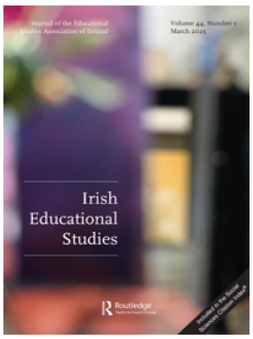

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Science and society in Ireland: examining public trust in scientists against a global background

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ABSTRACT

Public trust in scientists is vital for navigating complex global challenges, influencing evidence-informed policy, and promoting societal well-being. However, concerns exist about a potential crisis of trust in science, fuelled by misinformation, conspiracy theories, and science-related populism. The Trust in Science and Science-Related Populism (TISP) study investigated public perceptions of scientists across 68 countries. This paper examines the TISP findings for Ireland, focusing on public trust in scientists and the implications for the Irish educational landscape. The study reveals that trust in scientists in Ireland is generally moderate to high, exceeding global averages, but notably lower among younger respondents. Regression analyses show a strong association between trust in scientific methods and overall trust in scientists, highlighting the importance of robust science education with a strong emphasis on science communication. Qualitative analysis of open-ended responses reveals a strong expectation that scientists should embody professionalism, integrity, and continuous self-improvement. These findings suggest a need for targeted science education and communication efforts in Ireland, emphasising critical thinking skills, understanding of the scientific process, and the ethical responsibilities of scientists. Promoting transparency, dialogue, and public participation in scientific endeavours will help foster a more robust and trusting relationship between science and society in Ireland.

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Trust in scientists; science communication; science education; public engagement with science; survey

Introduction

In an era defined by rapid technological advancements and complex global challenges, the role of science and scientists in shaping society and our future is increasingly important. From navigating the COVID-19 pandemic to tackling climate change, evidence-informed decision-making, informed by scientific expertise, is essential for navigating

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a path towards a sustainable and equitable future. At the heart of this process lies public trust: the foundation for informed individual choices, for empowering citizens to participate in scientific endeavours, and for influencing policy decisions that align with the best available evidence (Besley 2013; Schroeder 2021). However, in recent years, concerns have arisen about a potential crisis of trust in science, with some researchers suggesting a decline in public confidence in scientists and their institutions (Algan et al. 2021; Kreps and Kriner 2020). A crisis of public trust in science is seen most clearly when people choose to ignore the advice of experts when it comes to societal challenges related to, for example, energy (Greenberg 2014), food (Kaiser and Algers 2017), or medicine (Larsen et al. 2023). However, it is always worth noting that when considering something like public trust, 'there is not simply one 'public' but [rather] our societies are culturally, regionally, socially and economically diverse, and that different social fractions are changing in different ways and at differing rates' (Millstone and Van Zwanenberg 2000, 1307). This uncertainty has been exacerbated by the rise of misinformation and disinformation, the proliferation of conspiracy theories, and the perceived polarisation of societal views on science, often along partisan lines (Bromme et al. 2022; Hamilton and Safford 2021). Understanding public perceptions of scientists and their role in society is particularly important in Ireland, a country with a rich history of scientific inquiry and a growing commitment to fostering public engagement with science (Foster and Chesney 1998; Trench et al. 2017). However, like many nations, Ireland also faces the challenge of bridging the gap between scientific knowledge, public understanding, and education – particularly amidst anxieties about the trustworthiness of scientific expertise and its influence on policymaking (Bruen 2014; Carroll and Grenon 2021; Chadwick, McLoughlin, and Finlayson 2023; Leavy and Hourigan 2021).

The Trust in Science and Science-Related Populism (TISP) study, a 'many-labs' collaborative effort involving more than 240 researchers from 169 institutions around the world, embarked on a monumental campaign to address these concerns and better understand the state of trust in scientists and their role in society (Cologna et al. 2025). The study surveyed over 71,000 individuals in 68 countries in 2022–2023, providing one of the largest and most geographically comprehensive datasets on public perceptions of scientists and their role in society to date (Mede et al. 2025). This unique dataset offers valuable insights into the diverse nature of trust in scientists across different countries and cultural contexts, highlighting potential factors that influence public confidence in scientists and raising critical questions about how to strengthen this relationship.

While the global TISP study (Cologna et al. 2025) provides a valuable overview of these trends worldwide, the next step in the research process is to generate a deeper understanding of trust in scientists at national levels. Despite increasing globalisation, each country in the study offers a unique vantage point from which to explore public trust in scientists. In this paper we examine aspects of this relationship in Ireland, an island nation on the Western edge of Europe, with a science-society axis that has been shaped by historical events and sociocultural circumstances. Comparing the views of Irish publics with those observed in other countries and global trends offers the chance to better understand the current relationship between science and society in Ireland in greater detail.

