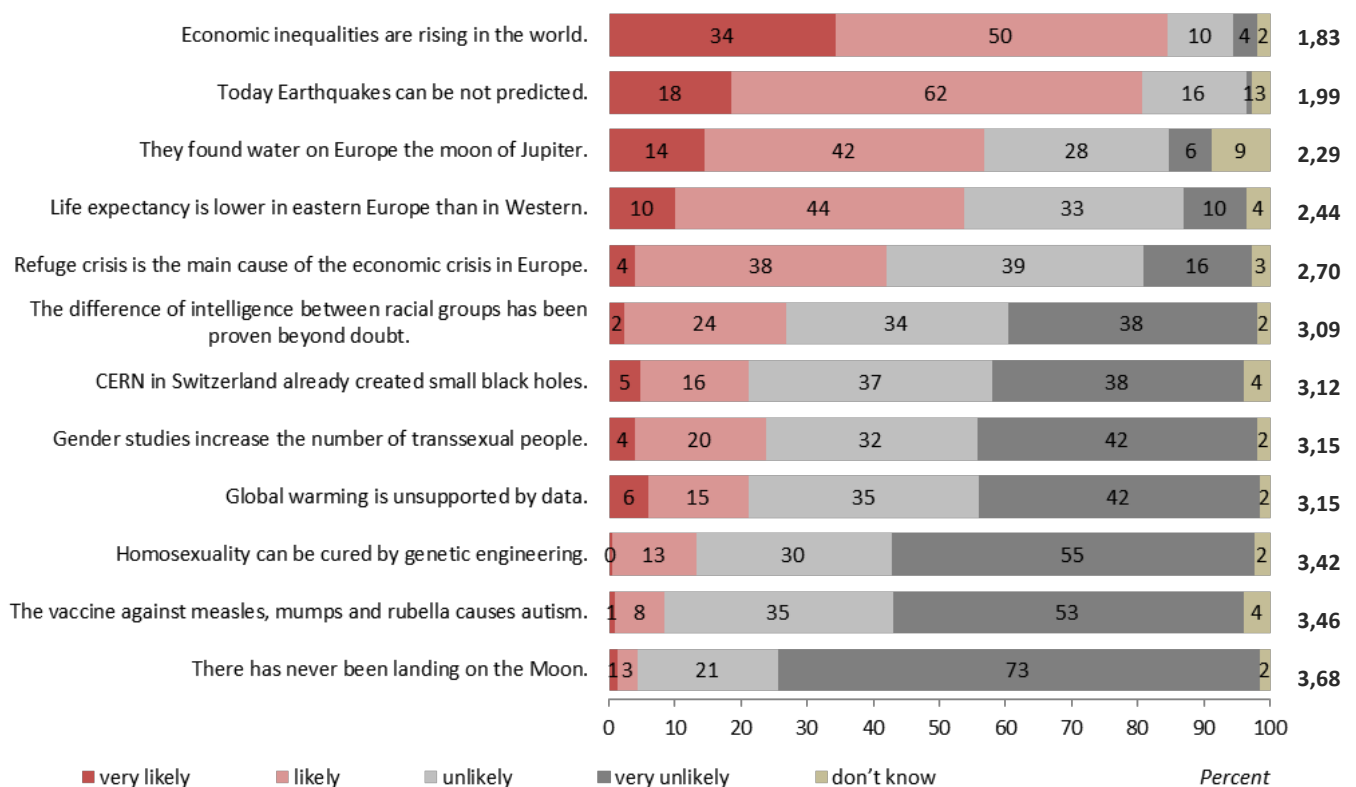
Source: INESAN (2020, N=259/256/257/256/258/256/253/256/254/258/257/256; N (mean)=254/248/242/233/250/233/246/241/250/249/252/252)
Note: Mean: 1=very likely, 4=very unlikely (without the answer 'don't know')

Students of human and social sciences (Chart 6) are also able to distinguish between true and false scientific news. In general, these students seem to be less willing to admit they 'do not know' and they are more often willing to take a stand on the issue. Their answers to the fake headlines seem to be less convincing (ranging between 0-6 %) than those of their technical counterparts (ranging 9-15 %) regarding the likelihood of these news items being true. This might show that they are able to more adequately assess fake news, however, their conviction is also lower among the true headlines (10-34 % compared to 21-40 % of the technical and science students). In other words, the assessments of scientific news seem to be more extreme among natural and technical science students than among the students of human and social sciences.

Chart 6 – To what extent you think these news items are likely or unlikely to be true? (Social/human sciences)

| News item | very likely | likely | unlikely | very unlikely | don't know | Mean |
|---|---|---|---|---|---|---|
| Economic inequalities are rising in the world. | 34 | 50 | 10 | 4 | 2 | 1,83 |
| Today Earthquakes can be not predicted. | 18 | 62 | 16 | 1 | 3 | 1,99 |
| They found water on Europe the moon of Jupiter. | 14 | 42 | 28 | 6 | 9 | 2,29 |
| Life expectancy is lower in eastern Europe than in Western. | 10 | 44 | 33 | 10 | 4 | 2,44 |
| Refuge crisis is the main cause of the economic crisis in Europe. | 4 | 38 | 39 | 16 | 3 | 2,70 |
| The difference of intelligence between racial groups has been proven beyond doubt. | 2 | 24 | 34 | 38 | 2 | 3,09 |
| CERN in Switzerland already created small black holes. | 5 | 16 | 37 | 38 | 4 | 3,12 |
| Gender studies increase the number of transsexual people. | 4 | 20 | 32 | 42 | 2 | 3,15 |
| Global warming is unsupported by data. | 6 | 15 | 35 | 42 | 2 | 3,15 |
| Homosexuality can be cured by genetic engineering. | 0 | 13 | 30 | 55 | 2 | 3,42 |
| The vaccine against measles, mumps and rubella causes autism. | 1 | 8 | 35 | 53 | 4 | 3,46 |
| There has never been landing on the Moon. | 1 | 3 | 21 | 73 | 2 | 3,68 |

Source: INESAN (2020, N=251/249/250/251/250/250/250/249/250/250/251/250;
N (mean)=246/242/228/242/243/245/240/244/246/244/241/246)

Note: Mean: 1=very likely, 4=very unlikely (without the answer 'don't know')

The two groups of students differ significantly in the structure of their answers to all the headlines but one – the true headline about the rise of economic inequalities in the world [$\chi2=8.665$, $df=4$, $p=0.070$]. Although the mean values of the true headline about differences in life expectancy in eastern and western Europe do not differ (see Charts 6 and 7), the structure of the answers clearly does [$\chi2=54.819$, $df=4$, $p=0.000$] as is the case in the rest of the news items.

Chart 7 reveals differences in the mean assessments of the headlines. Out of the first four headlines which are true, in two of them (economic inequalities, and life expectancy) there are no significant differences between the answers of the two groups of students. However, the other two true headlines (water on Europa [$t=-2.005$, $df=431.593$, $p=0.046$] and earthquake prediction [$t=-2.728$, $df=405.907$, $p=0.007$]) are from the natural/technical field, while the students of social/human sciences, surprisingly, are more successful in their assessment. Out of the eight fake news headlines, the two groups of students significantly differ in four of them. In the issue of the impact of the refugee crisis on Europe's economy (which is the fake social news), students of natural/technical sciences were, paradoxically, more successful in its mean assessment ($t=-3.509$, $df=461.084$, $p=0.000$). In the remaining three items where the two groups of students differ in their mean answers (fake Moon landing (SOC) [$t=3.063$, $df=421.763$, $p=0.002$], vaccines causing autism (SCI) [$t=2.407$, $df=432.798$, $p=0.017$], and homosexuality treatment (SCI) [$t=2.146$, $df=453.235$, $p=0.032$]), the social/human sciences students were able to assess these items more validly, even though they were studying the field of natural/technical sciences.

Chart 7 – Comparison of the mean values of answers to the news items between social/human science and natural/technical science students
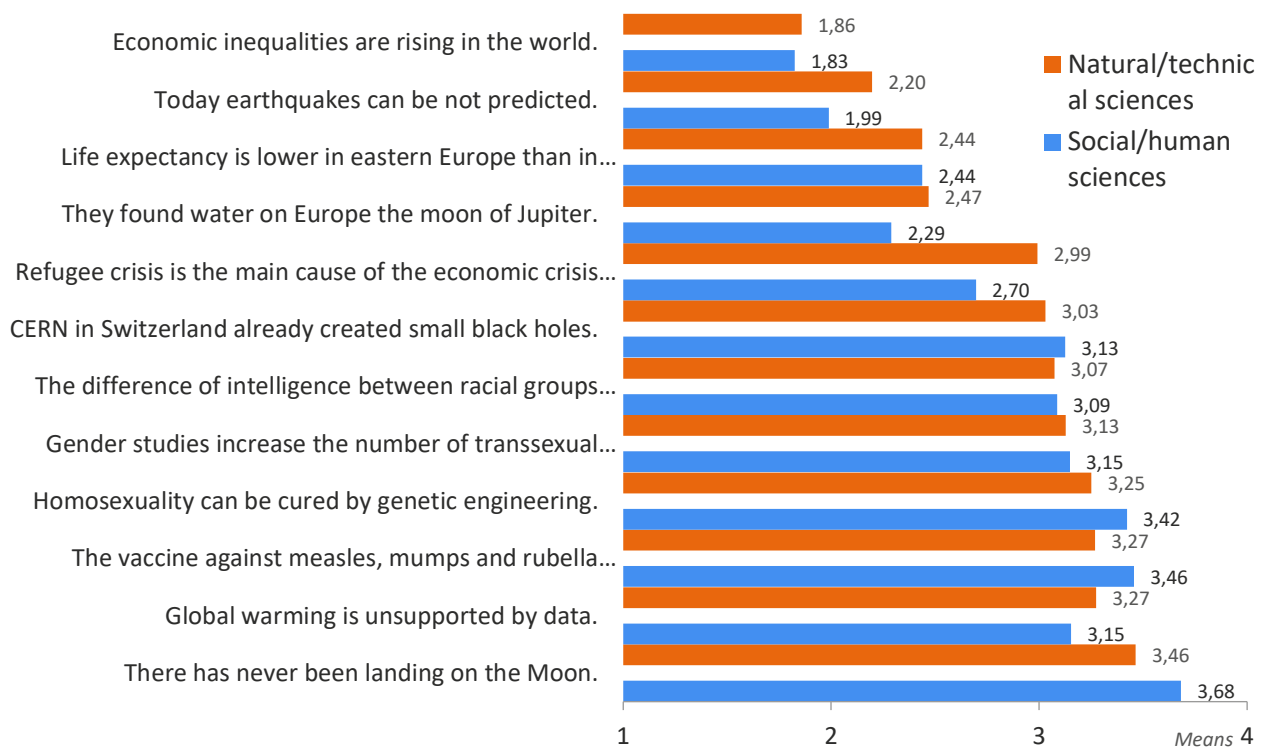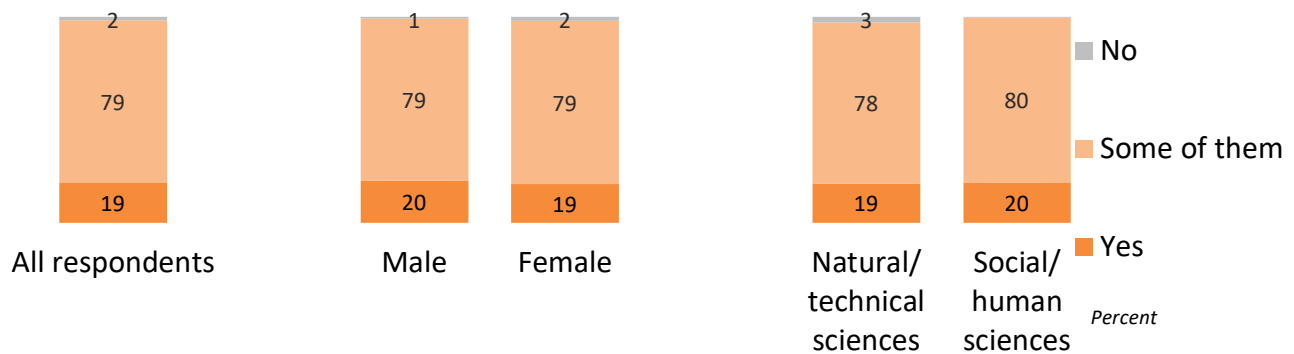


Source: INESAN (2020, N (natural/technical) =254/248/242/233/250/233/246/241/250/249/252/252; N (social/human)=246/242/242/228/243/240/245/244/244/241/246/246)

Note: Mean: 1=very likely, 4=very unlikely (without the answer don´t know)

When the likelihoods of individual headlines are dichotomised on the binary values of being likely (very likely + likely) and unlikely (very unlikely + unlikely), there seems to be two trends. Firstly, answers to the true headlines inclines to be mutually (very weakly) positively associated (in 5 out of 6 combinations). Secondly, answers to the false headlines are mutually (weakly) positively associated (24 out of 28 combinations). Finally, contrary to expectation, there is no evident negative association between assessment of true and false headlines (only 1 out of 32 combinations is in the expected association, while 7 combinations are the opposite of this expectation and in most of such combinations there is no significant relationship). The table of the associations between individual headlines is available in Appendix A.

It is evident, on an aggregated level, that there is no significant difference in the previous knowledge of the news (Chart 8). Both groups of students seem to experience similar knowledge of the issues. This is true also for the gender aspect.

Chart 8 – Have you ever heard about these issues before? (by gender and discipline of study)



| | No | | |
|---|---|---|---|
| | Some of them | | |
| All respondents | Male | Female | Natural/technical sciences | Social/human sciences |

Source: INESAN (2020, N=510/510/510)

Note: [P=1,058, p=0,619]; [P=4,197, p=0,130]

## 4.2.2. Consuming news

As Chart 9 depicts, two main groups of media are related to each other. Students who use the internet very often also use social media as the main source of their news. Television is also often used together with these two news sources. The scale of utilisation of these three sources might be therefore labelled as students' mainstream news channels, because all of them are used in over 70 % of cases. The second group of media can be characterised as a sort of students' alternative media, which are less used. Among them, the most used media are print media (50 %) and radio (34 %) Chart 9 – Where do you get the news?

Chart 9 – Where do you get the news?
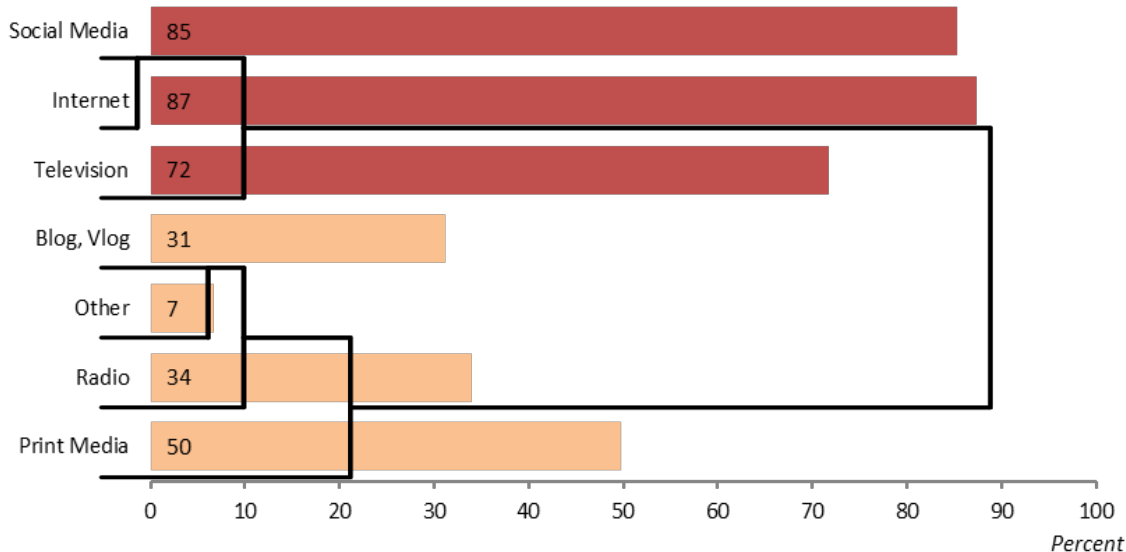


Source: INESAN (2020, N=512)

Note: This dendrogram defines typical groups of information sources. These groups (distinguished by different colours) are based on a cluster analysis. Horizontal distances in the dendrogram specify the similarity in the use of particular information sources; shorter distance represents higher similarity. Cluster analysis uses the Ward method.

Note: the most frequent other information sources are friends, school, lectures and podcasts.

The differences between natural/technical and social/human sciences students in media utilisation for news are significant only in cases of internet (95 % of social/human science and 80 % of natural/technical science students, [$\chi2$=25.096, df=1, p=0.000]), and blogs/vlogs (35 % of social/human science and 27 % of natural/technical science students, [$\chi2$=4.059, df=1, p=0.044]).

Chart 10 depicts, among other things, shares of interest of the Czech students in different kinds of news. There are four groups of news which serve as common interests for some kinds of students. The first (red) group of news is typical for traditional TV news or news services. The second (yellow) group is news which can be expected among university students which are expected to achieve higher cultural capital. The third (green) group is lifestyle and health news which is typical rather for specialised magazines. The last group (purple) could be described as news which is 'marginal' for students (even though 40 % of students are interested in local and weather news).

