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ARTICLE

Perceptions of Self-Efficacy with Misinformation

Evolution towards Resilience Among European Citizens (2018–2022)

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Resilience to misinformation has been conceptualised and defined as an intangible resource belonging to a country, a measure of the capacity of its citizens to deploy discerning and cognitive skills to determine the veracity or falsehood of information, as well as be aware of the degree of the problem. This conceptualisation allows for value to emerge from cross-country and cross-time analyses of data on perceptions of self-efficacy in curbing misinformation. Using data from Eurobarometer, this research conducts analyses at whole-country level, and 1. identifies key components of individuals' perceptions about their resilience to misinformation; 2. produces a factor with which cross-time observations can be operationalised; 3. shows evolution over time (2018–2022) for European citizens from 27 countries. Overall, results disclose a growing trend, and this is so for both specific individual attitudes and skills, as well as the resulting factor as a whole. The causes and implications of the findings are discussed to provide hints on how to improve public policies, such as taking into account self-perceptions

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of efficacy in fighting misinformation alongside media literacy strategies that engage citizens in curbing misinformation.

Keywords: misinformation, resilience to misinformation, self-efficacy beliefs, European Union, intangible resource

Introduction

How are the beliefs of European citizens evolving with regard to their self-efficacy and resilience to misinformation? This is the key question addressed by this research because a better understanding of how citizens react to misinformation will help achieve better policymaking to fight the damage associated to this phenomenon. *Misinformation* is used here as an umbrella term to describe *information disorder,* including both intentionally and unintentionally disseminated incorrect or misleading information.

The question of how to curb information disorder has gained much attention globally. The European Commission states in its *Action Plan against Disinformation* (2018) that the scope of the misinformation problem is challenging European values and freedoms, eroding institutional trust, increasing polarisation and interfering in public policy decision-making processes. For their part, national governments are trying to strengthen their regulatory policies to combat hate speech and online misinformation, including regulatory initiatives to impose accountability obligations on social platforms (Helberger, 2020). As Tenove (2020) explains, policy responses against misinformation are aimed at protecting three normative democratic benefits: self-determination, accountable representation and public deliberation.

This research is founded on the assumption that these attempts could be reinforced with better knowledge about how individuals perceive their reactions and behaviours in relation to misinformation. Coping with misinformation is certainly not only about policies and barriers to physically stop the dissemination and monetisation of misinformation content production, but it is also about fostering the skills and knowledge of citizens in developing adaptive behaviours to face the challenges generated by misleading and fake information (Golob et al., 2021; Hopp, 2022).

The literature offers clues on how to explore the way citizens curb misinformation. European cultural dimensions (Arrese, 2024) and sociodemographic characteristics are relevant for a better understanding of how citizens struggle with misinformation. Previous research looks at a number of variables in analysing what is associated with curbing misinformation, including age – *youth* (Baptista et al., 2021; Golob et al., 2021; Rodríguez-Pérez & Canel, 2023), education – *the higher educated* (Baptista et al., 2021; Humprecht et al., 2023; Rodríguez-Pérez & Canel, 2023; Staender et al., 2022), gender – *women* (Golob et al., 2021; Humprecht et al., 2023) and political ideology (Baptista et al., 2021; Rodríguez-Pérez & Canel, 2023; Roozenbeek et al., 2020), with findings indicating, for example, that left leaning people tend to cope better with misinformation.

These findings are clearly illustrative for better policymaking, but they derive mainly from explorations of sociodemographic variables. What is missing is knowledge about

self-perceptions of skills and attitudes, and also on how these self-perceptions can help in conceptualising resilience to misinformation in such a way that cross-country and cross-time comparisons can be established. Certainly, one ever-challenging issue in analysing misinformation is capturing information on the actual performance of individuals: there are always gaps between perceptions of self-efficacy in curbing misinformation and actual behaviours in curbing it.

This paper builds upon previous research that conceptualises *resilience to misinformation* as an intangible resource (Rodríguez-Pérez & Canel, 2022; 2023) and, by doing so, a) value is attributed to data on self-perceptions; b) factors are identified as composing said resilience to misinformation; c) relations between the latter and other intangible resources such as trust, engagement and legitimacy can be established; and d) suggestions are provided to operationalise observations of this intangible resource for comparisons across countries and over time. Such conceptualised resilience to misinformation is a construct that allows for analyses that assume a positive value may emerge regarding the curb of misinformation from interactions between citizens and public sector organisations.

Research question

RQ: *How has the resilience of European citizens to misinformation evolved over time?*

This paper is founded on data on self-perceptions of attitudes and behaviours towards misinformation. Based on the available data at Eurobarometer (not all barometers include items on misinformation), the timeframe covers 2018 to 2022. It is hoped that this research can inspire the efforts of European and member states in combatting misinformation by enhancing public awareness of and literacy in discerning between accurate and false information.

The paper is structured as follows: first, theoretical fundamentals are presented, including preliminary clarifications to frame the analysis of resilience to misinformation; second, specific items (media literacy and attitudes toward dealing with misinformation) that compose resilience to misinformation are then detailed; third, the data and methods, including details of the sample, measures and statistical techniques are described; fourth the results section presents verification of the hypotheses. Finally, we discuss the theoretical and practical implications.

Preliminary clarifications on the approach

This research is founded on previous research that conceptualises resilience to misinformation as an *intangible resource* (Rodríguez-Pérez & Canel, 2022; 2023). This is supported by Canel & Luoma-aho's (2019, p. 77) definition of an intangible asset for the public sector, the key point of which is the idea that value may derive from communicative interactions between organisations and stakeholders, and it is in this kind of interaction that misinformation develops. Based on the literature review, the cited research proposes that the concept of the citizenry's resilience to misinformation be understood based on attitudes and

behaviours that allow citizens to develop the capacity to be aware of and address the problem themselves, that is, to identify the risks and effects that misinformation causes for them, and to develop abilities (for instance, skills and knowledge) that allow them to overcome the threat. Using the construct of resilience to misinformation, the mentioned research refers to an array of citizen attitudes and behaviours in coping with misinformation content.

With data from Spain, previous research also explores whether factor analysis could help in synthesising information on citizens' attitudes towards misinformation (Rodríguez-Pérez & Canel, 2022). A factor analysis showed that resilience to misinformation is composed of different *attitudes and behaviours,* and from those resilience to misinformation was conceptualised and operationalised as an intangible resource and defined as "an intangible resource belonging to a country that measures the capacity of its citizens to deploy discerning and cognitive skills about the veracity and falsehood of a piece of information, as also to be aware of the scope of the problem" (Rodríguez-Pérez & Canel, 2022, p. 862).

Exploration of relationships between this intangible resource and the citizens' assessments of public sector organisations (more specifically, how they assess legitimacy and trust) turned up helpful insights about how governments can fight misinformation. Subsequent research (Rodríguez-Pérez & Canel, 2023) expanded the exploration from Spain to other European Union countries, and focused on the analysis of the relationships between this intangible resource and other intangibles that may derive from people's assessments of media performance.

Conceptualising resilience to misinformation as an intangible resource provides hints on how to identify whether intangible value can be derived from people's reactions to misinformation; and if it can, that could also allow the exploration of other intangible resources that could potentially increase it. It might open avenues to developing something positive setting out from misinformation. For instance, if it were the case that citizens from a specific country are more resilient to misinformation the more highly they assess the legitimacy of public organisations to be, country governments would find clues there to foster such resilience.

