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# Expectations of Katowice residents regarding the program assumptions of the European city of science Katowice 2024 in the field of medical and health sciences - questionnaire survey results

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## Abstract

**Introduction** Scientific literacy has been the subject of studies for several decades, but there is much less interest in the social perception of science, traceability of key areas of scientific activity and social expectations regarding science. Proper recognition of such issues can significantly contribute to a better understanding of the causes of the crisis of trust in science and help to find an effective and socially acceptable solution to mitigate it. Our study was aimed at identifying and systematizing the public needs and expectations towards medical and health sciences, based on the example of the population of Katowice.

**Materials and methods** The study was carried out using a mixed, qualitative-quantitative methodology. Based on the conclusions of the in-depth interviews, a questionnaire was constructed to check the level of awareness of residents of Katowice obtaining the title of the European City of Science 2024 and the respondents' opinion on the development of medical and health sciences. 400 inhabitants of the city and/or people associated with it through their work or education took part in the questionnaire survey.

**Results** Only 7.8% of respondents had in-depth knowledge about the European City of Science 2024 project, with further 28.8% declaring some level of general knowledge of the issue. Study participants associated medical and health sciences with health promotion and clinical specialties (43% and 33,5% respectively). In terms of further development of medical and health sciences in Katowice study participants prioritized mainly development of research in chronic and lifestyle-related diseases (51%) and the need of development of prevention and health promotion (46.3%) as well as clinical medicine (32.8%). The inhabitants of the city recognize the resources of the city and the region in the field of medical sciences and health sciences as large and with high development potential.

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**Conclusions** The events organized as part of the European City of Science 2024 should become a good opportunity to promote and disseminate knowledge about the achievements and development potential of the City and the Region in the field of medical and health sciences.

#### **Contributions to the literature**

- There are relatively few sources relating to public perception of medical and health sciences, and in the case of Poland, this publication is probably the first study of this type.
- Social support for the development of medical and health sciences depends on the extent to which these sciences can interact with the social environment and respond to its needs.
- The low level of understanding of the scientific process and the social role of science is fertile ground for the spread of anti-scientific views, which are particularly manifest in the area of health.
- Initiatives such as the European City of Science constitute an opportunity to build dialogue between the scientific community and the social environment.

**Keywords** European city of science, Medical sciences, Health sciences, Science literacy

## **Introduction**

The dynamic development of science and its overwhelming impact on the everyday life of modern societies means that the social perception of science and the ability to use scientific knowledge rise to the rank of key issues conditioning the effective use of knowledge and achievements generated by specialists in various fields of knowledge, as well as the further development of individual scientific disciplines [1]. At the same time, in recent years there has been a growing crisis of trust in science and reluctance to use verified scientific knowledge [2, 3]. It is difficult to clearly determine the reasons for this phenomenon, but it can be presumed that it is fuelled by both the degree of specialization of scientific knowledge, which is increasingly separated from the basic cognitive competences of the average representative of society [4], and the reluctance or inability of representatives of science, to effectively and easily communicate scientific knowledge to the public [5, 6]. According to Carrier it can also be attributed to the fact that the subject of scientific research is most often determined by the needs of commercial entities who provide finance for research projects or by the scientific community itself [7]. Finally, the decline in level of trust is also due to public concerns regarding the ethical misconduct during the research process [8].

In addition to the erosion of trust in science, we are observing a growing phenomenon of the dissemination of unverified or pseudoscientific information, easily accessible due to the widespread availability of various electronic communication channels and presented in an easily digestible and attractive way for the average recipient [5]. This gives rise to several dangers, including the risk of destabilizing social life, which could be observed during the global Covid-19 pandemic [9, 10].

Building a trust-based relationship between science and society is important for both parties. Huber et al. suggest that trust in scientific knowledge is a critical resource in modern societies, which enables political actors to

inform and legitimate political decisions. They also point out to the fact that in some areas scientific development is dependent on a people's willingness to participate in research projects, therefore diminishing level of public trust in science could effectively cripple future advancements [2]. Maintaining a high level of trust in science may also translate into direct benefits for public health. As Rosman and colleagues point out, the period of the Covid 19 pandemic showed that people who recognized the authority of scientific knowledge were less willing to believe conspiracy theories, more often used recommended protective measures, and were more likely to undergo vaccinations [11].

In recent years, efforts by the scientific community to effectively address the above-mentioned problems have intensified. The growing movement of open science and citizen science are trying to break the isolation of science from the public. With its general assumption of shift from research done for the public to research conducted with or by them [12], citizen science can be considered a vehicle for increasing general understanding of science. However, even with this positive trend of public participation in science, there is growing need for better understanding of a more fundamental issues, namely the social perception of science, the traceability of key areas of scientific activity, as well as social expectations regarding science and access to scientific knowledge. Proper recognition of such issues can significantly contribute to a better understanding of the causes of declining trust in science and public leniency towards pseudo-scientific explanations. It can also help to find an effective and socially acceptable solution to the communication and image crisis affecting science.

The city of Katowice, the capital of a highly urbanized and industrialized metropolitan area inhabited by population of about 2.5 million, was awarded the title of the European City of Science 2024 [13]. This circumstance becomes an excellent opportunity to promote science,

popularize civic participation in scientific communication and popularize scientific research, as well as globally popularize reliable and verified scientific knowledge and the ability to use it. Scientific and didactic activity can be used as instruments for solving urban or metropolitan problems and challenges because of mutual synergy, which assumes a bilateral relationship both in the theoretical and practical aspect. This assumption is reflected in the formulation of Katowice's urban strategy under the slogan: "science for the city - city for science", the details of which indicate the use of a conceptual link between a joint diagnosis of the current state and needs through community and expert consultations, but also in the form of a scientific and research consortium, proposing solutions to be implemented [14]. Due to the important social role, as well as strong embedment in the socio-economic structure of Katowice and the Upper Silesian-Zagłębie Metropolis, medical sciences and health sciences take on a special meaning in this context. Meanwhile, the role of local communities in creating the level of health is underestimated. Their effectiveness can result not only in low rates of morbidity or mortality in a given area, but also in minimizing undesirable behaviour related to health and affecting the level of security and sense of belonging [15]. Health is perceived through its population dimension, measured by epidemiological indicators relating to the entire community or to selected groups, and as such it is a common asset that should be strengthened and shaped. For all these goals to be effectively achieved, it is necessary to make efforts to recognize the opinions and expectations of the inhabitants in regard to the medical science, as well as the program of events prepared in connection with the title obtained.