Science and society in Ireland

Ireland, with a historically vibrant higher education sector and a growing commitment to research and innovation, has witnessed a notable shift in its relationship with science throughout the twentieth century (Bonetta 2008; Kirwan 2020; Murphy 2020). Beyond the realm of academia, there has been an increasing emphasis on engaging the public with scientific endeavours, fostering a deeper understanding and appreciation of scientific knowledge and its impact on daily life (for example, see the Irish Government's 'Creating Our Futures' campaign, run by Science Foundation Ireland[1]). This evolving landscape presents a unique context for examining public trust in scientists and scientific research, particularly within the Irish educational system.

While Ireland boasts a rich history of scientific inquiry, dating back to the methodical observations of natural phenomena by monastic communities in early medieval times (MacNiocaill 1975; McCarthy 2008; McCarthy and Breen 1997), the relationship between science and society has often been complex and marked by historical, cultural, and political factors (Roche et al. 2021). An enduring aspect is the pre-eminence of the Catholic Church in Ireland which at times viewed engagement with science as a potential threat to the Catholic faith, especially in the latter half of the nineteenth century and early twentieth century (Finnegan and Wright 2015; O'Riordan 1897). A pivotal moment in the development of formal science education in Ireland was the establishment of the University of Dublin, Trinity College, in 1592 (McDowell and Webb 2004), while the subsequent founding of the Dublin Philosophical Society in 1683 provided a platform for public discourse and shared learning among natural philosophers (Hoppen 1982; Wilde and Lloyd 1844). The ensuing period in the 18th and 19th centuries is often referred to as the 'golden age for Irish science' due to the significant contributions from Irish scientists in fields like mathematics, geology, and astronomy, earning them international recognition (Davies 1985, 297).

Despite these periods of scientific development, Irish society, throughout the 19th and early 20th centuries, continued to grapple with social and economic challenges that limited access to education and engagement with science for many citizens (Clarke 1973; Ferriter 2010). In the early twentieth century, with the clergy slowly abandoning efforts to challenge scientific interpretations of the natural world, scientists gained more freedom to engage public audiences (Turner 1978; White 2017). However, it was not until the mid-twentieth century, with the Irish state's commitment to expanding access to education and research funding (HEA 2017; Loxley, Seery, and Walsh 2014), that science education became more widespread and the country shifted towards a knowledge-based economy (Bruce 2006; Lolich 2011). Notwithstanding this change, Ireland's expenditure on scientific research remains low compared to other European Union countries (Butler 2015; OECD 2004), which highlights the ongoing need for more investment supporting higher education and research, as well as the disconnect between researchers and policymakers (Hazelkorn 2014; O'Connor 2024).

In recent years, Ireland has seen the emergence of numerous public engagement initiatives, aiming to bridge the gap between science and society (Trench et al. 2017). Several studies have explored the landscape of informal science learning spaces in Ireland, such as university campuses (Ní Shúilleabháin, McAuliffe, and Shé 2021; Roche et al. 2017), music and arts festivals (Roche, Stanley, and Davis 2016), and even

comedy clubs (Roche et al. 2019). In tandem with this development is the bolstering of the creative arts within youth-led informal science learning initiatives (Hurley et al. 2022; Hügel and Davies 2022) as well as a focus on meaningful community-led engagement (Hurley and Roche 2023). While these studies provide valuable insights into the state of societal engagement with science, they offer a less comprehensive picture of public perceptions of scientific expertise. Chughtai and Buckley (2013) explored trust among staff within scientific research centres in Ireland. During the COVID-19 pandemic in Ireland a number of studies of trust in science were carried out, focusing on media representations of science (O'Connor et al. 2021), political trust (Crepaz and Arikan 2021), and public attitudes towards science (SFI 2020, 2021). The TISP study, however, provides a unique opportunity to comprehensively examine public trust in scientists in Ireland across a broad sample of the population, not connected to any one political or other significant event, within a globally-comparable context.

Global trust in science

As described by Cologna et al. (2025), scientific information plays a crucial role in shaping our understanding of the world through evidence-informed decision-making at both individual and societal levels. Public trust in scientists is seen as a vital foundation for addressing complex societal challenges, navigating crises, and promoting collective well-being (Sturgis, Brunton-Smith, and Jackson 2021). When citizens trust scientific expertise, they are more likely to engage in behaviours that align with scientific recommendations, such as following public health guidelines during a pandemic (Algan et al. 2021) or embracing actions to mitigate climate change (Cologna et al. 2021; Cologna and Siegrist 2020).

For some time, there have been concerns about a potential crisis of trust in science (Nichols 2017). These anxieties are fuelled by a confluence of factors, including the proliferation of misinformation and disinformation, the perception of a reproducibility crisis in scientific research (Baker 2016; Hendriks, Kienhues, and Bromme 2020), the rise of conspiracy theories (Douglas 2021; Rutjens et al. 2022), and the growing influence of science-related populist attitudes (Mede and Schäfer 2020). Science-related populism, unlike its political counterpart, focuses on challenging the authority of professional scientists (in this case considered the academic elite) and their knowledge claims, suggesting that the common sense of non-scientists (interpreted as the ordinary people) is superior to expert opinion (Mede and Schäfer 2020; Mede, Schäfer, and Füchslin 2021).