Chart 10 – What kind of news are you interested in?
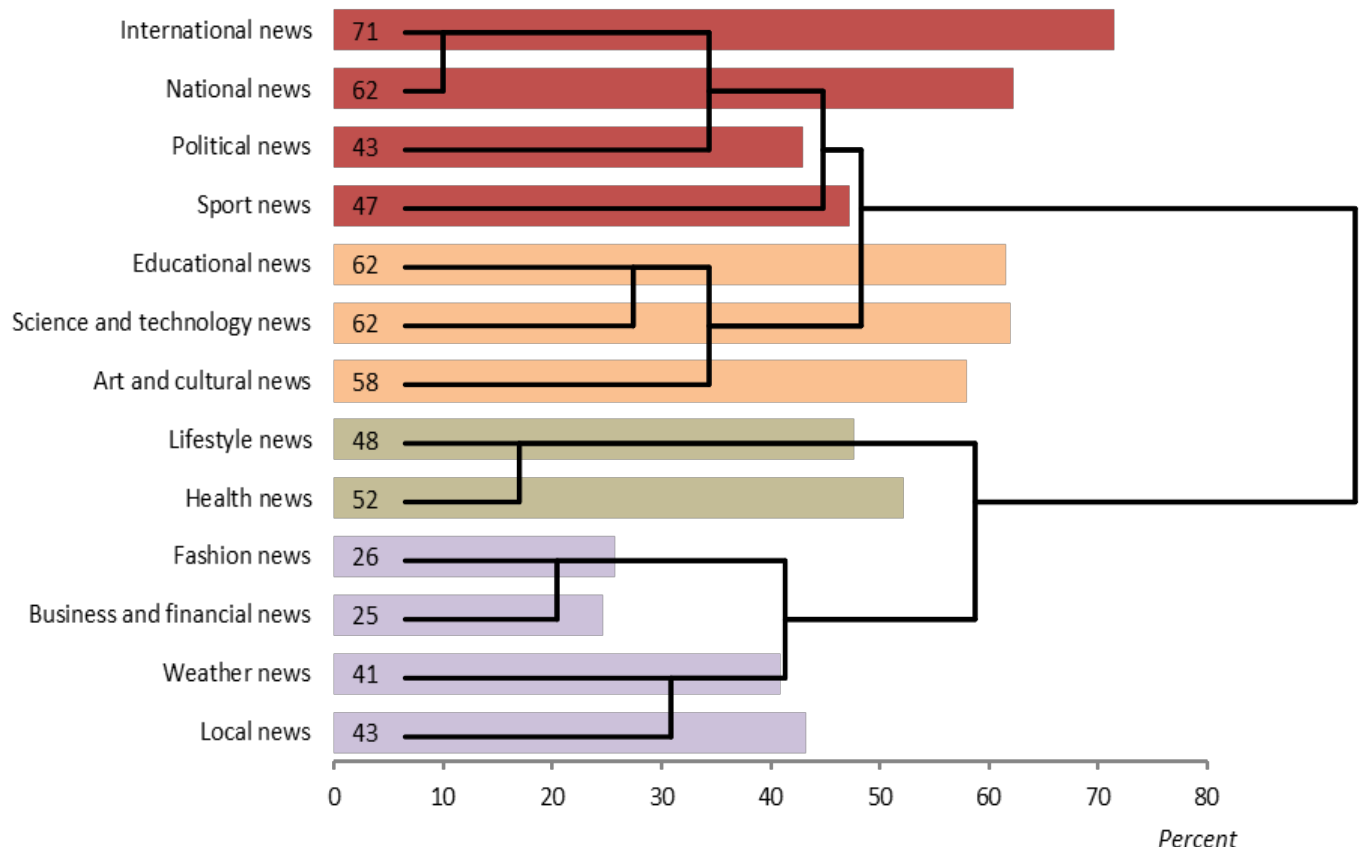


Source: INESAN (2020, N=512)

Note: This dendrogram defines typical groups of news. These groups (distinguished by different colours) are based on a cluster analysis. Horizontal distances in the dendrogram specify the similarity in the interest of particular news; shorter distance represents higher similarity. Cluster analysis uses the Ward method.

Note: 1 % of respondents are interested in another kind of news (nature, environment, agriculture/economy, military, travel).

Students differ significantly in their interest in national news (69 % of social/human sciences and 56 % of natural/technical sciences [$\chi2=10.326$, df=1, p=0.001], political news (47 % of social/human sciences and 39 % of natural/technical sciences [$\chi2=3.964$, df=1, p=0.046], art and cultural news (67 % of social/human sciences and 49 % of natural/technical sciences [$\chi2=17.569$, df=1, p=0.000], health news (61 % of natural/technical sciences and 43 % of social/human sciences, [$\chi2=15.011$, df=1, p=0.000]), business and financial news (33 % of social/human sciences and 16 % of natural/technical sciences [$\chi2=18.987$, df=1, p=0.000], weather (52 % of natural/technical sciences and 29 % of social/human sciences, [$\chi2=26.203$, df=1, p=0.000]), and local news (52 % of social/human sciences and 35 % of natural/technical sciences, [$\chi2=14.944$, df=1, p=0.000]). It seems that social/human science students are more interested in quite a few types of news than the other students, except for health and weather news.

## 4.2.3. Fact-checking

Czech university students expect most fake news to be present on media connected to the internet, which constitutes the first group in the dendrogram (Chart 11). A lot of them (40 %) also believe they can encounter fake news on television. In the rest of what was labelled as alternative media for students, they do not expect the presence of fake news so often.

Chart 11 – Where can you mostly come across fake news?
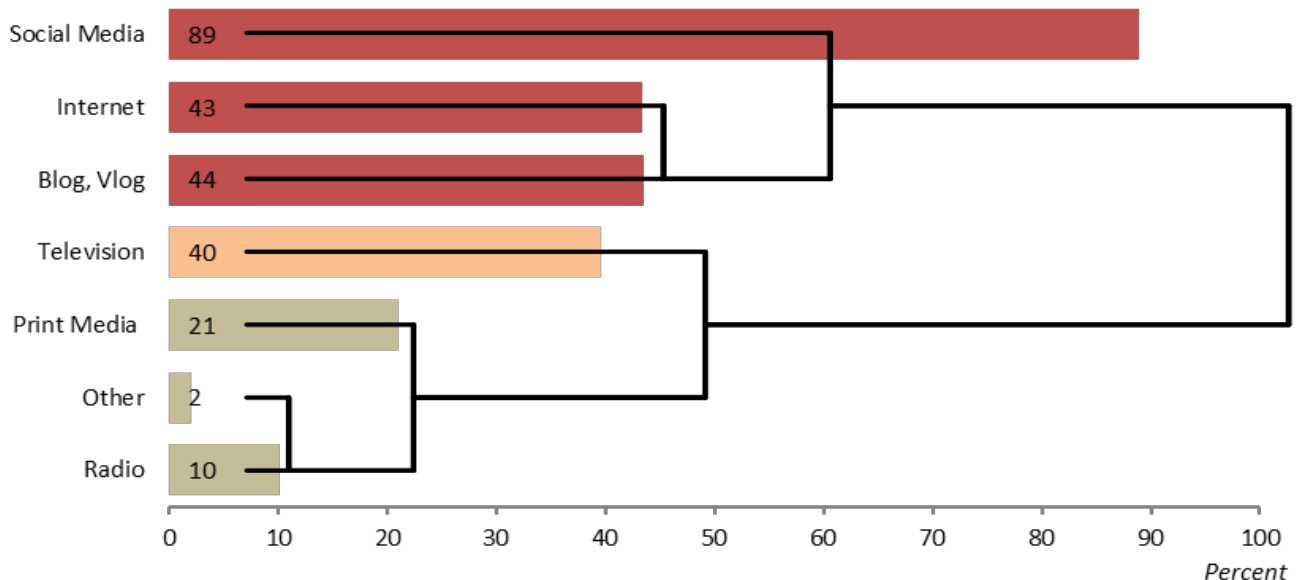


Source: INESAN (2020, N=512)

Note: This dendrogram defines typical groups of information sources. These groups (distinguished by different colours) are based on a cluster analysis. Horizontal distances in this dendrogram specify the similarity of particular information sources according to the occurrence of fake news; shorter distance represents higher similarity. Cluster analysis uses the Ward method.

Note: the most frequent other information sources are other people and disinformation, unverified sites.

The two groups of students are very similar in their expectation of fake news in different kinds of media. They only differ in the expectation of fake news in print media where 25 % of natural/technical students and 17 % of social/human students often expect fake news [$\chi2=5.625$, df=1, p=0.018].

On the other hand, students differ in the structure of using fact-checking pages. While most of the students do not even know any fact-checking pages, this ignorance is clearly lesser among social/human science students because they have better knowledge of these pages and use them more (Chart 12). In a very similar fashion, and quite interestingly, females know and (at least sometimes) use fact-checking pages less than males.

Chart 12 – Do you know/use any fact-checking pages? (by gender and discipline of study)
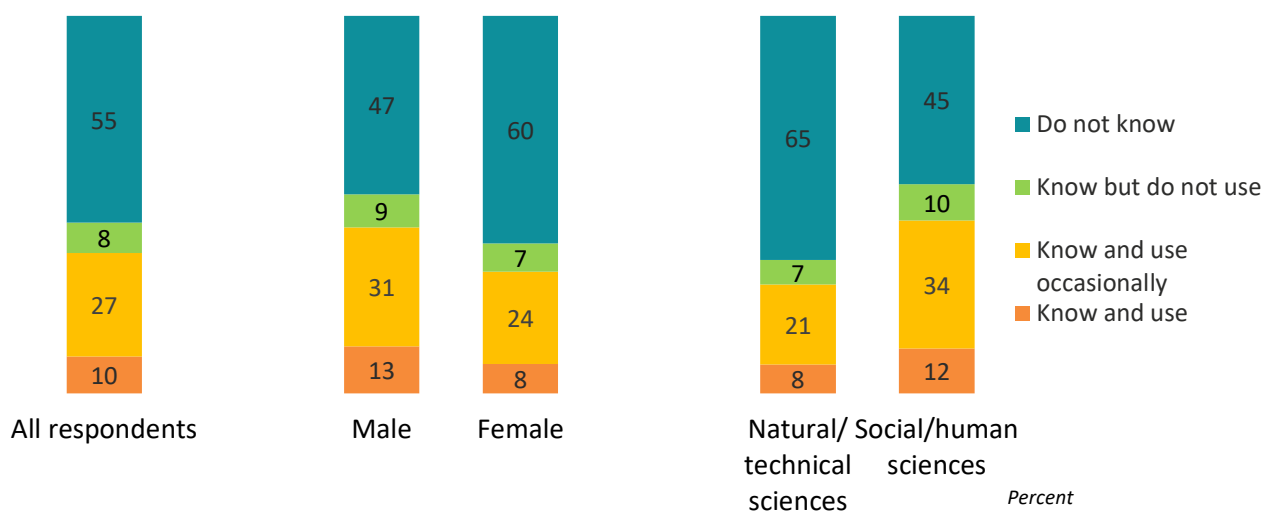


Source: INESAN (2020, N=511/511/511)

Note: [$\chi^2$=9.291, df=3, p=0.026]; [$\chi^2$=20.672, df=3, p=0.000]

## 4.2.4. Discussion

Czech university students, in general, are able to distinguish between real news and fake news, although there remains a quite substantive share of those who are wrong (which might also be issue specific). In addition, it is important to take into consideration that this research did not allow the reader to open/click on the headline and read what the news is about, which limits the findings of this report. Another research limitation is the focus on written news, no oral or visual (fake) news was researched, which could have the potential to affect the two groups of students differently.

Putting these limitations aside, the general trend is that natural/technical students tend to be more convinced of the likelihood of all the news items. In other words, they tend to more strongly believe the news in general, even when it is false. This could hypothetically make these students appear more convinced and more persuasive. On the other hand, students of social and human sciences are more successful in their judgements even when they are not that sure about them. They might be more hesitant and maybe more careful in their acceptance of both real and fake news. However, they are not so willing to admit that they do not know.

The knowledge of the news headlines here seems not to be important (on the level of aggregated results), because both groups of students revealed similar knowledge of the items. However, this information is very heavily limited, and it may be subordinated to various kinds of biases, which creates the need for further exploration.

The relative success of social/human science students does not seem to be related to their better knowledge of the media landscape because, on the aggregated level, they have similar expectations of where to expect fake news. Such intergroup expectation differences are very small and connected only to print media, which can be considered to be a rather alternative source of information for students (even if around 50 % of students use it).

On the other hand, the knowledge and use of the fact-checking pages on an aggregated level goes in line with the expectation that social and human science students are less trusting of the headlines. These students seem to be more familiar with fact-checking pages than their natural/technical peers. However, there is no significant difference in their level of trust in different media and even in other people (see Appendix B). This evokes the expectation that some kind of literacy, provided via their academic specialisation or past background, plays a role in this behaviour/decision-making.

## 4.2.5. Correcting misinformation and fighting disinformation

Although a relatively new term, fake news has become quite a hot topic in Czechia in recent years, especially among social scientists. There are a number of fact-checking pages and initiatives (e.g. Demagog.cz, Manipulátoři.cz, PoPravdě.cz, etc.), which recruit people mostly from the social and human science fields. The knowledge and utilisation of these initiatives is stronger among social and human science students, which confirms their greater involvement in the topic. This could be because of their fields, which push them to consider various perspectives when dealing with (very complex) issues regarding their interests (society and people). The provision of similar needs in the education of the technical/natural science students (or forms of increasing truly interdisciplinary research and education) could benefit both groups of students.

It seems reasonable to expect that the background of a student may play a role in the method of acceptance of both true and fake news. Further research is needed, but based on the above-mentioned results, it seems that the correction of acceptance of fake news could be inspired from the social/human science field of education.

It remains to be fully confirmed whether these differences between assessments of the news by the two groups of students are only caused by their educational background, or whether their personalities also intervene. It may easily be the case that different personalities are connected to the selection of different fields, as some research can indicate (Charles D. Pringle, Philip B. DuBose and Michael D. Yankey, 2010). This remains to be further researched.

## Appendix A – Phi coefficients of pairs of headlines coded dichotomously as unlikely–likely

| | CERN in Switzerland already created small black holes. | Gender studies increase the number of transsexual people. | Global warming is unsupported by data. | Homosexuality can be cured by genetic engineering. | Economic inequalities are rising in the world. | Life expectancy is lower in eastern Europe than in Western. | Refugee crisis is the main cause of the economic crisis in Europe. | The difference of intelligence between racial groups has been proven beyond doubt. | The vaccine against measles, mumps and rubella causes autism. | There has never been landing on the Moon. | They found water on Europe the moon of Jupiter. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Gender studies increase the number of transsexual people. | .223** | | | | | | | | | | |
| Global warming is unsupported by data. | 0.084 | .256** | | | | | | | | | |
| Homosexuality can be cured by genetic engineering. | .144** | .161** | .217** | | | | | | | | |
| Economic inequalities are rising in the world. | 0.079 | 0.086 | 0.044 | 0.022 | | | | | | | |
| Life expectancy is lower in eastern than in western Europe. | .182** | .104* | 0.031 | 0.042 | .134** | | | | | | |
| Refugee crisis is the main cause of the economic crisis in Europe. | 0.076 | .161** | .251** | 0.080 | 0.012 | .113* | | | | | |
| The difference of intelligence between racial groups has been proven beyond doubt. | 0.053 | .148** | .172** | .136** | -0.015 | .166** | .387** | | | | |
| The vaccine against measles, mumps and rubella causes autism. | .238** | .297** | .160** | .211** | -0.065 | 0.051 | .223** | .243** | | | |
| There has never been a landing on the Moon. | .209** | .171** | .238** | .224** | -.117** | 0.044 | .125** | .241** | .382** | | |
| They found water on Jupiter's moon, Europa. | .203** | .101* | 0.039 | .116* | .107* | 0.020 | -0.020 | -0.059 | 0.025 | 0.061 | |
| Today, earthquakes can be not predicted. | 0.079 | 0.039 | -0.038 | -0.013 | .228** | .158** | 0.089 | 0.017 | 0.049 | -0.053 | .098* |

*\*\*. Phi is significant at the 0.01 level; \*. Phi is significant at the 0.05 level.*

Note: Grey – expected positive association between true headlines; pink – expected negative association between true and false headlines; blue – expected positive association between false headlines; dark colours - cases in line with expectations.
Note: SPSS computes values of Phi coefficient for dichotomous variables on the scale <-1;1>, contrary to the commonly used <0;1>; Crammer V's results are positive equivalents of such SPSS's Phi coefficients; Pearson's correlations are equivalent to such Phi coefficients as Phi's computation is only simplified version (product-moment) of Pearson's correlation.

## Appendix B – Trust in other people and various media

Chart 13 – Would you say that most people can be trusted, or that you must be careful in dealing with other people? (by gender and discipline of study)
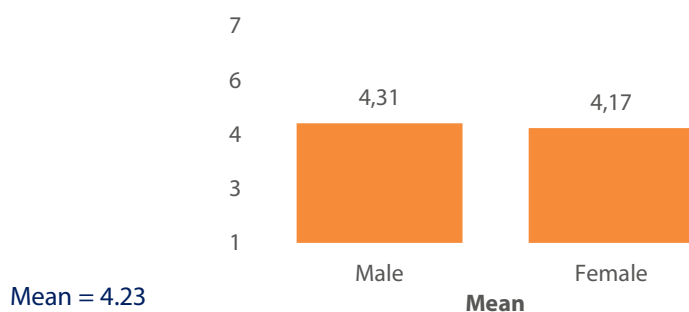


Mean = 3.12
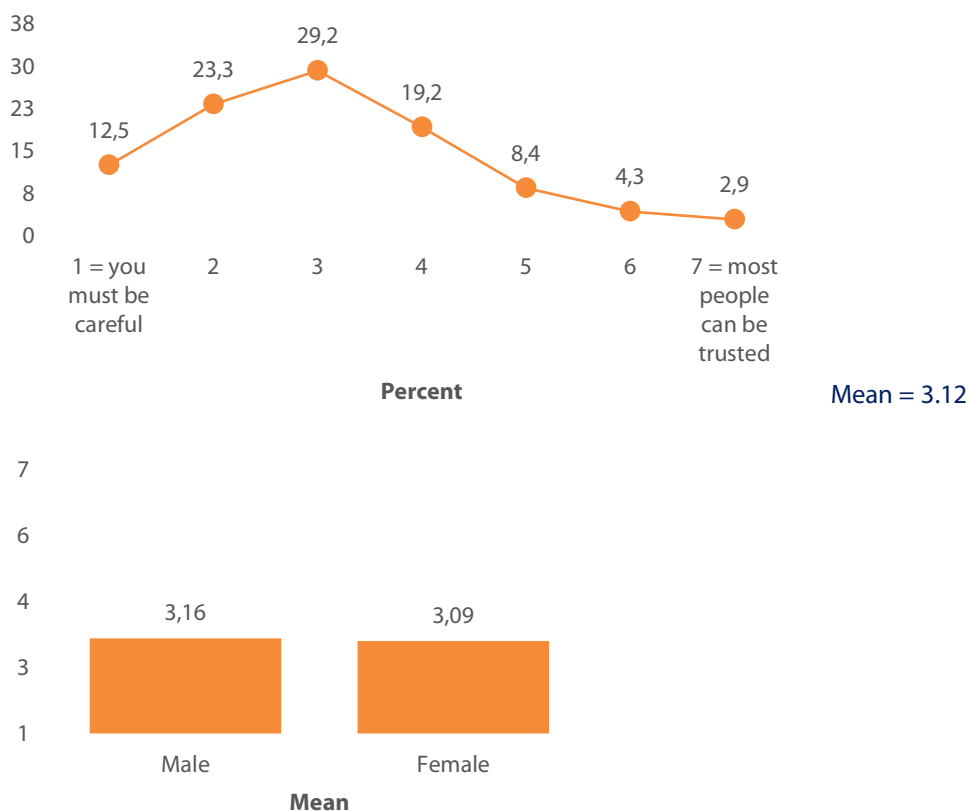


Source: INESAN (2020, N=510/510/510)

Note: standard deviation = 1.453

Note: [t=0.520, df=508, p=0.603]; [t=0.245, df=496.261, p=0.807]

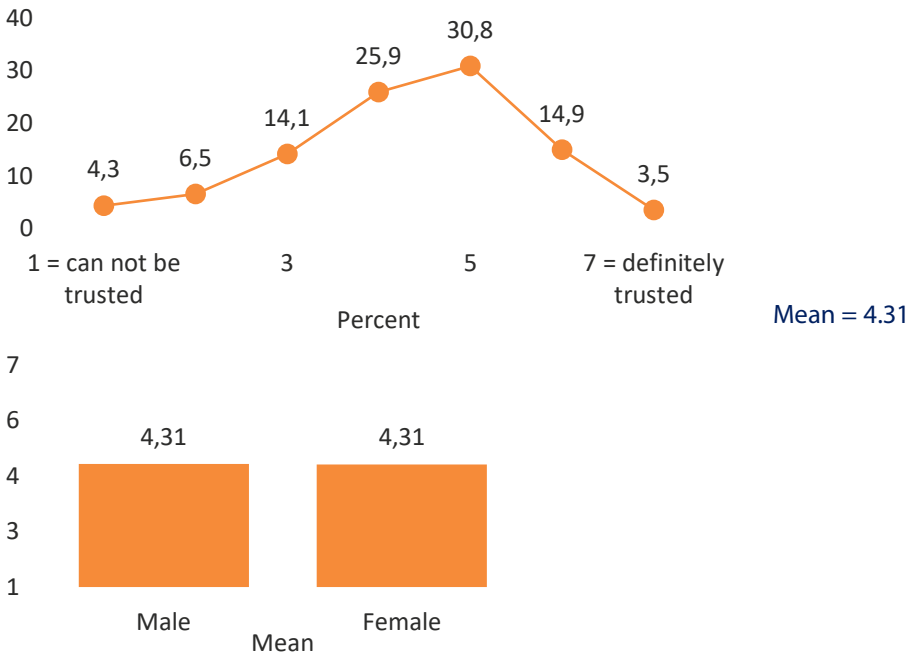Chart 14 – How trustworthy would you say the news from television/radio are? (by gender and discipline of study)



