



Original research article

The impact of the emotions that frame mothers' decision-making about the vaccination of toddlers

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Abstract

Introduction: Anti-vaccination campaigns have been broadened with a strong negative impact on the parental refusal of vaccination despite of the fact that fatal diseases had been greatly reduced thanks to mandatory vaccination programmes valid in Slovakia.

Methods: We used the questionnaire implemented by the Slovak public health institution to collect meaningful data, analysing the attitudes of 875 mothers of two-years old kids towards vaccination and the impacts of their emotional beliefs on decision-making.

Results: The results showed the correlation between attitudes to vaccination and variables such as age ($p = 0.136$), parenting ($p = 0.037$), regional district ($p = 0.326$), emotional backgrounds ($p = 0.043$) and life experiences ($p = 0.015$). The emotions have a significant impact on decision-making about vaccination in the first step and on the rational conclusion to get a child vaccinated ($p = 0.025$).

Discussion: In the sample of 875 women, the refusal of vaccination was found to reflect multiple factors, including family background, perceptions about healthy lifestyle and aspects of the natural immune system of children, awareness of risks of the diseases; perceived disadvantages of vaccines; its adverse effects compared to the efficacy, and negative experience with vaccination in the family or social environment in relation to the emotional effects.

Conclusions: Most of the parents call for non-mandatory vaccination and they are convinced that vaccination should be at everyone's free choice. On the other hand it can bring great chaos to the vaccination system, break preventive strategies and collective immunity, and may spread many old and new serious diseases into the population.

Keywords: Decision-making process; Emotionality; Frame effects; Toddlers; Vaccination

Introduction

We decided to focus on the attitudes to toddlers' vaccination for its controversy, inconsistency and plurality of opinions between the professionals and parents as well. These attitudes are very often associated with ethical dilemmas linked with the confusion, fear and mistrust spread in the compulsory vaccination system. It is hard to look for solutions and the lay public often make decisions on the basis of strong emotions, the impact of the Internet, unprofessional anti-vaccination campaigns, misleading information and negative stories about the vaccine risks. It turns out that the effect of emotionality has a strong influence on parents' decisions about childhood vaccination.

The parents complain that the quality of information that is provided by the national health authorities about the benefits and risks of vaccination is not very well presented. It is not persuasive enough that the benefits of vaccination are worth it. Instead they decide that not to vaccinate is the better option. Their decisions are based upon stories that they hear about. They decide without the full resource of verified facts about the benefits.

Emotionality and vaccination

Every state maintains some vaccine requirements for children who are entering public schools. However, almost all states allow religious or philosophical exemptions (Whelan, 2016).

Health-related information found on the Internet is increasing and has an impact on decision-making regarding the attitudes of parents to vaccination decisions. Research has shown that narrative information can impact treatment decisions, even when statistical information is presented concurrently. It has shown an inverse relation between the number of narratives reporting adverse events and vaccination intentions – which was mediated by the perceived risk of vaccinating. The study emphasizes that there is a stronger influence of the narratives versus the actual statistical information that shows benefits versus risks. The results are that the highly emotional narratives had a greater impact on the perceptions of vaccination (Betsch et al., 2011).

There is a differential impact of the message connected to vaccination aspects that influence the degree of perceived risk associated with childhood vaccination. Research has shown that when people begin to believe the broad spectrum of information and stories from internet that vaccination can or will cause the possible bad consequences of a vaccination, then

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<http://doi.org/10.32725/kont.2019.020>

Submitted: 2018-06-21 • Accepted: 2019-01-06 • Prepublished online: 2019-04-15

KONTAKT 21/2: 189–196 • EISSN 1804-7122 • ISSN 1212-4117

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they are less willing to go through the vaccination program. The perceived risk associated with a given behaviour is conceptualized as the subjective perception, leading to an unpleasant outcome (Ferguson et al., 2003). Based on this evidence, MMR immunization may be viewed by the general public as a prevention behaviour that is associated with potential health risks (Bellaby, 2003). Hatoková and Bašňáková (2017) have also presented that the beliefs and ideas based on emotionality may be particularly important when people respond to vaccination information.

