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# The antivaccination movement and the perspectives of Polish parents

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## ABSTRACT

**Introduction:** Vaccination is an important prophylactic strategy. However, recent years have seen the growth of antivaccination movements whose popularity has been driven by access to the Internet.
The present study examines the influence of these antivaccination movements on attitudes towards vaccination by Polish families.
**Material and methods:** Surveys of vaccination beliefs and knowledge, and popular antivaccination opinions ($n$ = 278) were completed by parents of patients on a paediatric ward and subjected to analysis (response rate = 56%).
**Results:** More than half the returned surveys ($n$ = 156; 56.12%) indicated awareness of the existence of antivaccination movements. One third ($n$ = 91; 32.73%) reported knowing antivaccine proponents in their social circle. Approximately half ($n$ = 126; 45.32%) were familiar with antivaccination arguments.
Awareness of antivaccination movements, knowing their proponents, and familiarity with their arguments were found to be significantly correlated with living in a large city (appropriately $p < 0.004$, $p < 0.003$, $p < 0.0003$), having a higher income ($p < 0.004$, $p < 0.001$, $p < 0.0009$), and a higher education level ($p < 0.000001$, $p < 0.008$, $p < 0.000001$).
Knowledge about the antivaccination movements had an influence on parental beliefs regarding vaccination. Familiarity with anti-vaccine arguments and personal familiarity with anti-vaccine proponents was related to the belief that vaccines caused serious complications ($p < 0.01$ and $p < 0.02$, respectively).
The performance of compulsory vaccination in children was negatively related with familiarity with antivaccination proponents (98.4% vs. 92.31%, $p < 0.05$) and with knowing their arguments (100% vs. 92.06%, $p < 0.05$). However, most parents who reported familiarity with antivaccination movements (53.85% vs. 40.16%, $p < 0.05$) or antivaccination proponents (65.94 vs. 39.04%, $p < 0.0001$), or their views (59.52% vs.38.16%, $p < 0.001$), still performed these vaccinations.
**Conclusions:** Knowledge about the existence of antivaccination movements influences parental attitudes towards vaccination. Because many people with high awareness of vaccinations and access to them are familiar with antivaccination arguments, this group should be especially included in professional educational activities regarding vaccination.

KEY WORDS:
**vaccination, health awareness, antivaccine movement.**

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## INTRODUCTION

One of the most important elements of preventive health care in developmental age is vaccination [1–4]. The implementation of compulsory vaccinations among children may be affected by parental attitudes and their knowledge of the topic [5–8].

Since its origin in the 19th century, vaccination has been beset by opponents, or anti-vaxxers [8, 9, 10]. Although the numbers of strong opponents have fallen, they nevertheless form a very socially active group, and have effective tools for popularizing their views, such as social media [2, 4, 5, 9, 11–15]. While many Polish parents appear willing to obtain information on vaccination from such Internet sources, they tend to be more critical when assessing the quality of information received from a doctor [16].

The public questioning of the validity of vaccinations and their safety, often referred to as "antivaccine movements", has become such a threat to public health that paediatric societies have considered it necessary to undertake vaccination awareness activities [2, 8]. It has been reported that antivaccination activities increase the numbers of parents refusing to vaccinate their children [1, 11]. In developed countries, a refusal to vaccinate children translates into a real increase in the risk of developing severe, potentially fatal diseases [5, 7, 8, 17].

Antivaccination proponents often position their arguments alongside popular and fashionable trends, such as returning to natural medicine and other ecological slogans [4, 13, 18]. They typically consider the immune system to be more effective at repelling infection than immunization by medical procedures, and often promote the value of alternative medicines [10, 13]. Sceptics are often presented with reports indicating a link between vaccinations and the development of diseases such as encephalopathy, autism, enteritis, or autoimmune diseases, without indicating that such links have been disproven by reliable clinical studies [4, 8, 17–19]. They may indicate the presence of potentially harmful compounds in vaccine preparations, despite them being present in clinically insignificant amounts [8, 13]. Interestingly, a relatively new myth spread by the anti-vaccine movement is that the measles virus has anti-cancer activity [7]. In addition, antivaccination proponents often argue against compulsory vaccination based on slogans of personal freedom, and highlight the profit motivations of pharmaceutical companies [4, 13].

The number of people questioning various aspects of vaccination has increased significantly in recent years [8]. Today, antivaccination proponents can be regarded as occupying 2 general groups: one that radically rejects vaccinations, and another that presents an intermediate position, such as accepting or rejecting certain vaccinations, accepting vaccinations under certain conditions, or delaying them [5, 8, 10, 20]. Of the 2, the latter group seems to predominate in developed countries; this presents a challenge for paediatricians, who may be required to modify the vaccination schedule accordingly [5]. The group also searches for information on immunization using a range of available sources [8].