While the analysis of this intangible resource has been operationalised in-country and cross-country, thus far there is no cross-time comparison to ascertain the evolution of resilience to misinformation. This is the goal of the present research with the RQ: *How has resilience to misinformation evolved over time in European citizens?*

Conceptualised as an intangible resource, resilience to misinformation is composed of different attitudes, skills and competencies, and research exploring the latter is helpful in identifying what should be brought into the analysis. The literature describes the attitudes of individuals to dealing with misinformation (Holland et al., 2024); it explores media literacy interventions to identify accurate information (Lee et al., 2024); and delves into attitudes to increase the likelihood of verifying content (Golob et al., 2021). Additionally, self-perceived measurements of exposure awareness to misinformation tend to be used to determine country-specific factors related to political and information environments (Boulianne et al., 2022; Humprecht et al., 2023; Rodríguez-Pérez & García-Vargas, 2021; Stubenvoll et al., 2021). The following sections detail the skills and attitudes associated with this intangible resource.

Media literacy to cope with misinformation

In this study, we consider individuals to be the core of any program, public policy, or effort in curbing misinformation. As a concern, misinformation must be addressed by individuals who are the principal participants in the struggle with, or in overcoming the risks around, problematic information. In the eyes of the European Commission (2018), coping with misinformation requires the active participation of civil society. *The Strengthened Code of Practice on Disinformation* (European Commission, 2022b) acknowledges the importance of empowering citizens who can distinguish and flag misinformation to mitigate its impact. Additionally, this code emphasises the necessity of promoting media literacy and critical thinking to equip citizens with the knowledge and skills needed to curb misinformation. In this sense, Sádaba and Salaverría (2022) indicate that these strategies are intended to foster a sense of responsibility among citizens, enabling them to assess autonomously the information they receive. Audiences, as prosumers of information, need to acquire an array of literacies to be aware of the scope of the misinformation problem.

Media literacy comprehends a wide range of definitions and approaches with the foundation of various kinds of skills, knowledge, or beliefs, among other things (Potter & Thai, 2019). Media literacy interventions have several potential benefits: in activating corrective action against misinformation (Xiao & Yang, 2024), in the rejection of misinformation and conspiracy theories (Ashley et al., 2023), in improving accuracy discernment of news headlines (Sirlin et al., 2021), and in people understanding better how news media works (Murrock et al., 2018).

Furthermore, the citizens' societal awareness against misinformation is related to, as Tully et al. (2022) state, individual media literacy behaviours that favour the capacity to discern accurate and reliable information from misinformation. Hence, Cunliffe-Jones et al. (2021) propose a definition of misinformation literacy that refers to understanding the possible formats for both misinformation and accurate information, how they are created, spread and consumed, as well as the ability to distinguish between them. Serrano-Puche (2021) indicates that the misinformation problem derives precisely from insufficient media literacy skills among citizens. Tully et al. (2022) explain that media literacy – in all its dimensions: news literacy, information literacy, digital literacy and misinformation literacy – is an approach toward citizens acquiring the knowledge and skills with which to navigate the current information ecosystem, being aware of and able to struggle with the misinformation problem. In fact, Vraga et al. (2021) explain that literacy development promotes the critical and thoughtful engagement of citizens with news content, allowing them to differentiate truthful content from falsehoods and other non-informative content, to identify misinformation and evaluate news quality through verification techniques. Pennycook and Rand (2019) conclude that the lack of analytic thinking contributes to an increase in the vulnerability of citizens to misinformation.

To further explore media literacy in detail, Vraga et al.'s (2022) association of this concept with an array of knowledge and skills that enables individuals to discern the accuracy of information is of help. These authors posit that individuals have to feel their ability to discern, which is what the authors call *self-perceived media literacy,* which refers to individuals' perceptions of their abilities and confidence in their news media literacy

skills. In this regard, differentiation must be made between individual self-perception of knowledge and skills from true knowledge and skill performance. For this reason, from a critical standpoint, Potter and Thai (2019) argue that several studies do not measure media literacy performance but rather the beliefs or attitudes of individuals regarding the individuals' self-perception. Additionally, these authors also indicate that when individuals have robust self-efficacy beliefs, they are more likely to learn more and to use that learning. Complementary, cognitive models affirm that individuals need to feel both in control of their media consumption and the media's influence on them in order to become media literate. This has been the case in studies (Vraga et al., 2022; Xiao and Yang, 2023) that asked participants about their confidence in their ability to interpret media messages.

Despite the subjectivism of self-perception data, this paper places value on how individuals report their attitudes towards misinformation and, by delving into self-attitude beliefs, examines whether or not European citizens are better equipped nowadays to curb misinformation.

Attitudes to coping with misinformation

The study of misinformation incorporates the theoretical framework of beliefs of self-efficacy in coping with misinformation. Self-efficacy beliefs promote cognitive processing and critical thinking that support the ability to assess and discern factually accurate information and misinformation (Hopp, 2022). According to Bandura (2006), perceived self-efficacy is a judgment of citizens' beliefs in their capabilities to produce given attainments. Borah (2022) points out that self-efficacy perceptions address the individual's feelings, motivations and behaviours, and based on social cognitive theory, this scholar proposes the concept of *misinformation efficacy* to refer to the perception that individuals have that they can distinguish false from accurate information.

Previous studies have provided hints about the extent to which the approach of self-efficacy beliefs contributes to success in facing problematic information, considering identifying fake and accurate information (Hopp, 2022; van Zoonen et al., 2024), avoiding sharing news that appears to be inaccurate (Paciello et al., 2023), disengaging with false news (Corbelli et al., 2023), reducing the belief in political misinformation (Daunt et al., 2023), and Covid–19 pandemic misperceptions (Borah, 2022).

The way in which this literature review has helped to frame the present approach is as follows. This article studies the evolution of European citizens' self-efficacy beliefs about overcoming misinformation risks and, thus, being less vulnerable to misinformation. We rely on self-reported data that gathers skills and attitudes (self-efficacy beliefs) that citizens think they possess to detect and deal with misinformation. These items (more details in the methodology section) encompass self-attitude beliefs regarding skills perceptions to distinguish accurate from fake information, and interpretations of how problematic misinformation is. As mentioned above, previous findings pointed out that those citizens with higher confidence in their ability to identify misinformation performed increasingly well on misinformation detection.

Definitively, to cope with misinformation, citizens need to be aware of their exposure to misleading or false content in order to disregard it and avoid spreading it (Boulianne et al., 2022; Humprecht et al., 2023), to develop new knowledge and skills – literacies – (Jones-Jang et al., 2021; Tully et al., 2022), and to be informed about the scope of the misinformation problem for the country and the democracy to function well (Bennett & Livingston, 2018; Tenove, 2020). Hence, these earlier studies state how relevant coping with misinformation is in setting literacy goals to distinguish accurate from false and misleading information, while highlighting the citizenry's concern of misinformation as a significant problem. Complementarily, several scholars (Acerbi et al., 2022) emphasise that, given the low prevalence of misinformation in the citizenry's news diet, efforts should focus on helping them to better recognise accurate information. Interventions aimed at increasing citizens' acceptance of reliable information, such as those related to literacy, may not only engage them with accurate content but also raise awareness of misinformation exposure, improve attitudes toward disregarding false information, and heighten concerns about susceptibility to misinformation.

These adaptive attitudes and behaviours – which are triggered to counteract misinformation – address self-efficacy beliefs that are important because they are relevant to human functioning and influence behaviour directly, but also by shaping other factors such as goals, expectations of outcomes, affective tendencies, and perceptions of challenges and opportunities within the social environment (Bandura, 2006). They are also relevant because individuals consequently set their challenges and goals along with the level of effort that is needed to pursue them (Bandura, 2006).