These trends raise crucial questions about the future of the relationship between science and society. While science and scientists are generally held in high esteem (IPSOS 2022), a growing minority harbours scepticism and distrust (Wellcome Global Monitor 2018; Wellcome Global Monitor 2020). These sentiments are particularly concerning as 'vocal minorities' (Knoblock 2020; Wolf 2021) could play a role in spreading misinformation which, in turn, could lead to individuals making decisions that are not aligned with scientific evidence (Amazeen et al. 2024; Osborne and Pimentel 2023).

Assessing the scope of these challenges and, importantly, addressing them effectively requires a deeper understanding of how public trust in scientists is shaped and what factors influence these perceptions. Previous studies have highlighted the importance of considering national and regional differences in trust, with evidence suggesting that

anti-science attitudes and lower levels of trust are more prevalent in some Latin American and African countries (Mede 2022; Rutjens et al. 2022; Wellcome Global Monitor 2018). Compounding this is the historical role of science in perpetuating racialised forms of knowledge and the legacy of unethical experimentation on non-White subjects (Brandt 1978; Dubow 2015; Scharff et al. 2010) or assumed access to land for scientific research, mining, or dumping (Hecht 2018), the repercussions of which has led to ongoing work towards decolonial/anti-colonial science and science education (Gandolfi 2021; Keane, Khupe, and Seehawer 2017; Liboiron 2021).

This paper aims to address the following research question: How do the findings of the TISP study for Ireland compare and contrast with the global findings? By examining these comparisons, we wish to illuminate the unique characteristics of trust in scientists within the Irish context, exploring how Irish perceptions align with or diverge from global trends. Furthermore, we hope to contribute to a deeper understanding of the factors that shape public trust in science and explore the implications of these findings for fostering more effective science education, science communication, and public engagement in Ireland.

Methods

This study was part of a global exploration of trust in scientists using an online survey with 71,922 participants from 68 countries. Global data were collected using Qualtrics software between November 2022 and 15 August 2023, with a median questionnaire completion time of 18 min (for included countries, sample sizes, and representativeness see 'The TISP Dataset' (Mede et al. 2025)). Irish data ($n = 506$) were collected during February in 2023 by global market research company Bilendi & Respondi. Survey respondents, who were recruited across Ireland from online panels, had to be at least 18 years of age and provided informed consent prior to participation. Quotas were used for age and gender, and samples were weighted conforming to national distributions of age, gender, education level, and country sample size (see Table 1 for sample characteristics).

Data records of respondents whose age or gender quotas were full, duplicated surveys (Ireland: $n = 0$), uncompleted surveys, surveys that did not pass two attention checks

Table 1. Characteristics of the final sample in Ireland (weighted).

N	506
Gender % female	50.45
Gender % male	49.55
Age M (SD)	45.64 (15.79)
Age % (18–29 years)	19.33
Age % (30–39 years)	17.91
Age % (40–49 years)	20.14
Age % (50–59 years)	16.23
Age % (60+ years)	26.39
Education % none	0
Education % primary	4.02
Education % secondary	56.98
Education % tertiary	39
Annual household income in USD M (SD)	43042.72 (311215.77)
Political orientation (conservative) M (SD)	2.88 (0.97)
Political orientation (right) M (SD)	2.96 (1.01)
Religiosity M (SD)	2.55 (1.26)
Place of residence M (SD)	39.79 (60.21)

(Ireland: 1st check 2.3% fail, 2nd check 31.0% fail), and extreme outliers were excluded from the data set. Post-stratification weighting required that all responses with missing values for gender, age, or education before raking were also excluded.

Questionnaire

Consent was sought prior to completing the questionnaire and no identifying information was collected. A total of 111 variables were collected globally (for the full list of variables, see Mede et al. 2025). The variables selected for this study were participant's gender (0 = Female, 1 = Male, 2 = Prefer to self-describe, 99 = prefer not to say), age, level of education (1 = Did not attend school, 2 = Primary education, 3 = Secondary education, 4 = Higher education), belief that scientific research methods are the best way to find out if something is true or false (1 = strongly disagree, 5 = strongly agree), political orientation (1 = strongly liberal, 5 = strongly conservative, 99 = I don't know), religiosity (1 = not religious at all, 5 = very strongly religious), and whether they live in a rural or urban area. Lastly, Irish participants also indicated their willingness to be vulnerable to scientific guidance, (ceding of authority, see Besley, Lee, and Pressgrove 2021), (1 = not at all, 5 = very strongly).

