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Original Research

Segmenting Science Audiences in Lithuania: Media Pathways and Climate Change Views

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Abstract: This study investigates how audience segmentation can support strategies to address climate change disinformation. A nationally representative survey conducted in Lithuania in 2024 used latent class analysis (LCA) to identify four audience segments based on perceptions of science, trust in research, and media use: "Engaged Enthusiasts,"" Informed Sceptics," "Occasional Observers," and the "Hard-to-Reach." While the segmentation structure is comparable to earlier findings from Switzerland, differences were observed in demographic composition, media practices, and engagement levels. The questionnaire was adapted to the Lithuanian context by including nationally relevant media sources and a section on climate change. Attitudes toward climate change vary across the segments. "Engaged Enthusiasts" strongly align with the scientific consensus and support climate science. "Informed Sceptics" also accept the reality and human causes of climate change, despite their more critical views of science. "Occasional Observers" show the weakest agreement with key climate statements, reflecting low scientific interest. The "Hard-to-Reach" segment, although disengaged from science generally, expresses relatively strong concern about climate change. These findings suggest that counter-disinformation strategies should differentiate between audience segments and align communication with their trust levels and information behaviors.

Keywords: *Science Attitudes and Perceptions, Science Communication, Survey, Climate Change, Counteracting Misinformation, Lithuania, Switzerland*

Introduction

Trust in science plays a foundational role in shaping public acceptance of scientific knowledge and science-based policies. As scientific information becomes increasingly intertwined with societal challenges such as climate change, public health, and technological innovation, trust determines not only how information is received but also whether individuals are willing to act on it (Intemann 2023; Algan et al. 2021). Research consistently shows that public trust in scientists is higher than in many other institutions, yet trust levels are not equal across all scientific domains and can fluctuate depending on issue, communication strategies, and perceived transparency (Fage-Butler et al. 2022; Dixson et al. 2022; Van Vleet and Fuller 2024). The erosion of trust, fueled by misinformation, political polarization, and fragmented media landscapes, presents a major challenge for science communication (West and Bergstrom 2020; Gertrudix et al. 2024). As public debates around scientific topics become increasingly contested, building and maintaining trust demands more than simply conveying accurate information. It requires active engagement, cultural

sensitivity, acknowledgment of uncertainty, and communication practices that resonate with different segments of society (Lewandowsky 2021; Schiavo 2022).

Audience segmentation provides an important tool to address this challenge. Rather than treating "the public" as a homogeneous group, segmentation approaches reveal meaningful differences in knowledge levels, trust in science, emotional responses, media practices, and issue-specific attitudes (Schäfer et al. 2018; Leiserowitz et al. 2020). By identifying distinct audience groups, segmentation enables more targeted, credible, and responsive science communication strategies. Tailoring communication to specific audience profiles strengthens the potential to foster trust, counter misinformation, and promote informed engagement with scientific issues.

This study maps public engagement with science in Lithuania, where audience-specific research remains limited, by identifying distinct segments based on perceptions of science, trust in scientific research, media practices, and attitudes toward climate change. It explores how these segments differ and what implications they hold for science communication strategies. The research addresses two key questions:

> RQ1: What distinct science audience segments can be identified in Lithuania based on perceptions of science and science communication?
>
> RQ2: How do these segments differ in their media pathways for science information and in their views on climate change?

The study provides a differentiated view of public engagement with science and offers practical insights for strengthening trust-building and communication efforts in the Lithuanian context.

Challenges in Communicating Climate Change for Society

Science communication connects scientific knowledge with social progress by enabling informed participation, supporting evidence-based policy, and strengthening collective responses to global challenges such as climate change and public health crises (Scheufele 2022; Bucchi and Trench 2021). When scientific information is made accessible and relevant, it enhances civic engagement, accountability, and public trust (Fischhoff 2019). Without such communication, science risks remaining confined to expert circles, limiting its public value. Transparent and culturally sensitive communication reduces uncertainty and fosters confidence in science and governance (Intemann 2023; Lewandowsky 2021). Its social importance also lies in cultivating critical thinking and openness to evidence. Approaches that emphasize dialogue and participation help audiences see science as a dynamic, self-correcting process rather than a fixed source of truth (Scheufele et al. 2021; Heinrich 2020), which is essential in an era of misinformation (West and Bergstrom 2020).

Science communication has moved beyond the deficit model toward audience-centered approaches that recognize how people use media and how they form views about science (Scheufele 2022; Schäfer et al. 2018). Understanding these processes matters for building trust, supporting dialogue and enabling collective action (Lewandowsky 2021; Fischhoff 2019). Digital media make this harder because message style, credibility cues, and social media platform dynamics shape what audiences see as trustworthy (Li et al. 2025; Markowitz 2024). The COVID-19 pandemic made these pressures visible and reinforced the need for transparent and empathetic communication (Smeets et al. 2025).

New frameworks such as the Planned Risk Information Seeking Model (PRISM) show that emotions and motivations shape how people engage with science (Kahlor et al. 2019). Reflective and evaluative practices help improve communication outcomes (Brick et al. 2024), though biases and motivated reasoning remain barriers (Pennycook and Rand 2021). Ultimately, effective science communication extends beyond transmitting facts—it nurtures informed, critical, and engaged publics by adapting to the emotional and social contexts in which science operates.

Communicating climate change is difficult because the topic is scientifically complex, its impacts often unfold over long time horizons, and environmental debates can become politicized. These features make it harder for many people to interpret climate information and to decide whether it is credible or relevant (Alvarez et al. 2023). When impacts feel distant or uncertain, some audiences are more likely to question urgency or even the basic reality of the threat. These challenges make trust central to how climate information is received and acted on. Trust shapes how people interpret evidence, form opinions, and support science-based policies, yet it is not uniform across the public (Intemann 2023; Algan et al. 2021). Trust can be strengthened through transparency about what science can and cannot explain, attention to public concerns, and the use of culturally relatable messengers (Lewandowsky 2021; Schiavo 2022). Higher trust in science is associated with stronger support for science-informed policies, and better understanding of complex issues and credibility often increases when communicators acknowledge uncertainty rather than hide it (Van Vleet and Fuller 2024). At the same time, maintaining trust is harder in fragmented media environments where misinformation circulates widely and emotional or partisan narratives can crowd out reliable information, making source evaluation more demanding for audiences (West and Bergstrom 2020; Gertrudix et al. 2024; Schiavo 2022; Abiri and Buchheim 2022; Sullivan et al. 2024).