Another study looks at the interaction between the content of the treatment and how it is formatted. This determines how the audience receives the message. Audiences using a peripheral route (pictures of someone after a vaccination) to persuasion are more likely to agree with the message. When the source in their opinion, is trustworthy the message carries a lot of weight. This is true even if the argument itself is weak. Strong arguments presented in the public service announcement will effectively appeal to emotions. It shows the impact of the strong arguments presented in the public service announcement based on the emotionality on the perception effects (Kang et al., 2006).

De Martino et al's study (2006) highlights the importance of incorporating emotional processes within models of human choice and suggests how the brain may modulate the effect of these biasing influences to approximate rationality. This so-called "framing effect" was specifically associated with amygdala activity, and suggests a key role for an emotional system in mediating decision biases. Human beings bring a broad range of additional emotional information into the decision-making process.

Hertwig et al. (2013) and Jacobson et al. (2013) described this deviation from rational decision-making, which they called the framing effect, as a key aspect of prospect theory. The framing effect is the model of influence of emotion on the decision-making process; we describe the example of a model situation of the framing effect on the basis of the vaccination against cervical cancer. In case of a positive and negative frame, model A and model B are identical, only presented in a different way.

Table 1. Framing effect model

Frame	Model A	Model B
Positive	Vaccine saved about 1.5 million women per year	44% – saved lives 56% – no women saved
Negative	2 million women died	44% – nobody died 55% – all women died

Abhyankar et al. (2008) present the impact of framing on the willingness to vaccinate a child and show the disadvantages of the negative frame effect of information on decision-making about vaccination. Abhyankar sees that the negative frame effect is more persuasive than the positive one. Pointing out the risks posed by the disease more effectively influences people to vaccinate. Describing potential dangers puts individuals into the "domain of losses". This makes them more tolerant of the perceived risks than messages about the benefits of vaccines.

Willingness to vaccinate a child was also identified in correlation with the negative model of information about vaccination risks and diseases published in the public media. The correlates of vaccination intentions included health beliefs and attitudes (perceived risk of HPV infection, perceived safe-

ty and effectiveness of HPV vaccines, perceived physician encouragement for vaccination) and previous health behaviour (HIV testing) (Gerend and Shepherd, 2007).

One's motivation and ability to process the message are the key predictors of one's attentional focus. Some message format features may attract people's attention without their conscious self-control and willingness. For example, if information shows vaccination damage examples to increase the number of people involved in a vaccination programme, this might not attract automatic attention and it can have an opposite impact (Ma and Stahl, 2017).

None of the pro-vaccine messages created by public health authorities increased intent to vaccinate with MMR among a nationally representative sample of parents who have children aged 17 years or younger. Corrective information reduced misperceptions about the vaccine/autism link, but nonetheless decreased intent to vaccinate among parents who had the least favourable attitudes toward vaccines. Moreover, images of children who have MMR and a narrative about a child who had measles actually increased beliefs in serious vaccine side-effects (Nyhan et al., 2014). The study highlights the strong emotional impact of public information about vaccines on the parental decision-making about vaccination for toddlers (Marsh et al., 2013; Nyhan et al., 2014).

Our study was inspired by the research of Nyhan et al. (2014) focused on analysing the effect of 4 different types of information about vaccination that make impact on the parental decision to vaccinate children including sample of 1,759 parents.

The results detected the high impact of emotionality on the effectiveness of perceived information and willingness to get a child vaccinated. Our study is aimed at analysing the impact of emotional feelings on the parental decisions to reject vaccination. It includes a questionnaire with different levels of emotional perceptions.