Trust in scientists index

Twelve items were used to capture trust in scientists using four acknowledged conceptual dimensions of trustworthiness: competence; integrity; benevolence; and openness (Besley and Tiffany 2023; Besley, Lee, and Pressgrove 2021). The unweighted mean of all twelve items was used to measure overall trust in scientists. The trust in scientists index was derived from a robust review of 35 trust measures used to assess perceptions of scientists (Besley, Lee, and Pressgrove 2021), and its psychometric properties were pre-tested for reliability and validated by factor analyses (See SM). Higher values on the scale indicate higher trust (1 = very low, 3 = neither high nor low, 5 = very high).

Trust in scientists survey open-ended question: 'What makes a scientist trustworthy?'

An analysis of the responses to the question 'What makes a scientist trustworthy?' was conducted, incorporating both inductive and deductive coding, categorisation, and interpretation (Elo and Kyngäs 2008; Graneheim, Lindgren, and Lundman 2017). A thematic analysis approach was utilised that involved the development of patterns of meaning, or 'themes', from the data (Braun and Clarke 2021; Clarke and Braun 2017). Through a rigorous reading of the data, coding of the data into categories, and identifying patterns, a set of themes were developed and revised (Braun and Clarke 2006, 2019). Throughout this process it was important to be cognisant of the 'underlying research values and philosophical assumptions' that researchers themselves bring to the development of codes and themes (Braun and Clarke 2023, 4).

Higher level categories were developed to contain codes of similar or connected features. These categories, based entirely on the original codes, were given titles such as 'Educated/qualified/knowledgeable', 'Works with Integrity', 'Evidenced based

research' and 'Prioritises mankind', 'Participant ambivalence' to group codes of similar or connected features. Quotes were selected to represent each of these sub-categories.

A second round of coding, this time deductive and quantitative in nature (White and Marsh 2006), was employed based on previous theory (Besley and Tiffany 2023). The pre-assigned individual codes from the first stage were clustered according to Besley's four dimensions of 'trustworthiness', under 23 categories, which were fitted into one of four top-level categories: 'Integrity', 'Competence', 'Benevolence' and 'Openness'. All of the data codes fitted within one of these four dimensions. In the case of ambiguous coding, multiple team members were involved to resolve disputes and select the most appropriate dimension for each code. Lastly the data were interpreted qualitatively by re-reading the data and quotes, referring back to the research question and looking for patterns within the arranged data to produce a set of representative themes.

Findings

Trust in scientists index

Our analysis explored the Irish-level responses to questions relating to the 'Trust in Scientists' index. The same index was explored for the global sample as outlined in Cologna et al. (2025), and demonstrates that no country across the globe found low trust in scientists (global $M = 3.62$, $SD = 0.70$; 1 = very low, 3 = neither high nor low, 5 = very high). According to our analysis, trust in scientists in Ireland is also moderate ($M = 3.87$, $SD = 0.63$), but the amount that Ireland is higher than the global average is statistically significant (Welch's t (483) = 8.62, $p < .0001$). Additionally, regarding each of the four dimensions of trust in scientists, there is a consistent trend for Irish people to have higher averages (Figure 1). Irish people perceive scientists as having significantly higher competence (Ireland: $M = 4.27$, $SD = 0.65$; Global: $M = 4.02$, $SD = 0.71$; Welch's t (482) = 8.02, $p<.0001$), integrity (Ireland: M = 3.80, $SD = 0.72$; Global: $M = 3.589$, $SD = 0.78$; Welch's t (482) = 6.34, $p < .0001$), benevolent intentions (Ireland: $M = 3.78$, $SD = 0.74$; Global: $M = 3.55$, $SD = 0.82$; Welch's t (483) = 6.75, $p < .0001$), and openness (Ireland: $M = 3.53$, $SD = 0.82$; Global: $M = 3.33$, $SD = 0.86$; Welch's t (482) = 5.30, $p < .0001$) (see Table 2).

Globally, scientists' intelligence is perceived as high ($M = 4.19$, $SD = 0.81$), with moderate perceived honesty ($M = 3.59$, $SD = 0.78$), and openness to feedback ($M = 3.32$, $SD =$

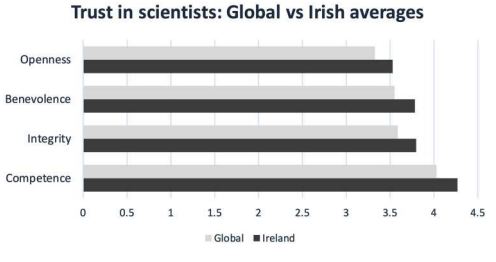

Figure 1. Mean trust in scientists using Besley's Four Dimensions (2023), (1 = very low to 5 = very high).

Table 2. Weighted mean and SD for the 12-item index measuring trust in scientists, the 12 individual items, the four dimensions indexes, and single item trust in the scientific method.