Mean = 4.23

Source: INESAN (2020, N=511/511/511)

Note: standard deviation = 1.364

Note: [t=1.109, df=509, p=0.268]; [t=1.236, df=488.890, p=0.217]

Chart 15 – How trustworthy would you say the news from print media are? (by gender and discipline of study)



Source: INESAN (2020, N=510/510/510)

Note: standard deviation = 1.384

Note: [t=0.043, df=508, p=0.966]; [t=-1.715, df=508, p=0.087]

Chart 16 – How trustworthy would you say the news from social media are? (by gender and discipline of study)



Mean = 3,15
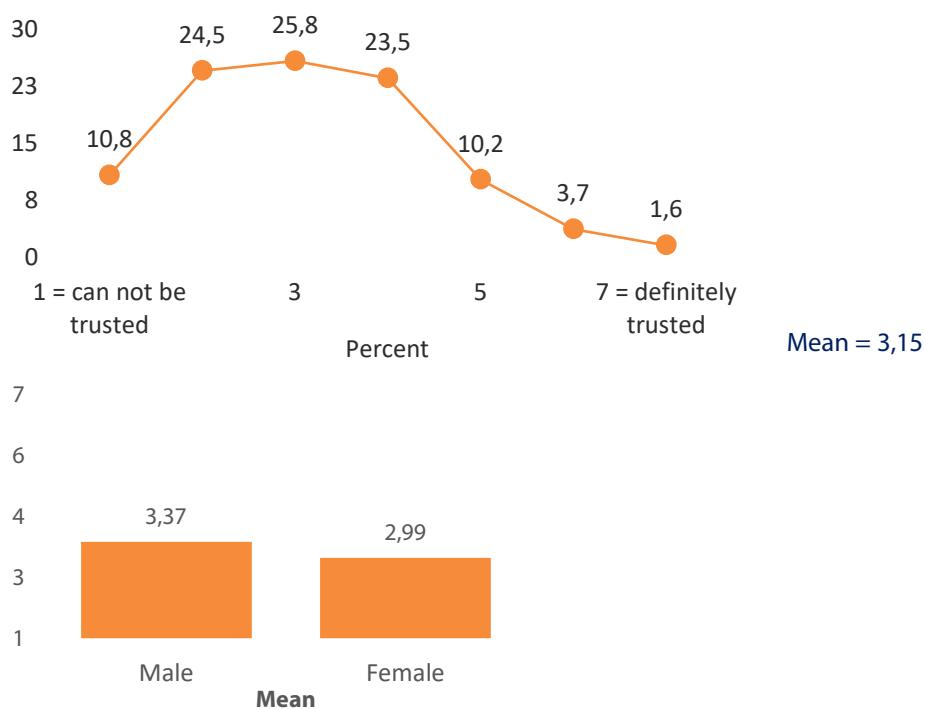
Source: INESAN (2020, N=511/511/511)

Note: standard deviation = 1.372

Note: [t=3.108, df=441.342, p=0.002]; [t=-0.757, df=488.163, p=0.450]

# 5. Fake news in social and natural sciences: Survey in Hungary

## 5.1. Introduction

Different disciplines emphasise different elements in different definitions of news (information, fact, types, forms of appearance, channel of mediation, recipients, objectivity: true-false, news value, public interest). Avoiding a detailed justification, we point out that, due to its political-public policy role, a specific type of news today – fake news – is in focus, both from an ordinary and scientific point of view.[3]

We do not consider here a detailed communication and/or media theory discussion of news in the present context; we merely briefly point out that one of the possible interpretations of news is a constructivist-representative interpretation.

News, which can be considered a social action and a pattern of action, is also discourses and narratives that are part of sociocultural knowledge. This knowledge is theoretically unlimited, but news only presents preselected parts of reality and the facts assigned to them – based on previous constructions. At the same time, the values of those who construct the news can be considered the value of the news, thus news does not strive for relevant, but for credible communication (Aczél, 2007).

The emergence of news takes place in such a fact-presenting process, in which the events of reality are not just information communication products, but the results of a pre-structured presentation. Learning about the interpretation of reality of the media presenting news can be done by exploring direct epistemological (linguistic-cultural characteristics) or *a priori* socio-cultural background (Jenei 2001). Based on the second cognition paradigm, we consider the theory of social representation to be one of the possible theoretical frameworks for the examination and analysis of news representing reality. Why? In theory, in the construction of the world, the individual and the social are not separate, the representation is not organised exclusively on the basis of internal (mental) or external (public), but on the basis of a kind of specific relationship. For both individuals and social groups, social representations express social reality. In other words, the basic function of social representations is to construct social reality.

In the framework of social representation theory primarily, those processes are examined by which content that is largely unknown to the public, through various channels of social communication, becomes a means of interpreting everyday behaviour and developing behavioural plans. (László, 2001).

In what follows, we will attempt to substantiate our assumption that one of the defining characteristics of news is whether it contains true or false fact(s). In other words, we consider news as a social representation whose core is whether statements are true or false. The data collection is suitable for determining the peripheral characteristics of representation also based on the theory of social representation.

In the course of the analysis, our aim is to explore the structure of news as representations and the defining features of the structure.

What are we investigating? News as social representation: how university students perceive false or true news. Based on these results, we will attempt to describe the core, semi-peripherals, and peripherals.

In the following, we will attempt to describe the social representation of true and false news based on the results of the analysis of the database available to us.[4] In order to explore and describe the peripheral elements, we basically consider only the significant results from the results of the applied statistical methods, which at the same time designate the peripheral elements related to the core.

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[3] Its recognition, purpose, intentional or accidental construction, effects, spread of characterisation of recipients according to different aspects) can be carried out in several interpretative frameworks.

[4] The size of the weighted sample is N = 466 people.

## 5.2. True/False – Likely/Unlikely

The truth or falsehood of the news was not judged on the basis of direct and dichotomous ratings (true-false), but on the basis of the probability assigned to a four-point scale (four-point scale – 1: very likely, 2: likely, 3: unlikely, 4: very unlikely in percentages). The original four-point scales were transformed to a dichotomous scale as follows: 1.2 (i.e., very likely and likely)=0 for the originally true news, while 3.4 (unlikely, very unlikely)=1. The transformation of the originally false news was reversed: 1.2=1 and 3.4=0, respectively. The consequence of this is that in the case of true news, a value of 1 must be considered, while in the case of false news, we must take the false rating into account, which is true.

Table 1 – No fake and fake news, (1-4 scale, %)

| No fake news | very likely | likely | unlikely | very unlikely | 'don't know' |
|---|---|---|---|---|---|
| Inequalities are rising in the world | 44 | 38 | 6 | 10 | 3 |
| Life expectancy is lower in eastern than in western Europe | 31 | 35 | 7 | 9 | 18 |
| They found water on Jupiter's moon, Europa. | 18 | 33 | 11 | 10 | 28 |
| Today, earthquakes cannot be predicted. | 4 | 10 | 25 | 57 | 4 |
| **Fake news** | very likely | likely | unlikely | very unlikely | 'don't know' |
| The difference in intelligence between racial groups has been proven beyond doubt | 6 | 26 | 25 | 31 | 12 |
| The refugee crisis is the main cause of the economic crisis in Europe | 10 | 12 | 45 | 25 | 9 |
| CERN in Switzerland has already created black holes. | 10 | 8 | 34 | 34 | 15 |
| Gender studies increase the number of transsexual people | 6 | 18 | 29 | 44 | 2 |
| Global warming is unsupported by data | 12 | 6 | 16 | 65 | 2 |
| Homosexuality can be cured by genetic engineering | 4 | 14 | 18 | 58 | 7 |
| The vaccine against measles, mumps and rubella causes autism | 5 | 4 | 25 | 53 | 14 |
| There has never been a landing on the Moon | 3 | 7 | 16 | 69 | 5 |

Following the transcoding of the originally true statements, respondents mostly consider the increase in economic inequalities and the difference in life expectancy in eastern and western Europe to be false. Of the four true statements, students have the least doubt about earthquake predictions. The assessment of the original eight false statements differs significantly from the assessment of the four original true statements. With two exceptions – assessment of ethnic groups and the refugee situation in Europe – the correct assessment of false statements is less characteristic of six of the eight statements.

To characterise the organisation of the probabilities assigned to the statements, we performed a factor analysis. In three of the variables included in the analysis, communality was below 0.2, so we performed the analysis with only 9 variables.[5]

The two factors do not include the true or false classification of the news, but their separation based on the probability of a true or false judgement. According to the procedure, the factor weight expresses the relationship between the variables involved (i.e., news or statements).

Table 2 – Result of the factor analysis (factor score, Varimax rotation)

| | Communalities | 1. Factor | 2. Factor |
|---|---|---|---|
| The vaccine against measles, mumps and rubella causes autism | 0.685 | 0.802 | -0.207 |
| Global warming is unsupported by data | 0.617 | 0.774 | 0.132 |
| Homosexuality can be cured by genetic engineering | 0.550 | 0.725 | 0.158 |
| The difference in intelligence between racial groups has been proven beyond doubt | 0.463 | 0.664 | 0.150 |
| There has never been a landing on the Moon | 0.458 | 0.601 | 0.311 |
| The refugee crisis is the main cause of the economic crisis in Europe | 0.345 | 0.587 | 0.019 |
| Gender studies increase the number of transsexual people | 0.304 | 0.551 | -0.001 |
| Inequalities are rising in the world | 0.999 | -0.176 | 0.984 |
| Life expectancy is lower in eastern than in western Europe | 0.275 | 0.220 | 0.476 |
| Explained variance | | 36.64 | 15.54 |

Goodness-of-fit Test: Chi-Square: 293.342, df: 19, Sig: 0.000

KMO: 0.701, Bartlett's Test: Chi-Square: 1312,753, df: 36 Sig.: 0.000

According to the results of the factor analysis, the two types of classification of statements as true or false, in other words, their acceptance, represent two social representations of news. The two types can be considered as the cores of two social representations of news (statements) because, as we have already pointed out, representation means the interpretation of the subject. In our case, the interpretation is a true or false probabilistic assessment of the subject (news).

The first type of opinion concerns the joint acceptance of four minorities (homosexual, transsexual, racial, autistic), against whom much of the majority of society is exclusive. The essentially positive attitude of classifying false (and transcoded non-false) statements as false, higher than average, is only seemingly paradoxical, as acceptance of negative classifications of sexual minorities is characterised by significantly higher-than-average rejection. Similarly, to the aforementioned minority groups, the relationship to transsexuals did not happen directly either. The indirect causal relationship is based on the fact that the statement includes both an increase in the number of the negatively judged gender studies and an

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[5] Communality below 0.2 applied to the following statements: CERN in Switzerland has already created black holes (0.167); They found water on Jupiter's moon, Europa (0.017); Today, earthquakes cannot be predicted (0.061).

increase in the number of transgender people also negatively judged. A common feature of the four statements is that they are all related to the hidden scientific justification of the claim, more specifically to the strengthening of its legitimacy. The prejudice that characterises the majority of Hungarian society is related to the rejection of gender sciences. The causal explanation of the economic crisis, which is based on the difference in intelligence (also) related to the understanding of the world, fits into this worldview. The type also includes a categorical questioning of global warming and the Moon landings. Contrary to previous statements, in these cases there are manifestly no groups of people targeted in the statement but doubt in science is present. For all of these reasons, this factor is hereinafter referred to as 'Intolerant'.

The two statements in the second major component emphasise the economic differences between the global world and Europe. In addition to negative news (growing economic inequality) about the global world, including Europe, the negative statements made specifically regarding Europe include the economic crisis affecting the region and the specific inequality (life expectancy) between the two regions of Europe. It is important to note that a long-term issue of the divergence between the two regions of Europe is that social health inequalities are systemic indicators of complex economic development. Therefore, we can say that the second main component contains an economically negative view of Europe due to factors that have developed in the past (East-West) and are present globally. In view of all these, this factor is termed 'Euroscepticism'.

## 5.3. Knowledge of news

Two-thirds of respondents (75 %) are not unfamiliar with part of the problems identified in the statements, one in ten (10 %) students is unaware of any of the problems, while 15 % are comprised by those who know all of them.[6]

Groups based on knowledge or ignorance of the statements are differently characterised by false or true judgements of the statements. There is a significant relationship between knowledge of the statements made in the statements and judging the truth of the statements for both types. The group of those who do not know the statements at all is characterised by both types of judgements (especially Intolerant).

The results suggest that the types (factors) formed on the basis of the judgements of the statements characterise those who do not recognise any statement to a greater extent than the average.[7] However, in the group familiar with each of the statements, the average score of both types (Intolerant, Euroscepticism) is lower than the average. Another characteristic is that the lack of knowledge increases attitudes of intolerance and Euroscepticism, while knowledge decreases them. All this means that a resolution according to the two types of classification of statements (news) is not precluded by the fact that statements (news) are not known – regardless of the significantly different content of Intolerant and Euroscepticism types. All of this feature is significant only in the case of the Intolerant type news evaluation type.

## 5.4. Sources of news

Of the possible news sources listed, most cited the internet (85 %) and most often social media platforms related to the internet and people-to-people interactions (social media, 81 %). Mention of traditional media (television, 55 %, radio, 40 %) was significantly lower. Also, to be considered as part of the internet is mostly public text or video blogs (diary, newspaper) mentioned by 23 % of respondents.

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[6] Have you ever read these issues before? (percentages) yes- all of them: 15, yes-some: 75, no – neither of them: 10.

[7] Score means: Intolerant factor (yes- all of them: -0.016, yes-some: -0.025, no – neither of them: 0.205. Independent-Samples T Test $p = 0.161$. Eurosceptic factor (yes- all of them: -0.144, yes-some: 0.003, no – neither of them: 0.235. Independent-Samples T Test, $p \leq 0.05$.

Radio and the print media play the most important role in the development of the aggregate indicator (main component), formed on the basis of the frequency of marking news sources, and the internet the least important.

The relationship between those naming the news sources and, presumably, the factors representing the core of the representation can be characterised by the score averages. The difference in score means is significant for all media. The two types of social representation of news do not differ in the case of two news sources: in the case of naming television and radio as a news source, both types (representation cores) have a positive average score, while in the absence of an indication the average is negative.[8]

This means that among those who are informed from the traditional media, both types of social representation of news are more typical than average, while those who are not are less typical than average. The situation is similar for blog and print media as a source of information, but only for Intolerant representation, as the rejection of Euroscepticism news characterises the users of the two news sources. Compared to television and radio, the relationship between the internet as a news source and presumably the factors expressing the core of social representation is reversed: those who name the internet as news source reject the preference for Intolerant and Euroscepticism news, while those who do not use this news source explicitly support it.

## 5.5. Topics and channels

In terms of interest, the content of the most marked (52-78 %) news is quite eclectic. In addition to news about politics, weather, or science, only news at three different levels (local, national, international) can be considered coherent. Based on the least marked content (18 %), some common features can also be discovered in different news items: sports, art, lifestyle and fashion are less intellectual, in some way they are all related to leisure.[9]

We described the interest in news with different content, and also the types of 13 variables developed according to different topics equal to this, on the basis of cluster analysis. The two separate clusters can be clearly interpreted, their number of elements is also appropriate: the first group includes two-thirds of the respondents (68 %), while the second group includes one-third (32 %).

The news consumption of the first group (public policy) is determined by the broadest (international), national and local scene in addition to the political news. The combined preference for a narrower and wider environment and political themes indicates a kind of complex and general public-political interest, which is coupled with an interest in everyday practical (weather news) and exact (scientific) knowledge (science and technology). In the other cluster (lifestyle and school) the proportion of lifestyle markers stands out, but there is also significant interest in education, science and weather. In summary, the two clusters are mainly distinguished by differences in the intensity of interest in the environment and politics, but in some cases (health, art) the difference is not significant.

All these are complemented by ordinary practical knowledge and lifestyle news. The somewhat incoherent second principal component, which represents the interplay of news consumption by content category, prefers the consumption of educational news the most, but health news also plays a significant role. It is also characteristic of the consumer type that, in addition to the above-average importance of education and health, it rejects the consumption of business/financial news.

[8] Where do you get the news? Score means and Independent-Samples T Test, 2 tailed : internet (Intolerant: -0.139: $p \leq 0.001$, Euroscepticism:-0.037: $p \leq 0.001$), Social Media (Intolerant: -0.062: $p \leq 0.001$, Euroscepticism:-0.661: $p \leq 0.001$), Television ((Intolerant: 0.123: $p \leq 0.001$, Euroscepticism: 0.173: $p \leq 0.001$), Radio (Intolerant: 0.124 $p \leq 0.05$, Euroscepticism: 0.251: $p \leq 0.001$), Blog/Vlog (Intolerant: 0. 107: $p = 108$, Euroscepticism:-0.355: $p \leq 0.001$), Print Media (Intolerant: 0.269: $p \leq 0.001$, Euroscepticism:-0.317: $p \leq 0.001$).

[9] What kind of news are you interested in? (percentage yes answers ): International news: 78 , Science and technology news: 68 , Weather news:62, National news: 59, Local news: 55, Political news: 52 Health news: 45, Educational news: 43, Sport news: 33, Art and cultural news: 30, Lifestyle news: 29, Business and financial news: 19, Fashion news: 18.

In the group interested in political and public news, the average of the negative scores of the first type of news based on probability indicates a positive judgement. All this is much stronger in the case of the lifestyle-school cluster, and in both clusters the Eurosceptic factor is not present at all, i.e. neither cluster is characterised by a Eurosceptic assessment of the news.

For almost all respondents (89 %), social media, which is based on internet interaction and creates news primarily as a user, mostly reports false news, but there is also a significant mention of the internet (70 %). Television and internet blogs are considered by half of respondents (55-52 %) to be a medium that conveys false news. The least mentioned were the print press (30 %) and the radio (22 %).[10]

Two-thirds of the total sample (69 %) are unfamiliar with fact-finding software, 10 % use them sometimes, while 76 % have not used such software at all. Among those who are familiar with some form of fact-checking sites, 46 % have already used them, 33 % have already occasionally used them, and 22 % have not used a program to control the disclosure of facts. Not surprisingly, those unfamiliar with such software have not yet used fact-finding software at all. Based on all this, we can say that knowledge of such programs is a clear condition for the application of the software.