Materials and methods

The study was designed as quantitative research based on the standardized questionnaire adopted from the Slovak public health institution (RÚVZ SR). It was modified to analyse attitudes of mothers toward childhood vaccination. The sample comprised 875 mothers of toddlers. A three-part survey was used to collect data from January to May 2018 including the sample criteria: **a)** the age of the mother from 20 to 40 years; **b)** the age of children – mothers of toddlers; **c)** the counselling visits at the paediatrician – minimum once every three months; **d)** taking care of a child for at least 18 months; **e)** agreement with participation in the research study; **f)** marriage. 875 mothers were recruited and data were collected by: **1.** making direct contact at paediatrician offices, at the offices of medical specialists that are visited by toddlers, and at Maternity Care Centres, and **2.** using online tools and social networks – Forum for health, Blue Horse, Facebook, Montessori Groups.

The research study is based on the 3 domains, analysing the impact of the various factors and emotionality on decision-making about the compulsory and optional vaccination of toddlers.

Demographic factors influencing the attitudes to vaccination

We looked at the impact of demographic indicators on the willingness of parents to get children vaccinated. We looked at the

research of others, e.g. (Smith et al., 2004) – there should be positive correlation between willingness to get a child vaccinated and the level of education of their mothers. On the other hand – the age of the mothers, the number of children that they had, and whether the parents were married should have a negative correlation with their attitude about vaccinating their child vaccination.

1. Attitudes of mothers to vaccination and influencing factors

The research is based on the impact of various indicators on the willingness of parents to undergo a vaccination programme for toddlers. We found a relation between positive attitudes towards getting a toddler vaccinated and other factors such as education and age of the mothers. Number of children or lifestyle can have a negative impact on the rejection of childhood vaccination.

2. The subjective perceptions of vaccine risks

There are many factors influencing the decision making of mothers to get a child vaccinated. Over the past few years, vaccination rates in Slovakia have been steadily declining. There are multiple causes for this: changes in the socio-cultural environment, lack of trust towards state institutions, freely available medical information; and, primarily, parental fear for their children and concerns about vaccine safety. Other studies emphasise the strong impact of media messages on the perception of vaccine risks (Nyhan et al., 2014).

3. Effect of emotionality on attitudes to vaccination and decision making

Based on the research, highly emotional narratives had a greater impact on the perceptions of vaccine risks (Betsch et al., 2011). On the other hand the di Martino study shows that humans use a broad range of additional emotional information in their decision-making process (De Martino et al., 2006).

Research question 1: What attitudes do mothers have towards the vaccination of toddlers?

Research question 2: What factors influence the decision of mothers to refuse childhood vaccination?

Research question 3: How does emotionality influence decision-making about vaccination?

Coding and statistical analyses of data were completed using the SPSS 7.0 package program. A percentage was used to evaluate the parameters of age, marital status, educational, occupational status, the district of living and maternity. The *t* test was applied to determine differences between the mean attitude to vaccination and emotionality scores according to maternity and education. Pearson correlation analysis was used to detect the relationship between attitudes to vaccination, emotional domains and decision-making. Significance in all statistical analyses was defined as $p < 0.05$.

Results

The research is based on analysing the attitudes of mothers towards the vaccination programme – including the vaccine Infanrix hexa and synflorix/prevenar13 + MMR vaccine – and exploring the relationship between emotionality and decision-making about childhood vaccination.

Using Multivariate Analysis of Variance, which was designed to compare the levels of qualitative variables in several groups in which the base set is decomposed into multiple nominal-type variables, we identified the following:

Completed education (56.3% with university degree: 43.7% with secondary education) has no impact on attitudes toward childhood vaccination. Limits: Achieved education does not have to correctly reflect the educational level, in view of the possible high number of mothers who do not have health education or a medical degree, they have only lay information about vaccination.