However, simply presenting arguments that contradict vaccine myths to the general public has been found to be an ineffective strategy of promoting vaccination awareness [17]. It may be more effective to familiarize parents with knowledge about the diseases that can be prevented thanks to vaccination and their complications [10,17], especially as parents who decide not to immunize their children are often convinced that that such diseases are harmless and immunity can be acquired most effectively through infection [9].

The aim of the present study is to determine the influence of antivaccination movements on attitudes about vaccination held by parents. It also examines whether antivaccination movements influence the performance of vaccination.

## MATERIAL AND METHODS

A voluntary survey was conducted among parents of patients of the Department of Paediatrics, Allergology, and Gastroenterology in 2016–2018.

The following criteria were used for inclusion in the study: informed consent to participate, and having at least one child over one year of age (the questionnaire included questions about the implementation of vaccinations in this child).

The followed exclusion criteria were used: medical history indicating deep prematurity, birth weight < 2000 g, and other perinatal conditions requiring postponement or significant modification of the vaccination schedule, and the occurrence of chronic diseases up to the end of the second year of life that required significant modifications of the vaccination schedule.

The participants completed a questionnaire created for the study. It comprised a list of questions regarding the implementation of mandatory (free) and recommended (paid) immunization in the child, as well as various other points:

1. Parental knowledge of antivaccination movements, including:
- awareness of the existence of antivaccination movements,
- personal familiarity with antivaccination proponents,
- familiarity with the arguments used by antivaccination proponents;

2. Position towards the most popular antivaccination principles.

The survey also included questions about the demographic data of the family: place of residence, age and education of the parents, their financial situation, and number of children. One question also asked whether

their child had previously survived a vaccination adverse reaction (VAR).

The obtained data regarding parental knowledge of antivaccination movements, personal familiarity with antivaccination proponents and antivaccination views, and the negative beliefs held by the respondents regarding compulsory and recommended vaccinations in children was then subjected to analysis, as well as the impact of antivaccination movements on parental attitudes to vaccination. The influence of VAR on the presence of unfavourable beliefs about vaccinations was also examined. Knowledge of the antivaccination movement and their own negative views on vaccination were also compared with demographic data. Due to the amount of the obtained material, only statistically significant relationships are presented in this report.

All analyses were performed using the $\chi^2$ test with Yates' correction for small groups. Differences where $p < 0.05$ were considered statistically significant.

For the research the consent of the Ludwik Rydygier *Collegium Medicum* in Bydgoszcz Bioethics Committee was obtained (consent number KB580/2015).

## RESULTS

In total, 500 questionnaires were distributed, of which 323 were completed and returned (64.6%). Of these, 278 (55.6%) were correctly completed and qualified for analysis. The characteristics of the study group are presented in Table 1.

### PARENTAL KNOWLEDGE OF ANTIVACCINATION MOVEMENTS

More than half, i.e. 156 (56.12%), of the respondents were aware of the existence of antivaccination movements. Respondents from large cities were more likely to report this awareness than those from rural areas and small towns ($p = 0.004$). This awareness increased in proportion to the level of income per family member ($p = 0.004$) and the level of education, i.e. primary or vocational education, secondary or higher (for mothers $p < 0.001$; for fathers $p < 0.001$). No statistically significant differences were observed with regard to family status, age of parents, or the number of children in the family. Personal familiarity with antivaccination proponents was reported by 91 (32.73%) respondents; such familiarity was more likely among inhabitants of large cities than among those of small towns and villages ($p = 0.003$), as well as those with a very good or good financial situation compared to those with an average or bad situation ($p = 0.004$); in addition, those with higher income per family member ($p < 0.001$) or with higher education (for mothers $p = 0.008$; for fathers $p < 0.001$) were more likely to personally know antivaccination proponents. No differences were found with regard to family