The assumption expressed above became the premise for undertaking the research presented in this article. Our main goal was to identify and systematize the perceptions and expectations of the inhabitants of Katowice regarding medical sciences and health sciences. In particular, the aim of the study was:

- to determine the traceability of research areas in the field of medical sciences and health sciences in the perception of the inhabitants of Katowice,
- to identify, based on the opinion expressed by study participants, what are the investment priority areas in medical and health sciences, and to rank them in accordance with their importance and level of acceptance,
- to determine what kind of knowledge-disseminating and increasing community involvement activities should be undertaken in the field of medical and health sciences.

## Materials and methods

### Research methodology

The study was carried out using a mixed qualitative-quantitative methodology. Due to the volume of the collected material, the authors decided to present only the results obtained in the quantitative study in this article, however, for full transparency, this section also describes the assumptions of the qualitative part of the study. The full results of the qualitative study were included in the report submitted to the research commissioner (Katowice City Hall), and in the future they will constitute the basis for a separate publication.

The first stage of the study consisted of qualitative research, which served to obtain information enabling the creation of a survey questionnaire, which was used in second stage of research. This part of the study consisted of:

- in-depth interviews with a group of 4 people professionally related to the health care sector (management area, representation of key medical professions and the scientific community). The interviews were conducted based on a uniform scenario,
- four focus group interviews, taking into account the participation of Katowice residents in particular age groups (age groups: 14–18, 19–26, 27–64, over 65). The total number of people participating in this part of the study was 32. The interviews were conducted based on a semi-standardized scenario.

Both in-depth and focus group interviews addressed following issues:

- perception of medical and health sciences;
- health needs and possibilities of meeting them;
- the potential of the city of Katowice and the possibilities of using the title of European City of Science.

The following quantitative part of the study included a diagnostic survey on a sample of Katowice residents, ensuring a basic level of representativeness in quantitative terms. The study was conducted using the PAPI (*Paper and Pen Interview*) method. As mentioned above, the study tool was a questionnaire based on the results of the qualitative part of the study (see: supplementary material – Survey questionnaire). A random selection of individuals qualified for the study sample was used, assuming the composition of the study sample to be as close as possible to the structure of the city population in terms of sex and age.

The study participants were informed about its aim and how the data would be utilised. Each respondent

gave explicit verbal consent to participate in the survey. Participants were guaranteed full anonymity during the study. The data obtained from the respondents did not contain information enabling the identification of individual persons.

### The research tool

The survey questionnaire in its essential part included questions referring to two basic subjects:

- a. the awareness of the European City of Science 2024 program;
- b. respondents' opinions regarding the development of medical sciences and health sciences in Katowice and the Upper Silesian-Zagłębie Metropolis.

The questionnaire utilized single choice closed and semi-closed questions as well as a rating scale. The content of the questions and answer options was based on conclusions drawn from the analysis of in-depth interviews and focus group interviews conducted in the first phase of the study.

### The size and structure of the sample in the quantitative part

The size of the sample was determined based on the estimation of the necessary minimum sample size for the fraction, considering the following assumptions:

- population size - number of inhabitants of Katowice:  $N = 296\,262$  [16],
- confidence level: 95%,
- estimated fraction size: 50%,
- allowable error: 5%.

With the obtained result  $n = 384$ , an additional margin of uncertainty was assumed, resulting in the final size of the tested sample at the level of  $n = 400$ .

We adopted a broader definition of “inhabitant of Katowice”, taking into account individuals residing in the city or staying in it in connection with their professional work or education, with the intention of eventually settling down.

In the assessment of the representativeness of the research sample, data on the demographic structure of the inhabitants of the Silesian Voivodeship and the inhabitants of Katowice were considered [17]. The percentage of respondents was compared, taking into account the breakdown by gender and age groups (years): 15–19, 20–26, 27–50, 51–65, over 65 years old. The composition of the study group did not differ statistically significantly in relation to the population of the Silesian Voivodeship and the population of the city of Katowice.

### Data analysis

We carried out the analysis of the collected research material in the qualitative part using the MAXQDA v. 2020 software. The content of the in-depth interviews and focus group interviews was transcribed and then undergone thematic analysis.

In the quantitative part we employed calculation tools of office software such as Microsoft 365 Office, Microsoft Office 2019, Libre Office, Open Office to collect data. Statistical analyses were performed in Statistica v.13.3, StatSoft Poland. The assessment of the compatibility of the demographic structure of the study group with the demographic structure of the population was carried out using the Kolomogorov-Smirnov distribution compatibility test. The relationship between qualitative data was checked using Pearson's chi-square ( $\chi^2$ ) test of independence, its corrections, or Fisher's test, depending on the size and number of variants. Statistical significance was set at  $p < 0.05$ .

To present quantitative data, mean values and standard deviations  $X \pm SD$ , as well as medians and quartiles of the order of 0.25 and 0.75  $M (Q_1 - Q_3)$  were calculated. For qualitative data numeric-percentage notation was used.

The territorial differentiation of the place of residence of the respondents in separate local administrative units of the Śląskie Voivodeship was also traced according to NTS-4 (Nomenclature of Territorial Units for Statistical Purposes), using a cartogram of the number of respondents. We used Microsoft Office 2019 Excel tools for this purpose.

### Data availability

The data that support the findings of this study are available from the corresponding author upon request. Data are located in controlled access data storage at the Medical University of Silesia.

### Results

Interviews conducted with experts and focus group interviews revealed the major potential of medical and health sciences, both in the centres located in Katowice and, more broadly, in the Silesian-Zagłębie Metropolis. The conclusions drawn from the analysis of the respondents' statements became the basis for the construction of a questionnaire constituting the basis for a quantitative analysis of the needs and expectations of the inhabitants of Katowice towards medical and health sciences. Details of the qualitative study are subject of another publication.

The quantitative survey focused on the respondents' opinion on the development of medical and health sciences.

**Characteristics of the study group**

As a result of the questionnaire survey, data from 400 people were collected, including 216 (54%) women and 184 (46%) men. Among the age groups, the 27–50 age group was the most numerous,  $n=184$  (46%). Almost 70% of the respondents were people registered as residents of the city of Katowice ( $n=278$ , 69.5%) and persons in employment ( $n=277$ , 69.3%). Half of the respondents declared higher education (total  $n=199$ , 49.8%), with 45% of the respondents studying in Katowice. At the same time 35.3% of the respondents declared that their child was or is a student at a university in Katowice. The largest group of respondents were the current residents of Katowice ( $n=278$ , 69.5%). The remaining respondents are mainly residents of other poviats (counties) of the Silesian Voivodeship, including: Chorzów ( $n=18$ , 6.4%), Sosnowiec ( $n=13$ , 4.6%), Bytom ( $n=11$ , 3.9%), Dąbrowa Górnicza ( $n=8$ , 2.8%), Mysłowice ( $n=8$ , 2.8%), Zabrze ( $n=7$ , 2.5%), Siemianowice Śląskie ( $n=7$ , 2.5%), Piekary Śląskie ( $n=6$ , 2.1%), Gliwice ( $n=5$ , 1.8%). Other poviats were represented in the study at the level of 0–1%. Only 6 people came from outside the Śląskie Voivodship, but