## 5.6. Channels and trust

Three medium communications (news) were rated on the basis of trust and the level of trust in people was measured on the basis of a seven-point Likert scale. Based on the evaluations, we created confidence indices, which were based on assigning 1 and 7 points to their extreme values (1:cannot be trusted – 7:definitely trusted, in the case of an overall assessment of people 1:you can't be careful enough – 7:most people can be trusted). The averages of the 7-point scales are hereinafter referred to as the confidence index, but we also use the pooled confidence index variable based on the aggregation and averaging of the four indices (mean: 3.47).

Compared to electronic and print media (television, radio, press media), respondents have more trust in people (index average: 3.96). This averages virtually the same as trust in print media (average: 3.94).

Based on the results, respondents' trust in people (index average: 3.96) is higher than the confidence index of all three media, although the average of the trust index of the print media (3.94) is practically no different. Of the three media, the average of the social media trust index is remarkably low (2.90).

Based on the distribution of the values of the consolidated confidence index, we formed two groups with the same number of items. The mean of the Intolerant news factor score in both groups is close to zero and there is no significant difference between them. The mean Euroscepticism factor score, on the other hand, differs significantly between the two groups. The group that condenses low confidence values (Low confidence index group) is characterised by a lower-than-average score average, while the group with higher confidence values (High confidence index group) is characterised by a higher-than-average score average. This means that a low confidence index for the media is more likely to favour Euroscepticism, while a high confidence index (confidence in the media) is more likely to reject Euroscepticism attitudes.

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[10] Where can you encounter fake news mostly? (the proportion of 'it would disturb me' answers): Social Media: 89, internet:70, Television:55, Blog / Vlog: 52, Print Media: 30, Radio: 22) Independent Samples T-test, 2 tailed: Social Media (Intolerant: p=0.483, Euroscepticism: $p \leq 0.00$); internet (Intolerant: $p \leq 0.00$, Euroscepticism: p = 0.719); Television (Intolerant: $p \leq 0.05$, Euroscepticism: $p \leq 0.00$); Blog / Vlog: (Intolerant: $p \leq 0.00$, Euroscepticism: $p \leq 0.00$); Print Media (Intolerant: p= 0.1, Euroscepticism: $p \leq 0.00$); Radio (Intolerant: p= 0.603, Euroscepticism: $p \leq 0.00$).

## 5.7. Opinion on Europe and the country

Compared to the situation in the country, a significantly higher proportion of respondents judge Europe's present and, consequently, its presumed future more favourably (good direction: own country: 26 %, Europe: 41 %).[11]

## 5.8. Demographic characteristics

In addition to the characteristics discussed so far, the questionnaire also included questions on some demographic characteristics. The results for the complete sample are as follows:

The proportion of men and women is almost the same among the respondents.[12] The mean score of the two representative core factors is low in both gender groups, with no significant difference. The difference is not significant in either case.

Similar to the gender distribution, the distribution of the two educational profiles (social/human sciences; natural/technical sciences) is almost the same, but the difference between the averages of the representation factors is not significant.[13]

The two representation factors are in different 'directions', but in both cases they are significantly related to age (a positive change in the value of the Intolerant factor is associated with increasing age, while in the case of the Euroscepticism factor, the opposite is true. In other words, it is increasingly characterised by older respondents who accept false news that can be considered intolerant.[14]

Half of the respondents (49 %) are characterised by the fact that one of the parents has a university degree.

Based on the answers to a question about the probabilistic nature of the intellectual background of the family background, 49 % of the responding young people have at least one parent with a degree. Parental background differs only in the Eurosceptic core type: higher parental education is characterised by a rejection of Euroscepticism, while the lower other group is characterised by its preference.[15]

After appropriate transcoding, cluster analysis was performed involving the four variables.

The characteristics of the two groups separated on the basis of the analysis (method) are as follows. The number of items in the two groups differs significantly, as the cluster with the largest number of items

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[11] Do you think that things are going in the right or in the wrong direction in Europe?

going right: 41 %, going wrong: 56 %. Right (Intolerant: Independent Sample, p = - 0.186) Euroscepticism: Independent Samples T-test, p≤ 0.05), wrong (Intolerant: Independent Sample, p = - 0.075, Euroscepticism: Independent Samples T-test, p ≤ 0.05).

Do you think that things are going in the right or in the wrong direction in your country?

going right: 26 %, going wrong: 72 %. Right (Intolerant: Independent Samples, p p≤0.0000) Euroscepticism: Independent Samples T-test, p≤ 0.000), wrong (Intolerant: Independent Sample, p ≤ 0.05, Euroscepticism: Independent Samples T-test, p ≤ 0.00)

[12] Male: 56 % %, Female: 44 % %.

[13] Natural/technical sciences: 47 % %; Social/Human sciences: 53 % %. Score-mean: Natural: (Intolerant core: 0.037, Euroscepticism core -0.047, Independent Samples T-test, 2 tailed, p = 0.318); Social/Human sciences (Intolerant core: .040, Euroscepticism core: -0.050, Independent Samples T-test, 2 tailed, p = 0.201)

[14] Correlation coefficients, Pearson correlation, 2 tailed) age (years) and Intolerant core factor (score) = - 0.297; Correlation significant p ≤ 0.001)

Correlation coefficients, Pearson correlation, 2 tailed) age (years) and Euroscepticism factor (score) = 0.217; Correlation significant p ≤ 0.001)

[15] Do any of your parents have a university degree? yes: 49 %; no: 51 %

Score mean: have parent with higher education (Intolerant core: 0.011, Eurosceptic core: -0.373, Independent Samples T-test, 2 tailed, p = 0.751).

Score mean: not have parent with higher education (Intolerant core: -0.011, Eurosceptic core: 0.357 Independent Samples T-test, 2 tailed, p ≤ 0.001).

accounts for 77 % of the total sample, while the other includes 23 %. In both clusters, the proportion of women is larger, and in the second group, the difference between the sex ratios is bigger.

The average age is remarkably higher in the first cluster than in the second cluster. This is presumably explained by the fact that the first cluster has a significantly higher proportion of students studying in correspondence or distance learning.[16]

In the first cluster, the proportion of groups separated by training profile is almost the same, while in the second group, there are significantly more natural/technical science students.[17]

In two-thirds of cluster 1, there is no parent who has completed tertiary education, while in the second cluster this factor characterises only half of the students.[18]

The first cluster is characterised by higher-than-average intolerance and lower-than-average Euroscepticism. The second cluster, conversely, is characterised by lower-than-average intolerance and higher Euroscepticism.[19]

Given the results so far, we attempt to describe social representations using peripheral elements and demographic variables related to the two cores (types) of representations related to true-false statements. Given the results so far, we also attempt to describe social representations using peripheral elements and demographic variables related to the two cores (types) of representations related to true-false statements. In the case where the attachment to the given core is strongly significant ($p \leq 0.001$), then the element is considered highly peripheral, if it is less significant ($p \leq 0.05$), then the element is considered peripheral, while the element, being not significantly related to the representation core, is considered semi-peripheral.

Highly peripheral ($p \leq 0.001$) elements related to the Intolerant Core are: news source (television, social media, print media, internet), topics and channels (public policy/lifestyle/school), fake news (blog/vlog, internet), fact-checking pages know, fact-checking pages use, Europe direction, Country direction, Age). Peripheral ($p \leq 0.05$) elements related to the Intolerant Core are news source (radio), fake news (television). Semi-peripheral elements related to the Intolerant Core are news knowledge, news source: blog, vlog; fake news (radio, social media, print media), trust, gender, parental degree

Highly peripheral ($p \leq 0.001$) elements related to the Euroscepticism core are: News source (radio, television, social media, blog, vlog; print media; internet), fake news (radio; television; social media; blog, vlog; print media). Peripheral elements related to the Euroscepticism core are: Knowledge of news. Semi-peripheral elements related to the Euroscepticism core: Topics and channels (public policy/lifestyle/school), fake news: internet; European direction, gender, educational profile

The majority of students who tend to accept intolerant types of false news are women, older than the average undergraduate, studying in practically the same proportion in natural or social education fields. The more disadvantaged family background characteristic of the group is likely due to the high proportion of parents with low education. The social representation of this type of news is characterised by intolerance towards different minority groups, in which the internet has a strong mediating role both as a source of news and as a channel of communication. Another peculiarity is that – apart from the particularly non-defining blog/vlog media – all media are significantly related to the core. The intolerant core is also closely related to judging the future of the country, to age, and to the control (knowledge and use) program that

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[16] 2019/2020 academic year: Debreceni Egyetem student headcount data as of 15 March 2020 by forms of funding. Total number of students: 25 964; Full-time: 20 296 people; Correspondence, distance learning department: 5 668 people. https://unideb.hu/hu/node/896

[17] Cluster 1: Natural/technical sciences 48 %, Social/Human sciences: 52 % Cluster 2: Natural/technical sciences 71 %, Social/Human sciences: 29 % Pearson Chi-Square: 2.500, df. 1 sig (2-sided) 0.000, Eta: 0.197

[18] Cluster 1: no parent with higher education: 71 %; a parent with a higher education: 29 %. Cluster 2: no parent with higher education: 45 %; a parent with a higher education: 55 %.

[19] Intolerant (mean: 1. Cluster: -0.4229; 2. Cluster: 0.130; Score mean: Independent Samples T-test, 2 tailed, $p \leq 0.001$ Euroscepticism: (mean: 1. Cluster: 0.457, 2. Cluster: - 0.138) Score mean: Euroscepticism Samples T-test, 2 tailed, $p \leq 0.001$

controls the true or false content of the news. In summary, all the listed communication channels, but most of all the internet, have a role in the representation of false and content-intolerant news. Such representation of the news prevails in a social environment where a rather unfavourable socio-cultural family background is characteristic and there is no dominant educational profile.

The peculiarity of the representation of Euroscepticism fake news is that all the listed channels are strongly connected to the core. The specific structure of the representation is indicated by the fact that, apart from the internet element, all news sources are linked with fake news. In other words, all the news sources examined convey false news. Very probably, it is also due to the critical assessment that the level of trust towards the news channels and the country also belong to the highly peripheral elements. Among the least peripheral elements attached to the core, the relationship of the internet is peculiar: although it is a determining source of news in the representation, it is not a mediator of false news. Among students who are more likely to accept false news of the Euroscepticism type, the proportion of men and women is almost the same, their age is average, significantly more people are in natural science studies, and the proportion of parents with rather low and more high educational levels is almost the same.

# 6. Fake news in social and natural sciences: Survey in Italy

## 6.1. Data collection

The data collection process was conducted in the period March-April 2020, by means of an online questionnaire designed through the SurveyMonkey platform.

The data collection and survey dissemination (i.e. via link) were coordinated by ISIG and supported by a group of researchers and professors from the University of Trieste and the University of Udine (Friuli Venezia Giulia Region, branches of Gorizia) and the University of Catania (Sicily Region), as well as by student associations, such as ASSID Gorizia.

The data collection process was implemented within the period of the first phase of the national lockdown in Italy, due to the Covid-19 outbreak. In order to overcome the limits imposed by the first phase of lockdown on the campaign for data collection, the following strategies have been implemented:

- Intense campaign on social media channels (i.e. the questionnaire was promoted on the organisational accounts of ISIG and supporting institutions);
- Student mailing lists – the questionnaire link was forwarded to existing mainlining lists (i.e. by ISIG and supporting organisations).

It must be stated that the overall events characterising the period of implementation of the survey have impacted on the data collection process, which led, finally, to the gathering of 248 questionnaires.

## 6.2. Methodological note

The initial expectations of the research team were to obtain a sample proportionate in terms of:

- Gender ratio (50 % female; 50 % male);
- Discipline ratio (50 % social science students; 50 % natural science students).

The actual ratios of these two dimensions has significantly deviated from the initial expectation, especially in what concerns the discipline of study,[20] as shown below:

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[20] One of the main difficulties in the data collection process was linked to the Covid-19 outbreak, which in Italy led to the closure of all schools and universities, starting from 5 March 2020. In this sense, it was difficult to reach a significant number of students from the different fields of study.
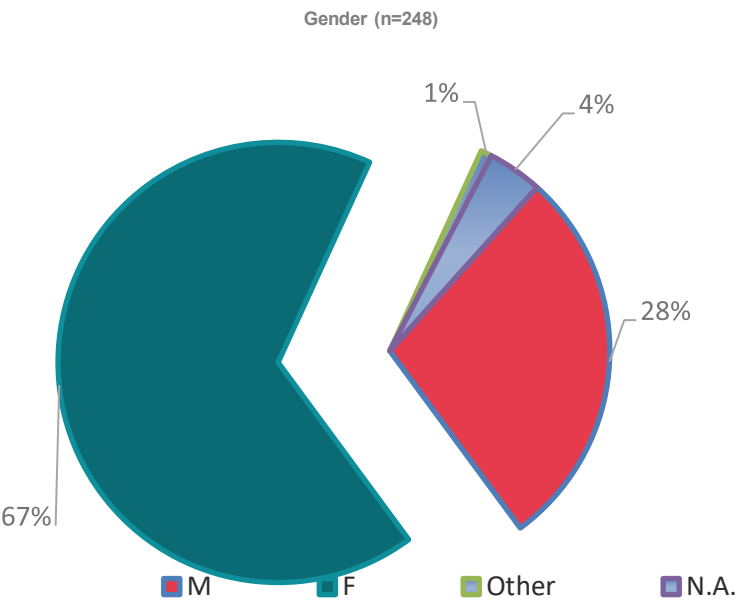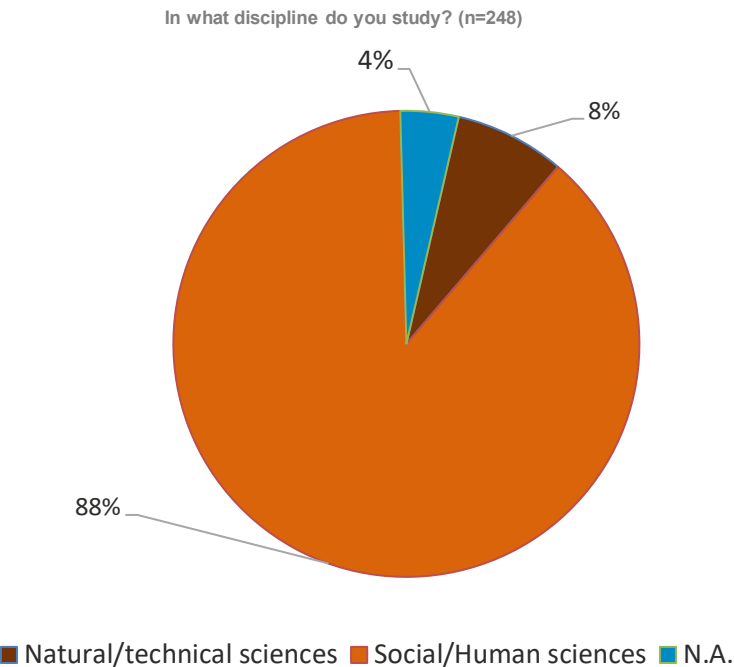
Chart 1 – Gender (original dataset)

**Gender (n=248)**



1%    4%

28%

67%

M    F    Other    N.A.

Chart 2 – Discipline (original dataset

**In what discipline do you study? (n=248)**



4%

8%

88%

■ Natural/technical sciences   ■ Social/Human sciences   ■ N.A.

The original dataset was thus rescaled, by creating a weighting variable, in order to meet the expected 'gender ratio'. It was not possible to weight the dataset on the basis of the expected 'discipline ratio', given the low percentage of answers from natural science students (8 % versus 88 % of social sciences students), otherwise their answers would have weighed too much and the size of the dataset would have dropped significantly. By weighting the dataset in terms of the expected 'gender ratio', the total number of valid cases upon which the analysis was based was 195.

Investigation on potential trends in answers by correlation with socio-demographic aspects will allow to identify elements of differentiation that might be gender, age related, etc. In the following paragraphs, statistically significant correlations are presented and indicated with the symbol (*).
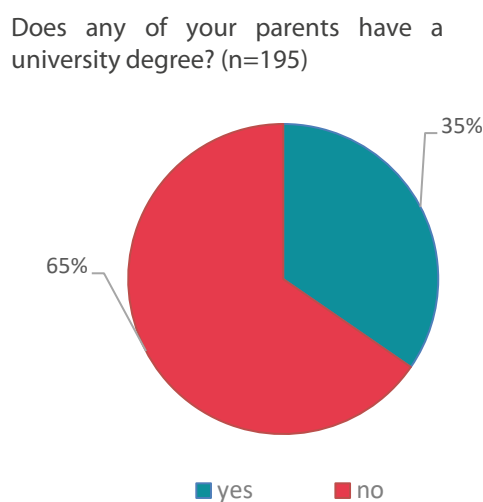
## 6.3. Results

The results of the analysis of data collected in Italy, are presented in the following paragraphs.

### 6.3.1. Socio-demographic information

The great majority of students that answered the survey has a social/human science university background (90 %), while only 10 % of respondent students are studying natural/technical sciences disciplines.

**In what discipline do you study?**
**(n=195)**



- Natural/technical sciences
- Social/Human sciences
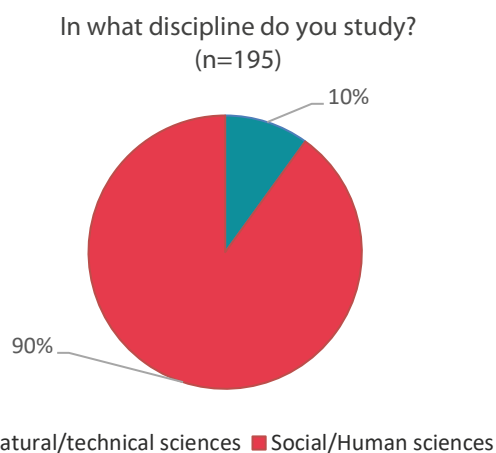
Respondents were asked to indicate whether any of their parents had a university degree: the majority of students (65 %) say that none of their parents has a university degree. Some 35 % of students has at least one parent with a university degree.

**Does any of your parents have a university degree? (n=195)**



- yes
- no

Do you think that things are going in the right or in the wrong direction in Europe? (n=195)

Students were then asked to express their perception on the overall situation in Europe, 'whether things are going in the right or wrong direction': the great majority of respondents (82 %) answered that the situation in Europe is going wrong, only the 18 % of students think that things are going right.

18%

82%

■ Going right  ■ Going wrong

Do you think that things are going in the right or in the wrong direction in Italy? (n=195)
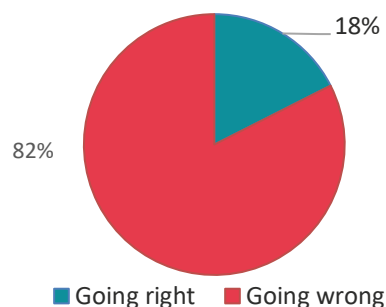
Students were also asked to express the same opinion on the overall situation at national level (i.e. Italy). In this case, the perception seems to be more positive, even though the great majority of students thinks that things in Italy are going in the wrong direction (76 % vs 24 %).
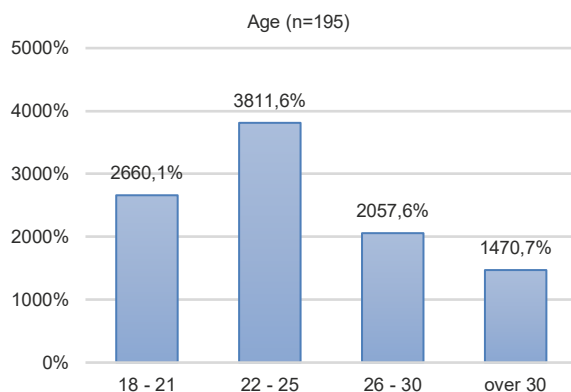
24%

76%

■ Going right  ■ Going wrong
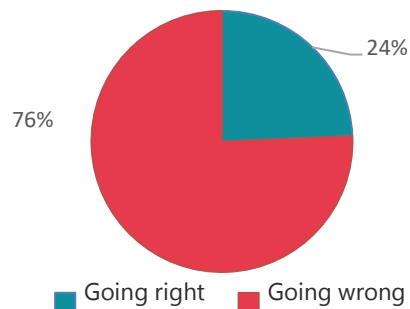
In general, by analysing data by gender, it seems that male respondents are more prone to assess the overall situation as 'positive' than female respondents.