**TABLE 1.** Characteristics of the study group

| Parameter | Study group, $N = 278$ (100%) |
|---|---|
| Sex, *n* (%) | |
| Female | 269 (96.76) |
| Male | 9 (3.24) |
| Age, mean, years | |
| Mothers | 35.98 |
| Fathers | 38.22 |
| Number of mothers, *n* (%) | |
| < 35 years | 140 (50.36) |
| > 35 years | 138 (46.76) |
| Number of fathers, *n* (%) | |
| < 35 years | 115 (41.37) |
| > 35 years | 163 (58.63) |
| Family – the child lives, *n* (%) | |
| With both parents | 237 (85.25) |
| With one of the parents | 41 (14.75) |
| In a multigenerational family | 26 (8.27) |
| Living environment, *n* (%) | |
| Big city/suburbs | 117 (42.09) |
| Small town | 74 (26.62) |
| Farm | 87 (31.29) |
| Subjective assessment of the family's financial situation, *n* (%) | |
| Very good/good | 155 (55.75) |
| Average | 120 (43.17) |
| Bad | 3 (1.08) |
| Average monthly income in PLN per person | |
| < 500 | 35 (12.59) |
| 500–1500 | 167 (60.07) |
| 1500–2500 | 56 (20.14) |
| > 2500 | 20 (7.19) |
| Education, *n* (%) | |
| Mothers | |
| Primary | 58 (20.86) |
| Secondary | 100 (35.97) |
| Higher | 120 (43.16) |
| Fathers | |
| Primary | 95 (34.17) |
| Secondary | 105 (37.77) |
| Higher | 78 (28.06) |
| Number of children in families, *n* (%) | |
| One | 89 (32.01) |
| Two | 130 (46.76) |
| Three | 40 (14.39) |
| > 3 | 19 (6.83) |

status, age of parents, or the number of children in the family. Antivaccination arguments were known to less than half of the respondents, i.e. 126 (45.32%). This was significantly more common among people living in large cities than rural areas and small towns ($p < 0.001$). Such a likelihood increased with income per family member ($p < 0.001$) and parental level of education (for mothers $p < 0.001$; for fathers $p < 0.001$). No other significant differences were observed between the subgroups in this analysis (Table 2).

The most commonly known anti-vaccination arguments were that they were associated with autism ($n = 34$, 12.23% of respondents) or other neurological diseases or developmental disorders ($n = 17$, 6.12%), induced serious post-vaccination complications, without precisely defining them ($n = 30$, 10.79%), caused diseases (without any specific indication) ($n = 17$, 6.12%), contained potentially harmful substances in vaccines ($n = 14$, 5.04%), and that they were ineffective and unnecessary ($n = 14$, 5.04%). Less common were the belief that vaccination causes a decrease in immunity ($n = 8$, 2.88%), excessive vaccination overloads the immune system ($n = 5$, 1.8%), and that they cause allergies ($n = 5$, 1.8%), shock, and even death ($n = 4$, 1.44%). Two parents indicated that freedom of choice was limited by obligatory vaccination, and another 2 that vaccinations were performed for the benefit of pharmaceutical companies.

## PARENTAL OWN NEGATIVE OPINIONS ON VACCINATION

Some of the surveyed parents also reported their own negative opinions on vaccination (Figure 1). For example, 13.31% reported that vaccinations are unnecessary due to the low incidence of infectious diseases and low risk of infection. This view was significantly more likely to be expressed by older people (for mothers $p < 0.001$; for fathers $p = 0.006$). 6.12% believed that a disease is a better way to immunize a child than vaccinations. 11.87% of respondents indicated that vaccinations cause serious complications, 19.06% that they can cause neurodevelopmental disorders, including autism, and 7.55% that they are a risk factor for the development of chronic allergic diseases. 12.59% of the respondents believed that children commence vaccinations too early, and over 16% believed that vaccinations overload the immune system of children.

19.06% of respondents believed that compulsory vaccination limited their parental rights. This opinion was significantly more common in large cities (where 54.72% of responders agreed with this statement) than in small towns (24.53%) or rural areas (20.75%; $p = 0.033$). Holding such a belief was also related to lower paternal level of education ($p = 0.021$). No other statistically significant differences were found between the tested subgroups.

## THE INFLUENCE OF KNOWLEDGE OF ANTIVACCINATION MOVEMENTS ON THE PARENTAL BELIEFS REGARDING VACCINATION

Awareness of the existence of antivaccination movements, personal familiarity with antivaccination proponents, and awareness of their views had a significant influence on the beliefs held by the respondents regarding vaccination (Table 3). People aware of the existence of anti-vaccine movements were more likely than unaware that vaccines caused serious complications ($p = 0.061$), to believe that children commenced vaccination too early ($p = 0.016$), and to believe that measles is a mild disease and that children do not require vaccination against it ($p = 0.004$).

Familiarity with anti-vaccine arguments was related to the belief that vaccines caused serious complications ($p = 0.003$), including developmental disorders such as autism ($p < 0.001$) and chronic allergic diseases ($p < 0.001$), as well as the view that children commence vaccination too early ($p < 0.001$) and that receiving high numbers of vaccinations overloads the immune system ($p < 0.001$). Respondents who were personally familiar with antivaccination proponents were much more likely to believe that vaccination causes serious complications ($p < 0.005$), including developmental disorders, such as autism ($p < 0.001$). They were also more likely to believe that vaccination in children is initiated too early ($p < 0.001$) and that the immune system becomes overloaded by large numbers of vaccinations ($p < 0.001$).