Effective communication must also recognize that different groups relate to science in distinct ways. Contemporary approaches view the public as active interpreters, not passive recipients. Strategic audience segmentation is essential for climate communication. Studies show that tailoring messages to audience-specific values, political identities, and behaviors improves responsiveness (Roser-Renouf et al. 2011). Distinct groups such as the "Alarmed," "Disengaged," and "Dismissive" require different frames and tones (Klinger et al. 2022). The Six Americas model (Leiserowitz et al. 2020) illustrates that publics vary in concern, engagement,

and emotion, calling for tailored strategies. Combining digital outreach for younger audiences with economic or security framing for others increases support for climate policies (Nisbet 2009; Feldman and Hart 2016). Despite this, much climate research still emphasizes technical problem-solving while neglecting communication (Capstick et al. 2015; Nerlich et al. 2010). Analyses show many scientists maintain technical framings that limit accessibility and resonance (Brüggemann et al. 2020). Communication often remains secondary in project design, and few funding bodies require detailed outreach strategies, limiting the broader societal impact of climate research (European Commission 2020; Peters 2013).

Segmentation Approaches for Science Audience

Science communication is increasingly shaped by audience heterogeneity, differing levels of scientific literacy, and the rapidly evolving digital media environment. Within this context, audience segmentation has emerged as a central strategy to tailor communication to distinct motivations, concerns, and cognitive orientations (Bucchi and Trench 2021; Scheufele 2022). Drawing from marketing and behavioral science traditions—particularly the Theory of Planned Behavior (Ajzen 1991, 2020)—segmentation enables communicators to differentiate audiences not only demographically but also in terms of attitudes, beliefs, and behavioral intentions. Psychographic segmentation, which organizes audiences by beliefs, motivations, and attitudes, offers greater explanatory power in topics marked by controversy or uncertainty (Kumar et al. 2025; Koch et al. 2020). Behavioral segmentation adds another layer by identifying individuals through observable practices, such as media use or participation in science-related activities (Ihm and Lee 2021). Finally, geographic segmentation highlights the influence of local environments, both physical and institutional, in shaping public attitudes toward science (Jurabek et al. 2024).

Recent empirical work supports this approach, particularly in environmental and science-related domains. Bamberg and Möser (2007) show that pro-environmental behavior is shaped by moral obligation, perceived control, and social norms, which manifest differently across audience segments. Brick et al. (2024) similarly highlights the inefficacy of united messaging in sustainability campaigns, arguing that both active and passive audiences require differentiated framing strategies. Among the most influential segmentation models is the Six Americas framework (Leiserowitz et al. 2020; Guenther et al. 2022), which categorizes the public based on climate change beliefs and engagement levels. This model has been applied in various national settings, including Lithuania (Budžytė and Zolubienė 2024), revealing patterns ranging from enthusiasm to skepticism.

The rise of digital media has further transformed the practice of segmentation. Li et al. (2025) demonstrate how digital narratives are received differently based on linguistic features and user profiles. Meanwhile, Markowitz (2024) argues that AI-driven communication platforms now enable real-time message adaptation based on user interaction, although their use raises concerns over transparency, privacy, and algorithmic bias. In parallel, calls for more

participatory and inclusive science communication have gained momentum. Smeets et al. (2025) emphasize the growing public demand for trustworthiness, inclusivity, and responsiveness, suggesting that segmentation should not only capture cognitive profiles but also account for lived experience and civic expectations. Fischhoff (2019) contends that evaluations should focus on whether communication builds trust, supports informed decisions, or leads to behavioral change. In addition, poorly designed segmentation can have adverse effects, from reinforcing polarization to enabling misinformation (Pennycook and Rand 2021; Scheufele et al. 2021). Misalignment between audience profiles and message strategies can perpetuate misinformation or disengagement, as highlighted by Pennycook and Rand (2021) and Scheufele et al. (2021), especially in polarized digital environments. This also applies to the broader types of segmentation employed in science communication research. Demographic segmentation—based on variables such as age, gender, or education—remains common but can mask deeper variations in values and behavior (Klinger et al. 2022; Champine et al. 2025).

While each segmentation type offers distinct advantages, they also pose methodological challenges. Obtaining accurate, representative data remains a barrier, particularly when engaging heterogeneous or marginalized groups (Humm et al. 2020). Digital divides and emotional exclusion further constrain the inclusiveness of science communication efforts (Rahman et al. 2024). Addressing these challenges requires integrating qualitative and participatory methods, ensuring that segmentation strategies capture the full range of public experience.

Accordingly, audience segmentation should be understood as a strategic framework essential for advancing inclusive, responsive, and ethically responsible science communication. Integrating insights from behavioral theory (Naskar and Lindahl 2026; Kufaine 2024), cognitive psychology (Thorp 2024), and research on emotional and motivational processes (Tam 2024) enables communicators to develop more refined and context-sensitive engagement strategies. Empirical studies demonstrate that segmentation based on robust audience data can enhance the effectiveness of communication by improving the alignment between message content, delivery channels, and audience profiles (Schäfer et al. 2018). Building on these principles, this study adopts a segmentation approach that goes beyond sociodemographic classification to include cognitive, emotional, and behavioral dimensions. Although international research has explored multidimensional clustering (Weingart and Guenther 2016), such studies remain fragmented, and comprehensive science audience segmentation research has not previously been conducted in the Lithuanian context.