Parenting

For the purposes of this research, all respondents (whether they had already taken care of children at the time of enrolment) are referred to as “mothers of toddlers”. Only mothers with one or more children were included in the research. A positive correlation between mothers’ willingness to vaccinate children and the number of children in the family has been identified. Mothers with at least two children have a more positive attitude towards vaccinations compared to mothers with only one child who show a lower willingness to vaccinate. A significant influence of parenthood on decision-making about vaccinations has been shown ($p = 0.0435$): Mothers with one child are less willing to vaccinate children compared to other mothers. Limitations: Fathers were not included in the research study. The most of the care about toddlers is upon the shoulders of mothers, including visits to paediatrician clinics and free time activities at mother care centres or browsing social networks such as Blue Horse, Montessori Group mostly browsed by women. That is why we did not get in touch with fathers during the recruitment process of the study.

There is also a significant relationship between the age and the mother’s attitudes toward childhood vaccination ($p = 0.0372$). Younger mothers up to 35 years-old are more willing to risk not vaccinating. They have a higher negative attitude about vaccinating. Their children are less often vaccinated, or not vaccinated at all, compared to older mothers over 35. The older mothers prefer not to face the risks of non-vaccination. Younger mothers prefer to pursue healthy lifestyles, with the hopes that they build immunity through a natural pathway. They prefer not to use artificial resistance by vaccinations. Older women prefer to build collective immunity by nationwide vaccination ($p = 0.0341$).

Place of residence and region

The place of residence does not influence the variable of attitudes to vaccination ($p = 0.257$). Whether mothers live in the village or in the city has not showed significant differences in attitudes towards vaccination. In terms of the region where they came from ($p = 0.0274$), mothers from Bratislava (24%) and Banská Bystrica (21%) have the highest negative attitudes towards vaccinations compared to others. The most positive attitudes were expressed by mothers living in the Prešov region (28%) and the Košice region (25%). Limitations: The sample was more or less evenly divided into 8 Slovak regions. A typical phenomenon is that most of the Slovak inhabitants leave from the eastern regions to the Bratislava district, which can influence the outcomes of the research.

Social status

The study has not showed a correlation between job-placement and attitude to vaccination. A strong sample consisted of women on parental leave and women working part-time ($p = 0.269$). Limitations: We did not focus on the specific professions of the sample due to most of them being on maternity or parental leave. It would be interesting to consider this variable as well.

Table 2. Characteristics of the sample

Variables/demographic characteristics	Paediatricians <i>n</i> = 386	Mothers care centres	Online recruitment	Social network <i>n</i> = 489	<i>p</i>
	<i>N</i> (%)	Mean	<i>N</i> (%)	Mean	
Education		1.0		2.0	<0.231
university	229 (59.32)		207 (42.33)		
high school	157 (40.67)		282 (57.66)		
Age		29.4		31.3	<0.034
22–24 years	91 (23.57)		92 (18.81)		
25–29 years	152 (39.37)		133 (27.19)		
30–34 years	76 (19.69)		157 (32.10)		
over 35 years	67 (17.35)		107 (21.88)		
Residence		2.0		2.0	<0.164
village	155 (40.15)		93 (19.01)		
city	231 (59.85)		296 (60.53)		
Marriage		1.0		2.0	<0.073
married	204 (52.84)		198 (38.65)		
engaged (shared household)	161 (41.70)		279 (57.05)		<0.048
divorced	21 (5.44)		12 (2.45)		
Parenting					<0.065
1 child	151 (39.11)		254 (51.94)		<0.041
2 children	235 (60.88)		217 (44.37)		<0.037
more than 2	23 (4.70)		18 (3.68)		
Social status		2.0		2.0	<0.235
maternity leave	106 (27.46)		111 (22.70)		
parental leave	167 (43.26)		203 (41.51)		
part-time job	82 (21.24)		136 (27.81)		
unemployed	31 (8.03)		39 (7.98)		
Awareness of vaccination		2.0		1.0	<0.044
good	102 (26.42)		222 (45.39)		
low	181 (46.89)		162 (33.12)		
poor	103 (26.68)		105 (21.47)		

There is the significant relationship between demographic variables and the attitudes to childhood vaccination identified by the study. The results figured out the correlation between attitudes to vaccination and demographic variables such as age ($p = 0.034$), parenting ($p = 0.037$), social status ($p = 0.235$), vaccination awareness ($p = 0.044$) and marriage ($p = 0.048$).