Considering the efforts made by the EU and member states to boost attitudes and behaviours in engaging citizens to face the problem, and assuming that these efforts had a certain measure of success, it can be anticipated that the evolution of resilience to misinformation will be positive. Therefore, we worded Hypothesis 1 as follows:

> **H1:** *European citizens' beliefs about self-efficacy in coping with misinformation with regard to their exposure awareness for misinformation* (H1a), *their perception of their ability to identify misinformation* (H1b), *and their acknowledgement of the scope of the misinformation problem* (H1c) *increase over time.*

This hypothesis is founded on the following assumptions: We assume self-attitude beliefs favour individuals being resilient to misinformation, which implies an adaptive behavioural pattern to achieve optimistic conditions when faced with a threat. In other words, as Barua et al. (2020) explain, resilience not only alludes to positive developmental adaptations of individuals when facing threats or adversity, but also involves the ability to overcome challenges and achieve success even in high-risk situations.

This research operationalises the observation of resilience to misinformation via a factor analysis composed by the self-perceptions mentioned above. Since the hypotheses regarding the evolution of these self-perceptions are of a positive evolution, the second hypothesis is worded as follows:

> **H2:** *European citizens' resilience to misinformation evolves positively.*

Data and method

This article analyses secondary published data from five Standard Eurobarometers, polling instruments that have collected citizens' perceptions about their attitudes and behaviours in coping with misinformation. The Standard Eurobarometer is the official and flagship polling instrument of the European Commission, monitoring European public opinion twice a year about several issues regarding political, societal and economic activity. In using Eurobarometer's data sets, we are following a large research tradition (see references in GESIS, 2024) to hopefully better understand the social trends of European citizenry.

Fieldwork was carried out in a range from 2018 to 2022: Eurobarometer 90.3 (European Commission, 2019a) from 11.08.2018 to 11.22.2018, Eurobarometer 91.5 (European Commission, 2019b) from 06.07.2019 to 07.01.2019, Eurobarometer 92.3 (European Commission, 2020) from 11.14.2019 to 12.13.2019, Eurobarometer 94.3 (European Commission, 2021) from 02.12.2021 to 03.18.2021, and Eurobarometer 96.3 (European Commission, 2022a) from 01.18.2022 to 02.14.2022. These dates indicate that the data under analysis span periods before, during and after the Covid–19 outbreak, as well as preceding Russia's invasion of Ukraine.

Data sample

This research processes five Standard Eurobarometer cross-sectional datasets, which include data from 27 countries, have an N of 26,000 (approx.).[1] These polling instruments cover a time range that goes from 2018 to 2022 (2020 is not covered as Eurobarometer did not carry out fieldwork surveying citizens about items regarding misinformation in 2020).

Eurobarometer employed a stratified sampling procedure, which means, as the survey technical details show, that the target population is subdivided into separate and mutually exclusive segments (strata) covering the entire population. Subsequently, independent random samples are drawn from within each segment. As the mode of data collection, face-to-face interviews were carried out by polling companies hired to collect data for the Eurobarometer.

Data collection and measures

These five Standard Eurobarometers included specific items about how citizens perceive their efficacy in developmental adaptations for coping with misinformation. More specifically, items are oriented to ascertain the extent to which they (dis)agree with four statements regarding critical steps of problematic information evaluation (see Table 1).

1 List of countries: AT (Austria), BE (Belgium), BG (Bulgaria), CY (Cyprus), CZ (the Czech Republic), DE (Germany), DK (Denmark), EE (Estonia), ES (Spain), FI (Finland), FR (France), GR (Greece), HR (Croatia), HU (Hungary), IE (Ireland), IT (Italy), LT (Lithuania), LU (Luxembourg), LV (Latvia), MT (Malta), NL (the Netherlands), PL (Poland), PT (Portugal), RO (Romania), SE (Sweden), SI (Slovenia) and SK (Slovakia).

Table 1
Items and names of variables

Item from Eurobarometer's survey	Name of variable
You often come across news or information that you believe misrepresent reality or are even false	Exposure awareness
It is easy for you to identify news or information that you believe misrepresent reality or are even false	Media literacy
The existence of news or information that misrepresent reality or is even false is a problem in the country	Problem for country
The existence of news or information that misrepresent reality or is even false is a problem for democracy in general	Problem for democracy

Source: Compiled by the authors.

The original scale consisted of five levels in which 1 = "totally agree"; 2 = "agree"; 3 = "disagree"; 4 = "totally disagree"; and 5 = "don't know". We inverted the scale so that the higher the value, the higher the positivity and used "don't know" answers as a midpoint position of neutrality in a symmetric way in both directions (Joshi et al., 2015).

Data analysis

The data were analysed using SPSS (v.25) software. We downloaded the five datasets from the GESIS website. After converting the scales, we proceeded with the statistical analysis, first of descriptive statistical information (M and SD) of each specific item. Then, we applied an analysis of the variance (ANOVA) with a post-hoc test to find out the differences between variables across years. A t-test was used to compare data sets from the two extreme years (EB 90.3, fieldwork in 2018 and EB 96.3, fieldwork in 2022). Once tested, the increase for each variable, a factor analysis was run to explore whether these different variables could compose a single factor termed *resilience to misinformation.* The method used was principal component analysis with varimax rotation. With the final emerging factor for each data set, an ANOVA test was conducted to test the differences across years.

Results

Descriptive statistical data provides insights for an initial picture of the evolution over time of the self-reported attitudes and behaviours of citizens towards misinformation. Table 2 presents basic data on the four items from each dataset (the source of all tables is the Eurobarometer). The second column indicates the year for fieldwork, and data have been arranged to show the evolution in time.

Table 2
Descriptive statistic for statements measuring self-efficacy beliefs toward misinformation

		Exposure awareness		**Media literacy**		**Problem for country**		**Problem for democracy**	
Dataset number	Fieldwork year	M	SD	M	SD	M	SD	M	SD
EB 90.3	2018	3.49	1.16	3.36	1.18	3.59	1.18	3.88	1.09
EB 91.5	2019	3.69	1.17	3.43	1.22	3.72	1.17	3.98	1.07
EB 92.3	2019	3.52	1.17	3.33	1.2	3.65	1.18	3.94	1.08
EB 94.3	2021	3.67	1.16	3.60	1.19	3.78	1.16	4.13	1.02
EB 96.3	2022	3.66	1.15	3.50	1.18	3.85	1.13	4.09	1.04

Source: Compiled by the authors.

From Table 2 the following basic initial considerations can be made. In general terms, an increasing trend emerges for the four variables: reported data in 2022 are higher than in 2018. Looking at the detail, "Exposure Awareness" had its peak in 2019 reaching a similar mean in 2021 and 2022. Regarding "Media Literacy" there is a positive trend, but we observed an up and down trend, which may also be identified in association with "Problem for Country". "Problem for Democracy" reports a positive trend over time.