Interestingly, having a child who had experienced vaccine adverse events (VAE) was found to have a similar influence on views on vaccination as familiarity with antivaccination arguments. In total, VAE was reported at least once after vaccination by 121 (43.53%) respondents. This group were significantly more likely to believe that infection is a better way to build immunity than vaccination ($p = 0.009$), that vaccinations can cause serious complications ($p < 0.001$), that they increase the risk of developing chronic allergies ($p = 0.003$), that they are performed at too young an age ($p = 0.003$), and that high numbers of vaccinations overloads the immune system of the child ($p < 0.001$) (Figure 2).

## THE INFLUENCE OF KNOWLEDGE OF ANTIVACCINATION MOVEMENTS ON REALISATION OF COMPULSORY AND RECOMMENDED VACCINATIONS

Despite awareness of the existence of antivaccination movements and widespread awareness of antivaccination arguments, almost all (96.40%) respondents vaccinated their children in accordance with the current vaccination schedule. Awareness of the existence of antivaccination movements was found to have a different influence on

**TABLE 2.** The awareness of anti-vaccine movements according to demographic characteristics of groups

| Parameters | Awareness of the existence of anti-vaccine movements $N = 156$ (100%) | *p* | Presence of anti-vaxxers in the respondent's environment $N = 92$ (100%) | *p* | Knowledge of the arguments of anti-vaxxers $N = 126$ (100%) | *p* |
|---|---|---|---|---|---|---|
| Family, *n* (%) | | | | | | |
| One-parent-family | 19 (46.34) | 0.170 | 10 (24.39) | 0.340 | 15 (36.59) | 0.220 |
| Parents living together | 137 (57.81) | | 81 (34.18) | | 111 (46.84) | |
| Multigenerationality, *n* (%) | | | | | | |
| Yes | 9 (34.62) | 0.020 | 5 (19.23) | 0.100 | 9 (34.62) | 0.240 |
| No | 147 (58.33) | | 86 (34.13) | | 117 (46.43) | |
| Number of mother's, *n* (%) | | | | | | |
| < 35 years | 80 (57.14) | 0.720 | 55 (39.29) | 0.005 | 62 (44.29) | 0.720 |
| > 35 years | 76 (55.07) | | 36 (24.32) | | 64 (46.38) | |
| Number of father's age, *n* (%) | | | | | | |
| < 35 years | 64 (53.33) | 0.890 | 48 (40.00) | 0.001 | 54 (45.00) | 0.640 |
| > 35 years | 92 (58.23) | | 43 (27.22) | | 72 (45.57) | |
| Place of residence, *n* (%) | | | | | | |
| Village – agricultural farm | 42 (48.28) | 0.004 | 21 (24.14) | 0.003 | 26 (29.89) | < 0.001 |
| Small town | 35 (47.30) | | 21 (28.38) | | 29 (39.19) | |
| Large city or its suburbs | 79 (67.52) | | 49 (41.88) | | 71 (60.68) | |
| Subjective assessment of the financial situation, *n* (%) | | | | | | |
| Very good or good | 89 (57.42) | 0.670 | 62 (40.00) | 0.004 | 72 (46.45) | 0.150 |
| Average | 66 (55.00) | | 28 (23.33) | | 54 (45.00) | |
| Bad | 1 (33.33) | | 1 (33.33) | | 0 (0.00) | |
| Average monthly income in PLN per person, *n* (%) | | | | | | |
| < 500 | 15 (42.86) | 0.004 | 6 (17.14) | 0.001 | 6 (17.14) | < 0.001 |
| 500–1500 | 91 (54.49) | | 48 (28.74) | | 77 (46.11) | |
| 1500–2500 | 56 (60.71) | | 27 (48.21) | | 31 (55.36) | |
| > 2500 | 16 (80.00) | | 10 (50.00) | | 12 (60.00) | |