This study demonstrates that segmentation, when carefully designed and empirically grounded, provides both a diagnostic map of public orientations and a practical framework for improving science communication. Compared to models such as the Six Americas, which provide a useful typology of issue-specific beliefs, our approach integrates engagement behaviors, communication preferences, and cognitive orientations into a holistic audience profile. This allows communicators not only to identify where audiences stand but also to determine how they might best be reached and meaningfully engaged.

Methodology

Study Design and Instrument

This study follows the segmentation approach developed by Schäfer et al. (2018) and applies it to Lithuania using the same core survey instrument and latent class analysis (LCA) to identify distinct science audience segments based on perceptions of science and science communication. The questionnaire relies on predefined variables used in earlier science communication segmentation research and retains the original structure to support comparability across contexts. These measures remain relevant because they operationalize widely used dimensions of public orientations toward science, including cognitive, affective, and conative components emphasized in the Theory of Planned Behavior tradition (Ajzen 1991, 2020; La Barbera and Ajzen 2020; Hagger and Hamilton 2025) and enduring themes in science perception research such as optimism and skepticism about the promise and limits of science (Schiavo 2022; Scheufele et al. 2021) and normative expectations about public support for science (Ros et al. 2020).

Two context adaptations were introduced. First, a short climate change module was added to capture agreement with three core statements on the reality of climate change, its human causes, and its expected harmful consequences. Second, the media-use battery was adapted to Lithuania by updating the list of outlets and platforms to reflect the national information environment, including major Lithuanian news portals and commonly used online platforms. The instrument was translated from English into Lithuanian by a bilingual expert familiar with science communication terminology. It was then back-translated into English by an independent translator and discrepancies were reviewed by the research team to secure semantic equivalence. The questionnaire was pretested with a small group of respondents and refined through cognitive interviews, making minor wording adjustments for clarity while keeping the original constructs unchanged.

Survey items cover attitudes toward science and research, expectations about the role of science in society and exposure to science information across different media channels. These include indicators such as interest in science, perceived personal relevance, general trust in science, active information seeking and willingness to participate in research, alongside views on the benefits and limits of science. Media pathways are captured through frequency of encountering science content via television, radio, online news portals, institutional websites, social networks, Wikipedia and video platforms, as well as attention to science coverage and evaluations of its trustworthiness, comprehensibility, and extensiveness. Climate change views are measured with the added three-item module described earlier.

Data Collection and Sample

Data come from a nationally representative survey of adults in Lithuania (18+). Fieldwork was conducted from June 21 to July 7, 2024, by the Lithuanian-British public opinion

research company Baltijos tyrimai using multistage stratified random sampling. The survey was implemented in 112 sample points across towns and villages. People in prison, in hospital, and without a place of residence were not included in the sampling frame. The final sample consisted of 1,005 respondents. LCA was applied to the set of segmentation indicators to classify respondents into mutually exclusive latent segments based on shared response patterns in science perceptions, trust, engagement, and science-related media use.

Models with one to four latent classes were estimated and compared using established fit criteria (Akaike Information Criterion [AIC], Bayesian Information Criterion [BIC], sample-size adjusted BIC [SABIC], Consistent AIC [CAIC], and entropy). The final model was selected by considering both statistical fit and the degree of class separation. After selecting the final solution, segment profiles were interpreted using item–response patterns and descriptive statistics, and each segment was assigned a descriptive label reflecting its dominant characteristics. We then examined how segments differed in their media pathways for encountering science information and in their views on climate change, and we described segment composition across key sociodemographic variables.

A brief contextual note on Lithuania's information environment helps to interpret the media pathway findings. Lithuania is generally regarded as having a favorable environment for journalism and ranked 14th in the World Press Freedom Index 2025 (Reporters Without Borders 2025b). The European Commission Rule of Law Report 2024 observed that the legal framework continues to safeguard freedom of expression, transparency of media ownership has improved, and the national public service broadcaster (LRT) maintained operational independence (European Commission 2024). At the same time, several analyses have noted growing political and financial pressure on LRT and ongoing debates about its governance and funding, which illustrate that institutional safeguards remain open to contestation even in higher-ranking systems (Reporters Without Borders, 2025a; European Broadcasting Union 2024). Lithuania also operates within a regional setting marked by persistent foreign information manipulation, with the European External Action Service documenting pro-Kremlin disinformation and coordinated narratives targeting Baltic audiences (European External Action Service 2024). Local fact-checking organizations such as Debunk.org have reported coordinated influence incidents surrounding the 2024 presidential election, showing that Lithuania's media ecosystem must manage both domestic and cross-border sources of misinformation (Debunk.org 2024). Within this context, the survey's measures of perceived misleading science information and evaluations of fairness, trustworthiness, and comprehensibility of science coverage gain additional meaning: they capture not only differences in media use but also how citizens assess the credibility of science information within an environment that can both inform and misinform.

Results

As stated in the previous section, the sample consisted of 1,005 respondents (aged 18 and over), with a slight majority of women (54%) and 46% men. The age distribution was skewed

toward older individuals: 51% were aged 50 and above, 34% were between 30 and 49, and 15% were between 18 and 29. The vast majority of respondents identified as Lithuanian (91%), with smaller proportions identifying as Polish (4%), Russian (3%), or other nationalities (1.4%); 0.6% did not specify their nationality. In terms of income, 27% reported a monthly household income of up to €1,200, 28% reported €1,201–2,000, and 21% reported incomes above €2,000, while 24% either did not know or did not disclose their income. Educational attainment varied: 16% held a university degree (Bachelor's or higher), 12% had non-university college education, 18% had technical higher education, 30% reported professional training, 18% had completed secondary education, and 6% had only primary or incomplete secondary education. In the present article, we describe segment composition by gender and age, while education was not analyzed at the segment level. Given that education can shape science engagement and information practices, a follow-up analysis comparing educational distributions across segments would be a useful extension of the current results.

Respondents were geographically distributed across major Lithuanian regions. Urban residents made up 43% of the sample (living in major cities such as Vilnius, Kaunas, and Klaipėda), 25% lived in other cities, and 32% resided in villages or small towns. The largest share of respondents was from Vilnius County (29.4%), followed by Kaunas County (19.6%) and Klaipėda County (11.1%). Table 1 presents means and standard deviations of the items used in this study.