	Ireland			Global		
	N	Mean	Std. Dev.	*N*	Mean	Std. Dev.
Trust in scientists Index**	476	3.87	0.63	64049	3.62	0.70
Competence**	**476**	**4.27**	**0.65**	**69053**	**4.03**	**.71**
How expert or inexpert are most scientists?	476	3.93	0.91	64023	3.86	0.88
How intelligent or unintelligent are most scientists?	476	4.51	0.75	64017	4.19	0.81
How qualified or unqualified are most scientists when it comes to conducting high-quality research?	476	4.38	0.78	64027	4.02	0.86
Integrity**	**476**	**3.80**	**0.72**	**69053**	**3.59**	**.78**
How honest or dishonest are most scientists?	476	3.81	0.90	63992	3.59	0.92
How ethical or unethical are most scientists?	476	3.76	0.91	64029	3.56	0.90
How sincere or insincere are most scientists?	476	3.83	0.86	64022	3.62	0.92
Benevolence**	**476**	**3.78**	**0.74**	**69049**	**3.55**	**.82**
How concerned or not concerned are most scientists about people's well-being?	476	3.69	0.95	64019	3.53	0.99
How eager or uneager are most scientists to improve others' lives	476	3.99	0.89	63999	3.72	0.94
How considerate or inconsiderate are most scientists of other interests?	476	3.67	0.88	64016	3.41	0.96
Openness**	**476**	**3.53**	**0.82**	**69050**	**3.33**	**0.86**
How open are most scientists to feedback?	476	3.5	1.01	63987	3.32	1.01
How willing or unwilling are most scientists to be transparent?	476	3.68	0.96	64031	3.4	1.01
How much or little attention do scientists pay to others' views?	476	3.42	1.02	64017	3.26	1.03
Trust in the Scientific method*	476	4.17	0.94	64045	4.07	0.957

Note: Response options varied for each item, e.g. 1 = very [inexpert], 3 = neither [expert] nor [inexpert], 5 = very [expert]; *$p < 0.5$; **$p < .0001$.

1.01). Irish participants likewise perceived scientists as being high on intelligence ($M = 4.51$, $SD = 0.75$). They also believe scientists are qualified to conduct high-quality research ($M = 4.38$, SD 0.77), and that scientists are moderate to high in terms of their expertise ($M = 3.93$, $SD = 0.914$), their honesty ($M = 3.81$, $SD = .89$) and their ability to improve the lives of others ($M = 3.99$, $SD = 3.99$). Perception that Irish scientists attend to others' views received the lowest score ($M = 3.42$, $SD = 1.02$), but this was still just above the global average ($M = 3.26$, $SD = 1.03$). Results suggest that Irish trust in scientific methods ($M = 4.17$, $SD = 0.94$) is statistically higher than global trends ($M = 4.07$, $SD = 0.96$; Welch's t (482) = 2.31, $p = 0.02$), and is moderately correlated with trust in scientists (r = 0.45, $p < .001$).

Explanatory factors: age and trust in scientists

Linear random-intercept regression models identified global correlates of trust in scientists. Post-stratification weights provided estimates that were nationally representative in terms of gender, age, and education. Globally, women, older people, urban dwellers, people with higher income, religious, educated, liberal, and left-leaning people have higher levels of trust (Cologna et al. 2025).

Looking specifically at participant age in Ireland revealed that there is a significant difference in trust in scientists between people aged 18–29 ($M = 43.44$, $SD = 7.20$) and those aged 40–49 ($M = 46.58$, $SD = 6.30$), or 60+ ($M = 48.27$, $SD = 8.22$), [Welch's F (4, 227.894) = 5.412, $p<.001$]. People in the youngest age group have significantly lower

levels of trust than those aged 40–49 and the oldest participants aged 60 and over. Globally, people who are youngest in age (18-29; $M = 43.12$, $SD = 8.25$) have significantly less trust in scientists than those aged 30–39 ($M = 43.68$, $SD = 8.66$) and those aged 60 and over ($M = 43.72$, $SD = 8.06$), [Welch's F (4, 30486.413) = 12.509, $p<.001$].

Moreover, in Ireland younger people have significantly less confidence in scientists than older participants, [F (4, 470) = 3.554, $p = .007$]. Those with the lowest confidence have a mean age of 32.43, (SD 13.88) while those with the highest confidence reported a mean age of 48.06 (SD 15.57).

A hierarchical multiple regression analysis was performed to test the relationship between Irish people's trust in scientists and the independent variables age, sex, education level, political conservatism, religiosity, residence, trust in scientific methods, and willingness to be vulnerable to science (see Table 3). The first model included age, sex, and education level. This model showed that age was the only variable that contributed significantly to the first regression model, [F(3,348) = 6.821, $p<.001$] and accounted for 5.6% of the variation in trust in scientists. Introducing political conservatism explained a small but significant 2.1% of variance [F(6,345) = 4.768, $p<.001$], while

Table 3. Hierarchical multiple regression model of Trust in Scientists based on age, sex, education level, political conservatism, religiosity, residence, trust in scientific methods and willingness to be vulnerable to science.