**TABLE 2.** Cont.

| Parameters | Awareness of the existence of anti-vaccine movements $N = 156$ (100%) | $p$ | Presence of anti-vaxxers in the respondent's environment $N = 92$ (100%) | $p$ | Knowledge of the arguments of anti-vaxxers $N = 126$ (100%) | $p$ |
|---|---|---|---|---|---|---|
| Mother's education, *n* (%) | | | | | | |
| Primary | 18 (31.03) | < 0.001 | 13 (22.41) | 0.008 | 12 (20.69) | < 0.001 |
| Secondary | 50 (50.00) | | 25 (25.00) | | 31 (31.00) | |
| Higher | 88 (73.33) | | 53 (44.17) | | 83 (69.17) | |
| Father's education, *n* (%) | | | | | | |
| Primary | 38 (40.00) | < 0.001 | 18 (51.43) | < 0.001 | 29 (82.86) | < 0.001 |
| Secondary | 59 (56.19) | | 31 (29.52) | | 41 (39.05) | |
| Higher | 59 (67.05) | | 42 (47.73) | | 56 (63.64) | |
| Number of children in families, *n* (%) | | | | | | |
| One | 48 (53.93) | 0.76 | 32 (35.96) | 0.570 | 37 (41.57) | 0.580 |
| Two | 76 (58.46) | | 44 (33.85) | | 63 (48.46) | |
| Three or more | 32 (54.24) | | 15 (25.42) | | 26 (44.07) | |

beliefs regarding compulsory and recommended vaccinations; however, personal familiarity with antivaccination proponents and their views appeared to have a greater effect. Parents who were personally acquainted with antivaxxers were less likely to implement compulsory vaccinations than those who were not ($p = 0.026$), as were those who were aware of their views. However, recommended, i.e. non-compulsory, vaccinations were more likely to be observed by parents who were aware of the existence of antivaccination movements compared to those who were not ($p = 0.023$), as well as those who were acquainted with antivaccination proponents ($p < 0.001$) and their views ($p < 0.001$) (Figure 3).

## DISCUSSION

More than half of the surveyed parents were aware of the existence of antivaccination movements, and over a third reported being personally acquainted with antivaccination proponents; it was more frequently reported by parents living in large cities, with a higher level of education and a better financial situation, i.e. people with good access to vaccinations. Therefore, it may be particularly beneficial to focus on these groups when targeting vaccination awareness activities.

Faleńczyk *et al.* [21] reported that 71% of Polish parents indicated negative opinions on vaccination. Similarly to the present study, these people tended to have completed higher levels of education. An analysis of statements made by parents on social media by Canadian researchers [15] showed that only 43% of comments regarding vaccinations were clearly positive: 35% were negative, 17.1% were ambivalent, and 4.3% contained various doubts.

Some of the surveyed parents presented negative views on vaccination. In addition, it was found that familiarity with antivaccination movements may have a negative influence on the beliefs of parents regarding vaccination. These views also appeared to be influenced by the child encountering VAE.

The continuing decline in the number of infectious diseases, as well as more efficient diagnosis and treatment, appear to have diminished the value of vaccinations [4]. Indeed, over 13% of respondents consider them unnecessary and over 6% believe that it is better to acquire immunity by surviving the disease itself. Similarly, Kałucka *et al.* [22] reported that more than a quarter of parents consider vaccinations unnecessary due to the rareness of infectious diseases, and that they offer little benefit to offset the risk of VAE.

Among the surveyed parents, the nature of the claim that vaccination causes "serious complications" remains unclear. Many indicated an association between vaccination and the occurrence of neurodevelopmental problems and allergies. The belief that vaccine use is associated with autism proposed by Wakefield *et al.* [23] may come as a surprise today because it has been disproved in a number of clinical trials [11, 19, 24–29].