The vaccination attitudes of mothers

RQ1: What attitudes do mothers have toward the vaccination of toddlers?

The results show three attitudes to childhood vaccination based on final decision-making to get a toddler vaccinated. Our findings identified 3 types of attitudes: **1.** positive attitude to vaccination; including passing the compulsory vaccination programme for toddlers which is accepted in Slovakia as increasing the collective immunity in society; **2.** negative attitude to vaccination characterized by parental refusal of vaccination and highlighting vaccine risks, vaccine side-effects and natural immunity process; **3.** neutral attitude presenting the willingness to re-vaccinate a child in the future and a dual approach to vaccine risks.

Research findings suggest the positive pro-vaccine approach to information is not very effective. Pro-vaccine intervention does not increase intent to vaccinate among mothers of toddlers who have the least favourable attitude toward vaccines. The effectiveness of those messages may vary depending on parental attitudes toward vaccines. There is a correlation in emotional perception about information about risks and vaccination side effects and the mothers' decision-making about vaccination.

Luckily, most of the mothers have a positive attitude towards childhood vaccination. On the other hand, they face the strong media influence and emotionality connected with the

spread of information about the risks of vaccination, especially with the MMR vaccine.

Ma and Stahl (2017) highlight that an anti-vaccine online social group's posts exhibited sentimental rhetoric and graphic information about vaccine injury and have identified four attributes (sentimentality, reductionism, tautology, and insularity) that may affect parental information seeking and sharing. Parents need to be guided towards open-minded and critical approaches to seeking and assessing online health information linked to childhood vaccination.

RQ2: What factors influence the decision of mothers to refuse childhood vaccination?

The results showed the relationship between attitudes to vaccination and other variables such as age ($p = 0.034$), parenting ($p = 0.037$), social status ($p = 0.235$), vaccination awareness ($p = 0.044$) and marriage ($p = 0.048$). Younger mothers with one child are less willing to accept the vaccination programme compared to older mothers, social status has an impact on the decision to reject vaccination, mothers with a modern lifestyle are not scared of the financial penalty and their beliefs surrounding the vaccination risks are far stronger. Not all of them have good vaccination awareness and they are keener on receiving information from the public media. Our research findings suggest a necessity to increase the vaccination awareness, to eliminate false myths about vaccines and to reduce anti-vac-

ination campaigns. These campaigns based on myths are breaking the system of vaccination immunization. The study of Betsch and Wicker (2012) showed that healthcare professionals lack awareness about national guidelines and lack knowledge about vaccines (both specific attributes including beliefs about contraindications, as well as beliefs about vaccine-related health damages). Their lack of awareness of these issues leads to a decreasing number of vaccinated children and an increasing number of parents who refuse to allow their children to get vaccinated.

We used a 20-item scale measuring beliefs and attitudes; we identified 8 factors or subscales, which were used in subsequent analyses. These factors included normative beliefs, or emotional beliefs influencing the decision-making (two items,

$p = 0.129$), barriers to vaccination related to vaccination side effects and risks (three items, $p = 0.032$), practical barriers related to vaccination (two items, $p = 0.076$), barriers related to insufficient knowledge about childhood vaccination (two items, $p = 0.079$), benefits of vaccination related to health and safety (two items, $p = 0.042$), benefits of vaccination related to protection of population (two items, $p = 0.034$), prevention of related disease (one item, $p = 0.025$), and fear of shots in general (two items, $p = 0.179$). We also included a scale assessing MMR-related stigma, which we had developed previously (8 items, $p = 0.78$). Cronbach's alpha for the two-item scale measuring future attitudes to vaccination and willingness of re-vaccination was $p = 0.026$, and belief in the change of vaccination programme to optional ($p = 0.014$).