	B	*β*	*R*	R^2	Adjusted R^2	
Model 1			.236	.056	.047	Final $R = .596$** Adjusted $R^2 = .340$
Age	.109**	.222				
Gender	−1.079	−.069				
Education Level	.543	.039				
Intercept	40.346					
Model 2			.277	.077	.060	
Age	.112**	.229				
Gender	−.897	−.058				
Education Level	.408	.029				
Political Conserv.	−.995*	−.125				
Religiosity	−.294	−.049				
Residence	.442	.028				
Intercept	43.924					
Model 3			.540	.291	.277	
Age	.089**	.183				
Gender	−1.270	−.820				
Education Level	−.120	−.009				
Political Conserv.	−1.025*	−.129				
Religiosity	.119	.020				
Residence	.337	.021				
Trust in Method	3.982**	.473				
Intercept	25.664					
Model 4			.596	.355	.340	
Age	.087**	.179				
Gender	−.974	−.063				
Education Level	−.295	−.021				
Political Conserv.	−.904*	−.114				
Religiosity	.014	.002				
Residence	.119	.008				
Trust in Method	3.227**	.383				
Willing to be vulnerable	2.085**	.270				
Intercept	25.664					

**$p < .001$; *$p < .01$.

controlling for religiosity and residence, illustrating that liberalism in Ireland is associated with greater trust. In Model 3, the introduction of trust in scientific methods explained an additional 21.5% of variance [$F(7,344) = 20.226$, $p<.001$], and lastly, adding willingness to be vulnerable to science to the models explained an additional 6.4% of variance. This change was also significant [$F(8,343) = 23.640$, $p<.001$]. The most important predictor of trust in scientists in the final model was trust in scientific methods ($\beta = .383$). Together the final model accounted for 34.0% of the variance.

Trust in scientists survey open-ended question: 'In your opinion, what makes a scientist trustworthy?'

This study's inductive line-by-line coding revealed 395 different codes representing participants' individual ideas or opinions on what makes a scientist trustworthy. A second, deductive stage of analysis revealed that 46% of people believed 'Integrity' was the most representative dimension of the perceived trustworthiness of scientists (Besley and Tiffany 2023), followed by 'Competence' at 26% of participants. 19% mentioned factors associated with 'Openness' and nine percent of people cited 'Benevolence' factors as evidence of trustworthiness (see Table 4). In the final stage of analysis, the data was interpreted qualitatively to produce a set of themes which are described in detail below.

The results of the thematic analysis reveal in three main themes that there is a clear expectation among participants that a trustworthy scientist is an exemplary professional. They must be shown to manifest determined dedication to their work and be an honourable person who is ceaselessly developing their knowledge and experience.

Dedication to excellence

The most prevalent theme evident in the data represents the requirement for scientists to repeatedly demonstrate their dedication to excellence. 179 Irish participants support the view that scientists' workmanship is a key determinant of their trustworthiness. People believe that trustworthiness is evident when the scientists 'work very hard' and 'to the best of their ability', when they are a scientist who conscientiously is 'thorough, dedicated, [and] does not take shortcuts' ($n = 14$). Participants expressed their opinion that a trustworthy scientist shows their dedication to scientific excellence by employing

Table 4. Deductive analysis guided by Besley (2023).

Competence *n* = 101 25.60%		Integrity *n* = 183 46.33%		Benevolence *n* = 37 9.37%		Openness *n* = 74 18.73%	
Educated/ Qualified	***n* = 19**	Evidence based research	***n* = 49**	Prioritises mankind	***n* = 18**	Acknowledges limitations	***n* = 26**
Reliable studies	***n* = 17**	Valid and accurate findings	***n* = 39**	Cares about the world	***n* = 8**	Clear and transparent	***n* = 17**
Peer reviewed work	***n* = 15**	Honest	***n* = 31**	Impactful work	***n* = 6**	Disseminates findings	***n* = 13**
Dedicated to excellence	***n* = 14**	Uses scientific methods	***n* = 23**	Implements change	***n* = 5**	Independence	***n* = 11**
Good reputation	***n* = 13**	Proves facts	***n* = 22**			Open minded	***n* = 7**
Knowledgeable	***n* = 12**	Unbiased	***n* = 11**				
Experienced	***n* = 11**	Ethical	***n* = 8**				

robust scientific methods ($n = 23$). High quality methods mentioned by participants include in-depth empirical studies, experiments, longitudinal research and qualitative research, as one person's response illustrates:

> A scientist is trustworthy if he has a testable hypothesis, has tried out many experiments, made changes to his hypothesis and comes out with a scientific theory.

It is considered important by many people that scientists must 'present evidence-based results and findings' and that they can 'back up their views with data' ($n = 49$). There is an expectation of scientific accuracy and validity that may be demonstrated with objective 'proof', 'irrefutable facts', or 'statistics and logic' ($n = 61$). Study reliability is also considered crucial, whereby 'scientific results are checked and replicated' through 'tests and retests and independent verification' ($n = 17$). Lastly, academic excellence can be revealed by scientists through 'published peer reviewed studies' showing that their work is 'accepted by peer scientists and experts in the field' ($n = 15$).