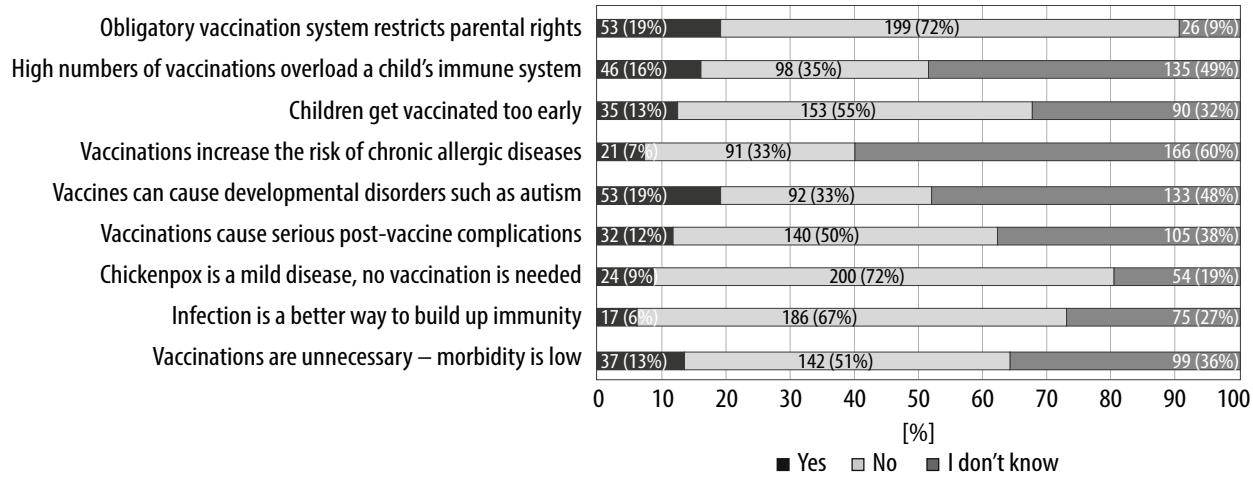


**FIGURE 1.** Anti-vaccination beliefs held by the parents

Faleńczyk *et al.* [21] found the negative beliefs about vaccinations given by parents most often concerned post-vaccination complications such as autism, or that the vaccines themselves were ineffective, contained harmful compounds, or caused death. In the present study, a significant proportion of the surveyed parents were concerned about the presence of potentially harmful substances in the vaccines, despite the fact that such vaccines have to complete thorough clinical trials, and that claims regarding the harmfulness their ingredients (e.g. thiomersal) have been successfully challenged by credible scientific evidence [11, 19, 30, 31]. Kałucka *et al.* [22] indicated that nearly 40% of surveyed parents believe that vaccines are insufficiently tested and contain dangerous compounds, and Gawlik *et al.* [32] reported that parents expressing concern about the composition of vaccines are particularly concerned about new vaccines.

In contrast, an international study found parents in several European countries to generally have a positive attitude towards vaccination. Even so, the results varied depending on the commitment to vaccination by the state, the demographic situation, the economic status of the participants, and the method of recruitment [33].

In the present study, a small proportion of respondents believed that children commenced vaccination too early, and that vaccination could overload the immune system of the child. Such claims were included among the list of beliefs expressed by anti-vaccine movements. Previous studies in Poland have found parents to have doubts about recommended and obligatory vaccinations, to be concerned about giving their children excessive vaccines in too short a time, and the occurrence of VAE, and to believe that vaccinations weaken the natural immune system [32, 34]. Similarly to our present findings, Rogalska *et al.* [34] reported that such concerns were more often expressed by older and more educated parents and those in urban areas.

Gawlik *et al.* [32] reported that almost one-third of surveyed parents believed that vaccination disrupts the natural development of the immune system, and one-fifth that vaccination can be successfully replaced with a healthy lifestyle. In these studies, 37.3% of respondents believed that vaccinations are administered too early in life and 43.9% that there are too many of them. In contrast, a Chinese study found that parental education did not appear to influence concerns about vaccination; simultaneously, it was noted that using the Internet as a source of information was a cause of fear of vaccination and combination vaccines in infants up to 6 months of age [35].

Only a small proportion of our respondents reported that obligatory vaccination restricts freedom of choice and that vaccines only profit pharmaceutical companies. Kałucka *et al.* [22] found that nearly 23% of parents, especially educated ones, would like to abolish the obligation to vaccinate children. Similarly, Hornsey *et al.* [6] found parents with specific personality traits, such as highly hierarchical views, low tolerance towards restricting freedom and a tendency to conspiratorial thinking, as well as those who are afraid of needles and injections, to be significantly more likely to express such views. Demographic parameters, such as education, were found to have a less significant influence; however, these demonstrated greater significance in the present study.

Our present findings indicate that awareness of the existence of antivaccination movements, personal acquaintance with antivaccination proponents, and their views regarding vaccination have a significant influence on attitudes towards vaccination. Interestingly, although this impact is quite obvious for compulsory vaccinations, this was not the case for recommended vaccinations: awareness of the existence of antivaccination movements and familiarity with antivaccination proponents and their views were found to have an inverse relationship with the implementation of recommended vaccinations. This may be due to parents attempting to broaden their knowledge on the subject based on various sources, and consciously considering the arguments supporting and

