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Greater knowledge about COVID-19, more negative emotions. Research in adult Poles after 2nd and 5th waves of the pandemic

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Abstract

Introduction: The study investigated the dynamics of cognitive and emotional representation of COVID-19 in adult Poles, following the second (2021) and the fifth (2022) wave of the pandemic.

Material and methods: The study involved a total of 303 subjects (N = 198 in Survey 1 in 2021, and N = 105 in Survey 2 in 2022). The following measures were used: a questionnaire covering demographic data and general opinions about COVID-19 as well as the Revised Illness Perception Questionnaire (IPQ-R).

Results: After the fifth wave, significantly more respondents were convinced that COVID-19 was a real and dangerous disease. Cognitive deficits were more commonly recognised among symptoms of the viremia. Vaccination against COVID-19 was recognised as an essential preventive measure. Both surveys showed that COVID-19 representation was characterised by negative emotions and low sense of illness coherence. However, there was increased belief that the disease can be controlled through medical interventions. The age of the respondents in Survey 1 and Survey 2 was differently related to beliefs about COVID-19.

Conclusions:

1. After 2.5 years of the pandemic, the awareness of Poles about the causes, symptoms and methods of preventing the disease has increased.
2. Failure to vaccinate against COVID-19 has been identified as a significant cause of viremia.
3. Negative emotions and a sense of serious consequences were predominant in both Surveys, but after the fifth wave of the pandemic the scores reflect increased perception of the chronic nature of the disease and belief that the illness can be treated with medication, whereas the sense of personal control was found to decrease.
4. After the fifth wave of the pandemic, older age corresponded to increased belief in the relevance of some preventive measures, and to greater awareness of the viral origin, increased belief in the feasibility of controlling the disease through one's behaviours and a greater sense of illness coherence.
5. The intensification of negative emotions related to the pandemic can be treated as a predictor of the increase in adjustment disorders and risk of mental health deterioration among adult Poles in the following years.

Keywords: cognitive and emotional representation of illness, COVID-19 pandemic, Polish adults

Streszczenie

Wstęp: W badaniu oceniano dynamikę poznawczo-emocjonalnej reprezentacji COVID-19 u dorosłych Polaków uwzględniając drugą (2021) i piątą (2022) fali pandemii.

Materiał i metody: Badanie objęło łącznie 303 uczestników (N = 198 w badaniu 1 w 2021, i N = 105 w badaniu 2 w 2022). Wykorzystano następujące metody: kwestionariusz dotyczący danych demograficznych oraz ogólnych poglądów na temat COVID-19 a także Revised Illness Perception Questionnaire (IPQ-R).

Rezultaty: Po piątej fali pandemii istotnie więcej uczestników była przekonanych, że COVID-19 jest realnie istniejącą i niebezpieczną chorobą. Wśród objawów wiremii częściej wskazywano deficyty poznawcze. Szczepienie przeciw COVID-19 było określane jako istotna metoda prewencji. Obydwa pomiary wykazały, że w reprezentacji COVID-19 dominują emocje negatywne i niskie poczucie koherencji choroby. Jednakże wzrosło przekonanie, że choroba może być kontrolowana poprzez interwencje medyczne. Wiek respondentów z badania 1 i 2 był inaczej powiązany z przekonaniami na temat COVID-19.

Wnioski:

1. Po 2.5 latach pandemii COVID-19 wzrosła wiedza Polaków na temat przyczyn, symptomów i metod prewencji.
2. Nieszczepienie się przeciw COVID-19 było częściej wskazywane jako istotna przyczyna wiremii.
3. W obydwu pomiarach dominowały negatywne emocje oraz przekonanie o poważnych konsekwencjach choroby, ale wyniki badanych uzyskane w pomiarze po piątej fali pandemii wskazują na wzrost przekonania na temat chronicznej natury choroby i wzrost przekonania, że może być ona kontrolowana medycznie, ale wskazują też na spadek poczucia kontroli osobistej nad chorobą.
4. Po piątej fali pandemii starszy wiek uczestników korespondował ze wzrostem przekonań o znaczeniu niektórych środków zapobiegawczych, z większą świadomością pochodzenia wirusa, większą wiarą w możliwość kontrolowania choroby poprzez własne zachowania i z większym poczuciem koherencji choroby.
5. Intensyfikację emocji negatywnych w związku z trwającą pandemią można traktować jako predyktor rozwoju zaburzeń adaptacyjnych oraz ryzyka pogorszenia się zdrowia psychicznego w kolejnych latach.

Słowa kluczowe: poznawczo-emocjonalna reprezentacja choroby, pandemia COVID-19, dorośli Polacy

Introduction

From the viewpoint of epidemiology, it is human behaviours that determine the rate of virus transmission, as well as scale and dynamics of infections [1]. These behaviours are closely linked to cognitive and emotional representation of illness. Research on the representation of illness was carried out in many countries in relation to earlier epidemics [2], as well as during the first wave of the COVID-19 pandemic [3-4]. Illness representation includes several groups of perceptions about major symptoms, causes, methods of prevention, course, consequences (impact of the illness on life), control/cure (a sense of controllability, attributed to one's own actions, or interventions by professionals), coherence (making sense of the illness) as well as negative emotions linked to the illness [5]. The contents of illness representation are affected by the interaction of various factors, including the level of professional and non-professional knowledge, personal experiences [2], socio-cultural factors, legal regulations and religious beliefs [5], as well as age and gender [6]. Some evidence suggests that illness representation is due to change over time [5]. When the disease occurs far from a given community, the content of the representation is mainly based on the discourse encountered in the media and in the public domain. As the disease increasingly affects their own community, people tend to be more and more interested in the nature of the disease, and may take various measures to adapt to the situation (e.g., they pay more attention to hygiene, and get vaccinated). When directly confronted with a threat to one's well-being, one may perceive it as a sudden condition, with limited duration, requiring rapid medical intervention. In the case of a long-lasting illness (or pandemic), one is forced by the actual events to abandon this 'acute' model of illness in favour of a sense of 'chronicity' [5].