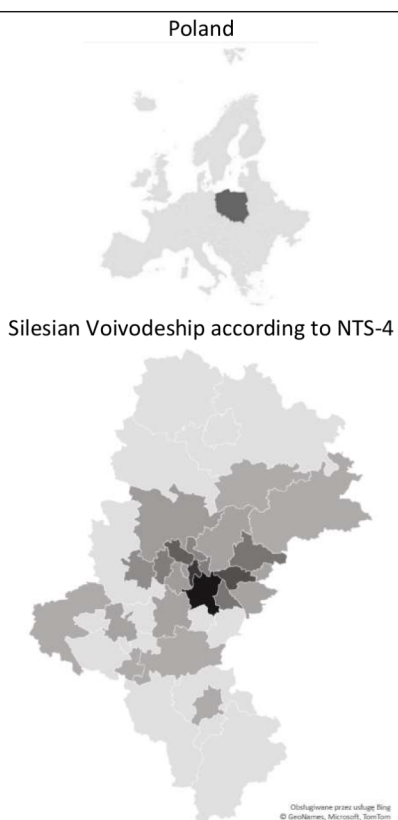
they were connected with Katowice by work or studies. The detailed structure is presented in Table 1.

**Expectations towards medical sciences and health sciences - results of a questionnaire survey**

In order to verify the general interest of the respondents in scientific issues, we decided to assess the awareness of the respondents regarding the title of the European City of Science 2024 obtained by Katowice (Table 2). Detailed information was known only to 7.8% of the respondents ( $n=31$ ), while general knowledge on the subject was reported by 28.8% ( $n=115$ ) of the investigated group.

Considering the results from the perspective of socio-demographic data, a difference was observed in the percentage of people who had knowledge regarding the award of the title of the European City of Science 2024. We observed a significantly higher knowledge level among people whose children or fathers started/have taken up studies in Katowice. Detailed information in this regard was significantly more often declared by respondents living in Katowice or the respondents who had close contact with people studying in Katowice (child, father, mother).

Socio-demographic data		Total N=400 (100%)
Sex	women	216 (54)
	men	184 (46)
Age groups	15-19 years old	21 (5.3)
	20-26 years old	68 (17)
	27-50 years	184 (46)
	51-65 years old	71 (17.8)
	over 65 years old	56 (14)
Education	basic	14 (3.5)
	and incomplete basic	55 (13.8)
	vocational	132 (33)
	secondary and post-secondary	77 (19.3)
	higher undergraduate	122 (30.5)
Employment	work in Katowice	130 (32.5)
	work outside Katowice	97 (24.3)
	work in and out of Katowice	50 (12.5)
	no employment	123 (30.8)
Studies	Respondent	180 (45)
	Child	141 (35.3)
	Father	97 (24.3)
	Mother	89 (22.3)
Place of residence	Katowice	278 (69.5)
	outside Katowice	122 (30.5)



The data are presented in the form of quantity and percentage n (%). Map of the respondents' place of residence made using MS Office 2019 tools

**Table 1** Socio-demographic data and place of residence of people participating in the study

**Table 2** Respondents' awareness of the city of Katowice obtaining the title of European City of Science 2024 in groups based on socio-demographic data

The title of the European City of Science 2024		Have you heard about Katowice being awarded the title of European City of Science 2024?		Do you know what are the benefits and obligations of being awarded the title of European City of Science?			
		NO	Yes	c. I have no knowledge in this area at all	b. I have only very general knowledge about the European City of Science project	a. yes, I have been looking for detailed information on this subject or I have it from other sources	Yes
Total		225 (56.3)	175 (43.8)	254 (63.5)	115 (28.8)	31 (7.8)	159 (39.8)
Sex	women	119 (55)	97 (45)	132 (61)	67 (31)	17 (8)	99 (46)
	men	106 (58)	78 (42)	122 (66)	48 (26)	14 (8)	60 (33)
p-value		0.61		0.53			
Age groups	15–19 years old	12 (57)	9 (43)	13 (62)	8 (38)	0 (0)	6 (29)
	20–26 years old	36 (53)	32 (47)	49 (72)	13 (19)	6 (9)	22 (32)
	27–50 years	106 (58)	78 (42)	113 (61)	55 (30)	16 (9)	75 (41)
	51–65 years old	37 (52)	34 (48)	42 (59)	23 (32)	6 (8)	33 (46)
	over 65 years old	34 (61)	22 (39)	37 (66)	16 (29)	3 (5)	23 (41)
p-value		0.85		0.37			
Education	basic and incomplete basic	7 (50)	7 (50)	1 (7)	5 (36)	8 (57)	6 (43)
	essential vocational	30 (55)	25 (45)	4 (7)	16 (29)	35 (64)	22 (40)
	middle and post-secondary	84 (64)	48 (36)	8 (6)	29 (22)	95 (72)	42 (32)
	higher undergraduate	40 (52)	37 (48)	6 (8)	28 (36)	43 (56)	36 (47)
	higher master's / doctorate	64 (52)	58 (48)	12 (10)	37 (30)	73 (60)	53 (43)
p-value		0.34		0.46			
Employment	work in Katowice	71 (55)	59 (45)	78 (60)	40 (31)	12 (9)	63 (48)
	work outside Katowice	55 (57)	42 (43)	63 (65)	29 (30)	5 (5)	33 (34)
	work both in Katowice and outside Katowice	30 (60)	20 (40)	37 (74)	9 (18)	4 (8)	14 (28)
	no employment	69 (56)	54 (44)	76 (62)	37 (30)	10 (8)	49 (40)
p-value		0.93		0.53			
Place of residence Katowice	NO	75 (61)	47 (39)	92 (75)	23 (19)	7 (6)	37 (30)
	Yes	150 (54)	128 (46)	162 (58)	92 (33)	24 (9)	122 (44)
p-value		0.16		0.004			
Studies - Respondent	NO	95 (62)	59 (38)	105 (68)	36 (23)	13 (8)	57 (37)
	Yes	94 (52)	86 (48)	104 (58)	58 (32)	18 (10)	80 (44)
p-value		0.08		0.14			
Studies - Child	NO	105 (62)	65 (38)	117 (69)	46 (27)	7 (4)	59 (35)
	Yes	67 (48)	74 (52)	73 (52)	46 (33)	22 (16)	76 (54)
p-value		0.01		0.0004			
Studies - Father	NO	150 (60)	98 (40)	172 (69)	59 (24)	17 (7)	90 (36)
	Yes	47 (48)	50 (52)	44 (45)	39 (40)	14 (14)	49 (51)
p-value		0.04		0.0002			
Studies - Mother	NO	151 (60)	100 (40)	170 (68)	67 (27)	14 (6)	93 (37)
	Yes	45 (51)	44 (49)	45 (51)	28 (31)	16 (18)	43 (48)
p-value		0.12		0.001			