Table 1: Descriptive Statistics of the Items Used in the Study

Dimension	*Items*	*N*	*M*	*SD*
Attitudes toward science and research	How interested are you in science and research? (1 = "not at all" … 5 = "very interested")	977	2.65	1.143
	Science and research play an important role in my life	940	2.99	1.113
	How high is your trust in science in general?	938	3.57	0.938
	I specifically search for information about science and research	970	2.41	1.217
	I would like to partake in scientific research once	929	2.23	1.179
Reservations versus beliefs in the promise of science	Science and technology can sort out any problem	942	3.12	1.032
	Science and research make our lives better	947	3.77	0.947
	The benefits of science are greater than any harmful effects it may have	889	3.41	0.967
	Science should have no limits to what it is able to investigate	903	3.40	1.057
	We rely too heavily on science	860	2.84	0.965
Desirable relation between science and society	Scientific research is necessary even if there is no immediate application (1 = "do not agree at all" … 5 = "agree strongly")	917	3.66	0.972
	Scientific research should be publicly funded	928	3.87	0.998
	Political decisions should be based on scientific findings	882	3.48	1.013
	It is important to be informed about science and research	944	3.19	1.071
	There is a lot of misleading information about scientific research in the media	794	3.19	0.988
	Information published in the media about scientific news is fair and impartial	838	3.22	0.928
Attitudes toward climate change	Climate change is real (1 = "do not agree at all" … 5 = "agree strongly")	947	3.83	0.921
	The main cause of climate change is inappropriate human activities	941	3.66	0.958
	Climate change will cause dangerous phenomena	926	3.88	0.904

Sociodemographics	Gender (% female)	546	54	-
	Age (years)	1005	49.94	17.187
	Education (% professional education)	303	30	-
Patterns of information and media use	How often do you come in contact with science and research via … (always from 1 = "never" … 5 = "very often")			
	Lithuanian TV (LRT, LRT Plius)	978	2.60	1.125
	Other Lithuanian television	976	2.62	1.110
	Other TV stations (Discovery, History, etc.)	960	2.33	1.217
	Radio	960	2.29	1.132
	Science magazines	954	1.96	1.146
	Internet portals (Delfi, Lrytas, fifteen minutes, etc.)	963	2.50	1.216
	Institutional websites (scientific, government, organizations)	941	1.96	1.134
	Social networks (Facebook, Instagram, etc.)	944	2.35	1.278
	Wikipedia	933	2.18	1.262
	YouTube or similar video platforms	949	2.39	1.330
	How often do you do one of the following … (always from 1 = "never" … 5 = "very often")			
	Visit museums and exhibitions covering science and research	995	1.79	0.927
	Attend events, talks, discussions concerning science, and research	987	1.52	0.817
	Read nonfiction books on science and research	985	1.64	0.936
	Talk about science and research with friends and acquaintances	980	1.91	0.989
	How attentive are you when media report on scientific topics? (1 = "not attentive at all" … 5 = "very attentive")	961	3.15	1.132
Assessment of media coverage	Generally, do you think media coverage about science and research is … (always from 1 = "do not agree at all" … 5 = "agree strongly")			
	Trustworthy	894	3.23	0.964
	Comprehensible	905	3.21	0.970
	Extensive	885	3.12	0.991
Motivations for tending to scientific content	How important are the following reasons for you to deal with science and research? (always from 1 = "not important at all" … 5 = "very important")			
	To inform myself for school/work	917	2.23	1.255
	Because I'm curious	922	3.02	1.296
	To better understand science and research	915	2.82	1.237
	To be able to participate when others talk about science and research	910	2.52	1.201

Note: M: arithmetic mean; SD: standard deviation.

The Segmentation of the Population: Four Perspectives on Science

The analysis identified four distinct audience segments in the Lithuanian population based on their perceptions of science, attitudes toward research, and media engagement patterns. As mentioned above, a LCA was conducted to identify subpopulations within the sample based on perceptions of science, attitudes toward research, and media engagement patterns. Models specifying one through four latent classes were evaluated. Fit indices, including AIC, BIC, SABIC, CAIC, and entropy, were compared to determine the optimal number of classes. The four-class solution provided the best fit to the data, as indicated by the lowest AIC (93,992), BIC (97,230),

and SABIC (95,137), as well as high entropy (0.948), suggesting excellent class separation. The maximum log-likelihood for the four-class solution was −46,337, and the likelihood ratio statistic (G^2) was 46,370. Fit statistics for all estimated models are presented in Table 2.

Table 2: Fit Indices for Latent Class Models (1–4 Classes)

Number of Classes	*Log-Likelihood*	*AIC*	*BIC*	*SABIC*	*CAIC*	*Entropy*	G^2
1	−52,558	105,445	106,250	105,730	106,414		53,269
2	−48,535	97,729	99,345	98,300	99,674		48,681
3	−47,154	95,296	97,723	96,154	98,217		47,259
4	−46,337	*93,992*	*97,230*	*95,137*	*97,889*	0.948	46,370

Notes: Best-fitting model in italics; G^2 = Likelihood ratio statistic; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SABIC = Sample-size Adjusted BIC; CAIC = Consistent AIC.

The segmentation analysis revealed four distinct groups in the Lithuanian population, each differing in their level of interest, trust, and engagement with science and scientific research.