Table 3. Mothers' attitudes to toddler vaccination

Decision-making statement	1 strongly agree	2 agree	3 disagree	4 totally disagree
Vaccination is dangerous	0.0325	0.0127	0.1581	-0.214
Vaccination is big business	0.1294	0.0286	0.0496	0.0874
Vaccination doesn't have a real point	0.0753	0.5173	-0.3252	-0.0358
Encourage collective immunity	0.0346	-0.2469	0.1137	0.0023
Prevention against serious diseases	0.0257	-0.3567	-0.1154	0.2562
Vaccination saves lives	0.0421	-0.3671	0.2586	0.3487
No re-vaccination in the future	0.0267	0.0247	0.1686	0.2496
Obligatory vaccination should be changed to optional	0.014	0.0121	0.1578	0.2148

There are many factors influencing the decision making of mothers to vaccinate, as shown by research results on the basis of completed age. Our research findings provide a model of the most common beliefs and factors underlying mothers' decisions about toddler vaccination. Being less willing to vaccinate a child is linked with general side effects/safety concerns (relationship observed in 24%, $p = 0.0226$), lack of perceptions of vaccine effectiveness and importance (17%; $p = 0.0583$), belief that vaccine causes autism (7%, $p = 0.1151$), own and others' experiences of vaccines (26%, $p = 0.0257$) and vaccine adverse events (22%, $p = 0.0341$), belief in anti-vaccination campaigns with the emotional basis and arguments (23%, $p = 0.0325$), belief in the danger of immune overload (8%, $p > 0.05$), thinking about vaccine as a business (5%, $p = 0.148$), and belief that children receive too many shots (3%, $p = 0.2174$).

The study found the significant correlation between attitudes to vaccination and emotionality in the process of decision making, respectively the emotional power of the spread information about vaccination ($p = 0.0325$).

The emotionality has been monitored on 4 levels: **1.** I am more easily influenced by the opinions of others (family, friends, co-workers) – the presented story raises strong emotions in me; **2.** I am mainly influenced by expert arguments. In other words, the expert can convince me of the harmfulness of vaccination; **3.** My experiences in life are my guide; **4.** I make my decision based upon my convictions.

The study showed the relationship between level of emotionality (identified by the sample on the scale from 1 to 4) and attitudes to childhood vaccination (Table 4).

Many mothers are not entirely polarised in their opinions of vaccination. Usually they have mixed views and beliefs about vaccination. They hold a diverse profile of attitudes to vaccination and combine the multifactorial aspects of the decision making in relation to the emotionality. There is a high

relation with neutral attitude and decision-making about vaccination ($p = 0.0382$).

On the other hand, the strong emotional feelings affect the decision itself, mainly in the first phase of decision-making. However, ultimately it does not play a key role. It is rationality under the influence of emotions. Mothers are more compelled to look for more detailed information about vaccination and relevant facts that would refute their beliefs or their attitude. There is an example of how emotionality and a high statement (without research evidence) can negatively influence the attitudes to vaccination. "The increased cases of autism observed over the past two decades is a result of the combined MMR vaccine, which overwhelms the immune system with three simultaneous viral infections causing increased gut permeability to neurotoxins, thereby causing irreversible brain damage leading to autism" (Betsch and Wicker, 2012). This statement is strong enough to encourage parental refusal of MMR vaccines or even open up misunderstandings and doubts about vaccination in general.

Table 4 presents the levels of emotionality influencing the decision-making about childhood vaccination. These can be multifactorial, based on the power of the spread of information, temperament of the mothers and value system, and associated with amygdala activity and emotional system.