To determine whether these data report statistical significance, first, we carried out a Levene test for each variable which revealed that the series of data did not have equal variances, and a Welch test that indicated unequal means. The Levene test for each variable revealed that the series of data did not have equal variances "Exposure Awareness" ($F_{(4\text{-}133,298)} = 59.64$; $p < .001$), "Media Literacy" ($F_{(4\text{-}133,298)} = 336.28$; $p < .001$), "Problem in Country" ($F_{(4\text{-}133,298)} = 174.13$; $p < .001$) and "Problem for Democracy" ($F_{(4\text{-}133,298)} = 42.76$; $p < .001$). Also, the Welch test revealed that the means regarding "Exposure Awareness" ($F_{\text{Welch }(4\text{-}66622.40)} = 162.45$; $p < .001$), "Media Literacy" ($F_{\text{Welch }(4\text{-}66576.33)} = 233.31$; $p < .001$), "Problem in Country" ($F_{\text{Welch }(4\text{-}66615.51)} = 208.89$; $p < .001$), and "Problem for Democracy" ($F_{\text{Welch }(4\text{-}66588.47)} = 268.50$; $p < .001$) are unequal. Analyses of variance (ANOVA) reported statistically significant differences: "Exposure Awareness" ($F_{(4\text{-}133298)} = 162.91$; $p < .001$; $\eta^2 = .005$); "Media Literacy" ($F_{(4\text{-}133298)} = 223.638$; $p < .001$; $\eta^2 = .007$); "Problem in Country" ($F_{(4\text{-}133298)} = 206.461$; $p < .001$; $\eta^2 = .006$); and "Problem for Democracy" ($F_{(4\text{-}133298)} = 265.013$; $p < .001$; $\eta^2 = .008$). Eta squared (η^2) indicates a small effect for "Exposure Awareness", "Media Literacy", "Problem in Country" and "Problem for Democracy".

As a post hoc test for multiple comparisons, we applied the Games-Howell test which is used with unequal sample sizes and unequal variances. Overall, this process helps in understanding how large or small the differences are between the years of each Eurobarometer dataset in terms of each variable. The following subsections present data for evolution over time for each specific variable.

The evolution of "Exposure Awareness"

Regarding "Exposure Awareness", we conducted a multiple comparisons test to assess differences across years and to evaluate whether a significant change from 2018 to 2022 was found. This is how we tested H1a: *European citizens' beliefs about self-efficacy in coping with misinformation with regard to their exposure awareness for misinformation increases over time.*

In other words, the five data sets were contrasted with each other in pairs. The results are presented in Table 3: the first column indicates the reference of the year and first data set; the second column, shows the year and reference of the other data set to which the mean is compared. Each row includes one comparison, and the sequence goes along with the increase in time. The third column indicates the mean difference, and the fourth and fifth the information for statistical significance. This information is graphically illustrated in Figure 1 using a 95% family-wise confidence level (when the central vertical zero line is crossed, the mean difference between samples is not statistically significant).

The results indicate an increase in "Exposure Awareness" over time. The higher positive evolution was reported from 2018 to 2019 and from 2019 to 2021. There is a negative difference (a decrease in exposure awareness) when comparing the two datasets coming from 2019 (mean difference is –.169). Negative differences associated between 2019 and 2021 and 2021 and 2022 were not significant.

Overall, evolution of citizens' awareness of exposure to misinformation from 2018 to 2022 indicates a positive trend. A t-test for independent samples to compare both years (2018 with 2022) was conducted, and it indicates statistical significance: $F = 120.416$; $p < .001$; $t_{(53,070.162)} = 16.106$; $p < .001$; $d = .14$. Statistical Cohen's d size effect revealed a small effect accomplished after five years.

Table 3
Multiple comparisons for "Exposure Awareness"

Games-Howell test		Mean Difference	Std. Error	Sig.
2018 (EB 90.3)	2019 (EB 91.5)	.191	.010	.000
2018 (EB 90.3)	2019 (EB 92.3)	0.022	.010	.198
2018 (EB 90.3)	2021 (EB 94.3)	.174	.010	.000
2018 (EB 90.3)	2022 (EB 96.3)	.161	.010	.000
2019 (EB 91.5)	2019 (EB 92.3)	–.169	.010	.000
2019 (EB 91.5)	2021 (EB 94.3)	–0.017	.010	.439
2019 (EB 91.5)	2022 (EB 96.3)	–.029	.010	.029
2019 (EB 92.3)	2021 (EB 94.3)	.152	.010	.000
2019 (EB 92.3)	2022 (EB 96.3)	.140	.010	.000
2021 (EB 94.3)	2022 (EB 96.3)	–0.012	.010	.722

Source: Compiled by the authors.

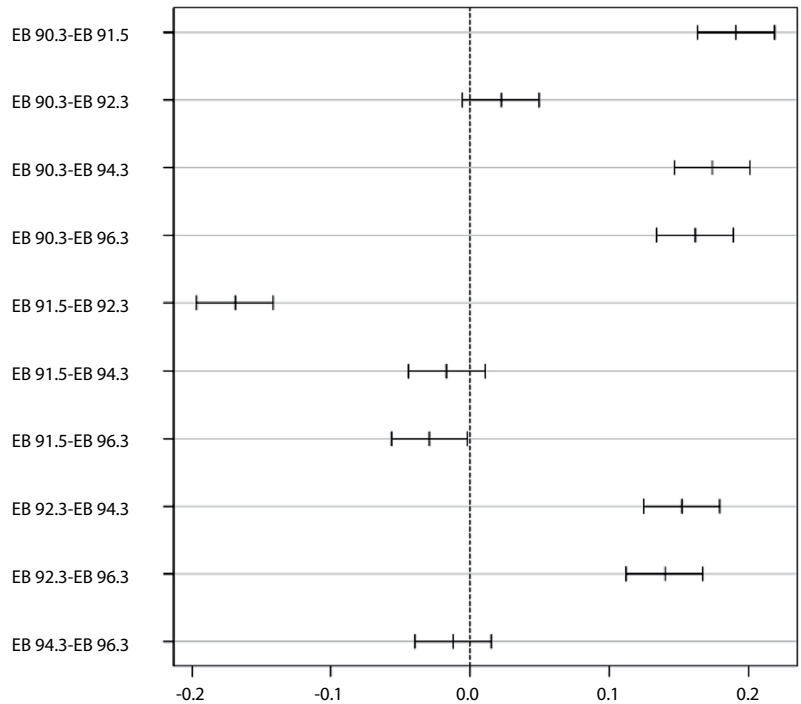

Figure 1
Graphic representation of multiple comparisons for "Exposure Awareness"
Source: Compiled by the authors.

Therefore, H1a which states that *European citizens' beliefs about self-efficacy in coping with misinformation with regard to their exposure awareness for misinformation increases over time* is accepted, having to mention, though, that there are some points with (not statistically significant) negative means differences. Whether this increase in exposure awareness to misinformation indicates just being overconcerned with the problem, or whether it can be conceptually interpreted as being better equipped to struggle misinformation is discussed below.

The evolution of "Media Literacy"

As in the previous analysis regarding "Media Literacy" to test H1b *(European citizens' beliefs about self-efficacy in coping with misinformation with regard to their perception of their ability to identify misinformation),* we performed multiple comparisons across years. Results are presented in Table 4, which displays the mean differences in between two points in time. Figure 2 provides a visual representation of these data.

The results show an increase in "Media Literacy" over time. The higher positive evolution was identified from 2019 to 2021 (mean difference is .266). Some negative differences emerged, for instance the decrease in 2022 in comparison to 2021 (mean difference is –.096).

Table 4
Multiple comparisons for "Media Literacy"

Games-Howell test		Mean Difference	Std. Error	Sig.
2018 (EB 90.3)	2019 (EB 91.5)	.068	.010	.000
2018 (EB 90.3)	2019 (EB 92.3)	–.031	.010	.024
2018 (EB 90.3)	2021 (EB 94.3)	.235	.010	.000
2018 (EB 90.3)	2022 (EB 96.3)	.138	.010	.000
2019 (EB 91.5)	2019 (EB 92.3)	.098	.011	.000
2019 (EB 91.5)	2021 (EB 94.3)	.167	.010	.000
2019 (EB 91.5)	2022 (EB 96.3)	.071	.010	.000
2019 (EB 92.3)	2021 (EB 94.3)	.266	.010	.000
2019 (EB 92.3)	2022 (EB 96.3)	.169	.010	.000
2021 (EB 94.3)	2022 (EB 96.3)	–.096	.010	.000

Source: Compiled by the authors.