**TABLE 3.** Anti-vaccine movements and parental anti-vaccination beliefs

| Anti-vaccination beliefs held by the parents | Awareness of the existence of anti-vaccine movements, *N* = 278 (100%) | | Presence of anti-vaxxers in the respondent's environment, *N* = 278 (100%) | | Knowledge of the arguments of anti-vaxxers, *N* = 278 (100%) | |
|---|---|---|---|---|---|---|
| | Yes 156 (100%) | No 122 (%) | Yes 126 (%) | No 152 (%) | Yes 92 (%) | No 186 (%) |
| Vaccinations are unnecessary – the morbidity is low, *n* = 37 | 15 (9.62)*** | 22 (18.03) | 16 (12.7)*** | 21 (13.82) | 9 (9.78) | 28 (15.05) |
| Infection is a better way to build up immunity, *n* = 17 | 12 (7.69) | 5 (4.10) | 11 (8.73)* | 6 (3.95) | 7 (7.61) | 10 (5.38) |
| Chickenpox is a mild disease, no vaccination is needed, *n* = 24 | 17 (10.90)** | 7 (5.74) | 14 (11.11) | 10 (6.58) | 9 (9.78) | 15 (8.06) |
| Vaccinations cause serious vaccination complications, *n* = 33 | 24 (15.38) | 9 (7.38) | 23 (18.25)** | 10 (6.58) | 18 (19.57)** | 15 (8.06) |
| Vaccines can cause developmental disorders, e.g. autism, *n* = 53 | 33 (21.15) | 20 (16.39) | 37 (29.37)*** | 16 (10.53) | 30 (32.61)*** | 23 (12.37) |
| Vaccinations increase the risk of chronic allergic diseases, *n* = 21 | 14 (8.97) | 7 (5.74) | 17 (13.49)*** | 4 (2.63) | 10 (19.87) | 11 (5.91) |
| Children get vaccinated too early, *n* = 35 | 26 (17.11)* | 9 (7.38) | 25 (19.84)*** | 10 (66.67) | 21 (22.83)*** | 14 (7.53) |
| Too many vaccinations 'overload' a child's immune system, *n* = 45 | 29 (28.59) | 16 (13.11) | 30 (23.81)*** | 15 (9.87) | 23 (25.00)*** | 22 (11.83) |

** < 0.05, ** < 0.01, *** < 0.001*

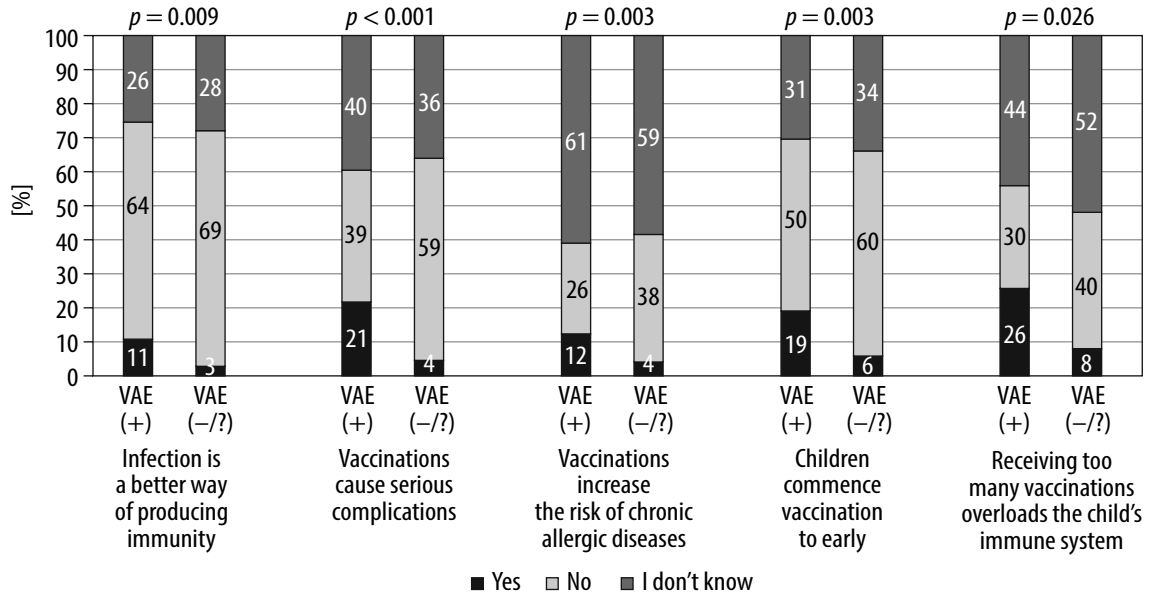


**FIGURE 2.** The influence of vaccine adverse events in the child on parental anti-vaccinations beliefs
*VAE – vaccine adverse events*

undermining their own position, when making an autonomous decision to immunize their child. This group should be supported through educational activities, by providing rational arguments based on reliable research supporting decisions about vaccination and refuting false theories about their harmfulness. However, such an approach poses a difficult challenge for GPs, who would be required to improve communication with increasingly demanding parents, especially in the context of previous findings [16].