Class Profiles

The "Engaged Enthusiasts" (n = 173; 17.3%) group exhibited consistently high engagement, interest, and trust in science. They scored the highest on most indicators of scientific curiosity and activity. For example, the mean score for "How much interested in science" was 3.72 (SD = 0.84), and for "How attentive to media reports on science," it was 4.07 (SD = 0.79). Members of this class frequently searched for science information (M = 3.33, SD = 1.07), reported high trust in science (M = 4.22, SD = 0.72), and endorsed science as important in society (M = 3.85, SD = 0.86). They also had strong agreement that climate change is real (M = 4.06, SD = 0.88) and attributable to human activity (M = 3.90, SD = 0.94). Media about science was perceived as trustworthy (M = 3.59, SD = 0.93), comprehensive (M = 3.66, SD = 0.91), and extensive (M = 3.42, SD = 1.04). Thus, "Engaged Enthusiasts" demonstrated the highest overall engagement with science. Members of this segment report a strong interest in scientific topics and score highest across nearly all variables related to science attitudes and beliefs. They view science as personally relevant, regularly consume science-related content—particularly in new media—and actively seek out such information. They exhibit high levels of trust in science, are interested in participating in research, and strongly support the role of science in addressing societal challenges. Their views include the belief that science can solve any problem, improve quality of life, and should not be subject to boundaries or restrictions. They affirm that scientific research should be publicly funded and that political decisions should be grounded in scientific evidence. However, they do not agree with the statement that people trust science too much, indicating a rejection of science skepticism.

The "Informed Sceptics" (n = 160; 15.9%) segment can be characterized by moderate scientific interest and relatively high levels of knowledge or awareness, but lower levels of trust and engagement. For example, "How much interested in science" had a mean of 2.49 (SD = 0.83), and

trust in science was moderate (M = 3.49, SD = 0.72). This class tended to express some caution about the limits of science (e.g., "Science should have no limits of investigation," M = 3.38, SD = 0.81) and the impartiality of science media coverage (M = 3.20, SD = 0.77). Although their endorsement of climate change was relatively high (M = 3.77, SD = 0.81), their engagement in science-related activities remained low to moderate. On the whole, "Informed Sceptics," as the smallest segment in the sample, share a relatively high level of scientific knowledge and similar attitudes to the "Engaged Enthusiasts," yet with a more cautious orientation. While still generally supportive of science, they place less importance on science in their everyday lives and are less engaged with science content in digital media. Their enthusiasm is more reserved, though they nonetheless agree that science can solve problems, improve life, and should operate without undue restrictions. Their position suggests a mix of informed engagement and critical distance.

The "Occasional Observers" (n = 365; 36.3%) group was the largest segment and reported moderate interest and involvement in science. Their mean scores across indicators were lower than "Engaged Enthusiasts" but higher than those in the least engaged group. For instance, "How much interested in science" had a mean of 1.93 (SD = 0.80), and "How attentive to media reports on science" was 2.53 (SD = 0.81). They expressed moderate trust in science (M = 3.17, SD = 0.47) and lower engagement in science-related activities. Although they partially recognized the importance of science (M = 2.56, SD = 0.84) and the reality of climate change (M = 3.40, SD = 0.61), their willingness to seek out scientific information or participate in research was limited (e.g., "Would like to participate in research," M = 1.51, SD = 0.88). On the whole, "Occasional Observers" segment shows relatively low levels of interest in science and research, although their attitudes remain moderately positive. They express some trust in science and a degree of interest, yet do not consider science highly relevant to their personal lives. They rarely seek science information or participate in science-related activities. Across evaluative statements—such as whether science can solve problems, whether scientific research is valuable even without immediate application, or whether it should be publicly funded—their responses tend to be neutral. This segment is generally passive in its engagement with science, indicating limited integration of scientific thinking into daily experience.

The "Hard-to-Reach" (n = 307; 30.5%) class was the second largest segment and demonstrated the lowest levels of engagement, trust, and activity regarding science. "How much interested in science" averaged 1.76 (SD = 0.97), and "How attentive to media reports on science" was 2.13 (SD = 1.13). Trust in science was also low (M = 2.90, SD = 1.20). Members of this class rarely searched for scientific information or participated in science-related activities. They reported the lowest scores across most indicators, including media trustworthiness (M = 2.61, SD = 1.27) and comprehensibility (M = 2.48, SD = 1.30). Thus, "Hard-to-Reach" segment is marked by the lowest interest in and engagement with science. Members of this group place little importance on being informed about scientific topics, do not actively seek out science-related information, and report minimal interest in participating in scientific research. However, their responses are not overtly negative; rather, some of them

tend to be neutral on key statements concerning the utility and trustworthiness of science. Notably, this group expresses relatively stronger support for public funding of science compared to "Occasional Observers." They are also the most likely to agree that media coverage of science often contains misleading information, indicating a degree of media skepticism rather than direct distrust of science itself.

Analysis of item–response probabilities revealed additional distinctions between classes. For example, "Engaged Enthusiasts" had a high probability of responding at the upper end of all positive science attitude scales, whereas "Hard-to-Reach" individuals showed the highest probability for the lowest response options. Classes also differed in their preferred sources of scientific information and perceptions of media accuracy and impartiality. Notably, "Engaged Enthusiasts" were more likely to consume a broad range of media, including internet portals, institutional websites, and science magazines, compared to other classes. The results indicate substantial heterogeneity in the public's engagement with and attitudes toward science and scientific information in media. The "Engaged Enthusiasts" are actively interested and highly trusting of science, whereas the "Hard-to-Reach" represent a more disengaged and less trusting segment. "Occasional Observers" and "Informed Sceptics" occupy intermediate positions, with the former displaying passive but positive attitudes and the latter combining awareness with some skepticism. Descriptive Statistics for key indicators by four latent classes are displayed in Table 3.