Data are presented as percentage n (%); p-value for the  $\chi^2$  test



### Respondents' opinion on the development of medical and health sciences

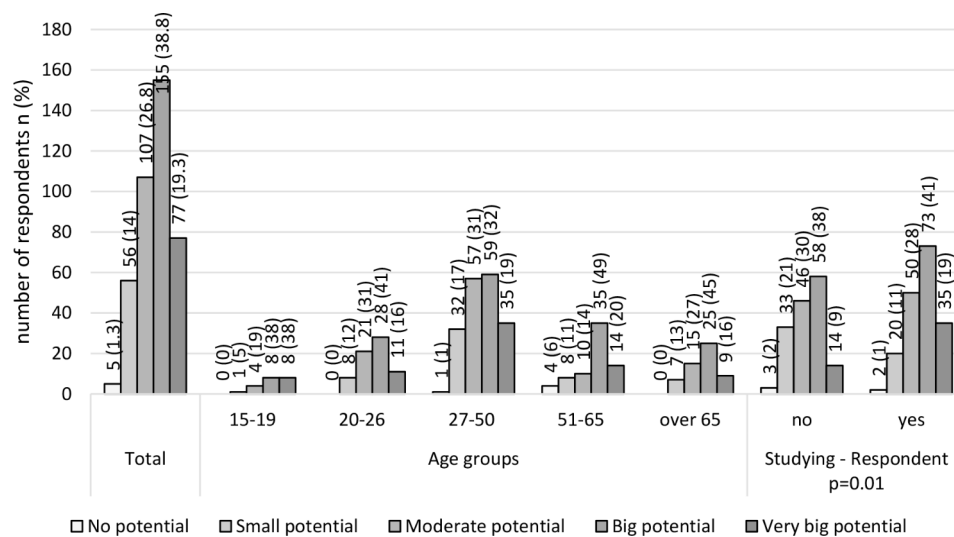
Respondents asked about associations with “medicine and health sciences” mainly mentioned prevention and health promotion ( $n=172$ , 43%) and clinical specialties ( $n=134$ , 33.5%). Every tenth respondent indicated medical and pharmaceutical technologies ( $n=50$ , 12.5%), the lowest percentage concerned bioengineering ( $n=17$ , 4.3%). Among other statements ( $n=27$ , 6.8%) there were: biology, chemistry, biochemistry, neurobiology, psychology, environmental exposures, genetics. The respondents' associations were significantly related to their education ( $p=0.0008$ ). The answer concerning prevention and health promotion was significantly more often chosen by respondents with primary and incomplete primary education (respectively for subsequent levels of education: 79% vs. 55% vs. 36% vs. 49% vs. 38%), while the answer indicating clinical specialties significantly more often was chosen by people with secondary or higher education (respectively for subsequent levels of education: 14% vs. 25% vs. 39% vs. 26% vs. 38%). However, there was no significant difference in the frequency of responses in the groups by gender ( $p=0.31$ ) and age groups ( $p=0.46$ ).

The potential of Katowice and the Metropolis of Upper Silesia and Zagłębie in the development of medical and health sciences was reported to varying degrees by 98.7% of the respondents ( $n=395$ ). A very high potential for developing medical sciences and health sciences in the Upper Silesian agglomeration was significantly more often confirmed by people at a young age (15–19 years old) and people studying in Katowice (Fig. 1). No significant differentiation was confirmed in the groups due to: gender ( $p=0.62$ ), education ( $p=0.08$ ), place of employment ( $p=0.13$ ), residence in Katowice ( $p=0.10$ ), studies

in Katowice undertaken by the child ( $p=0.82$ ), mother ( $p=0.40$ ) or father ( $p=0.39$ ).

The priority areas of medical sciences and health sciences in the context of the development strategy of the city of Katowice and the Metropolis of Upper Silesia and Zagłębie, the respondents mainly included prevention and health promotion ( $n=185$ , 46.3%) and clinical medicine ( $n=131$ , 32.8%) – Table 3. Other statements included: psychology, oncology, primary care clinics, electro-radiology. The answer concerning prevention and health promotion was significantly more often chosen by respondents aged 20–26, with primary and incomplete primary education. On the other hand, the answer indicating clinical specialties was significantly more often chosen by elderly people (aged 51 and more), with secondary education, or among the respondents whose children study in Katowice. It is worth noting that only in the 51–65 age group, clinical medicine was mentioned more often than prevention and health promotion. There was no significant differentiation in the frequency of selected answers in the groups due to: gender ( $p=0.14$ ), place of employment ( $p=0.80$ ), residence in Katowice ( $p=0.43$ ), studies in Katowice undertaken by the respondent ( $p=0.24$ ), father ( $p=0.23$ ), mother ( $p=0.45$ ).

Among the fields of modern medicine, the development of which may significantly contribute to beneficial changes for the inhabitants of Katowice and the Metropolis of Upper Silesia and Zagłębie, the respondents mainly indicated chronic and lifestyle-related diseases ( $n=204$ , 51%) – Table 3. Other statements included: oncology, psychology, neurology, gynaecology. Chronic and lifestyle diseases as a priority area of medical science were significantly more often indicated by women. In turn, environmental-related diseases were significantly



**Fig. 1** Potential for the development of medical sciences and health sciences in Katowice and the Metropolis of Upper Silesia and Zagłębie in the opinion of respondents in groups due to socio-demographic data

**Table 3** Priority areas of medical sciences and health sciences, as well as the field of modern medicine, the development of which may bring benefits from the point of view of the inhabitants of Katowice and the Metropolis of Upper Silesia and Zagłębie, in the opinion of respondents in groups due to socio-demographic data