Changes in the representation of COVID-19 were revealed by respondents from various countries, including Poland. At the time the COVID-19 pandemic broke out in Europe, Polish society had low epidemiological awareness [7]. Common beliefs related to its origin included conspiracy theories suggesting direct or indirect human or non-human interventions (God, immigrants, wild animals, 5G networks) [8-9]. When the pandemic affected a given community, including Poland, the latter tendency decreased, and it was the media, the pharmaceutical industry, and politicians that were now blamed for the pandemic or for exaggerating its extent. Based on meta-analyses of the data acquired in 2020, Wake [10] showed large differences in people's knowledge about the source of pandemic, and origin and transmission of the virus. Early research into the current COVID-19 pandemic suggests that people were comparatively optimistically biased regarding their likelihood of becoming infected during the initial stages of the disease outbreak [11]. Early research involving respondents from different regions [12-14] and from Poland [15] showed incomplete knowledge about sources of the disease and risk factors. Conversely, high awareness of the causes, symptoms and ways to prevent the spread of COVID-19 was exhibited by respondents in other Polish study [3]. After the first wave of the pandemic, some people believed that COVID-19 was not more dangerous than influenza [16]. On the other hand, studies carried out in France [17] showed that respondents predominantly believed that COVID-19 was considerably more dangerous than influenza. Fever and coughing were most commonly known symptoms of COVID-19, whereas respiratory problems (such as Acute Respiratory Distress Syndrome), weakness, headache, chest pain, sore throat and diarrhoea were selected less frequently [15, 18]. Neurological symptoms and cognitive deficits initially were not recognised as significant

symptoms or consequences of the disease by adult Poles [15]. Compared to other European countries, the number of Polish people sceptical about vaccinations remained high, regardless of changes in the severity of the pandemic [19].

Apart from the recommended precautions, common beliefs suggested that COVID-19 pandemic could be avoided by adopting religious practices [20], healthy diet, staying in the sun, and considered effects of stimulants [13]. Healthcare workers and elderly people were commonly perceived as a high-risk group, as opposed to children or young people. As for the consequences of COVID-19, numerous studies clearly showed that the pandemic was perceived as a factor adversely affecting mental health, social functioning, or economic status [3-4, 20-23] and leading to existential crisis [24]. Researchers have also shown links between representation of COVID-19 and individual factors. Better knowledge of the causes and mechanisms of the viremia, as well as COVID-19 symptoms and prevention was found in adults reporting higher education, and better socioeconomic status, working in medical professions, women, urban residents and those who had personally experienced the disease [10, 15]. Older respondents seemed to be less worried and not as affected by the pandemic crisis as younger participants [25], but were less likely to follow epidemic rules and were more likely to create misconception about causes, treatment and prevention [26].

As regards COVID-19, comparison of data acquired during/after several waves of the pandemic suggests there were dynamic changes in various aspects of COVID-19 representation. This resulted from the emerging new COVID-19 variants, with slightly different symptoms and consequences, and from the introduction of vaccines as well as changes in recommendations and public health regulations. Similarly to other countries, also in Poland after the subsequent waves of the pandemic, compliance with protective measures was more frequently reported [3, 27]. The opinion that the risk of infection is difficult to minimise through one's own behaviour was positively related to vaccination uptake [28-29], but in Poland, more than 40% of responders had doubts about vaccination [30]. There was also a change in the emotional representation of the disease. Initial increase in negative emotions [23, 31] was followed with a slight decrease in the negative perceptions of COVID-19 [4], and even with a sense of positive changes in life [32]. However, a meta-analysis [33] of research reports focusing on mental health during the COVID-19 pandemic showed that stress and mental burden in this case were comparable to war time experiences. The effects of the pandemic, observed after the consecutive waves, included increased depression, insomnia, anxiety and fear, and more severe symptoms of post-traumatic stress disorder (PTSD) [22, 34-36]. Longitudinal research conducted in Europe in the frames of Living, working and COVID-19 program [37] showed improved well-being in 2022 compared to 2020 and 2021, but the positive change did not go back to pre-pandemic levels. This could be attributed to the war in Ukraine (24 February 2022) for which 76% of respondents expressed high or very high concern.

Aims

In view of the existing evidence, and the variable course of the pandemic as well as the dynamic nature of mental representation of COVID-19, the present study was performed in order to: a) describe and compare the COVID-19 representation during the two stages of the pandemic in Poland (after the second (2021) and fifth (2022) wave of the pandemic), and b) determine whether age affects the cognitive and emotional representation of COVID-19.