Table 3: Descriptive Statistics for Key Indicators by Latent Class

Indicator	*Engaged Enthusiasts (M, SD)*	*Occasional Observers (M, SD)*	*Informed Sceptics (M, SD)*	*Hard-to-Reach (M, SD)*
How much interested in science	3.72 (0.84)	1.93 (0.80)	2.49 (0.83)	1.76 (0.97)
Science plays an important role	3.85 (0.86)	2.56 (0.84)	2.80 (0.90)	2.18 (1.15)
How attentive to media reports on science	4.07 (0.79)	2.53 (0.81)	3.10 (0.86)	2.13 (1.13)
Specifically search for information about science	3.33 (1.07)	1.77 (0.82)	2.24 (1.02)	1.73 (1.17)
Would like to participate in research	3.07 (1.10)	1.51 (0.88)	2.18 (0.97)	1.55 (1.03)
How is trust in science in general	4.22 (0.72)	3.17 (0.47)	3.49 (0.72)	2.90 (1.20)
Science can sort out any problem	3.57 (1.06)	2.77 (0.72)	3.09 (0.88)	2.61 (1.16)
Science makes lives better	4.39 (0.76)	3.32 (0.68)	3.59 (0.78)	3.34 (1.18)
Science should have no limits of investigation	3.86 (1.05)	3.04 (0.72)	3.38 (0.81)	2.84 (1.39)
Research is necessary even without immediate application	4.20 (0.87)	3.28 (0.65)	3.52 (0.80)	3.25 (1.28)
Research should be publicly funded	4.37 (0.85)	3.39 (0.68)	3.68 (0.85)	3.71 (1.37)
Political decisions should be based on science	3.87 (0.91)	2.94 (0.65)	3.46 (0.81)	3.19 (1.49)
Benefits of science are greater than harm	3.85 (0.99)	3.08 (0.50)	3.26 (0.72)	3.18 (1.37)
We rely too heavily on science	2.56 (1.00)	3.05 (0.55)	3.01 (0.80)	2.89 (1.32)
A lot of misleading information on science in media	3.06 (1.02)	3.09 (0.48)	3.17 (0.91)	3.61 (1.27)
Climate change is real	4.06 (0.88)	3.40 (0.61)	3.77 (0.81)	3.95 (1.26)
Cause of climate change is human activities	3.90 (0.94)	3.24 (0.58)	3.58 (0.83)	3.73 (1.33)
Climate change will cause dangerous phenomena	4.20 (0.83)	3.41 (0.60)	3.75 (0.82)	3.96 (1.17)
Information on science in media is fair and impartial	3.45 (0.93)	2.89 (0.49)	3.20 (0.77)	3.05 (1.35)

It is important to be informed about science	4.12 (0.66)	2.56 (0.85)	3.05 (0.80)	2.38 (1.13)
Visit museums and other places to know more about science	2.50 (0.98)	1.20 (0.47)	1.66 (0.71)	1.35 (0.75)
Participates in events on science	2.06 (1.03)	1.03 (0.16)	1.45 (0.64)	1.12 (0.43)
Reads scientific literature	2.47 (1.07)	1.05 (0.21)	1.42 (0.65)	1.14 (0.47)
Talks to friends about science	2.81 (0.96)	1.18 (0.41)	1.73 (0.72)	1.36 (0.73)
Wants more information for work	3.02 (1.32)	1.39 (0.71)	2.18 (0.96)	1.49 (1.12)
Just interested in science	4.23 (0.64)	1.75 (0.86)	2.90 (0.87)	2.03 (1.30)
Wants to better understand science	3.96 (0.77)	1.58 (0.76)	2.67 (0.79)	1.99 (1.23)
Wants to participate when others talk about science	3.46 (0.99)	1.42 (0.74)	2.47 (0.83)	1.78 (1.20)
Lithuanian TV (LRT, LRT Plius)	3.03 (1.15)	2.14 (0.86)	2.68 (0.98)	2.03 (1.20)
Other Lithuanian television	2.96 (1.12)	2.13 (0.94)	2.73 (0.91)	2.19 (1.32)
Other TV stations (Discovery, History, etc.)	3.13 (1.10)	1.49 (0.77)	2.32 (1.10)	1.61 (1.01)
Radio	2.47 (1.14)	1.81 (1.03)	2.48 (1.01)	2.00 (1.27)
Science magazines	2.83 (1.18)	1.10 (0.34)	1.87 (0.93)	1.31 (0.82)
Internet portals (Delfi, Lrytas, 15min, etc.)	3.23 (1.05)	1.48 (0.73)	2.61 (1.02)	1.82 (1.25)
Institutional websites	2.51 (1.26)	1.17 (0.51)	2.06 (0.99)	1.40 (0.92)
Social networks (Facebook, Instagram, etc.)	3.00 (1.17)	1.39 (0.77)	2.36 (1.15)	1.93 (1.38)
YouTube or similar video platforms	3.18 (1.15)	1.31 (0.77)	2.35 (1.18)	1.92 (1.43)
Wikipedia	2.94 (1.24)	1.23 (0.66)	2.11 (1.05)	1.77 (1.33)
Media coverage about science is trustworthy	3.59 (0.93)	2.96 (0.50)	3.29 (0.79)	2.61 (1.27)
Media coverage about science is comprehensible	3.66 (0.91)	2.92 (0.46)	3.23 (0.73)	2.48 (1.30)
Media coverage about science is extensive	3.42 (1.04)	2.91 (0.47)	3.16 (0.76)	2.59 (1.33)

Attitudes Toward Climate Change Across Science Audience

Attitudes toward climate change vary across the four identified segments, reflecting broader patterns in their engagement with and trust in science. The "Engaged Enthusiasts" strongly align with the scientific consensus on climate change. They agree that climate change is real, primarily caused by inappropriate human activity, and likely to result in dangerous consequences. Their high engagement with science and strong support for scientific research extends to clear acceptance of climate-related scientific findings.

The "Informed Sceptics" exhibit similar views. Despite their more reserved stance toward the role of science in daily life, they also recognize the anthropogenic causes of climate change and its potential risks. Their agreement with key climate change statements mirrors that of the "Engaged Enthusiasts," indicating that critical attitudes toward science do not necessarily entail climate skepticism. In contrast, the "Occasional Observers" express the lowest level of agreement with statements related to climate change. While they do not reject the scientific view outright, their responses suggest a weaker conviction regarding the reality, causes, and consequences of climate change. This corresponds with their limited interest in science and lower overall attentiveness to scientific information. The "Hard-to-Reach" segment, despite their generally low engagement with science, demonstrates relatively strong agreement with the scientific consensus on climate change. They affirm that climate change is real, caused by human activity, and potentially dangerous. Their views on climate change are notably more

aligned with scientific consensus than those of the "Occasional Observers," suggesting that low general interest in science does not preclude concern about specific issues like climate change.