Person of honour

The second theme that was developed from this analysis confirms the prevailing view of participants that a trustworthy scientist is one of exceptional character ($n = 148$). As a person of honour, they are 'honest' and 'truthful' and pride themselves in producing 'genuine studies' without 'fabricating' their results ($n = 31$). 17 people expressed their view that a trustworthy scientist is presumed to be 'open and transparent' in their work, which can be achieved by reporting 'clear and understandable findings', 'showing numbers that make sense' and 'explaining their message in clear language'. Assuring to disseminate their scientific findings to the public is a key characteristic displayed by scientists of honour ($n = 13$) as one participant explains:

> make their findings available and understandable to the general public, to be believed and acknowledged or not.

People believe that a trustworthy scientist of honour is 'unbiased' ($n = 11$) and 'works independently' ($n = 11$), free from political or commercial influence, and has 'good intentions" and 'adheres to ethical standards' ($n = 8$). They will also display an 'inquisitive' and 'open mind' ($n = 7$). In addition, honourable scientists are believed to have 'the good of the planet and it's [*sic*] people as a priority' and, essentially, they can 'make the world a better place' by turning their attention to 'curing illness', finding 'new food alternatives' and being 'proactive about global warming' ($n = 26$).

Continuous self-improvement

This analysis uncovered a final theme that recognises participant's view that scientists must be fully committed to self-development throughout their scientific career ($n = 68$). To begin with scientists are presumed to be 'highly educated', having 'years of education behind them' and can show 'verified qualifications' ($n = 19$). Trustworthy scientists, according to participants, are 'highly knowledgeable and have studied the field extensively', 'they know what they are talking about' and they are committed to continued development of their knowledge by 'regularly upskilling' ($n = 12$). Furthermore, people suggest that scientists should spend 'years' gaining scientific experience, show a 'passion for their work', produce 'lots of research', and develop 'multiple proven theories'

($n = 11$). Participants believe that scientists should address the limitations of science such as how it is 'complicated', sometimes 'not interesting', and that 'there is always a risk' while they must also acknowledge their own limitations, for example that they can be 'subject to arrogance' or undue 'influence' ($n = 26$).

Discussion

The TISP study offers a unique opportunity to examine public trust in scientists within a global context, providing valuable insights that can inform policymaking, education, and communication efforts. Our findings highlight that trust in scientists in Ireland, while higher than the global average[2], reveals some important nuances and trends, as well as implications for science education, science communication, and public engagement with science in Ireland.

The findings revealed that Irish participants express moderate to high levels of trust in scientists, exceeding global averages across all dimensions of trust. This suggests that Ireland, despite facing historical challenges in its relationship with science, has fostered a generally positive perception of scientists and their role in society. However, the significant differences in trust levels based on age are worthy of consideration. Lower trust amongst younger generations may have implications for evidence-informed decision-making which, in turn, could undermine support for looming evidence-based policy decisions, such as climate change mitigation efforts (Cologna and Siegrist 2020; Lacey et al. 2018). Similarly, a lack of support for evidence-based policies could potentially hinder efforts to control infectious diseases and address pressing public health challenges (Blair, Morse, and Tsai 2017; Cairney and Wellstead 2021). A decrease in trust in scientific expertise could lead to decreased funding and political support for scientific research initiatives, which is historically problematic in Ireland with government investment in research consistently below the European average (Butler 2015). The findings underscore the need for engaging younger generations in science education and communication efforts, as they hold lower levels of trust than their older counterparts, a trend seen in many countries (Mede et al. 2025). While the global TISP study identifies various factors influencing trust in scientists, the regression analysis further reveals that trust in scientific methods emerged as the strongest predictor of trust in scientists among Irish participants. This highlights the importance of fostering understanding and appreciation of the scientific process and methods of inquiry within the Irish educational system.

This is timely given the focus on Nature of Science (NOS) in recent curricular reform in Irish science education: 'a national curriculum change in the Republic of Ireland … saw the explicit inclusion of NOS … for the first time' (Cullinane and Erduran 2023, 201). NOS places importance on not only learning the scientific method but also considering scientists as working professionals and their roles in society (Cullinane and Erduran 2023; McComas 2004). A decade before the recent proliferation of misinformation and disinformation, and the ubiquity of AI-generated content (Monteith et al. 2024), Irish science education saw a growing focus on embedding key skills related to managing information. Although NOS is integral to primary science education in Ireland (Murphy, Smith, and Broderick 2021), it is post-primary science education which saw the most direct efforts to help learners combat misinformation. One of the original key elements

of the NOS strand in the Junior Cycle Science curriculum and assessment specification, drafted in 2014, was the 'communicating in science' element, which included the learning outcome for students to be able to: 'conduct research relevant to a scientific issues, evaluate different sources of information, understanding that a source may lack detail or show bias' (Erduran and Dagher 2014, 341). Consequently, young people in Ireland are taught four contextual strands of science concerning the physical world, chemical world, biological world, as well as Earth and space, while a fifth unifying NOS strand permeates the other strands and focuses on the development of knowledge of and about science (Kelly and Erduran 2019). This is becoming steadfastly more important as science students require the skills to tackle misinformation and disinformation (Demirbag and Bahcivan 2021; Osborne and Pimentel 2023; Park et al. 2024).