Material and methods

Participants

The measurement was carried twice using the Google Forms platform (links to the survey were provided via Facebook and were opened for two weeks): Survey 1 – after the peak of the second wave of the pandemic (January 2021) and Survey 2 - after the peak of the fifth wave (March 2022) in Poland. During the Survey 1, basic dose vaccination was available only to selected occupational groups, and during the Survey 2 booster shots were available to everyone. The study was conducted in compliance with The Declaration of Helsinki, and the protocol was approved by the Local Commission for Research Ethics (No. 34/2020 and 8/2021). Invitation to participate on a voluntary basis was addressed to individuals aged 18 or more. Potential respondents were generally informed about the content of the survey. They were also informed that by submitting the completed questionnaires, they would provide consent for the data to be used in a scientific publication.

Methods

Study procedures

Survey 1 (2021) and Survey 2 (2022) took into account completely filled questionnaires returned by 198 and 105 respondents, respectively. In line with the assumption of anonymity, no data were collected to enable identification of the respondents, hence the results acquired from the two groups were independent. The questionnaire covered respondents' gender, age, education, history of chronic diseases, and history of COVID-19 infection, and comprised statements expressing general opinion about COVID-19 pandemic (Table 1).

IPQ-R (Revised Illness Perception Questionnaire): COVID-19 Identity: a list of 21 symptoms characteristic for COVID-19 was used [38]. Respondents were asked to indicate to what extent they thought each symptom listed was typical of COVID-19 on 5-point Likert scale from 1(means definitely no) to 5 (definitely yes). A high reliability index was obtained in both Surveys (Cronbach's alpha of 0.89 and 0.91, respectively).

IPQ-R - beliefs scale: Beliefs scale (38 items) is divided into the following subscales: Timeline acute/chronic (6 items), Timeline cyclical (4), Consequences (6), Personal control (6), Treatment control (5), Coherence (5), and Emotion (6) [37]. Respondents rated each statement on a 5-point Likert scale from 1 (means strongly disagree) to 5 (strongly agree). Since the subscales do not have the same number of items, the analyses took into account the mean scores in each subscale (range 1-5). Reliability indexes (Cronbach's α) were 0.78 and 0.81, respectively.

IPQ-R: COVID-19 causes: A list of 16 possible causes of COVID-19, used in the survey, was created based on data from research reports. Item 17, added in Survey 2, was related to a lack of vaccination against COVID-19 as a potential cause of the disease. Respondents' opinions about possible causes of COVID-19 were expressed on a Likert scale, from 1 (means strongly disagree) to 5 (strongly agree). High reliability index identified was expressed by Cronbach's α of 0.86 and 0.87, respectively.

List of behaviours to minimise the risk of contracting COVID-19: A list of 16 behaviours, that can potentially minimise the risk of contracting COVID-19, was prepared and two items added in Survey 2 were related to vaccination against COVID-19 and to strict restrictions. A Likert scale, from 1 (means strongly disagree), to 5 (strongly agree) was applied, and the respondents were asked to rate importance of these behaviours. Cronbach's α was 0.85 and 0.87 respectively.

Statistical analyses were computed using SPSS version 26. Qualitative data were subjected to comparative assessment for independence using $\chi 2$ test with Yates correction, whereas quantitative results were compared using Student's t-test for independent data after they were assessed for normality with Shapiro-Wilk test and Hedges g as a measure of the strength of the relationship for two trials of different sizes. A mixed model analysis of variance (ANOVA) was applied for repeated measures (independent variable: Survey 2021 and Survey 2022; dependent variable - IPQ-R subscales), with comparisons using post hoc Bonferroni test. Correlations between age and representation of COVID-19 were assessed using Spearman's ρ. Quantitative data are represented by the means (M) and standard deviations (SD).

Results

No age differences were found between the groups (Survey 1: 32.15 ± 9.84, range of 18-67; Survey 2: 30.16 ± 10.86, range of 18-72; t = 1.61, p = 0.11). The two Surveys involved individuals representing mainly early adulthood and initial stage of middle adulthood, predominantly women, individuals with tertiary education (the category included those with master's and doctoral degrees), and those reporting a similar frequency of contacts with COVID-19 patients. Compared to Survey 1, in Survey 2 the respondents more frequently reported personal experience of COVID-19, and contacts with medical staff dealing with COVID-19 patients; likewise, more

Table 1. Respondents' characteristics and general belief about COVID-19

Variables	**2021 n =198 n (%)**	**2022 n =105 n (%)**	**χ^2 with continuity correction**
Gender: -female - male	 150 (75.7%) 48 (24.3%)	 77 (73.3%) 28 (26.7%)	 0.105
Level of education: - lower - higher	 98 (49.5%) 100 (50.5%)	 44 (41.9%) 61 (58.1%)	 1.29
History of chronic medical conditions: - yes - no	 47 (23.7%) 151 (76.3%)	 41 (39.1%) 64 (69.9%)	 7.08**
COVID-19 (confirmed): - yes - no	 12 (6.1%) 186 (93.9%)	 47 (44.8%) 58 (55.2%)	 63.09***
Quarantine: - yes - no	 39 (19.7%) 159 (80.3%)	 40 (38.1%) 65 (61.9%)	 11.11***