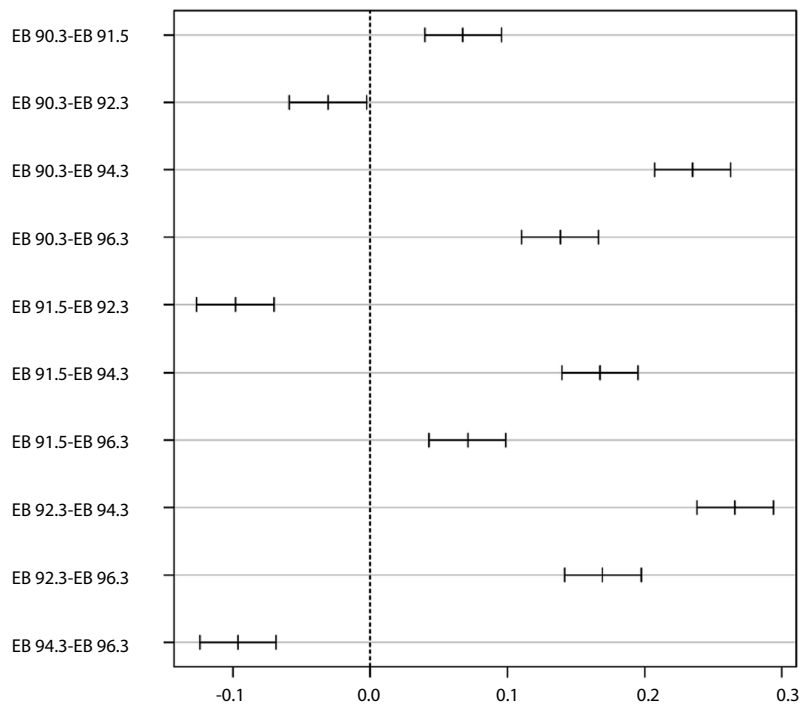

Figure 2
Graphic representation of multiple comparisons for "Media Literacy"
Source: Compiled by the authors.

Nevertheless, a positive evolution occurred when comparing the initial period (2018) and the final period under analysis (2022) which reports a positive mean difference of .138.

We carried out a t-test for independent samples to compare the initial period under analysis (2018) with the latest (2022) and determine how big the change is. The result of the effect is positive, but small (d = .12) ($F = 39.981$; $p < .001$; $t_{(53,083.098)} = 13.565$; $p < .001$).

Therefore, H1b, which states that *European citizens' beliefs about self-efficacy in coping with misinformation with regard to their perception of their ability to identify misinformation increases over time* can also be accepted, having to mention, though, that at some intermediate points in time, a significant decrease was found.

To make sense of this finding, it has to be recalled that what is being measured here is how respondents perceive their self-efficacy to curb misinformation (the item is *"It is easy for you to identify news or information that you believe misrepresent reality or are even false"*). Whether it is true that respondents are identifying misinformation more easily than before is something we cannot judge; major data for this paper lay on self-perceptions and not on actual performance. What can certainly be stated is that this self-perception concerning the capacity to identify misinformation ("Media Literacy") has slightly increased over time. More will be discussed about this in the corresponding section.

The evolution of "Problem for Country" and "Problem for Democracy"

H1c states that *European citizens' beliefs about self-efficacy in coping with misinformation and their acknowledgment of the scope of the misinformation problem increases over time.* It is here understood that self-efficacy is related with being more aware of the problem misinformation entails for the country and for democracy. Aiming to test the hypothesis, we analysed statistical differences and present results in Table 5 and Table 6. Figures 3 and 4 provide visual representations of the data.

Table 5
Multiple comparisons for "Problem for Country"

Games-Howell test		Mean Difference	Std. Error	Sig.
2018 (EB 90.3)	2019 (EB 91.5)	.132	.010	.000
2018 (EB 90.3)	2019 (EB 92.3)	.057	.010	.000
2018 (EB 90.3)	2021 (EB 94.3)	.191	.010	.000
2018 (EB 90.3)	2022 (EB 96.3)	.257	.010	.000
2019 (EB 91.5)	2019 (EB 92.3)	–.075	.010	.000
2019 (EB 91.5)	2021 (EB 94.3)	.060	.010	.000
2019 (EB 91.5)	2022 (EB 96.3)	.125	.010	.000
2019 (EB 92.3)	2021 (EB 94.3)	.135	.010	.000
2019 (EB 92.3)	2022 (EB 96.3)	.200	.010	.000
2021 (EB 94.3)	2022 (EB 96.3)	.066	.010	.000

Source: Compiled by the authors.

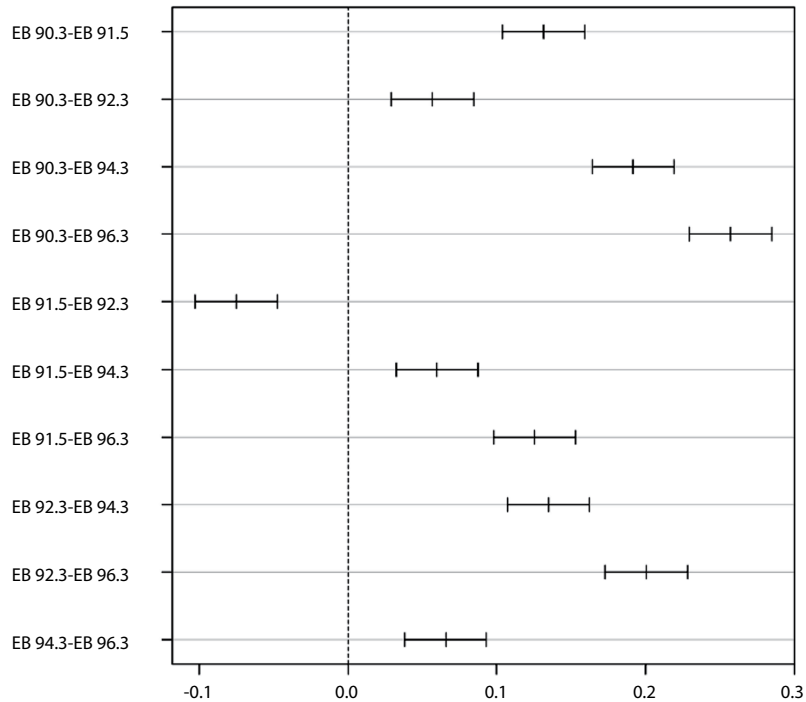

Figure 3
Graphic representation of multiple comparisons for "Problem for Country"
Source: Compiled by the authors.

Considering misinformation as a "Problem for Country", the test (Table 5) reveals that, except for one (which is very low between the two 2019 periods), all mean differences between points in time are positive, and all of them are statistically significant. The concern regarding the problem for the country associated with misinformation was greater when comparing 2018 and 2019, 2019 and 2021, and 2021 and 2022.

Particularly, a highest increase emerges in between 2018 and 2022, our two extreme periods, with a mean difference of .257. To understand how big this evolution was in the period under study, we carried out a t-test for independent samples to compare 2018 and 2022. The result is statistically significant ($F = 525.408$; $p < .001$; $t_{(52,938.089)} = 26.626$; $p < .001$; $d = .22$, statistical Cohen's d size effect revealed a small effect reached after five years).

Considering the misinformation a "Problem for Democracy", the test (Table 6) ascertains significant differences between the time samples. A positive evolution was found when comparing 2018 to 2019 (mean differences are .191 and .059) and 2019 to 2021 (mean differences are .153 and .196), but a significant decrease was reported from 2021 to 2022 (mean difference is –.047). However, from 2018 to 2022, the concern regarding the misinformation problem towards democracy is significantly higher (mean difference is .208).