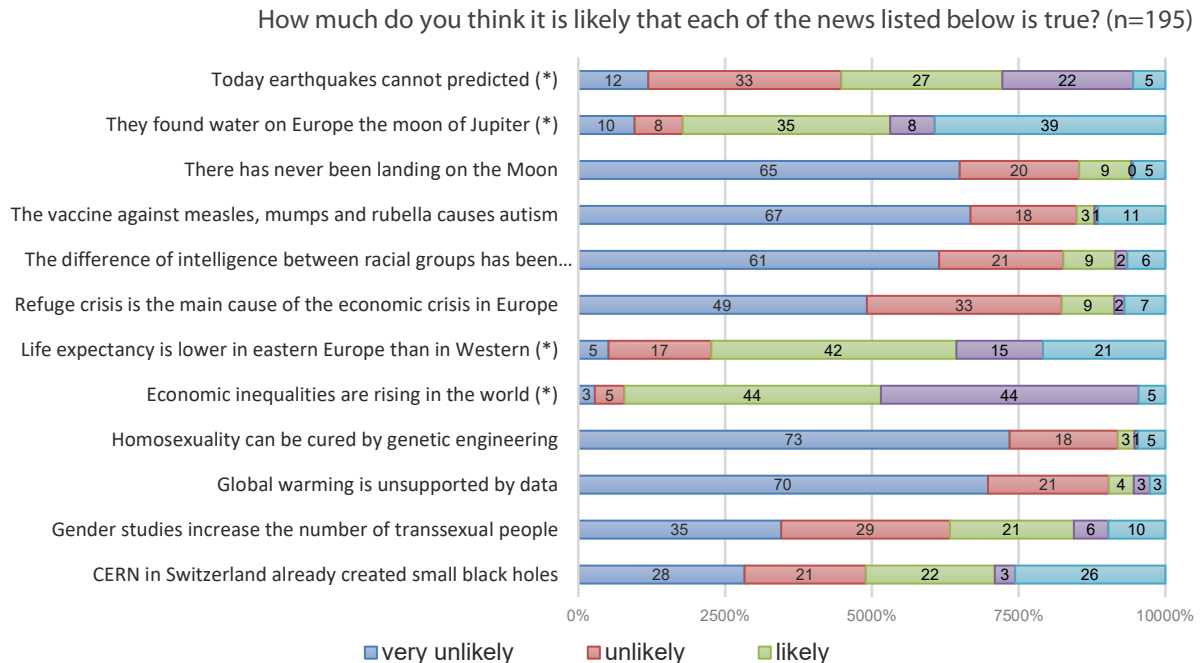The age of respondents is between 18 and 65 years old.

The following frequencies have been registered for the following age groups:

- 18-21 years (26.6 % of respondents);
- 22-25 years (38.1 % of respondents);
- 26-30 years (20.6 % of respondents);
- Over 30 years (14.7 % of respondents

Age (n=195)

5000%

4000%

3000%

2000%

1000%

0%

3811,6%

2660,1%

2057,6%

1470,7%

18 - 21      22 - 25      26 - 30      over 30

## 6.3.2. True or false

Several sentences (both true[21] and false) were presented to students, who were asked to indicate whether the statements are 'very unlikely', 'unlikely', 'likely' or 'very likely'.

How much do you think it is likely that each of the news listed below is true? (n=195)



| | very unlikely | unlikely | likely | | |
|---|---|---|---|---|---|
| Today earthquakes cannot predicted (*) | 12 | 33 | 27 | 22 | 5 |
| They found water on Europe the moon of Jupiter (*) | 10 | 8 | 35 | 8 | 39 |
| There has never been landing on the Moon | 65 | 20 | 9 | 0 | 5 |
| The vaccine against measles, mumps and rubella causes autism | 67 | 18 | 3 1 | 11 | |
| The difference of intelligence between racial groups has been… | 61 | 21 | 9 | 2 | 6 |
| Refuge crisis is the main cause of the economic crisis in Europe | 49 | 33 | 9 | 2 | 7 |
| Life expectancy is lower in eastern Europe than in Western (*) | 5 | 17 | 42 | 15 | 21 |
| Economic inequalities are rising in the world (*) | 3 5 | 44 | 44 | 5 | |
| Homosexuality can be cured by genetic engineering | 73 | 18 | 3 1 | 5 | |
| Global warming is unsupported by data | 70 | 21 | 4 3 3 | | |
| Gender studies increase the number of transsexual people | 35 | 29 | 21 | 6 | 10 |
| CERN in Switzerland already created small black holes | 28 | 21 | 22 | 3 | 26 |

By analysing the answers given by the respondents, focusing on false sentences, it is interesting to note that:

- The sentence 'Gender studies increase the number of transsexual people' is 'likely' for 21.1 % of students, 'very likely' for 5.9 % and 9.7 % does not know. By cross-referencing the answers by gender, female respondents tend to believe more that it is 'likely' (26.5 % of female respondents versus 15.5 % of males).
- The sentence 'CERN in Switzerland has already created small black holes' is deemed likely for 22 % of students, 'very likely' for 3.5 % and 25.6 % does not know.

Focusing on true sentences, it is interesting to note that:

- The sentence 'Today, earthquakes cannot be predicted'[22] is 'unlikely' for 32.9 % of respondents, 'very unlikely' for 11.9 %.
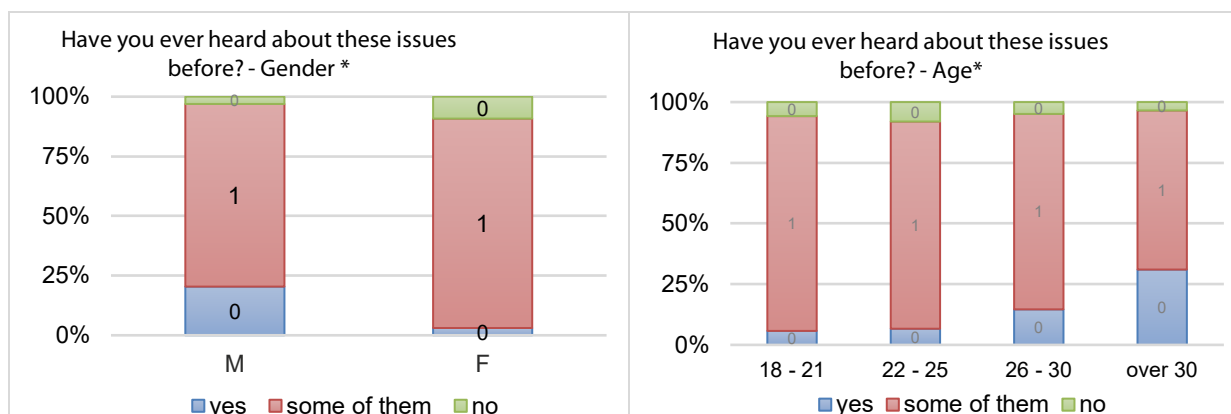
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[21] True sentences are marked with a (*).

[22] It is worth noticing that the phrasing of the sentence in terms of a negation could have confused the respondents.

Have you ever heard about these issues before? (n=195)

5,9%    11,5%

82,5%

■ yes   ■ some of them   ■ no

Respondents were then asked whether they had heard about these issues/topics before:
- 82.5 % answered 'some of them';
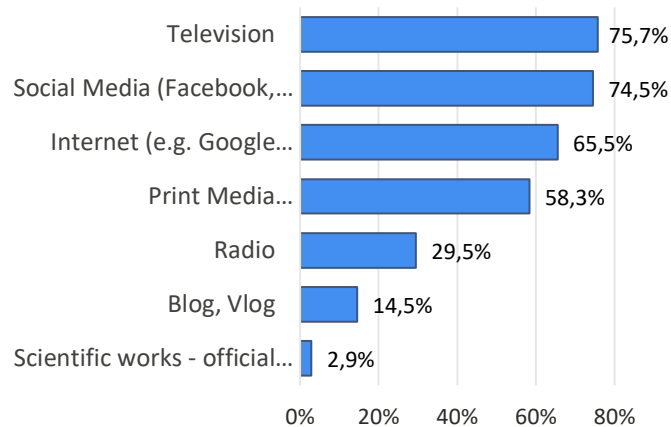- 11.5 % answered 'yes';
- 82.5 % answered 'no'.
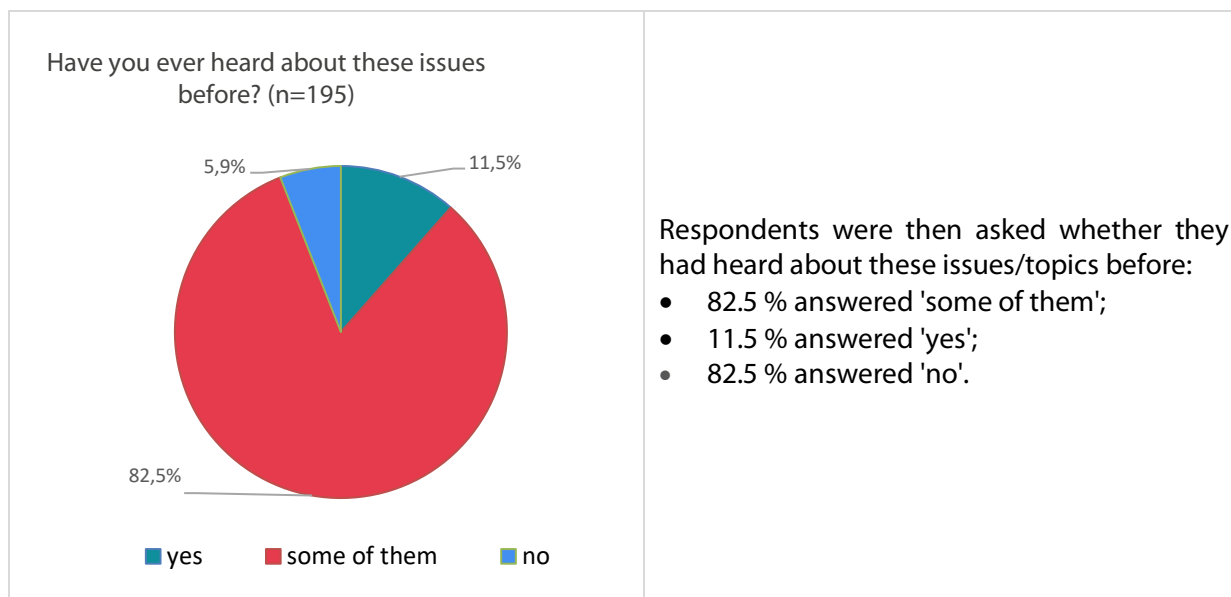
It is interesting to analyse answers by gender and age. It can be noted that:
- Male respondents, with respect to female respondents, state that they were already familiar with the presented issues (20.4 % of male versus 3.1 % of female respondents);
- As age increases, knowledge of these issues also grows.

Have you ever heard about these issues before? - Gender *

Have you ever heard about these issues before? - Age*

## 6.3.3. News consumption

**Where do you get the news ? (n=195)**



| | |
|---|---|
| Television | 75,7% |
| Social Media (Facebook,… | 74,5% |
| Internet (e.g. Google… | 65,5% |
| Print Media… | 58,3% |
| Radio | 29,5% |
| Blog, Vlog | 14,5% |
| Scientific works - official… | 2,9% |

In the second section of the questionnaire, respondents were asked to indicate the main type of media from which they get the news (with the possibility to give more than one answer):

- 75.7 % of respondents answered television;
- 74.5 % social media;
- 65.5 % internet;
- 58.3 % print media;
- 29.5 % radio;
- 14.5 % blog, vlog. Used more by male respondents (20.5 % of male versus 9.2 % of female respondents);
- 2.9 % scientific works – official sources.

**What kind of news are you interested in? (n=195)**



| | |
|---|---|
| National news | 80,7% |
| International news | 77,9% |
| Educational news | 58,9% |
| Art and cultural news | 57,9% |
| Political news | 56,6% |
| Health news | 51,8% |
| Local news | 51,6% |
| Science and technology news | 50,4% |
| Lifestyle news | 35,6% |
| Weather news | 33,7% |
| Sport news | 30,3% |
| Business and financial news | 23,3% |
| Fashion news | 14,9% |
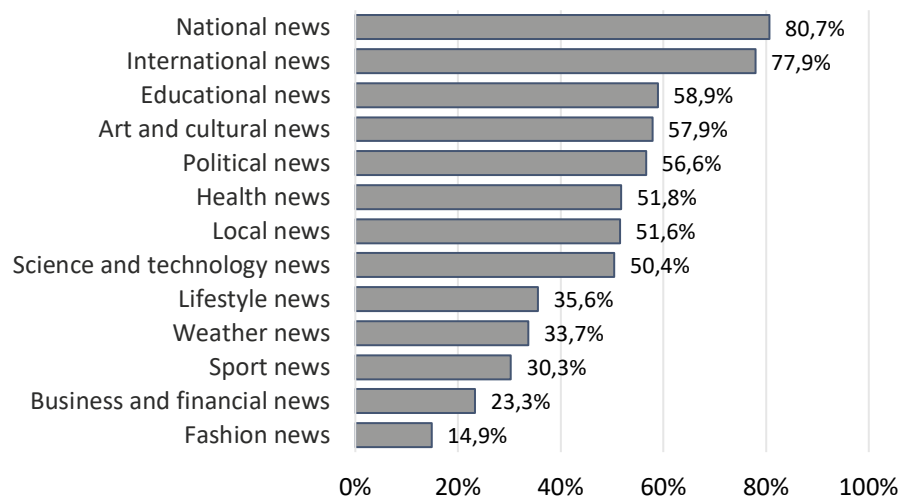
Students were then asked to specify the kind of news they are interested in (with the possibility to indicate more than one type of news):

- 80.7 % of respondents answered national news, in particular male respondents (91.8 % versus 70.1 % of female);
- 77.9 % international news, in particular male respondents (86.7 % vs 68.4 % of female);

- 58.9 % educational news, in particular female respondents (73.5.9 % vs 44.3 % of male);
- 57.9 % art and cultural news;
- 56.6 % political news, in particular male respondents (73.2 % vs 26.8 % of female);
- 51.8 % health news;
- 51.6 % local news;
- 50.4 % science and technology news;
- 35.6 % lifestyle news, in particular female respondents (43.9 % vs 70.1 % of male);
- 33.7 % weather news;
- 30.3 % sport news, in particular male respondents (48.5 % vs 12.2 % of female);
- 23.3 % business and financial news, in particular male respondents (39.8 % vs 6.2 % of female);
- 14.9 % fashion news, in particular female respondents (24.5 % vs 6.1 % of male).

**Where can you meet with fake news mostly? (n=195)**

| | |
|---|---|
| Social Media (Facebook,… | 95,6% |
| Blog, Vlog | 63,7% |
| Internet (e.g. Google News) | 36,2% |
| Television | 22,5% |
| Print Media (newspapers,… | 19,1% |
| Radio | 6,9% |
| from hearing from other people | 1,3% |

0%  20%  40%  60%  80%  100%
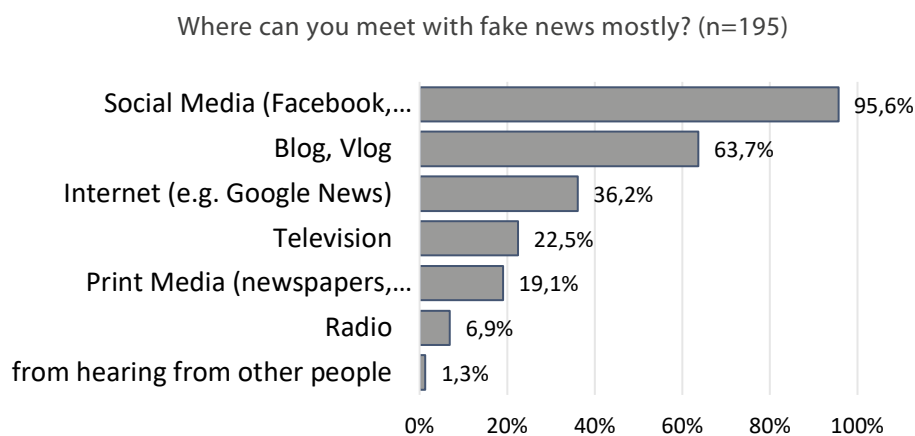
Correspondents were then asked, where, according to them, is it possible to encounter fake news mostly:
- 95.5 % of respondents answered social media;
- 63.7 % blog, vlog;
- 36.2 % internet;
- 22.5 % television;
- 19.1 % print media: this answer was given more by male respondents (28.6 % of male respondents vs 9.3 % of female);
- 6.9 % radio;
- 1.3 % from hearing from other people.

Do you know any fact-checking pages?
(n=195)

56%

44%

yes ■ no ■

Students were asked whether they knew any fact-checking pages on the web:

- 56 % of respondents answered yes;
- 44 % no.

Do you use any fact-checking page?
(n=195)

48%

52%

yes ■ no ■

All respondents were asked whether they use any fact-checking pages:

- 52 % of respondents answered no;
- 48 % yes.

Among those respondents who know fact-checking pages (n=129):

- 80.6 % use fact-checking pages;
- 19.4 % answered that they do not use fact-checking pages.

## 6.3.4. Trust

The third section of the questionnaire was aimed at defining the students' level of trust concerning:

- Dealing with other people;
- News from print media;
- News from television/radio;
- News from social media.

Respondents were asked to give their opinion, by giving a score to each proposed sentence, on a scale from 1 to 7, where 7 is the higher level of trust. Results are presented in the graphs below.