Contact with patients with COVID-19 (in person or via phone): - yes - no	 120 (60.6%) 78 (39.4%)	 68 (64.8%) 37 (35.2%)	0.34
Contact with person(s) taking care of patients with COVID-19: - yes - no	 93 (46.9%) 105 (53.1%)	 68 (64.8%) 37 (35.2%)	8.02**
General beliefs about COVID-19			
COVID-19 is a really existing and dangerous disease: - yes - not sure - no	 139 (70.2%) 51 (25.7%) 8 (4.1%)	 89 (84.8%) 16 (15.2%) 0	9.61**
Mass media and politicians overestimate the effects of COVID-19: - yes - not sure - no	 95 (47.9%) 69 (34.8%) 34 (17.3%)	 40 (38.1%) 30 (28.6%) 35 (33.3%)	10.20**
COVID-19 is as dangerous as influenza: - yes - not sure - COVID-19 is more dangerous than influenza	 117 (59.1%) 44 (22.2%) 37 (18.7%)	 69 (65.7%) 25 (23.8%) 11 (10.5%)	3.48
COVID-19 does not exist: - yes - not sure - no	 1 (0.5%) 25 (12.6%) 172 (86.9%)	 1 (0.9%) 15 (14.3%) 89 (84.8%)	0.38

***p≤0.01; ***p≤0.001.*

respondents had been in quarantine, and reported chronic illnesses (Table 1).

After the fifth wave of the pandemic, there were significantly more respondents who were convinced that COVID-19 was a real and dangerous disease, and fewer respondents denied it existed, or were uncertain about that. There was a significant decrease in the numbers of respondents who believed that the risk posed by COVID-19 is overestimated and those who did not have a specific opinion about that (Table 1).

In 2021, according to the respondents, the main symptoms of COVID-19 (Identity of COVID-19) included loss of smell and taste, loss of physical strength, fever, shortness of breath, cough, fatigue, muscle pain, whereas the less typical symptoms included stomach problems, runny nose and sore throat; the least typical were neurological symptoms and neuropsychological problems, headache, and rash (Table 2). In 2022, the symptoms acknowledged as typical for COVID-19 included shortness of breath, loss of physical strength, cough and fever, as well as loss of smell and taste; headache was recognised as a predominant symptom of the viremia, while cognitive deficits also received significantly higher rating.

Table 3. presents mean scores in IPQ-R subscales (Beliefs scale) in both Surveys.

Opinions expressed after the fifth wave of the COVID-19 pandemic showed a significant change in the way the illness was perceived (M = 3.55), compared to the responses after the second wave (M = 3.28, p = 0.001) (Figures 1, 2 and 3). The factor of Survey (2021; 2022) explains 9% of the variance in results (F = 28.45, p = 0.001, η2 p = 0.09). Representation of COVID-19 predominantly contained negative emotions (M = 4.11), and beliefs about serious consequences in various domains of life (M = 3.84), about cyclical course (M = 3.57) and chronic course of the symptoms (M = 3.53), which is not easy to control by means of one's behaviours (M = 3.20) or through pharmacological interventions (M = 3.02), and which is difficult to make sense of (M = 2.67). The scores in IPQ-R subscales differ significantly (p ≤ 0.001), but perceptions

Table 2. Representation of COVID-19 identity/symptoms (means and standard deviations)

COVID-19 Identity	**2021 M (SD)**	**2022 M (SD)**	Student's t-test / g Hedges
Muscle pain	4.23 (0.99)	3.76 (1.18)	3.56*** / 0.44
Stomach problems	3.33 (1.13)	3.15 (1.17)	1.26
Shortness of breath/ dyspnea	4.62 (0.68)	4.32 (0.95)	2.81** / 0.37
Body weight change	2.52 (1.08)	2.55 (1.07)	-0.22
Fatigue	4.43 (0.80)	3.96 (1.00)	4.12*** / 0.51
Joint stiffness	3.11 (1.14)	2.90 (1.11)	1.48
Eye irritation	2.60 (1.21)	2.48 (0.96)	0.96
Sleep dysfunctions	2.70 (1.11)	2.67 (1.07)	0.243
Dizziness	3.30 (1.15)	3.21 (0.90)	0.77
Loss of physical strength	4.36 (0.81)	4.20 (0.94)	1.53
Wheezing	3.96 (1.09)	3.84 (0.99)	0.98
Cough	4.52 (0.83)	4.20 (0.97)	3.01** / 0.40
Fever	4.58 (0.84)	4.42 (0.88)	1.57
Rash	2.51 (1.09)	2.47 (1.03)	0.29
Speech disorders	2.23 (1.06)	2.31 (1.05)	-0.67
Paresis of the upper and/ or lower limbs	2.18 (1.01)	2.36 (1.09)	-1.44
Loss of smell and taste	4.57 (0.81)	4.36 (0.81)	2.03* / 0.27
Sore throat	3.82 (1.08)	3.50 (1.09)	2.49
Runny nose	3.49 (1.15)	3.67 (0.99)	-1.28
Memory or thought deficits	2.41 (1.16)	3.41 (1.17)	-7.14*** / 0.88
Headache	2.54 (1.92)	4.25 (0.87)	-1.43*** / 1.17

**p≤0.05; **p≤0.01; ***p≤0.001.*

Table 3. IPQ-R (means and standard deviations)