The study figured out the relationship between the level of emotionality identified by the sample and attitudes to vaccination (Table 4, $p = 0.014$). Those who are easily influenced prefer the negative frame to others. They are more likely to see the side effects of vaccinations rather than positive aspects (e.g. children with permanent damage after MMR vaccine, $p = 0.011$). People with positive frame and with strong own convictions are less likely to refuse the vaccination due to symptoms of diseases ($p = 0.026$) and non-vaccination risks ($p = 0.034$). People facing personal experience with vaccination

Table 4. Effect of emotionality on attitudes to vaccination

	1	2	3	4
Negative frame/level of emotionality				
real stories about the relation between vaccination and harmful effects, e.g. autism	0.044	0.041	0.158	0.087
the amount of undesirable effects of vaccines and possible negative consequences after vaccination	0.021	0.028	0.137	0.049
negative personal experiences are stronger than the willingness to vaccinate toddlers	0.159	0.033	0.027	0.172
scary stories of children with permanent consequences after vaccination	0.011	0.162	0.138	0.015
I always do things according to my conviction	0.164	0.154	0.032	0.005
Positive frame/level of emotionality				
false myth about vaccinations and autism	0.129	0.114	0.036	0.012
dangerous risks and outcomes in case of non-vaccination	0.145	0.069	0.038	0.034
symptoms of infected childhood diseases shown in the media	0.025	0.072	0.063	0.026
scary stories of infected children	0.157	0.048	0.578	0.162
I always do things according to my conviction	0.186	0.050	0.814	0.135
Neutral frame/level of emotionality				
vaccination should be the free choice of everyone	0.148	0.136	0.043	0.076
vaccination has positive and negative aspects	0.008	0.034	0.084	0.095
vaccination is not for everybody	0.143	0.038	0.027	0.165

totally agreed with the following statement: Negative personal experiences are stronger than the willingness to get toddlers vaccinated ($p = 0.027$).

There is a fear and conviction that vaccines themselves may cause those diseases against which they are made to defend against, or at least cause serious complications. That gives room for anti-vaccination movements based on the negative emotions, fear and lack of trust. The mothers speak about violations of their human rights by making the Slovak vaccination programme obligatory. They call for a change and freedom of choice (31.5%). There are also neutral attitudes presented in some mothers' opinions: Vaccination is not for everybody (11.4%) and vaccination brings positive and negative aspects in itself (17.6%). 39.5% of the sample think the vaccination programme should remain compulsory to prevent and reduce diseases, save lives and build collective immunity. If the vaccination decision is on the basis of free will, many Slovaks would definitely not vaccinate, which could lead to an infectious disaster, which was something that was agreed on by 40% of mothers.

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There is a fear and conviction that vaccines themselves may cause those diseases against which they are made to defend against, or at least cause serious complications. That gives room for anti-vaccination movements based on the negative emotions, fear and lack of trust. The mothers speak about violations of their human rights by making the Slovak vaccination programme obligatory. They call for a change and freedom of choice (31.5%). There are also neutral attitudes presented in some mothers' opinions: Vaccination is not for everybody (11.4%) and vaccination brings positive and negative aspects in itself (17.6%). 39.5% of the sample think the vaccination programme should remain compulsory to prevent and reduce diseases, save lives and build collective immunity. If the vacci-

nation decision is on the basis of free will, many Slovaks would definitely not vaccinate, which could lead to an infectious disaster, which was something that was agreed on by 40% of mothers.

RQ3: How does emotionality influence decision-making about vaccination?

Those who can be easily persuaded are more likely to adopt an anti-vaccination philosophy and totally refuse the childhood vaccination. They do not have medical education and are easily influenced by the mistrustful internet information about vaccination, preferring emotionality to rationality in decision-making. They believe more strongly in the dangers of vaccination, vaccination side effects, risks and strong vaccine shots, and prefer natural immunization to vaccination.