Please indicate which of the following areas of medical and health sciences, in your opinion, should be treated as a priority in the context of the development strategy for the city of Katowice and the Metropolis of Upper Silesia and Zagłębie		a. clinical medicine	b. prevention and health promotion	c. bioengineering	d. medical and pharmaceutical technologies	e. other	p-value
		131 (32.8)	185 (46.3)	28 (7)	48 (12)	8 (2)	
Age groups (years)	15–19	6 (29)	10 (48)	2 (10)	0 (0)	3 (14)	<b>0.0002</b>
	20–26	16 (24)	38 (56)	7 (10)	5 (7)	2 (3)	
	27–50	60 (33)	88 (48)	14 (8)	19 (10)	3 (2)	
	51–65	27 (38)	24 (34)	2 (3)	18 (25)	0 (0)	
	over 65	22 (39)	25 (45)	3 (5)	6 (11)	0 (0)	
Education	basic and incomplete basic	2 (14)	10 (71)	1 (7)	0 (0)	1 (7)	<b>0.03</b>
	essential vocational	18 (33)	28 (51)	0 (0)	9 (16)	0 (0)	
	middle and post-secondary	51 (39)	55 (42)	9 (7)	13 (10)	4 (3)	
	higher undergraduate	24 (31)	34 (44)	7 (9)	12 (16)	0 (0)	
	higher master's / doctorate	36 (30)	58 (48)	11 (9)	14 (11)	3 (2)	
Studies - Child	NO	43 (25)	76 (45)	15 (9)	29 (17)	7 (4)	<b>0.006</b>
	Yes	52 (37)	64 (45)	10 (7)	15 (11)	0 (0)	
As far as the fields of modern medicine are concerned, the development of which of the listed fields will, in your opinion, bring the greatest benefits from the point of view of the inhabitants of Katowice and the Upper Silesian-Zagłębie Metropolis?		a. old age diseases	b. childhood diseases	c. environmental related diseases	and lifestyle diseases	e. other	p-value
		68 (17)	25 (6.3)	96 (24)	204 (51)	6 (1.5)	
Sex	women	39 (18)	11 (5)	43 (20)	117 (54)	6 (3)	<b>0.01</b>
	men	29 (16)	14 (8)	53 (29)	87 (48)	0 (0)	
Studies - Respondent	NO	26 (17)	15 (10)	38 (25)	74 (48)	0 (0)	<b>0.03</b>
	Yes	28 (16)	8 (4)	49 (27)	89 (49)	6 (3)	
Studies - Child	NO	32 (19)	15 (9)	37 (22)	80 (47)	6 (4)	<b>0.01</b>
	Yes	27 (19)	6 (4)	44 (31)	64 (45)	0 (0)	
Studies - Father	NO	39 (16)	19 (8)	56 (23)	127 (51)	6 (2)	<b>0.02</b>
	Yes	15 (15)	4 (4)	36 (37)	42 (43)	0 (0)	
Studies - Mother	NO	36 (14)	18 (7)	58 (23)	135 (54)	3 (1)	<b>0.03</b>
	Yes	17 (19)	5 (6)	32 (36)	32 (36)	3 (3)	

Data are presented as percentage n (%); p-value for the  $\chi^2$  test

more often reported by men, respondents having contact with people studying in Katowice (child, father, mother). On the other hand, childhood diseases were more often mentioned by people who did not study in Katowice. There was no significant differentiation in the frequency of answers given in the groups due to: age ( $p=0.11$ ), education ( $p=0.41$ ), place of employment ( $p=0.14$ ), residence in Katowice ( $p=0.07$ ).

According to the respondents, the development of medical sciences may contribute to changes in the development of the region, mainly in the following areas: elimination of health hazards related to environmental pollution and hazards in the work environment ( $n=176$ , 44%), building the recognition of the city and the region

based on high quality of medical services provided, and attracting patients from other regions/countries ( $n=105$ , 26.3%). Much less frequent was the perception of the development of medical sciences through the prism of creating jobs in entities providing healthcare services ( $n=76$ , 19%) or in entities dealing with the production and development of medical technologies ( $n=42$ , 10.5%). However, there was no significant diversification of respondents' views in particular demographic and social groups.

Respondents were asked to indicate the degree of agreement, on a scale of 1–7 (1-complete disagreement, 4-neutral answer, 7-complete agreement), with the recognition of the need to develop science in Katowice and



the Metropolis of Upper Silesia and Zagłębie in particular dimensions, overwhelmingly expressed full favour for undertaking all the presented actions - Fig. 2. The highest average value of indications concerns the expansion of medical infrastructure  $6.5 \pm 1.1$ , 7 (6–7), and the lowest - investing in areas that help to build an environment facilitating a positive change in health behaviours  $6 \pm 1.3$ , 6 [5–7]. Although the general differentiation of the values of indications determining the perception of the priority of individual areas is small, it is worth noting a certain lack of consistency of the respondents when comparing these results with the answers to the previous questions.

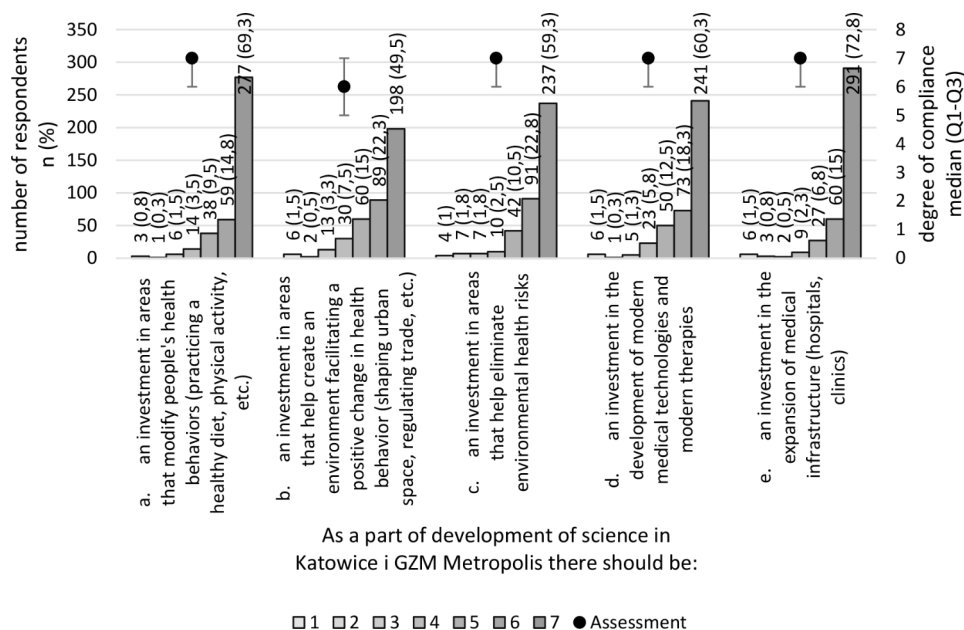
One of the initiatives connected with European City of Science 2024 is a new urban area to be developed, referred to as the Science Zone. Respondents asked to indicate the degree of acceptability on a scale of 1–7 (1-“completely disagree, 4-neutral answer, 7-completely agree) of the solutions proposed to be included in the Science Zone, overwhelmingly indicated all the presented elements (Fig. 3). The highest average value of indications concerned the infrastructure for activity and recreation enriched with measuring devices allowing for the assessment of health status  $6.3 \pm 1.2$ , 7 (6–7), and the lowest - multimedia search engines for scientific studies  $4.9 \pm 1.8$ , 5 [4–7], as well as permanent installations popularizing scientific knowledge  $5 \pm 1.8$ , 5 [4–7]. This indicates quite clearly the preference for solutions that allow for dynamic interaction of users with scientists and information, and those that focus on the practical dimension. Noteworthy, over 93% of the respondents declared that if they used measuring devices to assess their health,

they would consent to the disclosure of anonymized data recorded by such devices. This seems to provide some potential for creating an extensive infrastructure for collecting data on the health of the city’s inhabitants, the need for which was articulated by the experts participating in the in-depth interviews.