IPQ-R Subscales	**2021 M (SD)**	**2022 M (SD)**
Timeline acute/chronic	3.23 (0.73)	3.82 (0.64)
Timeline cyclical	3.63 (0.78)	3.51 (0.69)
Consequences	3.75 (0.73)	3.93 (0.63)
Personal control	3.14 (0.79)	3.26 (0.72)
Treatment control	2.71 (0.76)	3.32 (0.77)
Coherence	2.54 (0.72)	2.79 (0.82)
Emotion	3.97 (1.01)	4.07 (0.92)

of personal control and treatment control are at the same level (p = 1.0). The factor of IPQ-R Subscales explains 32% of the variance in the results (F = 120.88, p = 0.001, η2 p = 0.32). The findings also show an interaction Survey x IPQ-R Subscales, explaining 3% of variability in the results (F = 8.24, p = 0.001, η2 p = 0.03). Post hoc comparisons showed, for example, that in 2021 a sense of negative consequences prevailed over a perception of chronic course of the illness (p ≤ 0.001), whereas in 2022 the sense of negative effects of the illness and the perception of its chronic nature were at a similar high level (p =1.0). Negative emotions and a sense of serious consequences were predominant in both Surveys, but after the fifth wave of the pandemic the scores reflect increased perception of the chronic nature of the disease and belief that the illness can be treated with medication, whereas the sense of personal control was found to decrease.

In 2021 the predominant causes of COVID-19

(Representation of the causes) included: viruses or bacteria, altered immunity, old age and pre-existing medical conditions. The least probable causes included punishment for sins, excessive consumption of coffee, stress and emotional personality traits (Table 4). In 2022, viral or bacterial factor was most commonly recognised among the causes of COVID-19, and slightly lower importance was attributed to altered immunity, pre-

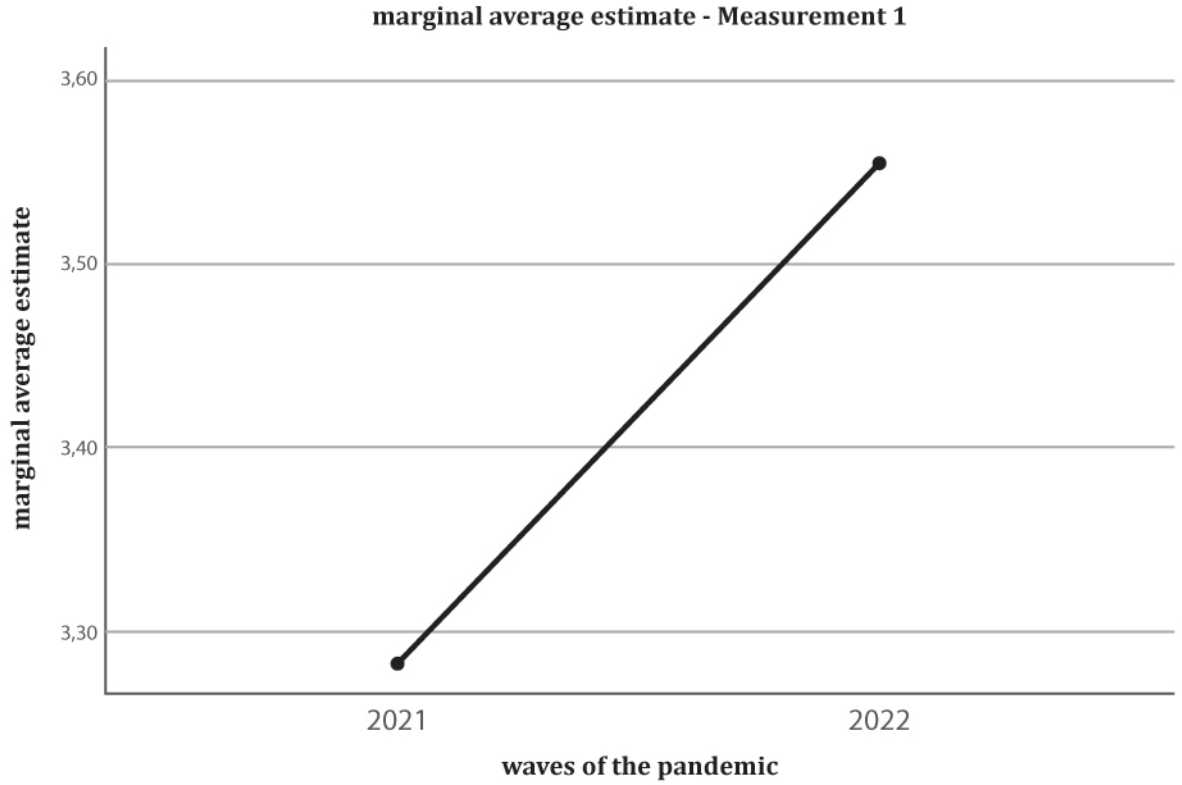

Fig. 1.