Table 6
Graphic representation of multiple comparisons for "Problem for Democracy"

Games-Howell test		Mean Difference	Std. Error	Sig.
2018 (EB 90.3)	2019 (EB 91.5)	.101	.009	.000
2018 (EB 90.3)	2019 (EB 92.3)	.059	.009	.000
2018 (EB 90.3)	2021 (EB 94.3)	.255	.009	.000
2018 (EB 90.3)	2022 (EB 96.3)	.208	.009	.000
2019 (EB 91.5)	2019 (EB 92.3)	–.043	.009	.000
2019 (EB 91.5)	2021 (EB 94.3)	.153	.009	.000
2019 (EB 91.5)	2022 (EB 96.3)	.107	.009	.000
2019 (EB 92.3)	2021 (EB 94.3)	.196	.009	.000
2019 (EB 92.3)	2022 (EB 96.3)	.149	.009	.000
2021 (EB 94.3)	2022 (EB 96.3)	–.047	.009	.000

Source: Compiled by the authors.

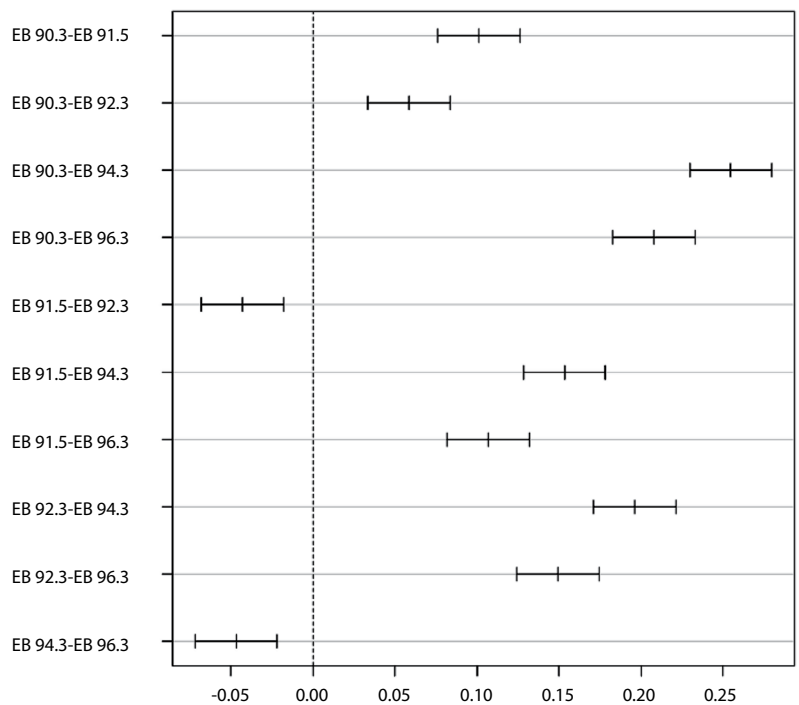

Figure 4
Graphic representation of multiple comparisons for "Problem for Democracy"
Source: Compiled by the authors.

Also, after five years, the evolution of the consideration of misinformation as a problem for democracy is beneficial: $F = 106.311$; $p < .001$; $t_{(52,949.715)} = 22.524$; $p < .001$; $d = .19$. Statistical Cohen's d size effect revealed a small effect reached after five years. Hence, as the years go by, respondents are more concerned about the negative effects that misinformation has on democracy.

H1c stated that citizens would acknowledge the scope of the misinformation problem more, which is accepted regarding the country and considering functioning democracy.

Overall, European Citizens seem to have increased awareness of misinformation as a problem for the country and democracy. The fact that the highest increase emerged between 2021 and 2022 leads us to look for explanations in the pandemic when misinformation flourished regarding health issues such as vaccines and public policies. Some more interpretations will be given to this finding in the discussion section.

The evolution of resilience to misinformation

It has been mentioned for several times in this paper that this research lays on previous research that conceptualises resilience to misinformation as an intangible resource, and with it, a) it identifies factors that compose the resilience to misinformation; and b) it operationalises observations of this intangible resource for comparisons across country and over time.

In this section, a factor representing resilience to misinformation is looked for to respond to the following research question: *How has the resilience of European citizens to misinformation evolved over time?*

We started by applying factor analysis in which we included the four items with statements regarding self-efficacy beliefs about attitudes and behaviours facing misinformation for each Standard Eurobarometer. The study determined a factor termed "Resilience to Misinformation".

Table 7 indicates that is statistically adequate to consider "Resilience to Misinformation" as a factor that emerges from the four variables under study: "Exposure Awareness", "Media Literacy", "Problem for Country" and "Problem for Democracy". Hence, we proceeded with a mean index to obtain the measurement of "Resilience to Misinformation" (means are the following: EB 90.3 ($M = 3.58$; $SD = 0.82$), EB 91.5 ($M = 3.70$; $SD = .85$), EB 92.3 ($M = 3.61$; $SD = .83$), EB 94.3 ($M = 3.79$; $SD = .77$); EB 96.3 ($M = 3.77$; $SD = .79$).

To ascertain how "Resilience to Misinformation" has evolved across years, first, we applied the Levene test and Welch test. The Levene test revealed unequal variances ($F_{(4\text{-}133,298)} = 101.69$; $p < .001$). The Welch test, as a robust test of equality of means, revealed significant differences ($F_{\text{Welch } (4\text{-}66,573.40)} = 378.09$; $p < .001$).

ANOVA was significant ($F_{(4\text{-}133,298)} = 370.05$; $p < .001$; $\eta^2 = .011$). Eta squared (η^2) indicates a small effect for "Resilience to Misinformation". Games-Howell post-hoc test confirmed statistical differences between the years (Table 8). Using this test allows us to compare each year and understand how "Resilience to Misinformation" evolved.

Table 7
Factor analysis to determine the factor "Resilience to Misinformation"

Fieldwork year	2018	2019	2019	2021	2022
EB reference numbers	EB 90.3	EB 91.5	EB 92.3	EB 94.3	EB 96.3
Exposure awareness	.749	.776	.761	.736	.724
Media literacy	.471	.505	.489	.456	.469
Problem in country	.835	.839	.835	.823	.823
Problem for democracy	.776	.795	.771	.740	.772
KMO	.663	.703	.673	.651	.644
Bartlett	.000	.000	.000	.000	.000
Eigenvalue	2.082	2.192	2.110	1.974	2.017
Explained variance	52.050	54.810	52.752	49.352	50.435
Cronbach's α	.68	.71	.69	.64	.65

Source: Compiled by the authors.

Table 8
Multiple comparisons for "Resilience to Misinformation"

Games-Howell test		Mean Difference	Std. Error	Sig.
2018 (EB 90.3)	2019 (EB 91.5)	.123	.007	.000
2018 (EB 90.3)	2019 (EB 92.3)	.027	.007	.002
2018 (EB 90.3)	2021 (EB 94.3)	.214	.007	.000
2018 (EB 90.3)	2022 (EB 96.3)	.191	.007	.000
2019 (EB 91.5)	2019 (EB 92.3)	–.096	.007	.000
2019 (EB 91.5)	2021 (EB 94.3)	.091	.007	.000
2019 (EB 91.5)	2022 (EB 96.3)	.068	.007	.000
2019 (EB 92.3)	2021 (EB 94.3)	.187	.007	.000
2019 (EB 92.3)	2022 (EB 96.3)	.165	.007	.000
2021 (EB 94.3)	2022 (EB 96.3)	–.022	.007	.007

Source: Compiled by the authors.