### Discussion

To the best of our knowledge, our study is the first attempt to identify the social perception of medical and health sciences in Poland. Also, international literature does not provide much comparative material in this regard. Our study, although representative of the population of the city of Katowice, has limitations related to the specificity of the studied population. Although it can be assumed with high probability that the obtained results are also representative for other populations living in large cities, it should be borne in mind that communities living in less urbanized areas may have different characteristics and a different approach to the studied issues.

Our results can be interpreted in terms of an unsatisfactory picture of the social approach to science. The overall picture illustrates the low level of awareness of the city’s residents about Katowice being awarded the title of European City of Science. Regarding medical sciences, the inhabitants also have a limited knowledge of the specificity of this field, and they also show a rather limited willingness to deepen their knowledge in this matter. The low interest in the subject among the youngest age group should be considered particularly unfavourable, which, however, corresponds to the globally observed



**Fig. 2** The need for the development of science in Katowice and the Metropolis of Upper Silesia and Zagłębie, expressed in the measurement on a scale of 1–7 (1-complete disagreement, 4-neutral answer, 7-complete agreement), in individual dimensions, in the opinion of the respondents

The planned Science Zone should include:

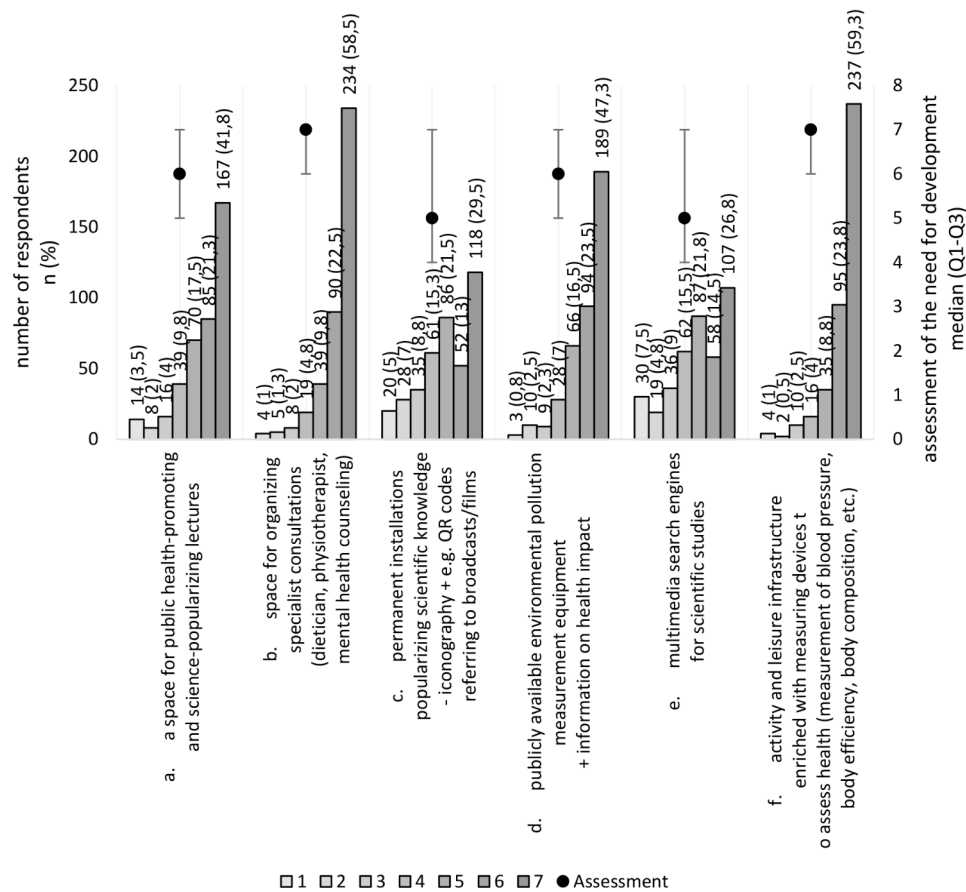


Fig. 3 Elements that, in the opinion of the respondents, should be included in the Science Zone

reduced interest in studying medicine and health sciences [18]. Although it concerns a slightly different matter, this observation may be consistent with the risks of deficits in the field of scientific literacy in the stages of academic education, as shown in the literature. [19] It was also noted that the perception of medical and health sciences is largely determined by the personal experiences of the respondents, in particular related to the use of health care services. A similar mechanism of the impact of individual experiences was observed by Brügger and colleagues in their analysis of perception and decision-making regarding climate change [20]. These observations suggest that it is necessary to take careful actions aimed at social promotion of science and preparation of communication channels for scientific results to be disseminated in an accessible and attractive way for recipients. It seems that projects such as the title of the European City of Science can be an excellent contribution to this, not only being an instrument for promoting science in itself, but also as a driving force for a more permanent trend of popularizing science and its civic

dimension, not only on the scale of one city or region. Such activities should be undertaken to disseminate scientific knowledge as such, but perhaps even above all - to create motivation to seek and use reliable scientific knowledge [21]. Because one of the sources of the communication barrier between the scientific community and society seems to be the tendency of the former to use a hermetic language, it is also necessary to make efforts to increase communication competences also within the representatives of this particular group, in order to build the ability to effectively transfer scientific knowledge to the public. Such interpretation corresponds with a similar need expressed by Jadranka Jezeršek Turnes [22]. Communication competence, however, is the ability to listen to the voices of society and to properly recognize the sphere of emotions and values, where both the message and mutual interaction must take place according to rules adapted to these dimensions [23].

Despite the noted limitations related to the perception of health-related scientific issues by the inhabitants of Katowice, based on our research it is possible to define

specific expectations that should become the basis for the policy of developing citizen science and engaging the public in the process of generating scientific knowledge at every stage, including defining the goals and subjects of scientific research [23–25]. Residents particularly emphasized the need for activities related to health prevention and health education, in particular expecting to undertake activities with a practical dimension and direct and concrete benefits for society. The residents also expected a space that would provide the opportunity to hold cyclical events to disseminate scientific knowledge, but also to take care of their health on a daily basis. The residents spoke favourably about the possibility of using such infrastructure to collect data for scientific research.