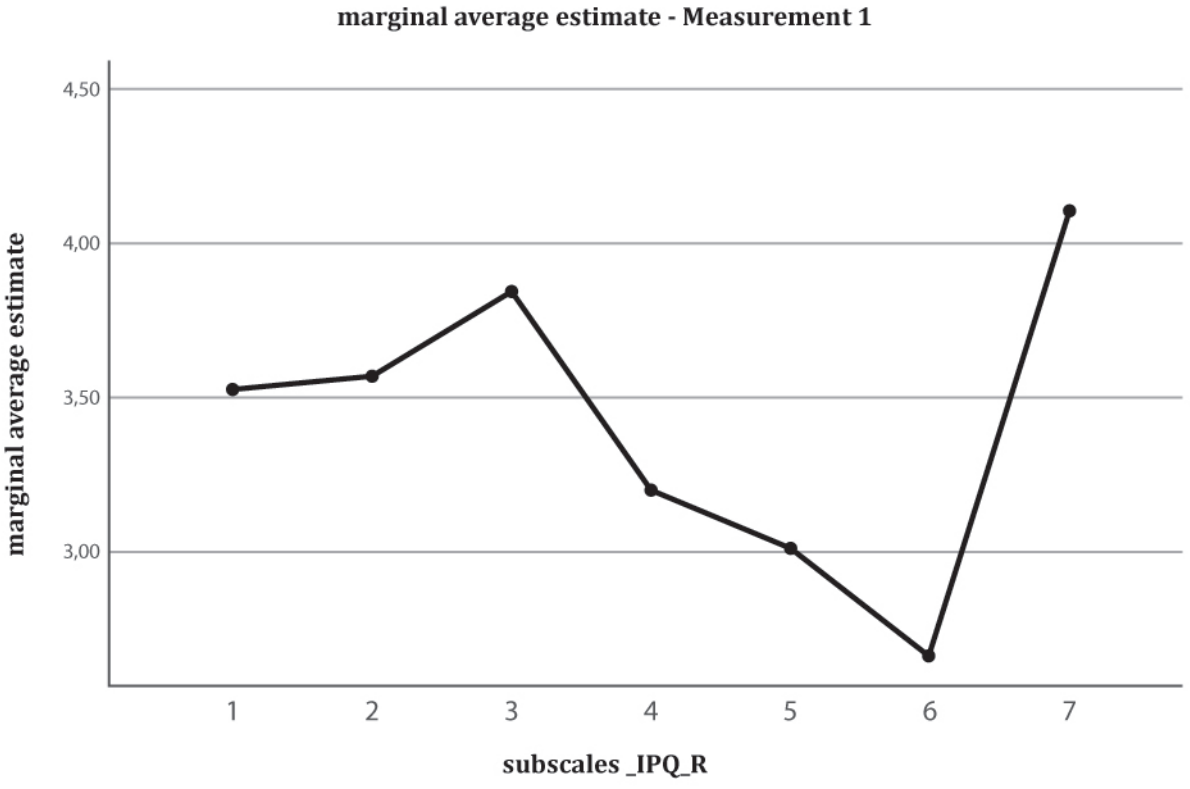

Fig. 2.

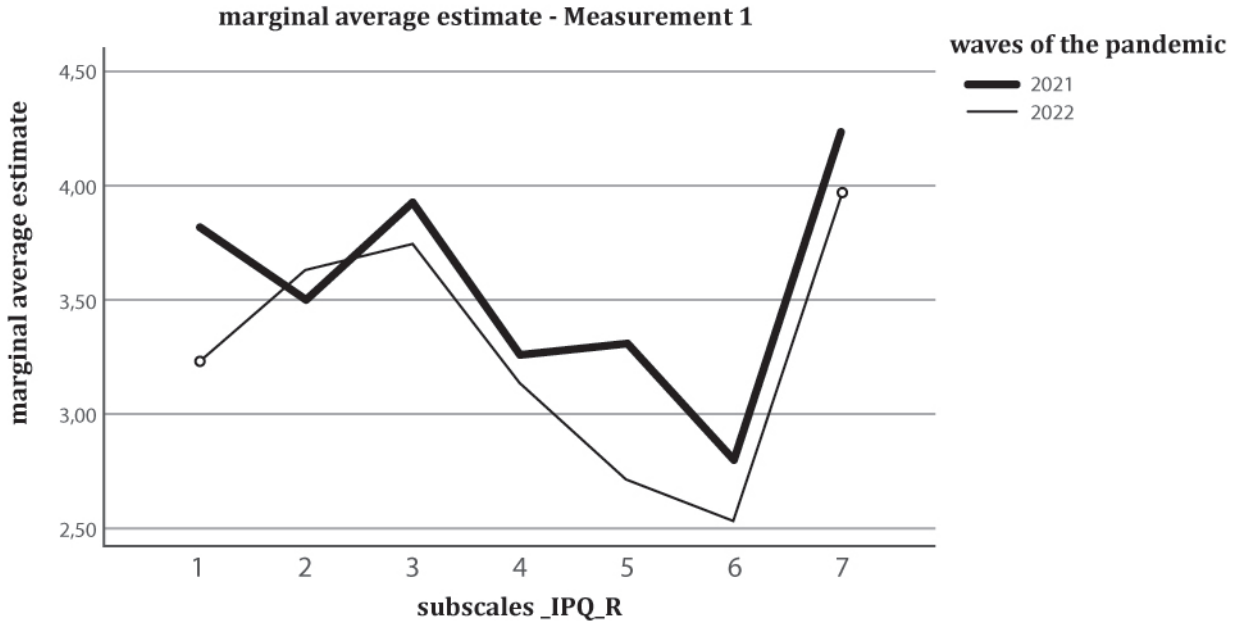

Fig. 3.

existing conditions, failure to vaccinate against COVID-19, and old age.