The main limitation of the study is the different ages of the children of the surveyed parents – from 1 to 18 years of age. Over the past 2 decades, the calendar of vaccinations and availability of recommended vaccinations in Poland have changed, which could have influenced the implementation of vaccinations. However, the knowledge of anti-vaccine movements and the parents' views on vaccinations were mainly assessed. The second limitation is the fact that a survey was conducted among the parents of hospitalized children. A child's illness re-

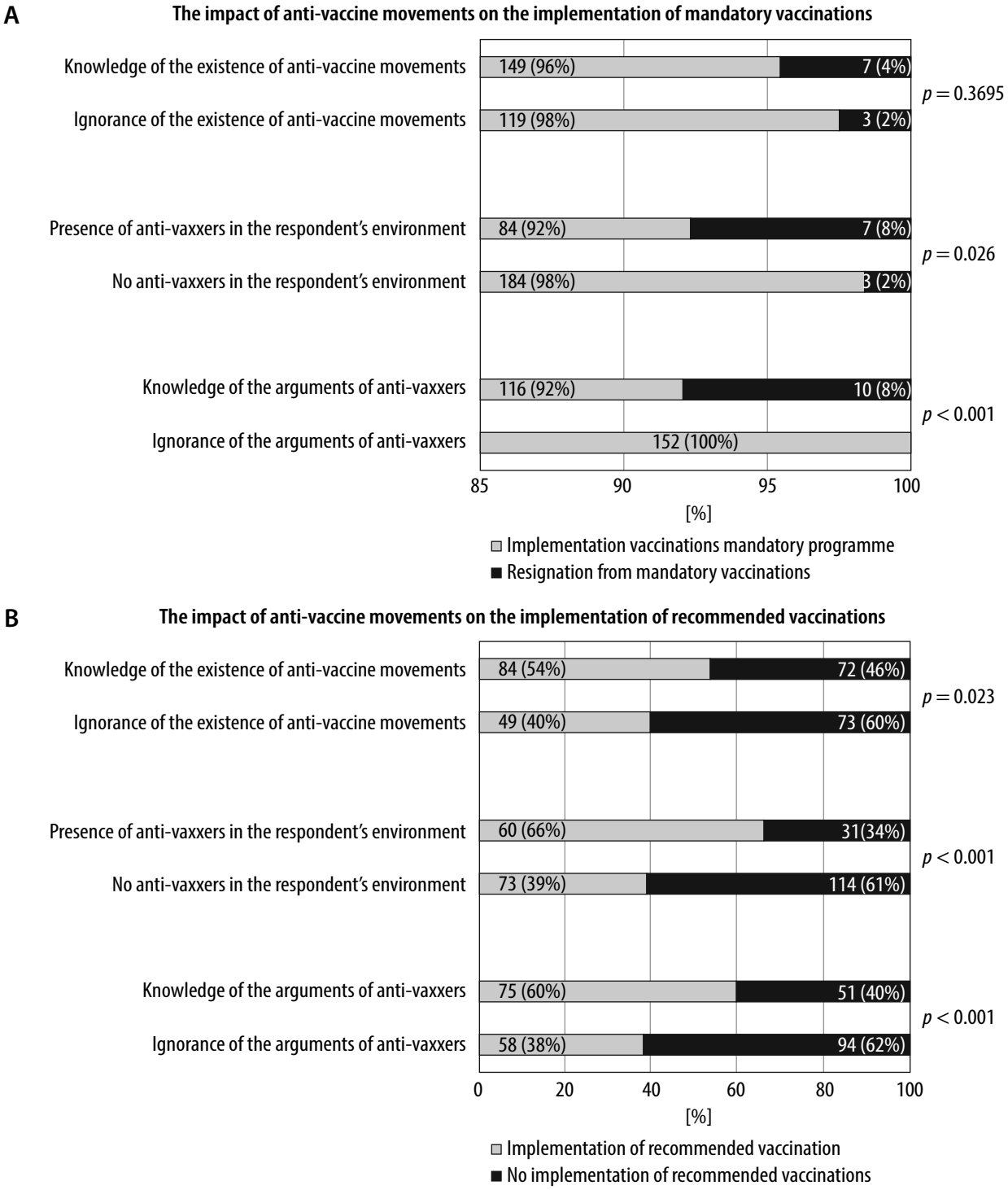


**FIGURE 3.** The impact of anti-vaccine movements on the implementation of vaccinations

quiring hospitalisation could have influenced the parents' perception of vaccination issues. Nevertheless, the study excluded parents of children who had chronic diseases, especially those requiring vaccine modification.

## CONCLUSIONS

Knowing about the existence of antivaccination movements influences parental attitudes towards vaccination. Many people with potentially high awareness of vaccinations and access to them are familiar with the arguments of antivaccination proponents. Therefore, this group should be included in educational activities based on individualized content presented according to conscious expectations and needs.

## DISCLOSURE

The authors declare no conflict of interest.

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