The above observations suggest that despite the apparently limited public interest in scientific issues, the potential for increasing such interest is considerable and it is necessary to make efforts to use it. Referring specifically to the field of medical sciences and health sciences, there is a strong need to acquire knowledge in the field of preventive health care and general health literacy. This is consistent with the currently dominant paradigm of new public health, although it stands in opposition to the still subordinate role the health promotion and prevention research plays in the general catalogue of financial and decision-making priorities and does not harmonize with the actual tendency of individuals to making active efforts to improve their own health competences, as well as using available preventive examinations. Although this phenomenon may be seen as a paradox, it is not inconsistent with other studies on similar issues, where, on the one hand, there is generally a high level of trust in scientists [23, 26–28], on the other hand, there is a growing group of people practicing behaviours harmful to health, guided by unscientific or pseudoscientific premises [23, 29–31] Undoubtedly, this is another symptom revealing a large potential for development of health sciences and of instruments for translating scientific knowledge into the practice of social life, including those for effective communication.

#### Limitations of the study

To ensure the reliability of the obtained results, potential sources of bias were identified, and countermeasures were taken. The study sample was established through random selection and its representativeness in terms of the main demographic characteristics (age and gender) was confirmed using statistical methods.

To minimize the risk of bias during data collection, this process was carried out by interviewers working under the supervision of two researchers with extensive experience in conducting survey research.

Due to the objective adopted in the research and its close connection with the needs resulting from the

implementation of the Katowice City of Science 2024 program, the study was carried out on the population living in economic and social conditions typical of the metropolitan environment. Therefore, the possibility of generalizing results to populations with different characteristics is limited. Elimination of the above-mentioned limitations would only be possible by carrying out similar research in a different socio-economic and cultural context.

#### Conclusions

1. The inhabitants of Katowice, in general, show a limited interest in the issues of science, including health and medical sciences.
2. The expectations of the inhabitants of Katowice regarding health sciences focus primarily on the issues of disease prevention and health education. The perception of priorities is largely determined by one's own experience of using health care services and the health problems experienced.
3. Medicine and health sciences are perceived by the inhabitants as an important element of the local and regional social and economic reality, and there seems to be a widespread consensus that the existing potential should be intensively used to build a positive global image of Katowice. In the area of social communication, however, residents expect, above all, the transfer of knowledge that will allow them to take better care of their own health, having a practical dimension from the point of view of an average individual.
4. There is a need for positive stimulation to improve the perception of science in social awareness and to increase scientific literacy. Circumstances such as obtaining the title of European City of Science 2024 can be a good tool for this purpose. At the same time, it is necessary to ensure the continuity and durability of projects and initiatives organized on this occasion in the long term. In addition, there is a need for bilateral actions, i.e. also addressed to the scientific community to improve social communication competences.
5. The low awareness of the European City of Science initiative among citizens of Katowice indicates the need for its stronger promotion in the candidate cities, but also at the European level.
6. The results of the study clearly indicate the need for stronger social participation in shaping scientific development and initiatives supporting the spread of scientific knowledge. In the context of the European City of Science initiative, this should be reflected at every stage, starting from the formulation of

program assumptions, through implementation, and ending with evaluation.

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#### Author contributions

Conceptualization P.R.; methodology E.N., P.R.; software K.K., E.N.; validation P.R.; formal analysis E.N.; investigation K.B., K.A.; resources P.R.; data curation K.B., K.A., E.N.; writing – original draft preparation E.N. and P.R.; writing-review & editing E.N., P.R., K.K.; visualization E.N. supervision T.H.; project administration P.R., T.H.; funding acquisition P.R., T.H.

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#### Data availability

The data that support the findings of this study are available from the corresponding author upon request. Data are located in controlled access data storage at the Medical University of Silesia.

#### Declarations

##### Human Ethics and Consent to Participate declarations

The study was not submitted for approval by an ethics committee. The need for such approval was deemed unnecessary according to national regulations [32, 33] and standard practice described in Recommendations of the Council of the National Science Centre regarding research involving humans [34]. Obtaining informed consent declarations from participants was deemed unnecessary according to national regulations [32, 33] and standard practice described in Recommendations of the Council of the National Science Centre regarding research involving humans [34].

##### Consent for publication

Not applicable.

##### Competing interests

The authors declare no competing interests.