Would you say that most people can be trusted, or that you must be careful in dealing with people? (n=195)

How trustworthy would you say the news from print media are? (n=195)

How trustworthy would you say the
news from television/radio are? (n=195)

How trustworthy would you say the
news from social media are? (n=195)
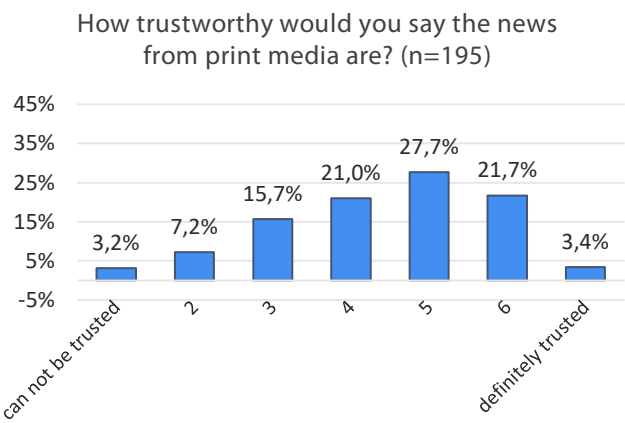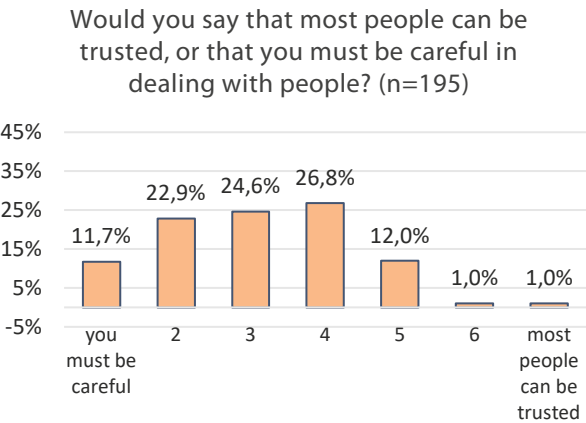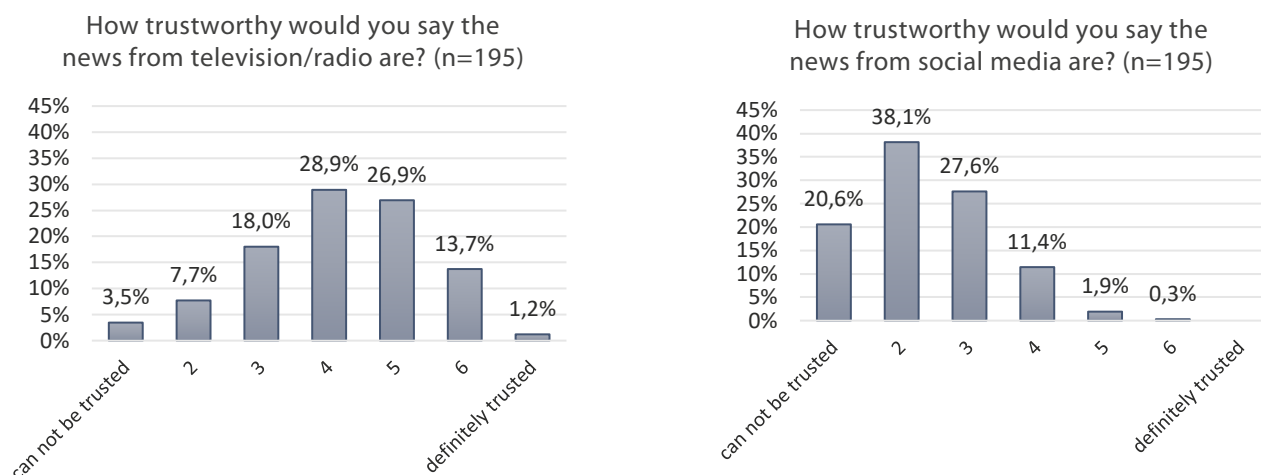
It is interesting to note that respondents showed the lower level of trust with regards to:
- News from social media: 86.3 % of respondents gave a score less than or equal to 3;
- Dealing with other people: 59.2 % of respondents gave as score less than or equal to 3.

Respondents showed a higher level of trust with regards to:
- News from print media: 52.8 % of respondents gave as score greater than or equal to 5;
- News from television/radio: 41.8 % of respondents gave as score greater than or equal to 5.

## 6.3.5. Key findings

From the analysis, it appears that respondents assess the overall situation of 'the direction in which things are going' rather negatively, both at European and Italian level (i.e. with a slight tendency towards a positive overview for the national level and of male respondents concerning both items).

Furthermore, it is interesting to note that, although 85 % of respondents state that they were familiar with at least some of the issues/topics presented in the true or false questions, false questions received rather high percentages of likely and very likely answers. Also, it appears that knowledge on the presented topics increases with age.

In terms of 'news sources', television, social and internet are the main channels to which respondents turn. Respondents identify internet-based channels as the ones more likely to contain fake news, while radio, printed media and television are considered less likely.

Concerning the potential tools for 'fact-checking', only half of the respondents are aware of their existence. However, almost 90 % of those who are familiar with such tools declare that they use them.

On 'trust' related items, it is interesting to note that social media appears to be the less trusted channel, while print media (and to a lower extent, television) appear to be among the most trusted.

# 7. Fake news in social and natural sciences: Survey in Slovakia

## 7.1. Frame of the research

An online survey research was carried out in Slovakia, addressing university students of humanities as well as science in spring 2020. The questionnaire consisted of 12 headline news in science and the students had to assess each of them according to the truth they represented. They had to assess the likelihood of each headline news item being true or false on a four-point scale.

In order to assess the competence of the respondents, we inserted four true science news in the list offered to the subjects, assuming that subjects recognising the true headline news would be less ready to accept the fake headline news as true, compared with those who were unable to recognise the truth in the non-fake science news.

Eight fake news headline news items and four true headline news items were presented in the questionnaire. In the case of each headline news item, the respondents had to rate how likely or unlikely is that the content of the news is true or false, according to their judgement, on a four-point scale.

As we can see, some of the news have come from the natural sciences, such as the news about the black holes, rejection of global warming on the grounds that it is not substantiated by data, the treatment of homosexuality by genetic engineering, or the alleged causal relationship between vaccination and autism. Other news reflected false statements concerning the social science on inequalities and minorities such as migration, role of gender studies, intelligence gap between races, or a disbelief of man's landing on the moon.

In the list of the fake science news items, four true news items were inserted.

Apart from items of false and true science news, the questionnaire consisted of questions concerning media consumption, social trust and basic information on the socio-demographic background of the respondents.

In Slovakia, 178 university students finally replied to the online questionnaires. Unfortunately, this was far below the expected 500 participants. Due to the low response rate, the analysis did not include a breakdown by gender or a breakdown of the disciplinary differences between science/technology and humanities.

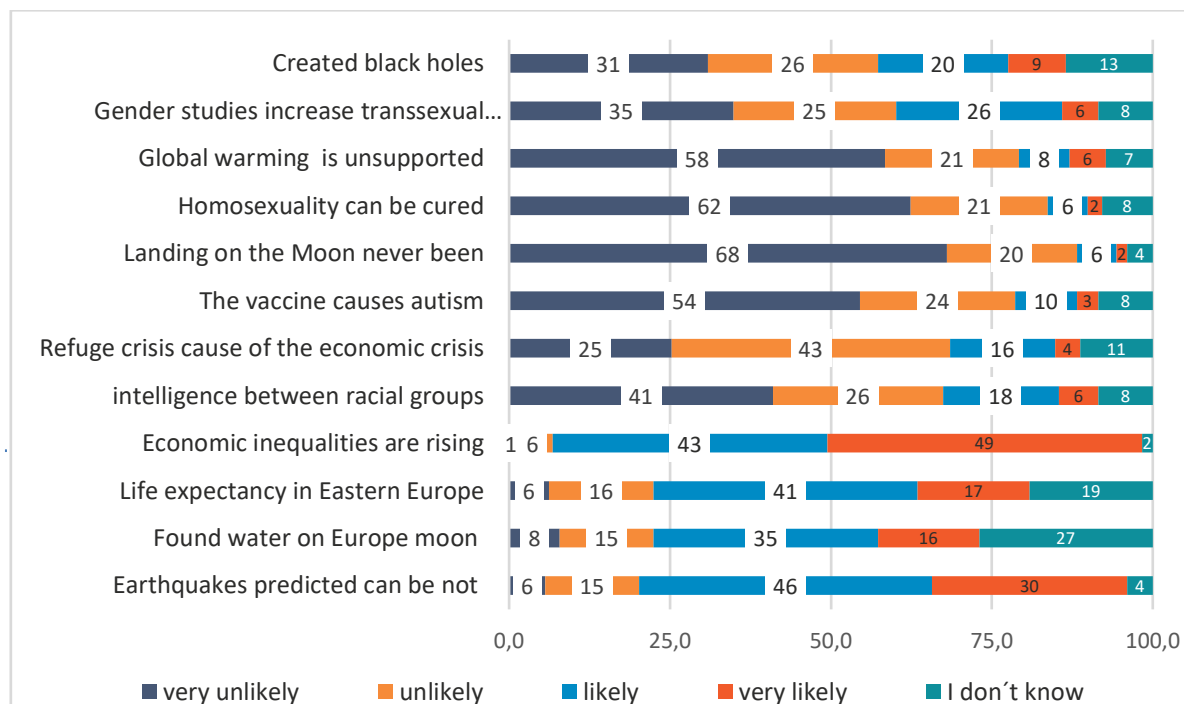## 7.2. Results

### 7.2.1. Fake-news recognition

Refusal rates and non-response rates generally remained below 10 %. However, some exceptions can still be observed. For the statement that 'they found water on Jupiter's moon Europa', 27 % of university students responded, for the statement 'life expectancy is lower in eastern than in western Europe' nearly 20 % of respondents, and for 'CERN has already created small black holes in Switzerland', 14 % could not answer.

Among the respondents who shared their opinion, three-quarters of the students accepted our statements for the four real news stories, moreover, in the case of growing economic inequality almost everyone agreed with the statement. This indicates that Slovak students are informed about the scientifically based news and accept them.

In the case of fake news, however, they are much less able to navigate. Although the majority rejects all fake news, in five cases out of eight fake news, 25-30 % of students moderately or strongly agree with them. The only exceptions were the denial of lunar landing, that homosexuality can be cured by

genetic engineering, the association of vaccines with autism, and the questioning of global warming, which found little acceptance among university students in Slovakia.

Chart 1 – To what extent you think the news items are likely or unlikely to be true



Altogether, as the aggregated results for all the questioned university students reveal (Chart 1) that the students, in general, incline to believe more in the true headlines than the false ones. However, while the majority rejects fake news, a significant minority is willing to accept many of the false news items.

If we calculate the proportion of those who accept false news and reject headlines based on real scientific claims, we can refine the previous picture. The second chart (Chart 2) shows that the rates of those who accept false news and reject true science news are very different. Those who accepted the true news in all cases make up half of the respondents, while in the rejection of false news it is only a quarter of the students. In contrast, those who accept false news for up to two or more news outlets are 34 %, while rejection of real news is only 17 %.

Chart 2 – Accepting fake news and rejecting real news, %
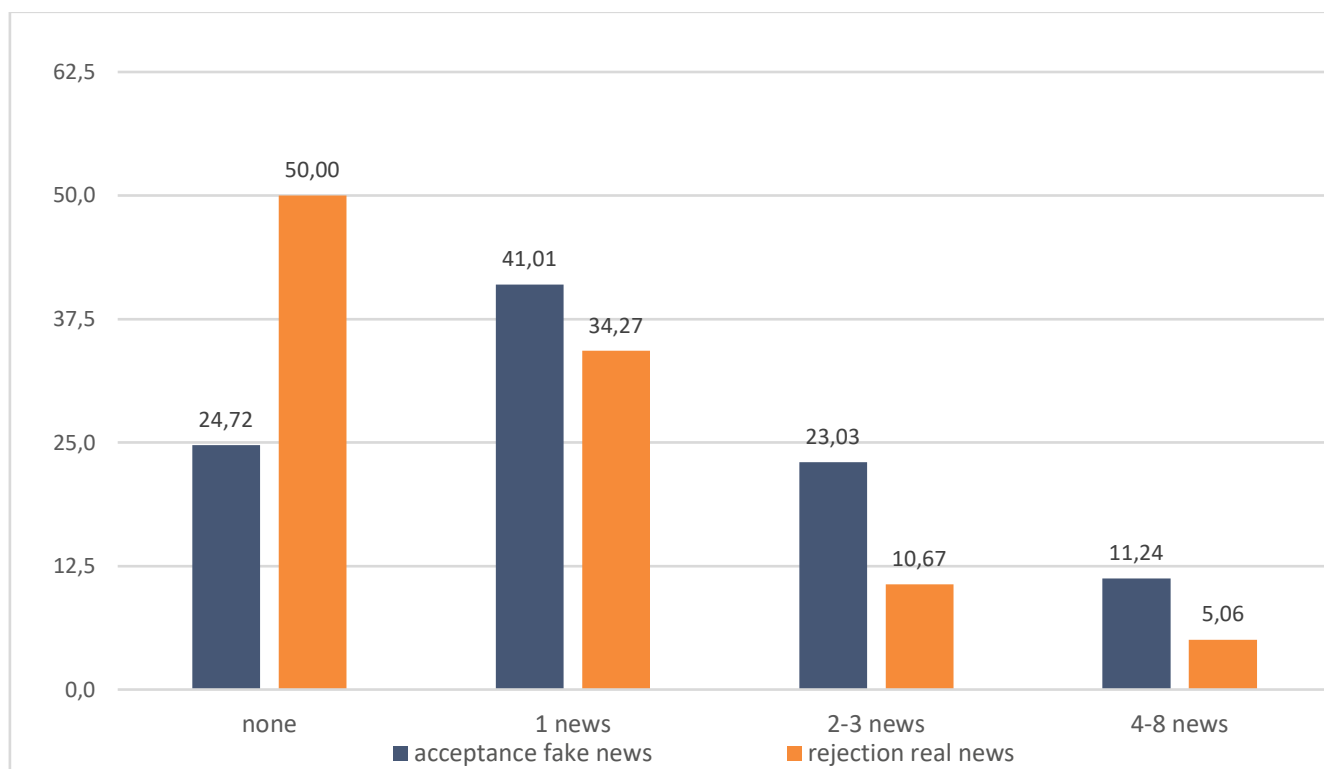


In another step, we combined the acceptance of fake news and the rejection of real news (Chart 3). Based on this, four groups can be distinguished. The first group rejects the fake news and accepts the scientifically based real news. The opposite is the fourth group, which includes those who accept fake-news and disagree with real-life news. Even the third group is interesting, which includes those who accept fake news but do not deny it in the case of real news.

A significant majority of respondents (60 %) reject all forms of false news. Another significant group identifies with false news but well informed and accept the real news (29 %). Only 7 % were those who accept the fake news and reject the real news. They are seen as extreme fans of fake news. Overall, there is a kind of imbalance in the perception of fake news and real news: in the case of real news, the vast majority of students in Slovakia can adjust and prepare their judgement, but despite the fact that fake news was rejected by the majority of respondents, there is still a minority who tend to fall for the false news in the media.

Chart 3 – Judgement of true and false news, %



Chart 3 – Judgement of true and false news, %

## 7.2.2. Consuming news

In the course of the research, we also asked from which media sources students get information, where they read news. We listed six news sources: social media (Facebook, Instagram, Twitter), internet (Google News), television, radio, blog/vlog, print media (newspapers, magazines).

Chart 4 – Consuming news, %
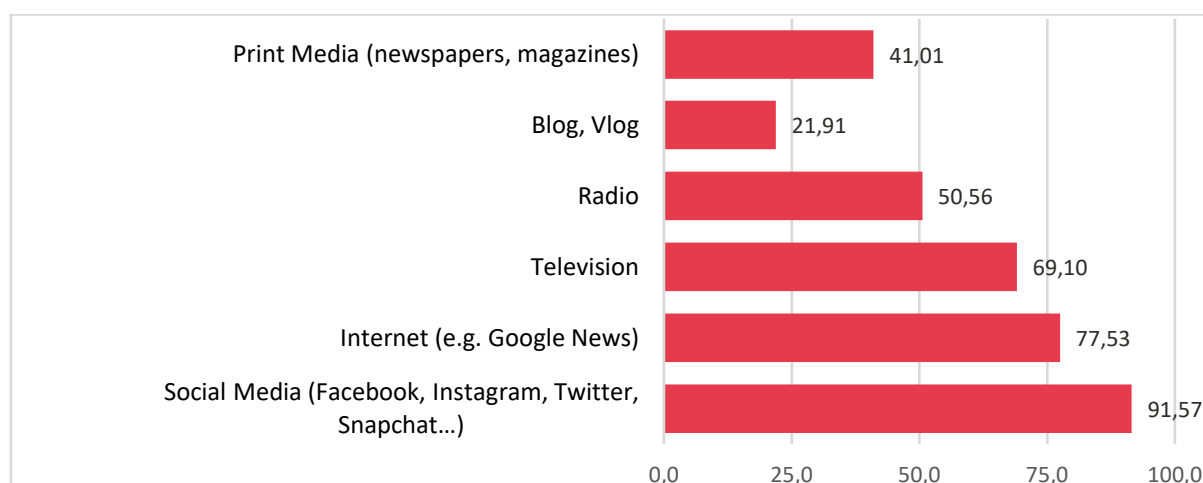


Most people learn about world news from social media, with the internet next, and finally the television, and radio. The prominent role of social media in the news consumption of university students in Slovakia is striking, well ahead of the internet.

If we cluster each news source, as Chart 5 depicts, there are two main groups of media related to each other. Students which use internet very often use also social media as a main source of the news. Television is also often used together with these two news sources. The scale of utilisation of these three sources might be therefore named as students mainstream news channels because all of them are used in over 70 % of cases. The second group of media can be characterised as sort of students' alternative media, which are less used among university students. Among them, the most used media are print media (41 %) and radio (51 %).

Chart 5 – Where do you get the news, cluster diagram
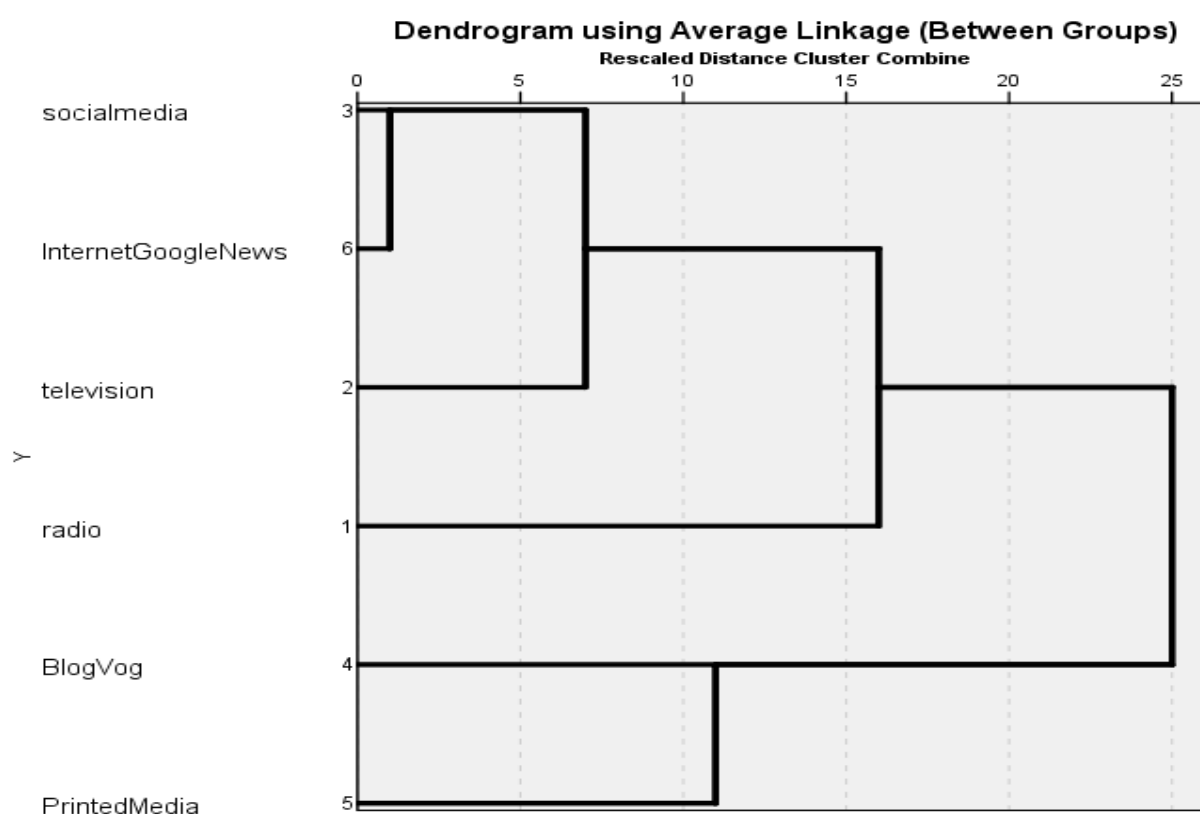


We also asked in which media students most often come across fake news. Slovak students mention social media in the first place, blogs in second place and the internet in third place (Chart 6). Surprisingly, traditional media such as the printed press, television, or radio are said by students to play a smaller role in spreading false news.