The results indicate that a positive trend was reported from 2018 to 2019 (mean differences are .123 and .027) and from 2019 to 2021 (mean differences are .091 and .187), but from 2021 to 2022 there was a small decrease (mean difference is – .022). Hence, 2021 was the year in which the "Resilience to Misinformation" was higher, which is statistically different from all the others. Nevertheless, "Resilience to Misinformation" increased with statistical significance when it compared 2018 with 2022 (mean difference is .191).

To determine what has been achieved in terms of the evolution of "Resilience to Misinformation", we applied a t-test for independent samples to compare the data sample from 2022 to the data sample gathered in 2018. Results obtained for the t-test were significant: $F = 83.807$; $p < .001$; $t_{(52,959.723)} = 27.382$; $p < .001$; $d = .24$. Statistical Cohen's d size effect revealed a small effect accomplished after five years. H2 states that the European citizens'

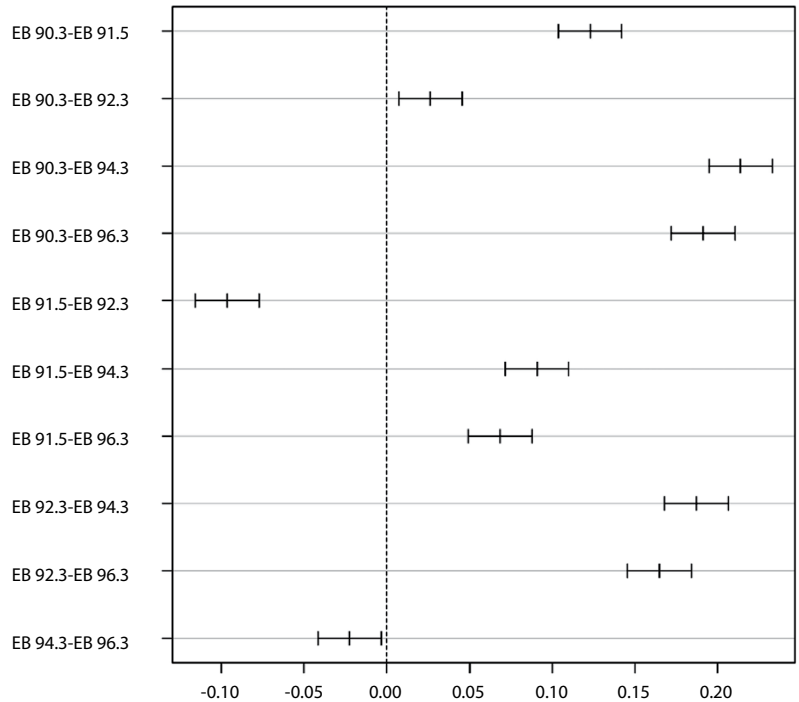

Figure 5
Graphic representation of multiple comparisons for "Resilience to Misinformation"
Source: Compiled by the authors.

self-efficacy beliefs are better, in terms of resilience, about coping with misinformation than in previous years, which is partially true. Self-efficacy beliefs prone to resilience to misinformation are better in 2022 than in 2018, but results in 2021 are, statistically, better than in 2022.

A small note on the values for each country

This research is not cross-country comparative, something that would require a different approach. However, it is deemed of interest to show what the situation is for each specific country regarding the evolution of "Resilience to Misinformation". For that purpose, as factor analysis had validated the theoretical construct, we calculated the mean of "Resilience to Misinformation" associated with each country for the barometers of the first year (2018) and the last one (2022). Results are shown in Figure 6. The list of countries is presented in descending order of the amount of increase in mean difference between 2018 and 2022.

Results show that the means of the factor "Resilience to Misinformation" increases in all countries except for Romania. The five top countries where "Resilience to Misinformation" evolved higher were the Czech Republic, the Netherlands, Estonia, Slovenia

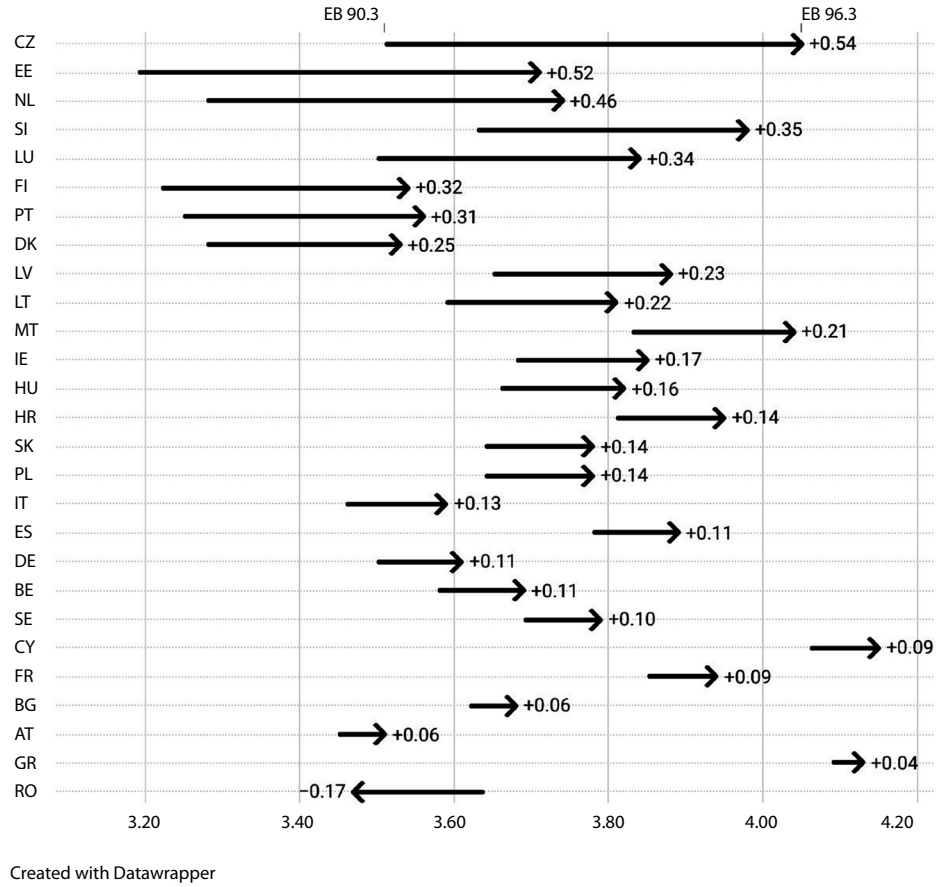

Figure 6
Evolution (2018–2022) of "Resilience to Misinformation" by country
Source: Compiled by the authors.

and Luxemburg; the four bottom countries in which the evolution was smallest were Greece, Austria, Bulgaria and France. Further research is needed to explore causes and consequences of this evolution of resilience to misinformation.

Discussion and conclusion

The intention of this article was to analyse the evolution (from 2018 to 2022) of resilience to misinformation among European citizens. It is founded on previous research that conceptualises this resilience as an intangible resource, and hence, the analysis is operationalised starting from specific attitudes and skills. Therefore, first, this article sought to study citizens' self-attitude beliefs about coping with misinformation regarding "Exposure Awareness", "Media Literacy", "Problem for Country" and "Problem for Democracy".

Secondly, it is confirmed that "Resilience to Misinformation" emerges as a factor in the five waves. Finally, how this "Resilience to Misinformation" evolves over the years is analysed.