Washing hands, wearing masks, avoiding crowded places, having healthy diet and doing exercises were recognised as the most important preventive measures in 2021. Flu vaccines, following media reports and fervent prayer were thought to be least effective (Table 5). In 2022, hand washing and wearing masks were again identified as the most effective measures along with vaccination against COVID-19. The lowest ratings were

Table 4. Representation of the causes of COVID-19 (means and standard deviations)

Causes of COVID-19	**2021 M (SD)**	**2022 M (SD)**	Student's t-test /g Hedges
Stress and worry	1.92 (1.22)	1.80 (1.15)	0.83
Personality traits	1.55 (0.94)	1.24 (0.66)	3.36** / 0.37
Overstrain	2.19 (1.30)	1.61 (0.95)	4.35*** / 0.51
Negative mood	2.00 (1.26)	1.28 (0.73)	6.25*** / 0.69
Unhealthy diet	2.36 (1.35)	1.80 (1.07)	3.88*** / 0.46
Viruses or bacteria	4.41 (0.97)	4.46 (0.89)	-0.43
Genetic factors	2.51 (1.38)	2.01 (1.17)	3.29*** / 0.39
Environment pollution	2.51 (1.37)	1.92 (1.17)	3.84*** / 0.46
Altered immunity	3.74 (1.32)	2.93 (1.39)	4. 94*** / 0.59
Smoking and/or illicit drugs	2.62 (1.43)	1.59 (0.88)	7.66*** / 0.87
Alcohol	2.28 (1.36)	1.38 (0.71)	7.45*** / 0.84
Coffee	1.75 (0.98)	1.14 (0.40)	7.34*** / 0.81
Pre-existing medical conditions	3.29 (1.51)	2.46 (1.36)	4.66*** / 0.52
Older age	3.31 (1.56)	2.16 (1.32)	6.73*** / 0.79
Bad luck	2.91 (1.55)	2.08 (1.33)	4.83*** / 0.57
Punishment for sins	1.30 (0.78)	1.09 (0.34)	3.28*** / 0.34
No vaccination against COVID	----	2.86 (1.35)	----

***p≤0.01; ***p≤0.001.*

assigned to fervent prayer, following media coverage, avoiding meetings with peers, flu vaccination or wearing face shields.

Higher age of the respondents in Survey 1 (2021) corresponded to stronger belief related to the role of personality, drinking alcohol and smoking in developing the illness and less frequent acknowledgement of viral origin of the disease; older respondents more commonly recognised importance of physical exercise and diet, and were less likely to acknowledge the role of avoiding

Table 5. Perception of measures reducing the risk of COVID-19 (means and standard deviations)

Preventive behaviour	**2021 M (SD)**	**2022 M (SD)**	Student's t-test / g Hedges
Washing hands	4.58 (0.95)	4.37 (0.87)	1.92* / 0.23
Wearing masks	4.01 (1.29)	4.13 (1.10)	-0.82
Wearing face shields	3.41 (1.37)	2.70 (1.24)	4.41*** / 0.52
Avoiding crowded places (shops, trains etc.)	4.37 (1.06)	3.87 (1.06)	3.96*** / 0.48
Healthy diet	4.10 (1.11)	3.58 (1.22)	3.62*** / 0.44
Physical exercises	4.03 (1.09)	3.45 (1.16)	4.20*** / 0.51
Avoiding individuals who have contact with COVID-19 patients	3.86 (1.09)	3.22 (1.17)	4.68*** / 0.57
Avoiding individuals who have contact with many people (hairdressers, teachers)	3.53 (1.24)	2.90 (1.22)	4.25*** / 0.51
Avoiding meetings with peers	3.34 (1.33)	2.59 (1.25)	4.72*** / 0.58
Getting vaccinated against flu	2.58 (1.30)	2.80 (1.26)	-1.38
Taking vitamins and other supplements	3.58 (1.27)	3.25 (1.04)	2.40* / 0.28
Following media reports concerning the scale of the risk	2.51 (1.44)	2.44 (1.26)	0.46
Refraining from traveling and social gatherings	3.70 (1.28)	2.98 (1.20)	4.69*** / 0.57
Avoiding sick people and places frequently attended by patients	4.12 (1.15)	3.47 (1.41)	4.06*** / 0.50
Keeping the recommended distance in all situations	3.92 (1.26)	3.60 (1.21)	2.12* / 0.26
Fervent prayer	1.81 (1.24)	1.41 (0.77)	3.37*** / 0.49
Restrictions	----	3.47 (1.41)	----
Getting vaccinated against the COVID-19	----	4.03 (1.27)	----

**p≤0.05; ***p≤0.001.*

individuals who have contact with COVID-19 patients and those who have contact with many people. Higher age also corresponded to a stronger belief about serious consequences of the illness. In Survey 2, higher age of the respondents corresponded to a stronger belief that muscle pain, upset-stomach, diarrhoea, fatigue, eye irritation, wheezing, rash, speech and sleep disorders and respiratory problems were typical symptoms of the disease. Older respondents also more commonly acknowledged viral origins of COVID-19. With age, environment pollution was less commonly perceived as a cause of the viremia, while higher rating was assigned

to such preventive measures as washing hands, wearing masks, or face shields, avoiding crowded places, refraining from travelling, avoiding sick people, keeping distance and vaccination against COVID-19. Older age corresponded to stronger belief about personal control, and control through treatment. A sense of illness coherence also increased with age (Table 6).

Discussion

Compared to the research after second wave of pandemic (2021), after the fifth wave (2022) significance of cognitive deficits and headache was more commonly acknowledged. The viral factor, pre-existing medical conditions, compromised immunity and older age continued to be associated with the causes of the disease.