Age and Gender Specifics Across Segments

Among males (n = 459), the most prevalent segment was "Informed Sceptics," with an estimated 155 individuals (15.4% of the total sample), followed by "Engaged Enthusiasts" (n = 149; 14.8%), "Hard-to-Reach" (n = 79; 7.9%), and "Occasional Observers" (n = 76; 7.5%). Among females (n = 546), the largest class was again "Informed Sceptics," comprising an estimated 211 individuals (21%), followed by "Engaged Enthusiasts" (n = 160; 16%), "Hard-to-Reach" (n = 95; 9.4%), and "Occasional Observers" (n = 81; 8.0%). Notably, the "Informed Sceptics" class is relatively more prevalent among females (21%) compared to males (15.4%), while the gender distribution is similar for the other classes.

The "Engaged Enthusiasts" class had a mean age of 44.5 years (SD = 16.2), indicating this group tends to be younger than other classes. In contrast, the "Occasional Observers" had the highest mean age at 57.9 years (SD = 15.8), suggesting that this segment is composed predominantly of older individuals. The "Informed Sceptics" had a mean age of 49.9 years (SD = 15.9), and the "Hard-to-Reach" group had a mean age of 52.6 years (SD = 19.3). Thus, "Engaged Enthusiasts" are, on average, substantially younger, while "Occasional Observers" are the oldest group, and the "Informed Sceptics" and "Hard-to-Reach" classes fall between these two extremes. The age differences across classes may reflect some generational variations in attitudes toward science, trust in scientific information, and engagement with science-related media.

Practical Implications

The Lithuanian segmentation provides an applied framework for tailoring science and climate communication to audience media pathways rather than relying on uniform messaging. The results indicate that the segment with the weakest alignment with the core climate statements is the "Occasional Observers," suggesting that communication priorities should focus on low-engagement groups and on improving reach, clarity, and relevance through the channels they already use. "Engaged Enthusiasts" and "Informed Sceptics" show stronger acceptance of climate science but differ in communication needs: the former are well positioned for mobilization and information diffusion through digital networks, while the latter may respond better to transparent, evidence-linked formats that acknowledge uncertainty and support critical evaluation. The "Hard-to-Reach" segment combines low general engagement with relatively high concern about misleading science information, implying that trust-supporting delivery and accessible verification cues may be more useful than increasing message volume. Overall, the findings justify segment-sensitive communication that aligns message format, messenger, and channel with audience profiles, and they show how segmentation can be used to translate descriptive audience differences into practical targeting decisions in Lithuania.

Discussion and Comparative Analysis

Public perceptions of science are complex, socially differentiated, and shaped by broader cultural, informational, and political environments. Research in science communication increasingly emphasizes the need to move beyond undifferentiated notions of "the public" and instead examine how distinct groups engage with science in different ways (Bucchi and Trench 2021). Segmentation approaches offer a valuable tool for identifying these differences, enabling more targeted and context-sensitive communication strategies. Research specifically focusing on science audience segmentation in Lithuania is limited. However, some studies have explored related areas. For instance, Budžytė and Zolubienė (2024) applied the "Six Americas" framework to analyze Lithuanian public opinion on climate change, identifying distinct audience segments with varying attitudes toward the issue. While both this study and the Six Americas model segment publics based on attitudes and engagement, the present analysis extends beyond diagnostic typologies by offering insights directly relevant to communication strategy. The segmentation developed in this article not only identifies attitudinal and behavioral clusters but also explores media habits, trust levels, and engagement patterns across both formal and informal contexts. These dimensions are crucial for science communication readiness—that is, understanding not only *who* the audience is but *how* they might best be reached.

Drawing on the same methodological framework as Schäfer et al. (2018), which identified four public segments in Switzerland, this research applies LCA to a representative Lithuanian sample. The aim was twofold: first, to reconstruct comparable audience segments within Lithuania, and second, to explore similarities and differences in how publics in Lithuania and Switzerland relate to science and science communication. While the segmentation analysis in this study follows the structure established by Schäfer et al. (2018), the labels assigned to the four audience segments were adapted. The original labels—such as "Sciencephiles" or "Critically Interested"—were replaced with alternatives that more clearly reflect the defining characteristics of each group in a neutral and analytically descriptive manner. The revised labels—"Engaged Enthusiasts," "Informed Sceptics," "Occasional Observers," and "Hard-to-Reach"—were selected to enhance conceptual clarity, reduce ambiguity, and improve communicative precision, particularly for applied use in science communication practice. The new terms were developed in line with current recommendations in audience segmentation literature, which emphasize the importance of clarity, neutrality, and interpretability in labeling audience types (Metag and Schäfer 2018). In this context, the renaming serves to facilitate clearer communication of findings to both academic and nonacademic audiences, while preserving comparability with the original framework.

Although the segment labels and general profiles are similar, notable differences emerge in the demographics, media habits, and attitudes toward science, providing useful insights into national contexts and public communication strategies. "Engaged Enthusiasts" in both

countries demonstrate high scientific literacy, interest, and support for science-based policy. Yet, their profiles differ: in Switzerland, this segment is predominantly male and highly interactive in its engagement with science across various media and social contexts. In Lithuania, this group is primarily young and female, with engagement driven more by personal curiosity than participation in public science activities. "Informed Sceptics" show that support for science can coexist with critical distance. In Switzerland, they remain active information seekers, even while questioning media portrayals and scientific promises. In Lithuania, they are more disengaged in practice, reflecting a more distanced stance despite some shared attitudes. "Occasional Observers" in Switzerland represent the largest group, with moderate levels of interest and trust, relying on accessible sources such as Wikipedia. In Lithuania, this segment is older, prefers traditional media like television, and exhibits less engagement overall—though with comparatively high trust in those media sources. This indicates a form of passive endorsement rather than active involvement. The "Hard-to-Reach" segment stands out for its minimal expressed interest in science, though not necessarily negative views. In Switzerland, this segment is the least educated, largely female, and interacts with science mostly through public broadcast channels. In Lithuania, they are predominantly female and show relatively high attentiveness when science appears in media. They also report higher engagement with informal science learning spaces such as museums and exhibitions and give the most positive evaluations of science coverage.