European institutions and Member States have deployed various public policies to fight misinformation and promote citizenship less vulnerable and more resistant to information disorder. Success in improving societal resilience depends on raising public awareness. This requires developmental adaptations and behavioural changes to be able to distinguish information from misinformation which is tangible when citizens disregard the dissemination of fake content and are aware of the negative outputs of misinformation in society at large. Previous findings (e.g. Hopp, 2022; Paciello et al., 2023) suggest that self-efficacy beliefs help citizens to distinguish factually accurate information from misinformation.

The central finding of this paper is that in 26 of 27 European countries the citizenry's resilience to misinformation increased between 2018 and 2022; and this is the case both in terms of specific self-efficacy beliefs ("Exposure awareness", "Resilience to Misinformation", "Media Literacy", "Problem for Country" and "Problem for Democracy"), as it is in terms of "Resilience to Misinformation" measured as a whole.

Regarding the specific attitudes, all measurements are based on self-perceptions; first, about "Exposure Awareness", this item captures the attitude of citizens to coming across what they consider to be information misrepresenting reality. This research does not check whether individuals have actually been exposed to more misinformation, but it analyses whether they think they have. We believe the findings allow us to state that even if the case was that respondents are more worried (or even over-worried) about misinformation, an increased alertness to being uncertain about the accuracy of information implies something positive with regard to curbing misinformation.

In that which refers to concern about the problem (more specifically "Problem for Country" and "Problem for Democracy"), findings reveal a higher level of awareness of the misinformation problem that European citizens are facing nowadays. This cognitive behaviour presents a more significant evolution when regarding the awareness of European citizens considering the misinformation threat to the country, which has evolved positively over time. The awareness regarding the problem for democracy also improved from 2018 to 2022 but suffered a decrease in 2022 compared to 2021, from which may emerge an alert to be monitored by national governments and European institutions. Whether being more concerned about the problem and associating the problem with the development of democracy means an improvement in curbing misinformation is something that has been discussed in the literature (Bennett & Livingston, 2018; Tenove, 2020), and we agree that considering misinformation a problem entails being more aware of its implications, and therefore, of being closer to fighting it.

Findings lead to look for explanation of the increase of this awareness in the pandemic caused by Covid–19. The five Eurobarometer datasets used encompassed fieldwork conducted before, during and after the Covid–19 pandemic (before Russia invaded Ukraine, so no relationship to this can be established). Consequently, the findings could be interpreted acknowledging the Covid–19 pandemic as a factor marking widespread of misinformation, for instance, against vaccines, as evidenced by various studies (e.g. Navarro-Sierra et al., 2024). It could be the case that the pandemic caused citizens to become more aware of

misinformation as a problem for the country and for democracy, and also to increase their concern about the trustworthiness of information, and add weight to the importance of citizens' literacy in coping with misinformation. This infodemic outbreak may have pushed citizens into developing new skills and knowledge to face the problem.

Regarding "Media Literacy", findings indicate, bluntly, that European citizens believe they are better equipped nowadays to identify information that misrepresent the reality. Whether this is so, once again, we would like to point out that this article relies on measurements of self-efficacy beliefs rather than on actual performance of individuals in coping with misinformation. This will be an everlasting research issue (see for instance Vraga et al., 2022; Xiao & Yang, 2023), for which the following considerations from cognitive social theory may be of help. Self-efficacy beliefs address feelings, motivations and behaviours of individuals; self-efficacy beliefs influence how citizens set their goals and outcomes (Bandura, 2006) and help citizens to learn more and to apply that new knowledge and skills against adversity. Greater concern, awareness, or even a more accurate self-perception of skills in distinguishing true from false information can help citizens become more resilient, as the literature suggests. Therefore, as long as the corresponding caveats are made about the scope of these data, information on self-perceptions of efficacy might be of great help to policymakers in fighting misinformation.

Throughout the analysed timeframe, institutions deployed efforts to raise awareness about misinformation while educating and sensitising citizens through various public policies. European institutions pinpoint media literacy as a central strategy in curbing misinformation. Being resilient implies not only an acknowledgment of problematic information but also gaining critical skills that allow citizens to autonomously recognise, disregard and refute misinformation, avoiding its dissemination.

In the European context, European public policies have been enhancing media literacy strategies to engage citizens and, therefore, to equip active citizenship to curb misinformation. Looking back at the findings of this research, European citizens' self-reported media literacy skills are better in 2022 than in 2018 (although slightly lower than in 2021). These findings should be relevant in strengthening the assessment of public policy literacy programs. The acquisition of a set of skills and knowledge oriented to critical thinking abilities to access, analyse, and evaluate pieces of information favours citizens flagging misinformation and discerning between factual and fake stories. However, the effect size resulting from the analysis reveals that while this increased belief in self-efficacy was positive, it was still small.

Based on the four abovementioned statements regarding misinformation, we measured how resilient to misinformation citizens perceive themselves, which revealed an increment from 2018 to more recently. According to the definition of an intangible asset (Canel & Luoma-aho, 2019), these adaptations give rise to resilience to misinformation that we expect will deliver a social value for both the society and the country in reducing misperceptions regarding public issues.

We live in a context where misinformation is a European concern; how well citizens judge their attitudes to the struggle with misinformation is remarkably noteworthy in the fight against it. Nevertheless, the statistical test for effect size also determined that the effect achieved after five years of implemented public policies – intended to promote

resilience to misinformation – was small. As an intangible asset, the EU and its members should focus on the assessment of public policies to monitor how well they are functioning in terms of fostering adaptive changes that allow citizens to be more resistant and less vulnerable to the misinformation threat. As a virus, misinformation techniques are also evolving to incorporate new technologies to produce and spread misleading content. The promotion of resilience to misinformation requires the challenge of emerging deceit techniques in audio, video, and text formats.

Further research lines for the study of resilience to misinformation should compare judgments of self-efficacy beliefs with experimental designs to test performance. The research on media literacy's actual performance in misinformation cases remains limited, as do findings on self-efficacy beliefs related to the issue of misinformation. Comparing and interconnecting both frameworks will help better understand how self-efficacy beliefs correlate with media literacy performance curbing misinformation and to what extent self-efficacy beliefs can hinder individuals' ability to effectively deal with misinformation.

Moreover, a focus on detailed analysis considering sociodemographic groups and country-specific environments should be carried out. Our literature review gathers how age, gender, education level and political leaning help explain the way citizens (dis) regard misinformation. Also, resilience to misinformation is associated with country-specific characteristics (Humprecht et al., 2020; 2023). An emerging future research line focusing on cross-national studies will help enlarge the analysis of the development of self-efficacy beliefs that favour resilience to misinformation regarding media intangible assets (e.g. trust or legitimacy) and public sector intangible assets (e.g. engagement or trust). These above-mentioned research lines will broaden the study of the evolution of resilience to misinformation when considering citizens' relations (e.g. use or consumption) with social network sites, which are related to behaviours prone to reducing resilience to misinformation (Boulianne et al., 2022).

In conclusion, this article contributes to the existing literature on misinformation, providing a process for cross-time analysis, and analysing how self-efficacy beliefs favouring resilience are evolving in European countries over a five-year period (2018–2022). These results provide clues in determining the impact of how self-efficacy judgments contribute to conform resilience to misinformation. Being resilient implies not only the acceptance of the existence of problematic information but also in gaining critical skills that allow citizens to autonomously recognise, disregard and refute misinformation to avoid its dissemination. Self-efficacy beliefs favour human capabilities in confronting challenges (Bandura, 2006). In the European context, European public policies have enhanced societal resilience to engage citizens and, therefore, to equip active citizenship in curbing misinformation. Although the data shows that the situation is better now than in 2018, a certain decrease in 2022 should be monitored by national governments and European institutions to nurture and protect resilience to misinformation as an intangible resource for the European sphere.

Disclosure statement

The authors report there are no competing interests to declare.

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