Table 6. Age x representation of COVID-19 in Survey 1 and in Survey 2 (Spearman's rho correlation coefficient and p) – only statistically significant (one-sided)

Survey 1 (2021)	
age x the causes of COVID-19	
Role of personality in developing the illness	ρ = 0.15*
Viral origin of the disease	ρ = - 0.16*
Smoking	ρ = 0.12*
Alcohol	ρ = 0.12*
Bad luck	ρ = - 0.14*
age x behaviours reducing the disease risk	
Wearing helmets	ρ = - 0.13*
Physical exercise	ρ = 0.16*
Healthy diet	ρ = 0.12*
Avoiding individuals who have contact with COVID-19 patients	ρ = - 0.16*
Avoiding individuals who have contact with many people	ρ = - 0.15*
age x IPQ-R subscales	
Consequences of the illness	ρ = 0.18**
Survey 2 (2022)	
age x the causes of COVID-19	
Viral origin of the disease	ρ = 0.21*
Environment pollution	ρ = - 0.23**
Personality	ρ = - 0.17*
age x behaviours reducing the disease risk	
Washing hands	ρ = 0.25**
Wearing masks	ρ = 0.26**
Wearing helmets	ρ = 0.25**
Avoiding crowded places	ρ = 0.24**
Refraining from travelling	ρ = 0.24**
Avoiding sick people	ρ = 0.23**
Keeping distance	ρ = 0.31***
Following restrictions	ρ = 0.23**
Healthy diet	ρ = 0.16*
Vaccinate against COVID-19	ρ = 0.16*
age x COVID-19 identity/symptoms	
Muscle pain	ρ = 0.24**
Upset-stomach	ρ = 0.31***
Dyspnea	ρ = 0.18*
Fatigue	ρ = 0.18*

Eye irritation	ρ = 0.22*
Sleep disorder	ρ = 0.18*
Wheezing	ρ = 0.26**
Speech disorders	ρ = 0.17*
age x IPQ-R subscales	
Personal control	ρ = 0.29***
Control through treatment	ρ = 0.29***
A sense of coherence	ρ = 0.36***

**p≤0.05; **p≤0.01; ***p≤0.001.*

After the fifth wave, a failure to get vaccinated was added as a risk factor. Vaccination against COVID-19 was selected as an important preventive measure, in addition to washing hands and wearing masks. The fact that cognitive deficits were recognised as a symptom suggests increased awareness of the respondents about COVID-19. Both surveys showed that representation of COVID-19 was predominantly characterised by negative emotions and a belief that the disease significantly affects personal life. The over three-year-long pandemic strengthened the opinion about the chronic nature of the disease, but there was also increased sense that it can be controlled through medical interventions. Both surveys showed the lowest ratings related to illness coherence, reflecting the ability to make sense of and cope with the pandemic. These findings suggest that mental representation of COVID-19 changed in some ways, and what is common to our results and those reported by others is the increase in knowledge about COVID-19, stronger sense of negative emotions and consequences of COVID-19 after several waves of the pandemic [4, 31, 33-36, 39]. Our findings are consistent with results reported in a longitudinal study [24], which showed that the highest level in the hierarchy of COVID-19 representations was occupied by a sense of negative consequences, while the lowest level was occupied by a sense of personal control. The results acquired by Shiloh [24] after four months showed stronger sense of negative consequences of COVID-19 and greater belief about the chronic nature of the illness, as well as improved ability of the respondents to identify symptoms, however the sense of illness coherence was lower. Our findings show age-related changes in representation of the disease. After the fifth wave of the pandemic, older age corresponded with increased belief in the relevance of some preventive measures, and - more importantly - to greater awareness of the viral origin, increased belief in the feasibility of controlling the disease through one's behaviours and a greater sense of illness coherence. The evidence showing a relationship between age and these aspects of representation is not conclusive, nevertheless, given that older age is associated with more severe COVID-19 consequences and perception of higher risk of infection [18, 28, 40], our findings are very optimistic.

A negative emotional representation of COVID-19 may be associated with better compliance, but it may also perpetuate or even exacerbate mental health problems [34, 38]. The increased confidence that the viremia can be controlled through medical interventions may be linked to the widely promoted knowledge related to COVID-19; it also reflects changes in Polish people's awareness related to the symptoms, diagnosis and treatments. The findings, which should be highlighted here, include the increased knowledge of the disease in the group of older respondents.

The research discussed here presents certain shortcomings. Firstly, the number of the participants decreased possibly due to the pandemic fatigue. Majority of our respondents were women and individuals with higher education. Secondly, at the time of the second survey, i.e. on 16 May 2022, in Poland the legal state of epidemic was lifted, and replaced with a state of epidemic threat [41], which may have led to an impression that the pandemic ended. Given the existing pandemic, there is a question whether and in what way COVID-19 representation will affect our mental health and everyday activity during possible future waves of the pandemic.

Conclusions

1. After 2.5 years of the pandemic, the awareness of Poles about the causes, symptoms and methods of preventing the disease has increased.
2. Failure to vaccinate against COVID-19 has been identified as a significant cause of viremia.
3. Negative emotions and a sense of serious consequences were predominant in both Surveys, but after the fifth wave of the pandemic the scores reflect increased perception of the chronic nature of the disease and belief that the illness can be treated with medication, whereas the sense of personal control was found to decrease.
4. After the fifth wave of the pandemic older age corresponded to increased belief in the relevance of some preventive measures, and to greater awareness of the viral origin, increased belief in the

feasibility of controlling the disease through one's behaviours and a greater sense of illness coherence.

5. The intensification of negative emotions related to the pandemic can be treated as a predictor of the increase in adjustment disorders and mental health disorders among adult Poles in the following years.

Conflict of interest

The authors have declared no conflict of interest.

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