Chart 6 – Prevalence of false news in various media, 0-1 mean value
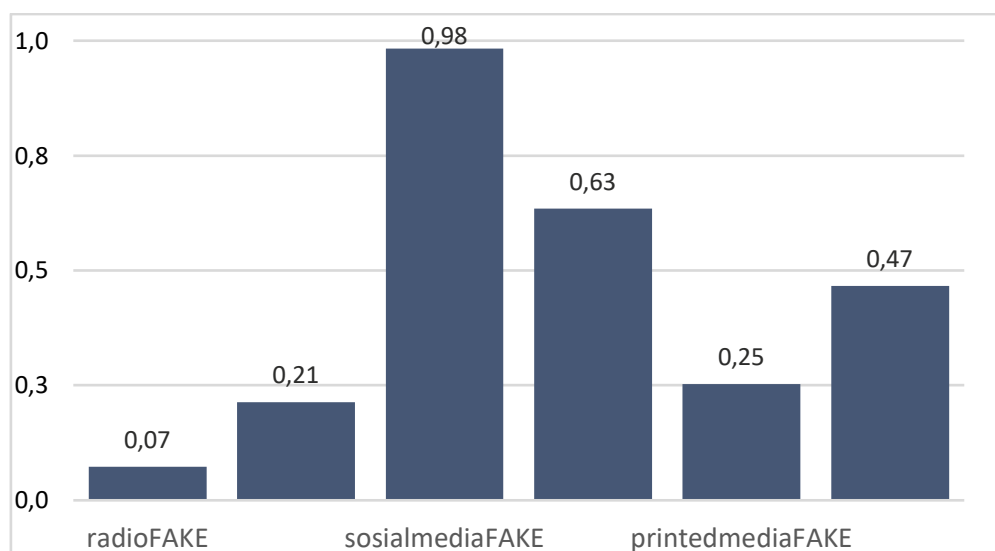


This picture is refined by clustering different media sources in terms of the spread of fake news. Slovak university students expect most fake news to be present on the media connected to the social media and the blog/vlog (which constitutes the second group in the dendrogram in Chart 7). In the first group we can find radio, television and print media. These are very closely linked in terms of the spread of

fake news, although their role is considered less important by students than the second group (social media, internet), (see Chart 7).

Chart 7 – Prevalence of false news in various media, 0-1 mean value: Where can you meet with fake news mostly, cluster diagram
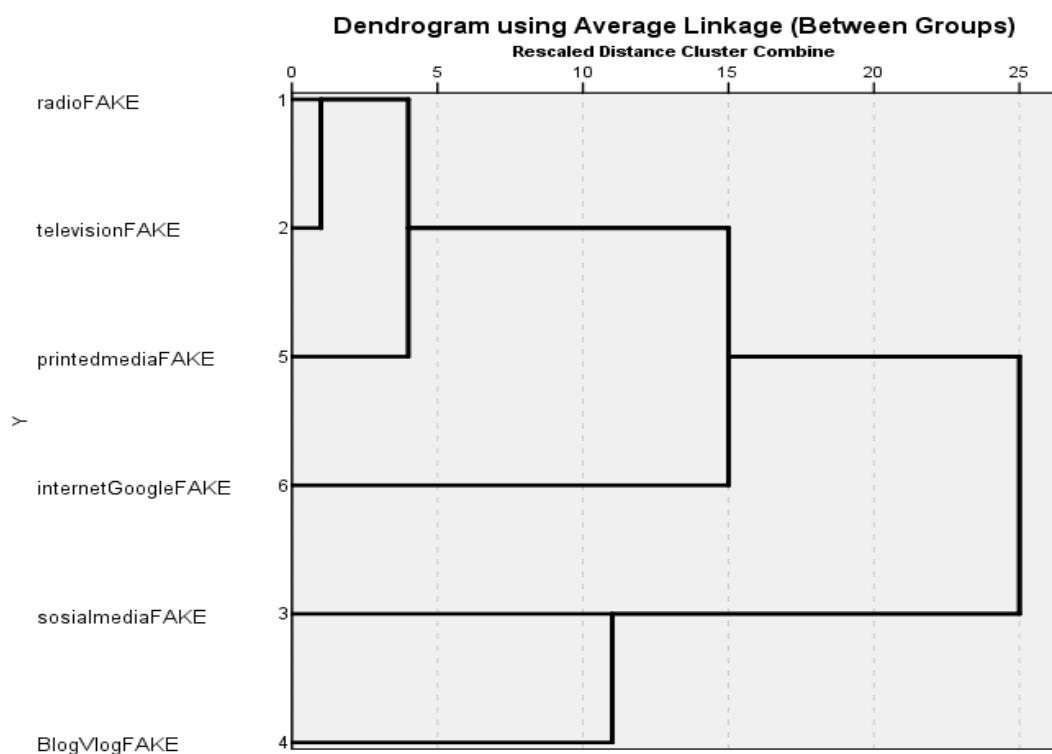


We looked at the media's perception of the spread of fake news according to whether someone does or does not accept the fake news. The results show that there is no significant difference between the attitudes of the two groups. The opinion patterns of the two groups are very similar. Slovak students, who are more inclined to accept fake news, attribute a slightly smaller role to blogs, but see a larger role in the print press, television and the internet.

Chart 8 – Prevalence of fake news in various media according to whether someone rejects or accepts fake news, mean value 0-1
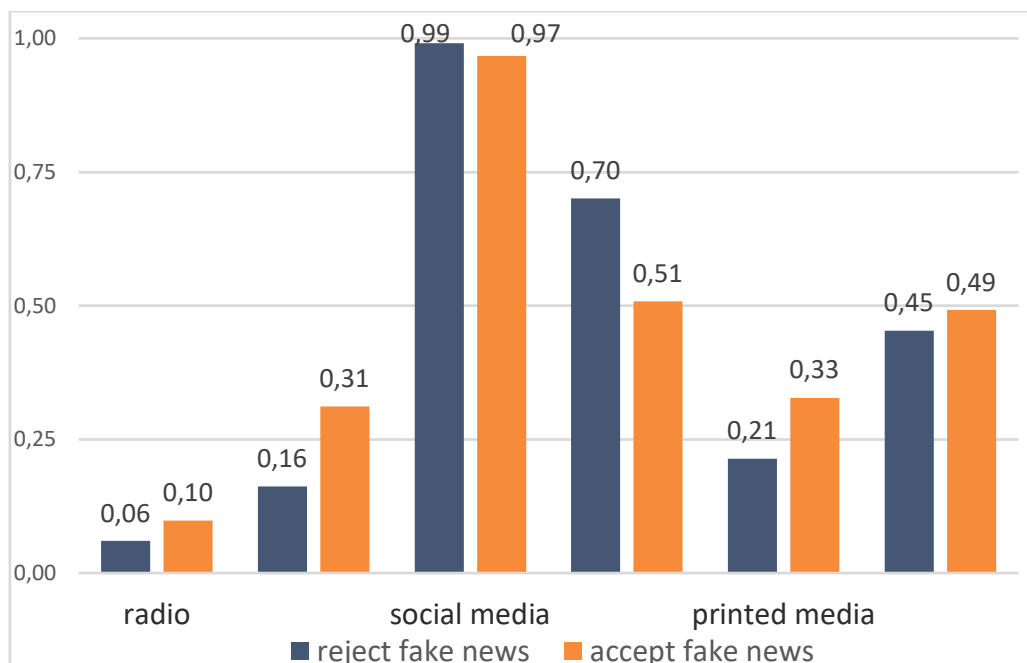


Finally, we examined whether there is a correlation between fake news consumption and media trust. In this regard, the questionnaire included three questions: How trustworthy would you say the news from television/radio are? How trustworthy would you say the news from print media are? How trustworthy would you say the news from social media are? We looked at the degree of trust according to whether someone is more open or dismissive of false news. The results are shown in Chart 9. The degree of trust was measured on a seven point scale, where a value of 1 measured a complete lack of trust and a value of 7 measured a high degree of trust.

Chart 9 – Trust in different media by accepting or rejecting fake news, 7-point scale, mean value
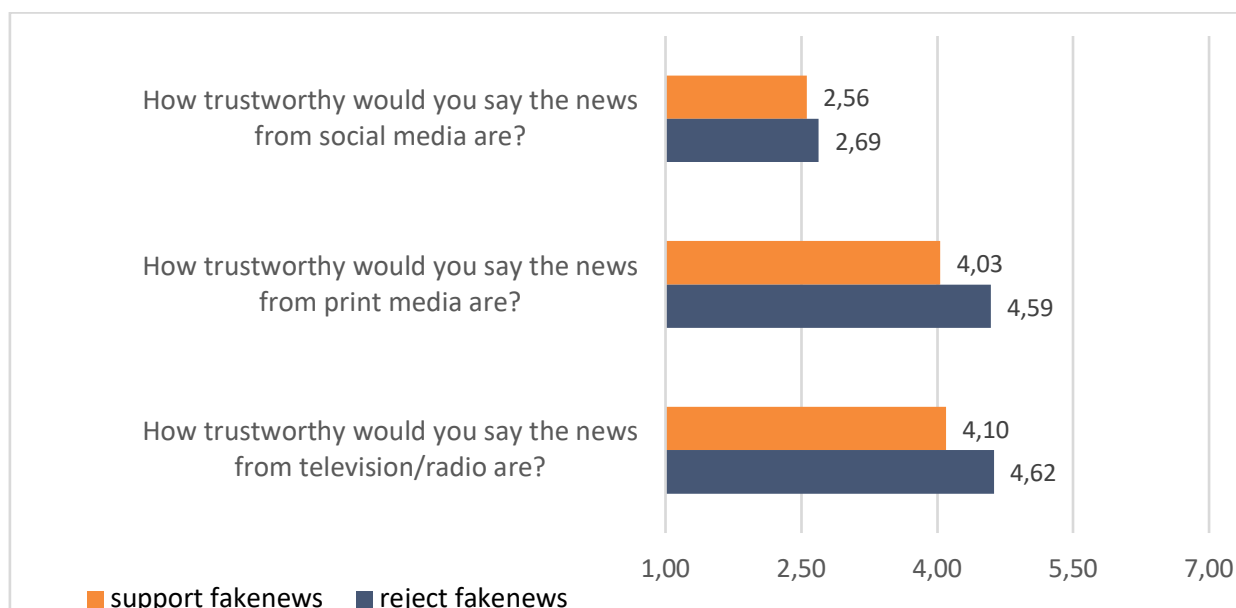


Surprisingly, Slovak students by far give much higher trust to traditional media (printed press, television, radio) than to news appearing on social media. This is interesting just because we have seen

before that the most important source of news among students is social media and the internet. (Chart 4). Thus, while the latter is the most important source of news for students, trust in them is particularly low.

We also looked at whether there is a difference between level of trust in different media actors and the consumption of false news. In the case of the printed media and television/radio, trust is slightly higher among those who give less credit to fake news. But the pattern of opinion structure is not significantly different between the two groups. However, a more detailed analysis has also shown that the more someone accepts fake news, the more distrustful against traditional media, while in terms of social media, this distrust does not show up sharply.

We also looked at the extent to which personal trust in other people is related if more someone accepts fake news. The result is shown in Chart 10.

Chart 10 – Level of personal trust by accepting or rejecting fake news, 7-point scale, mean value



The result is remarkable. In the case of Slovak students, the more one accepts false news, the more distrustful one is of others. The trust in fake news and distrust in persons correlate.

## 7.3. Summary

Research among university students in Slovakia has shown that although fake news and their acceptance appear among students, this is only typical of a minority. Most students are informed about and accept scientifically based news. Students, in general incline to believe true headlines than false ones. However, while the majority rejects fake news, a significant minority is willing to accept many of the false news items.

A significant group identifies with false news, but is well-informed and accepts the real news (29 %). Only 7 % accepted fake news and rejected real news items. These are the 'extreme fans' of fake news. Overall, there is an imbalance in the perception of fake news and real news: in the case of real news, the vast majority of students can adjust and prepare their judgement, but despite fake news being rejected by the majority of respondents, there is still a minority who tend to fall for false news in the media.

Concerning media consumption, most people learn about world news from social media, with the internet following, and finally the television and radio. The prominent role of social media in university students' news consumption in Slovakia is striking, well ahead of the internet.

We also analysed in which media students most often come across fake news. Slovak students mention social media in the first place, blogs in second place, and the internet in third place. Surprisingly, traditional media such as printed journals, television, or radio are said by students to play a lesser role in spreading false news.

We examined whether there is a correlation between fake news consumption and trust in media. In the case of the printed media and television/radio, trust is slightly higher among those who give less credit to fake news. However, the pattern of opinion structure is not significantly different between the two groups. Nevertheless, a more detailed analysis has also shown that the more someone accepts fake news, the more distrustful they are of traditional media, while in terms of social media this distrust does not show up sharply.

University students in Slovakia who tend to accept fake news are more distrustful of others. This connection may shed light on the fact that personal distrust, as a manifestation of a closed personality, plays a role in acceptance of false news.

# 8. Conclusion

When we started to plan our research into science fake news in several central European countries and northern Italy, we could not foresee that some months later the communication field where falsehood rules would literally become lethal on such a scale. Our initial aim was just to study the influences destabilising the public sphere in the field of scientific communication.

The surveys carried out among university students in Austria, Croatia, Czechia, Hungary, Italy and Slovakia have shown that the tendency to believe in unreliable scientific statements is present among university students in the countries under study. This result is certainly not surprising. Misinformation is part of the human condition. The conflict is not new between evidence-based, reliable statements of reality and false statements motivated by stupidity, malignancy and slanderous hostility.

Chart 1 – Distribution of respondents according to how many false (N=8) statements were accepted, and how many true statements (N=4) were rejected, by country. The average of the aggregated measurements (rejection and acceptance) in the two fields
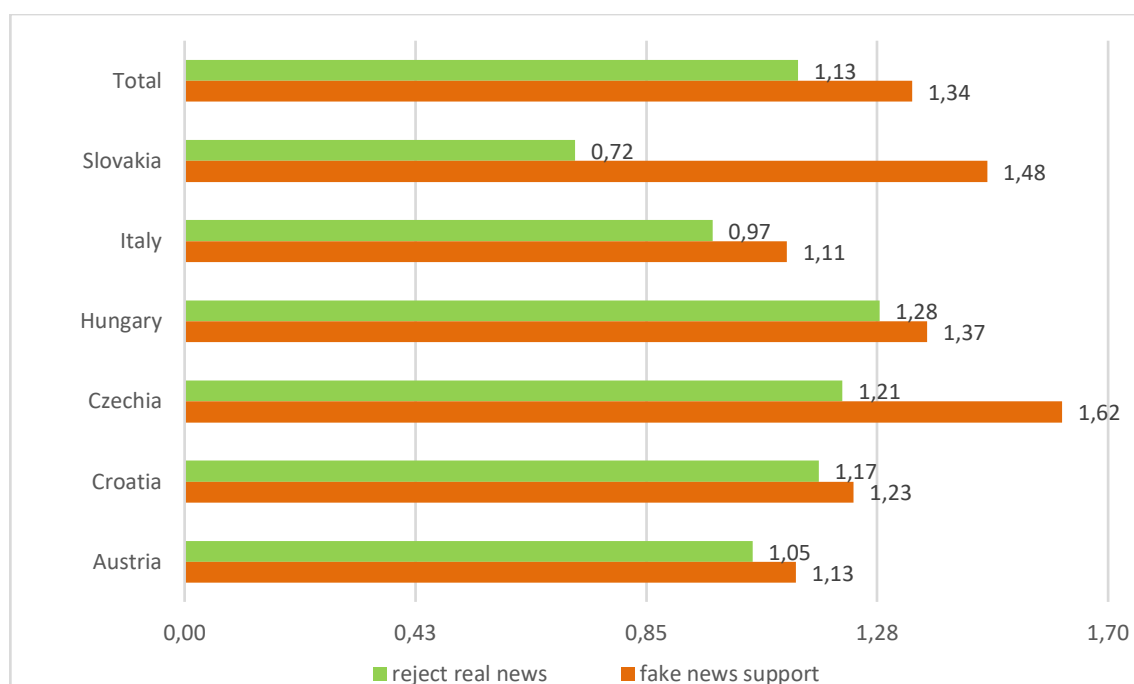


In both aggregate dimensions, the differences are significant, but the country differences show larger significant differences than the differences between the two indicators. In the different countries the identification of fake news was relatively less difficult than the identification of real news. The following table shows the strength of the differences.

Table 1 – ANOVA table of the level of significances

| | | | Sum of squares | df | Mean square | F | Sig. |
|---|---|---|---|---|---|---|---|
| Reject real news * country | Between groups | (Combined) | 52.700 | 5 | 10.540 | 12.402 | .000 |
| | Within groups | | 1 930.081 | 2 271 | .850 | | |
| | Total | | 1 982.781 | 2 276 | | | |
| Fake news support * country | Between groups | (Combined) | 75.107 | 5 | 15.021 | 6.396 | .000 |
| | Within groups | | 5 333.153 | 2 271 | 2.348 | | |
| | Total | | 5 408.259 | 2 276 | | | |

*The Eta value in the case of rejecting real news was 0.163, in the case of supporting fake news, it was 0.118.*

Incredulity is two-fold. Credulous persons reject true science news while simultaneously accepting the fake. Chart 1 shows that disbelief in true science news is generally less frequent than belief in false news. The pattern is the same in all countries.

Chart 2 shows the proportions of consistently credulous and non-credulous persons in each sample including proportions of hybrid types of persons who equally accept fake and true news, or equally reject both types of news. As we can see most of the students in Austria, Italy and Slovakia were not credulous at all. The proportion of non-gullible students was a bit less in Croatia and Hungary, and was surprisingly low in Czechia.