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#### References

- Brandt M, Groom Q, Magro A, Misevic D, Narraway CL, Bruckermann T et al. Promoting scientific literacy in evolution through citizen science. *Proceedings of the Royal Society B: Biological Sciences* [Internet]. 2022;289(1980):20221077. <https://doi.org/10.1098/rspb.2022.1077>
- Huber B, Barnidge M, Gil de Zúñiga H, Liu J. Fostering public trust in science: The role of social media. *Public Understanding of Science* [Internet]. 2019;28(7):759–77. <https://doi.org/10.1177/0963662519869097>
- Wingen T, Berkessel JB, English B. No Replication, No Trust? How Low Replicability Influences Trust in Psychology. *Soc Psychol Personal Sci* [Internet]. 2019;11(4):454–63. <https://doi.org/10.1177/1948550619877412>
- Weingart P. Science, the Public and the Media – Views from Everywhere. In: Carrier M, Nordmann A, editors. *Science in the Context of Application* [Internet]. Dordrecht: Springer Netherlands; 2011. pp. 337–48. [https://doi.org/10.1007/978-90-481-9051-5\\_20](https://doi.org/10.1007/978-90-481-9051-5_20)
- Growiec J. Społeczny odbiór nauki w erze cyfrowej. In: Lubacz J, editor. *Ewolucja Cywilizacyjnej Roli i społecznego odbioru nauki*. Warszawa: Instytut Problemów Współczesnej Cywilizacji Im. Marka Dietricha; 2021. pp. 27–34.
- Dudo A, Besley JC. Scientists' Prioritization of Communication Objectives for Public Engagement. *PLoS One* [Internet]. 2016;11(2):e0148867-. <https://doi.org/10.1371/journal.pone.0148867>
- Carrier M, Knowledge, Politics, and Commerce: Science Under the Pressure of Practice. In: Carrier M, Nordmann A, editors. *Science in the Context of Application* [Internet]. Dordrecht: Springer Netherlands; 2011. pp. 11–30. [https://doi.org/10.1007/978-90-481-9051-5\\_2](https://doi.org/10.1007/978-90-481-9051-5_2)
- Consoli L. Scientific misconduct and science ethics: a case study based approach. *Sci Eng Ethics* [Internet]. 2006;12(3):533–41. <https://doi.org/10.1007/s11948-006-0051-6>
- Glick M, Greenberg BL. A march toward scientific literacy. *The Journal of the American Dental Association* [Internet]. 2017;148(8):543–5. <https://doi.org/10.1016/j.adaj.2017.06.010>
- Capasso M, Caso D, Zimet GD. The Mediating Roles of Attitude Toward COVID-19 Vaccination, Trust in Science and Trust in Government in the Relationship Between Anti-vaccine Conspiracy Beliefs and Vaccination Intention. *Front Psychol* [Internet]. 2022;13. <https://www.frontiersin.org/journals/psychology/articles/https://doi.org/10.3389/fpsyg.2022.936917>
- Rosman T, Bosnjak M, Silber H, Koßmann J, Heycke T. Open science and public trust in science: Results from two studies. *Public Understanding of Science* [Internet]. 2022;31(8):1046–62. <https://doi.org/10.1177/09636625221100686>
- Marks L, Laird Y, Trevena H, Smith BJ, Rowbotham S. A Scoping Review of Citizen Science Approaches in Chronic Disease Prevention. *Front Public Health* [Internet]. 2022;10. <https://www.frontiersin.org/journals/public-health/articles/https://doi.org/10.3389/fpubh.2022.743348>
- <https://www.esof.eu/katowice-poland-the-next-european-city-of-science-at-esof2022/> [Internet]. 2022. Katowice, Poland: The Next European City of Science at ESOF2022.
- Załącznik do Uchwały Nr XIX/365/15 Rady Miasta Katowice z dnia 17 grudnia 2015 r. STRATEGIA ROZWOJU MIASTA „KATOWICE 2030” [Internet]. 2015. <https://bip.katowice.eu/Lists/Dokumenty/Attachments/95384/1450771333.pdf>
- Woźniak-Holecka J. Health education as a contribution to the civic element. In: Holecki T, Woźniak-Holecka J, editors. *Health care in civil society*. Katowice: Śląski Uniwersytet Medyczny; 2013.
- Bank Danych Lokalnych. Główny Urząd Statystyczny [Internet]. 2023 [cited 2023 May 11]. <https://bdl.stat.gov.pl/bdl/start>
- Zielona Księga dot. obszarów metropolitalnych [Internet]. Warszawa. 2012 Apr [cited 2023 Mar 1]. <https://www.portalsamorzadowy.pl/pliki/23065.html>
- Mashar M, Kilgour J, Nanapragasam H, Lipworth S. Academic medicine: the continuing challenges. *Clin Teach*. 2020;17(1):81–5.
- Mohan L, Singh Y, Kathrotia R, Cariappa MP, Khara A, Ghosh S. Scientific literacy and the medical student: A cross-sectional study. *Natl Med J India* [Internet]. 2020;33(1):35–37. <https://doi.org/10.4103/0970-258X.308242>
- Brügger A, Demski C, Capstick S. How Personal Experience Affects Perception of and Decisions Related to Climate Change: A Psychological View. *Weather, Climate, and Society* [Internet]. 2021;13(3):397–408. <https://journals.ametsoc.org/view/journals/wcas/13/3/WCAS-D-20-0100.1.xml>
- Shynkaruk JM, Thompson VA. Confidence and accuracy in deductive reasoning. *Mem Cognit* [Internet]. 2006;34(3):619–32. <https://doi.org/10.3758/BF03193584>
- Turnes JJ. Putting science on the public agenda. *Mark Sci Res Organ*. 2014;13:2–14.
- Kossowska M. Odporni na wiedzę... czy o zaufaniu i polityce. In: Lubacz J, editor. *Ewolucja cywilizacyjnej roli i społecznego odbioru nauki*. Warszawa: Instytut Problemów Współczesnej Cywilizacji im. Marka Dietricha; 2021. pp. 59–73.
- Zwart H, Landeweerd L, van Rooij A. Adapt or perish? Assessing the recent shift in the European research funding arena from 'ELSA' to 'RR!' *Life Sci Soc Policy* [Internet]. 2014;10(1):11. <https://doi.org/10.1186/s40504-014-0011-x>
- Audétat M. Re-Thinking Science, Re-Thinking Society. Nowotny H, Scott P, Gibbons M, editors. *Soc Stud Sci* [Internet]. 2001;31(6):950–6. <http://www.jstor.org/stable/3182949>
- 2018 Wellcome Global Monitor How does the world feel about science and health? [Internet]. 2018 [cited 2023 Apr 12]. <https://wellcome.org/sites/default/files/wellcome-global-monitor-2018.pdf>

27. Funk C, Tyson A, Kennedy B, Johnson C, Research S. Science and Scientists Held in High Esteem Across Global Publics FOR MEDIA OR OTHER INQUIRIES [Internet]. 2020. [www.pewresearch.org](http://www.pewresearch.org)
28. Public attitudes to science 2019 [Internet]. 2020 [cited 2023 Mar 22]. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/905466/public-attitudes-to-science-2019.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/905466/public-attitudes-to-science-2019.pdf)
29. Lewandowsky S, Mann ME, Brown NJL, Friedman H. Science and the Public: Debate, Denial, and Skepticism. *Journal of Social and Political Psychology* [Internet]. 2016;4(2):537–53. <https://jspp.psychopen.eu/index.php/jspp/article/view/4965>
30. Lewandowsky S, Oberauer K. Motivated Rejection of Science. *Curr Dir Psychol Sci* [Internet]. 2016;25(4):217–22. <https://doi.org/10.1177/0963721416654436>
31. Lewandowsky S, Gignac GE, Oberauer K. The Role of Conspiracist Ideation and Worldviews in Predicting Rejection of Science. *PLoS One* [Internet]. 2013;8(10):e75637-. <https://doi.org/10.1371/journal.pone.0075637>
32. Ustawa z dnia 9. Marca 2023 r. o badaniach klinicznych produktów leczniczych stosowanych u ludzi. Sejm RP; 2023.
33. Ustawa z dnia 5. grudnia 1996 r. o zawodach lekarza i lekarza dentysty. 1997.
34. Narodowe Centrum Nauki. Zalecenia Rady Narodowego Centrum Nauki dotyczące badań z udziałem ludzi. 2016 [cited 2024 Apr 24]. pp. 1–2 [ncn.gov.pl](http://ncn.gov.pl). [https://www.ncn.gov.pl/sites/default/files/pliki/2016\\_zalecenia\\_Rady\\_NCN\\_dot\\_etyki\\_badan.pdf](https://www.ncn.gov.pl/sites/default/files/pliki/2016_zalecenia_Rady_NCN_dot_etyki_badan.pdf)

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