These findings underscore that while similar public segments exist across national contexts, their characteristics and behaviors are shaped by local conditions. Science communication strategies must therefore go beyond demographic targeting and take into account how different publics relate to science within their specific cultural and media environments. A united approach is unlikely to succeed; instead, segment-sensitive and contextually grounded communication is essential for building meaningful connections between science and society.

Limitations

Large coordinated comparative survey programs show how simultaneous multicountry fieldwork can clarify cultural and geographic variation by keeping measurement and timing aligned. In the European Social Survey tradition, countries administer shared questionnaires using standardized translation, sampling and fieldwork protocols within a common round, which strengthens the interpretability of cross-country differences (Jowell et al. 2007; Harkness et al. 2010). These programs also institutionalize cross-national quality assurance for data collection, reducing variation that comes from differing national survey practices rather than genuine attitudinal differences (Koch et al. 2009). The Cross-Cultural Survey Guidelines summarize these best practices across the survey lifecycle, covering questionnaire development, translation, documentation and harmonization in comparative designs (Survey Research Center, Institute for

Social Research 2016). A further methodological pillar is the expectation that researchers evaluate measurement equivalence before comparing countries, so differences are less likely to be artefacts of language or context-specific interpretation (Davidov et al. 2014). Similar logic guides other coordinated infrastructures such as the International Social Survey Program, which fields common modules across countries within the same study period to enable systematic comparison (Scholz et al. 2017). Recent large-scale examples include the Wellcome Global Monitor Covid-19 study, implemented as representative surveys across 113 countries and territories during 2020 and early 2021, and a preregistered sixty-eight-country survey on trust in scientists, both designed to benchmark attitudes across settings under a shared time frame (Wellcome 2020; Cologna et al. 2025). Our research differs from these synchronized designs because it applies the Swiss segmentation instrument to Lithuania in 2024 and uses the earlier Swiss findings as a reference point rather than collecting data concurrently in both countries, which means Lithuania–Switzerland contrasts should be treated as descriptive and hypothesis-generating given possible period effects. At the same time, comparative survey methodology also highlights an advantage of this kind of replication across contexts: it tests whether constructs and segment structures travel across countries and media systems, helping identify which audience profiles appear robust across cultures and which features are context-specific, which can motivate future coordinated, simultaneous multi-country fieldwork using the same segmentation indicators. Another perspective is that cross-cultural comparison can be analytically productive even when a topic is global. It can show which audience patterns and media pathways are stable across contexts and which depend on national media systems, institutional trust and communication norms. It can also highlight where similar segments hold different climate views, helping identify locally specific barriers and opportunities for communication.

Conclusion

This study applied an established science audience segmentation approach to a nationally representative survey in Lithuania and identified four distinct segments that differ in their orientations toward science and in how they encounter science information in the media. The results confirm that public engagement with science is not uniform and that segment profiles provide a useful basis for communication planning for differing trust levels, attention patterns and preferred information pathways.

The segmentation analysis identified four distinct audience groups within the Lithuanian population, each exhibiting different levels of interest, trust, and engagement with science. These segments—"Engaged Enthusiasts," "Informed Sceptics," "Occasional Observers," and the "Hard-to-Reach"—reflect a spectrum of orientations toward science, from active involvement to passive detachment. While the "Engaged Enthusiasts" demonstrate strong alignment with scientific values and broad support for research and its societal role, the "Informed Sceptics" combine knowledge with a more reserved, critical stance. "Occasional Observers" show

moderate trust but low engagement, whereas the "Hard-to-Reach" segment remains largely disengaged, yet not overtly hostile toward science. These findings underscore the heterogeneity of public attitudes and the need for differentiated science communication strategies that account for varying degrees of interest, trust, and media engagement.

The analysis reveals that alignment with the scientific consensus on climate change does not strictly follow overall engagement with or interest in science. While "Engaged Enthusiasts" and "Informed Sceptics" demonstrate strong acceptance of climate science, the latter do so despite a more critical stance toward science in general. Conversely, the "Occasional Observers"—despite moderate trust in science—show the weakest recognition of anthropogenic climate change. Notably, the "Hard-to-Reach" segment, though generally disengaged from science, expresses substantial agreement with scientific views on climate change. These findings suggest that climate change beliefs are not solely determined by levels of scientific engagement but may also reflect broader socio-cognitive orientations and issue-specific sensitivities.

The analysis of media and information use reveals that science audience segments differ not only in their attitudes but also in their channels of engagement, levels of attentiveness, and motivations. "Engaged Enthusiasts" are the most digitally oriented, accessing a broad mix of online platforms but showing relatively limited offline engagement, with curiosity as their primary driver. "Informed Sceptics," despite comparable educational profiles, rely more heavily on traditional television and hold the most critical views of science coverage, with minimal active participation. "Occasional Observers" engage passively, primarily through television, and remain largely uninvolved in science-related discourse or activities, although they view media coverage of science favorably. In contrast, the "Hard-to-Reach" segment—despite its label—demonstrates unexpectedly high levels of informal science engagement, especially through thematic media and offline experiences, and reports the most positive assessments of science communication. These findings highlight the importance of segment-specific approaches to science communication that consider not only trust and attitudes but also preferred media environments and motivations for engagement.

This pattern suggests that climate change beliefs are shaped by issue-specific dynamics and by the media pathways through which people encounter science-related information, not only by overall trust or interest in science. The comparison with earlier Swiss work indicates that similar segmentation structures can be reproduced across countries, yet segment composition and media habits reflect national context. Taken together, the findings support using segmentation as a practical tool for developing communication strategies that are adapted to local media environments and audience profiles in Lithuania.

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Informed Consent

The author has obtained informed consent from all participants.

Conflict of Interest

The author declares that there is no conflict of interest.

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