Chart 2 – Distribution of respondents by four consistency types of acceptance of fake news and rejection of true news, by country, %
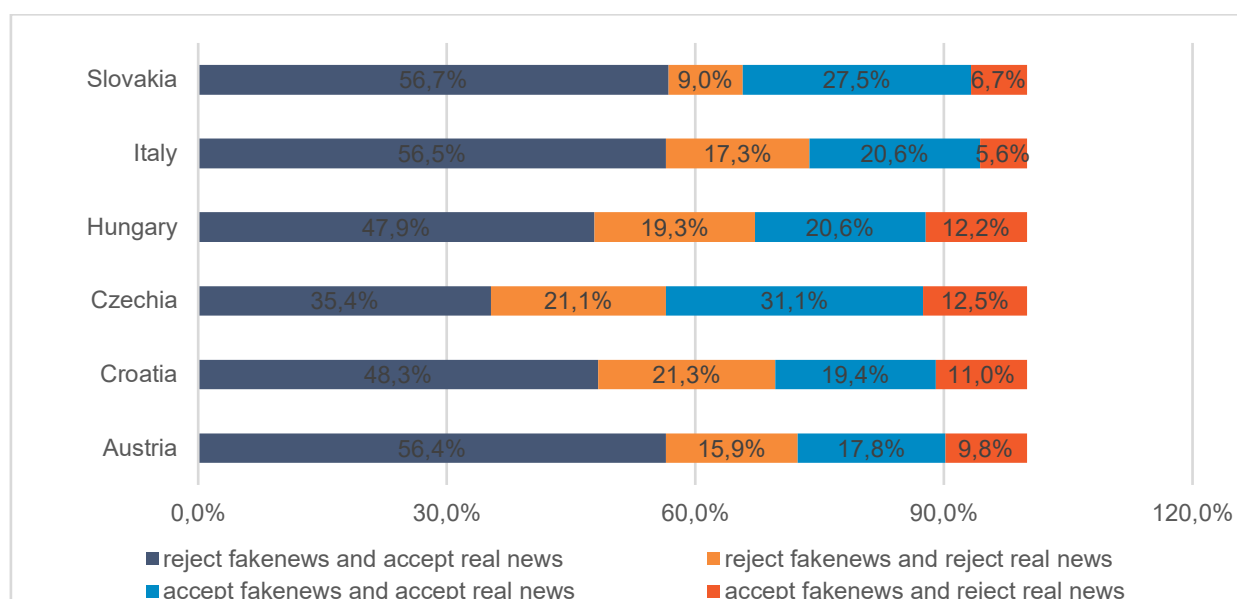
The differences by country for the four types are significant, which is well reflected in the following table.

Table 2 – Chi-Square tests of the cross-tabulation of consistency types of acceptance of fake news and rejection of true news, by country

| | Value | df | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 77.765[a] | 15 | .000 |
| Likelihood Ratio | 81.137 | 15 | .000 |
| Linear-by-Linear Association | .758 | 1 | .384 |
| No of Valid Cases | 2277 | | |

The good news is that the respondents in more or less all countries have shown resistance to falsehood in scientific communication, casting doubt over false news headlines. The students accepting headline news as evidence-based true statements and simultaneously rejecting fake headline news in each country outnumbered the non-believers of scientific communication. The content, however, of the individual headline news mattered. False or true, headline news referring to specific spheres of human existence, such as gender and sexuality, incited more interest than news concerning more neutral problems of society and nature.

The central issue was social trust, which can provide a solution to help people emerge from the mess created by the new information ecosystem that creates information bubbles and crushes reliable and responsible sources of information. Chart 3 shows that the level of interpersonal trust appears to be higher in Austria and Hungary and lower in Croatia, Czechia, Italy and Slovakia. Even the relatively highest scores of trusts are rather low, demonstrating a general unwillingness among our respondents to be open and sincere in meeting and communicating with unfamiliar people.

Chart 3 – Would you say that most people can be trusted? by country, mean values, on seven-point scale
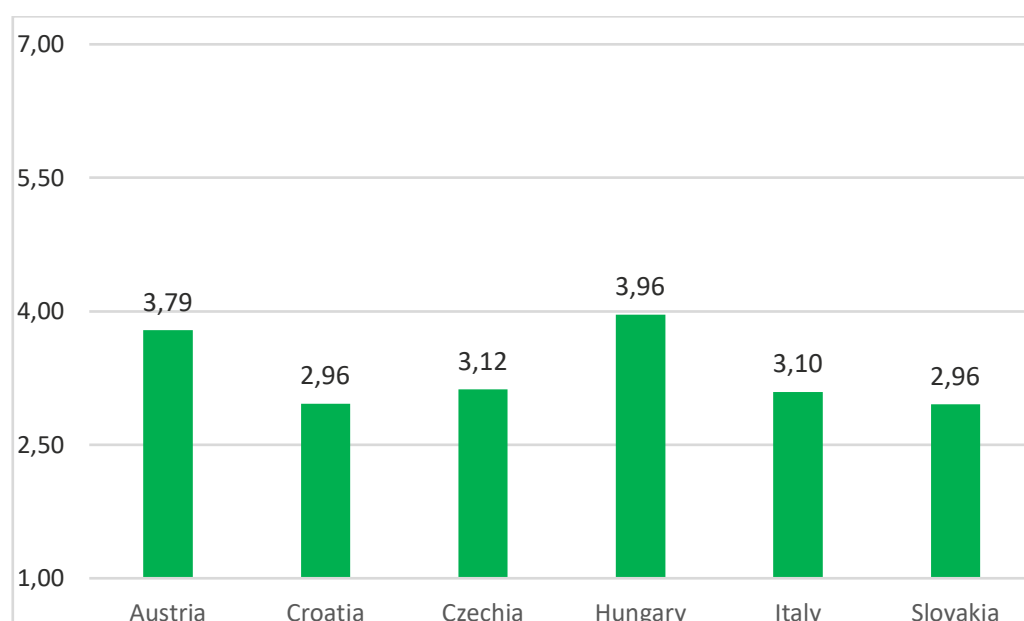
Misinformation is not new, but the information ecosystem within which it is now spreading is new. Charts 4 and 5 reveal the discrepancy between the level of trust and frequency of use of the individual media sources of the news. The more the respondents trust the media the less they use them, and conversely, the more they use them, the less they trust them. The public sphere has evolved into a completely new phase, where information filtering mechanisms no longer exist. The producers of messages disseminated through social media can broadcast news unchecked by any scientific authority. We have stepped into a world of public communication where truth plays no role in substantiating the content of the statements.

Chart 4 – Trust in different media sources by country, mean values, on seven point scale
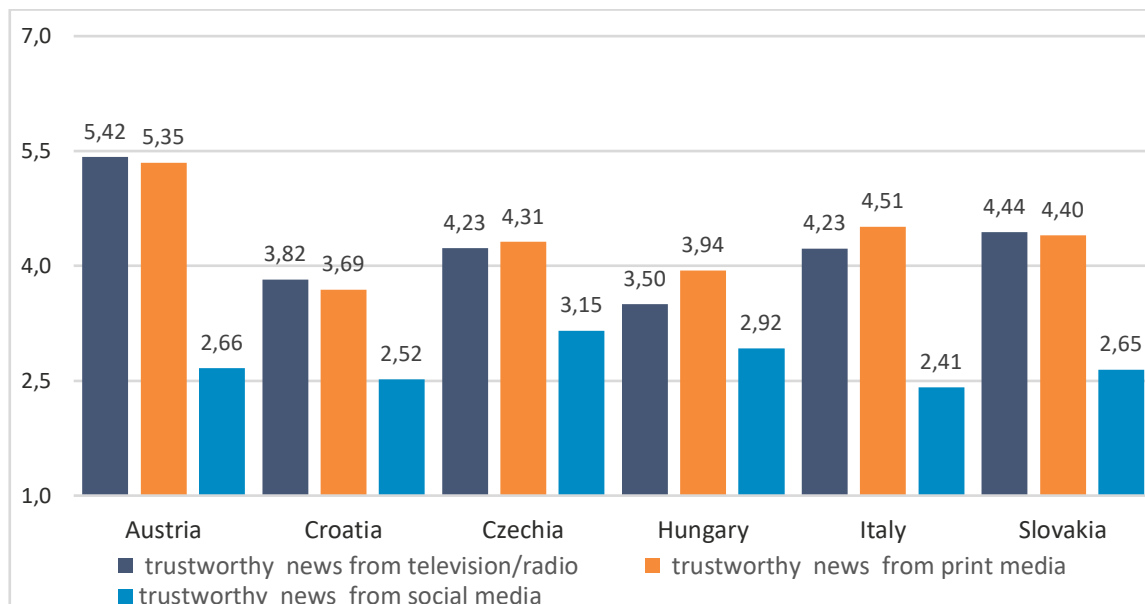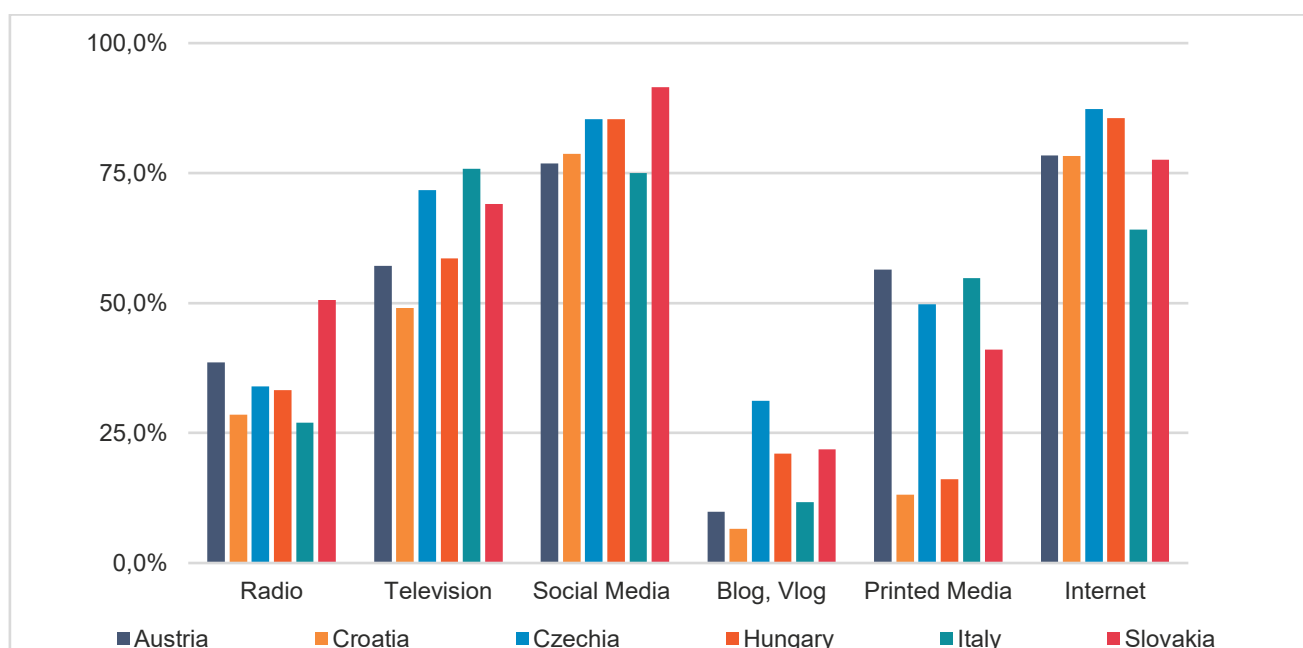


Chart 5 – Consuming news from different sources by country, %



The final question of our questionnaire asked the respondents' opinion concerning the nature of direction in which their country and Europe are going. As we can see in Chart 6, student opinions in the individual countries were far from being unanimous.

Chart 6 – Europe and the home country are going in the right direction, by country, %
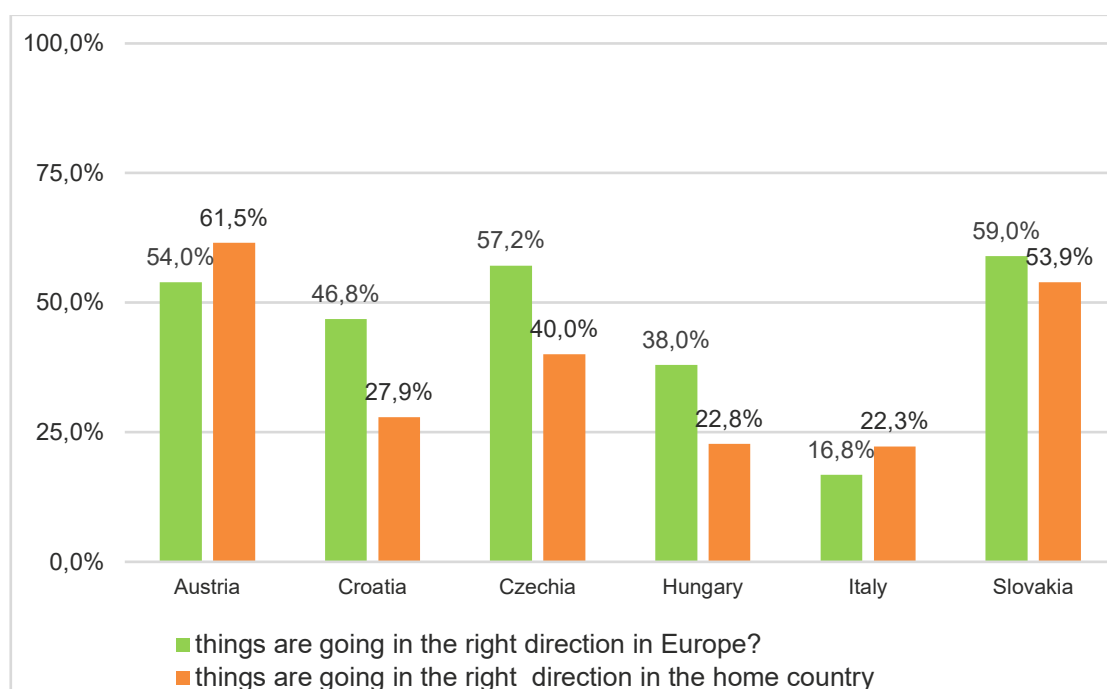


Respondents from Austria and Slovakia stand out as most satisfied with the course of their own country as well as with that of Europe, while respondents from Italy (and Hungary) seem the most pessimistic. In all countries, except Austria, the course taken by Europe is seen more positively than the course taken by the respondents' own country.

In the midst of our research, Europe was hit by the coronavirus pandemic that underlined the radically new aspects of our information ecosystem, magnifying and highlighting the most controversial points of the public sphere. Falsehood has become literally a lethal problem on an unprecedented scale.

Pandemics affecting our health will come and go, but the pandemic of misinformation will stay with us. The lesson we can learn from our results is that, in order to grapple with the 'infodemic', there is a need to enhance the level of public trust in science. We believe that the consumers and producers of social media should be trained to use fact-checking mechanisms enabling them to distinguish between true and false information. Furthermore, misinformation consumed by credulous persons should be distinguished from disinformation that is manufactured intentionally to cause havoc.

Myths are no doubt inherent parts of our mindset. We believe, however, that myths can no longer serve as at the only means of construction of reality. Real knowledge, in contrast, lies in recognising information and thoughts produced by trustworthy sources. Science communication, however, does not guarantee against inaccuracies and errors. Real wisdom is the art of doubting, this is a lesson Europeans can draw from this experience.

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# 10. Annex: Questionnaire

**1. Fake or not**

**In the following section, we will present to you some news that appeared on online portals in the past few months. Some of these headlines are true but some of them are fake. Please indicate to which extent you think the news items are likely or unlikely to be true, marking the number on the scale below!** (multiple choice grid)

1. very likely
2. likely
3. unlikely
4. very unlikely
5. I don't know

CERN in Switzerland has already created small black holes.

Gender studies are increasing the number of transsexual people.

Global warming is unsupported by data.

Homosexuality can be cured by genetic engineering.

Economic inequalities are rising in the world.

Life expectancy is lower in eastern than in western Europe.

The refugee crisis is the main cause of the economic crisis in Europe.

The difference of intelligence between racial groups has been proven beyond doubt.

The vaccine against measles, mumps and rubella causes autism.

There has never been a landing on the Moon.

They found water on Europa, the moon of Jupiter.

Today Earthquakes cannot be predicted.

**2.** Have you ever heard about these issues before? (multiple choice)
- Yes
- No
- Some of them

**Consuming news**

**In the following, we will ask you questions about your news consumption habits**

**3.** Where do you get the news? (checkboxes)
   a. Radio
   b. Television
   c. Social Media (Facebook, Instagram, Twitter, Snapchat…)
   d. Blog, Vlog
   e. Print Media (newspapers, magazines)
   f. Internet (e.g. Google News)
   g. Other: …
**4.** What kind of news are you interested in? (checkboxes)
   a. International news
   b. National news
   c. Political news

     d.    Lifestyle news

     e.    Fashion news

     f.    Sport news

     g.    Weather news

     h.    Local news

     i.    Business and financial news

     j.    Health news

     k.    Educational news

     l.    Science and technology news

     m.    Art and cultural news

     n.    Other: …

## Fact-checking

**In this section, we will ask about your news reading habits.**

5. What do you think where can you meet with fake news mostly?

     **a.**    Radio

     **b.**    Television

     **c.**    Social Media (Facebook, Instagram, Twitter, Snapchat…)

     **d.**    Blog, Vlog

     **e.**    Print Media (newspapers, magazines)

     **f.**    Internet (e.g. Google News)

     **g.**    Other: …

6. Do you know any fact-checking pages? (multiple choice)

     **a.**    Yes

     **b.**    No

7. Do you use any fact-checking page? (multiple choice)

     **a.**    Yes

     **b.**    No

## Trust

**In the next section, we will raise a few questions about trust.**

8. Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people? (linear scale, 7-point scale)

you can't be careful enough ← → most people can be trusted

9. How trustworthy would you say the news from television/radio?

cannot be trusted ← → definitely trusted

10. How trustworthy would you say the news from print media?

cannot be trusted ← → definitely trusted

11. How trustworthy would you say the news from social media?

cannot be trusted ← → definitely trusted

**Socio-demographic questions**

**In this section, we will ask basic demographic data.**

**12.** Gender (multiple choice)

    **a.** Male

    **b.** Female

**13.** Age (short answer)

**14.** What discipline do you study? (multiple choice)

    **a.** Natural/technical sciences

    **b.** Social/Human sciences

**15.** Do any of your parents have a university degree?

    **a.** Yes

    **b.** No

**16.** Do you think that things are going in the right or in the wrong direction in Europe?

    **a.** Going right

    **b.** Going wrong

**17.** Do you think that things are going in the right or in the wrong direction in your country?

    **a.** Going right

    **b.** Going wrong

The main aim of this report is to present and discuss the results of a survey concerning perspectives on fake news among undergraduate university students in central Europe and northern Italy. The survey was carried out in spring 2020, during the coronavirus pandemic. An online questionnaire was used. The report is therefore the product of what could be achieved under highly unusual circumstances and should serve as a pointer for further studies.

Misinformation is always troubling, especially in science. Scientists feel distressed when public understanding diverges from the truth. Intentional disinformation (fake news), however, is not always the cause of misinformation. The report discusses the causes related to social trust and types of media consumption.

The sample of the study consisted of several hundred bachelors or masters students from each participating country. Half of the students were recruited from social sciences areas and the other half of the sample were recruited from natural sciences areas. The method of approaching the students was online questioning. One university was chosen from each participating country, and the link to the questionnaire was sent by that university's administration to the students. The response to the questionnaire was naturally anonymous and voluntary.