The thematic analysis of open-ended responses reveals that Irish participants hold a strong expectation that scientists should be consummate professionals, demonstrating dedication to excellence, ethical conduct, and continuous self-improvement. These themes resonate with the broader ideals of professionalism and integrity often promoted in educational contexts, suggesting that these values can be further emphasised in science education to cultivate greater trust in scientists. The emphasis on dedication to hard work, rigour, and excellence are traits frequently promoted in education and highly valued in Irish society (Burnham 2003; O'Connor 2024), while the theme of continuous self-improvement reflects the values of lifelong learning and skill development that are broadly held in Irish society and its education system (Flynn 2024; Healy and Slowey 2006). The strong emphasis on ethical conduct and integrity aligns with ethical frameworks that have historically influenced Irish society and its institutions, perhaps best encapsulated by the European Commission's commitment to responsible research and innovation being announced at the 2012 Euroscience Open Forum held in Dublin while it held the title of European City of Science (Owen, Macnaghten, and Stilgoe 2012). NOS, as noted above, advocates for a more critical view of the role of science in society in science education, which aligns with the theme of ethics and integrity. Rather than teaching students to trust scientists because of their professional qualifications, NOS nurtures trust in scientists through an education that helps learners understand the job of a scientist, how scientific theories and knowledge are generated and shared through peer review and community consensus building and accepting, an understanding of how scientific research is funded, and the role of the media in sharing scientific knowledge (Holbrook and Rannikmae 2007; Lederman 2013). This aligns with the view of Oreskes (2021) and others who highlight that, contrary to popular opinion, there is no one single scientific method – that instead trust in both scientists and their claims is rooted in the processes by which society accepts them.

Several key implications for science education and public engagement in Ireland emerged from this research. The significant difference in trust levels between younger and older participants underscores the need for targeted and engaging strategies to foster trust in science among younger generations. Science education programmes should prioritise critical thinking skills, an understanding of the scientific process, and the ability to navigate misinformation and evaluate evidence. As misinformation undermines informed decision-making, science education that highlights NOS should empower learners to critically evaluate evidence, identify reliable sources, and navigate the complexities of misinformation in popular media and biases within the scientific enterprise itself (Cullinane and Erduran 2023; West and Bergstrom 2021). The prominence of trust in scientific methods as a

predictor of overall trust emphasises the importance of promoting a deeper understanding of the scientific process. Science education should not only focus on imparting factual knowledge but also on equipping learners with the skills to critically evaluate scientific information, identify reliable sources, and engage in informed decision-making. While the findings suggest a generally positive perception of scientists in Ireland, there is room for further strengthening this relationship through proactive and engaging communication strategies. Science educators, researchers, and communicators should prioritise open dialogue, transparency, integrity, and a commitment to social responsibility. While science teacher education has historically been heavily focused on technical approaches and content knowledge, the recent curricular focus on a broader understanding of NOS in science education can help learners to understand that diverse and local practices are found within and across scientific disciplines which builds trust in scientists (Rudolph 2000; 2022). This is reflected in the growing attention being given to the history of science, philosophy of science, and science communication in higher education science in Ireland (McAteer, Roche, and Kelly 2023) as well as the prevalence of science communication courses in universities around the world (Massarani et al. 2023).

Conclusion

This study underscores the importance of public trust in scientists within the context of Ireland's evolving relationship with science and its commitment to fostering public engagement. The Trust in Science and Science-Related Populism (TISP) study, with its comprehensive global scope, provides an ideal opportunity to understand the global patterns of trust in scientists and the factors that influence these perceptions. The TISP study has the potential to help develop more effective strategies for fostering a stronger and more equitable relationship between science and society worldwide. While Irish participants generally express moderate to high levels of trust in scientists, the findings highlight the need for targeted efforts to build trust among younger generations and to promote a more nuanced understanding of the scientific process and its value to society. As in other countries, there remains a need to ensure that public engagement with science in Ireland is inclusive and reaches diverse audiences (Canfield and Menezes 2020; Dawson, Iqani, and Lock 2024; Judd and McKinnon 2021; Roche et al. 2023), as well as addressing the question of whether scientists should be more involved in policymaking (Cologna et al. 2021; 2022). By embracing a holistic approach to science education and public engagement, prioritising transparency, ethical conduct, and open communication, a stronger and more resilient relationship between science and society in Ireland can be achieved.

Notes

1. www.creatingourfuture.ie
2. The TISP online dashboard allows users to explore and compare the survey data and results of the TISP project for each country: https://tisp.shinyapps.io/TISP

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