Information specifically covering vaccine efficacy trials, vaccination coverage, and institutional vaccine policy does not have an impact on the positive decision-making about vaccination. On the other hand, vaccine-critical websites resonate more and anti-vaccination strategies travel quickly across social networks. The messages spread that are based on emotionality can strongly influence the decision-making process and can lead to parental refusal of vaccination.

Discussion

The study evaluated the association between mothers' beliefs and vaccine attitudes, the association between emotionality and their decision to delay or refuse vaccines for their toddlers, and finally most of them do not cover immunization programme of two-year old children. The results showed four types of mothers' attitudes to vaccination: **1.** unconditionally accepts vaccination with less risk concerns; **2.** the hesitant parent, mostly accepts, but has great concerns; **3.** selectively vaccinates, the vaccine is only postponed or accepted; **4.** total refusal of public vaccination programme with negative attitudes to the risks.

This study explored which factors are important in the refusal of childhood vaccination by mothers of toddlers. Similar to Masaryk's study (Masaryk and Hatoková, 2017), our research has found that most refusal of vaccination is based on the deliberate decision-making of parents. Our results show that this decision is based on multiple factors, such as the lifestyle of parents, perceptions about the body and the immune system of the child, risk perception of diseases and vaccina-

tion side effects, perceived vaccine effectiveness, perceived advantages of experiencing the disease, personal negative experience with vaccination, and parents' social environment. In addition, this study shows that the use of online focus groups is an effective qualitative research method resulting in meaningful data.

Refusal of childhood vaccination may be influenced by concerns about vaccine components, low perceived likelihood and severity of the infectious diseases, and a trusting relationship with a natural healer or another respected person who doubts vaccination safety and effectiveness (Benin et al., 2006). It is important to communicate clearly and comprehensibly, identify the concerns of a particular parent, provide clear answers and logical arguments for vaccination, discuss options and draw attention to the negative consequences of both vaccinations and non-vaccinations (Jacobson et al., 2013). The issues of the harm, distrust and access might play a role in refusing childhood vaccination (Hertwig et al., 2013). Hilton showed that some parents fear an overload of the immune system caused by combination vaccines (Hilton et al., 2006). Additionally, the perception that vaccination is dangerous makes parents more uncomfortable about vaccine risks, and researchers have identified potential risks associated with unreliable health information obtained through social media (Mitra et al., 2016).

Our findings support the important role of negative frame effects on the attitudes to childhood vaccination. Mothers with stronger emotionality about vaccination issues are less likely to get a toddler vaccinated and they prefer not to pass through the vaccination programme that is compulsory in Slovakia ($p = 0,018$).

According to Masaryk and Hatoková (2017), parents who refused vaccination made a well-considered decision based on an assessment of the benefits and the risks of vaccination, the child's susceptibility to the potential disease, and the acceptance of responsibility for that decision. Our research confirmed the correlation between decision-making and the assessment of benefits and risk of vaccinations for toddlers ($p = 0,027$).

We have found that emotionality has an impact on decision-making about vaccination, and this effect, or the very presence of this influence, depends on the type of information message on which emotional manipulation is performed. To get deeper into the nature of this impact and reach a more explicit interpretation, further study of this would be appropriate.

Besides the perceived risk of disease versus vaccination, our findings, as well as those of Gerend and Shepherd (2007), suggest parents fear that the immune system in infancy is not adequately developed for a good response to vaccination. They apparently have not received enough information about the influence of vaccines on the immune system of their child, and their resulting doubts cause them to refuse vaccination. Mothers in this study indicated that when they start searching for information, it is hard to find reliable information and to make

a choice from all the information they have found. Mothers also face a lot of ethical dilemmas linked to childhood vaccination that can lead to refusal.

Research limitations

There are some limitations of this study to be considered when interpreting the data. Firstly, the intentional selection process of the participants and smaller sample size means that the study sample may not be representative of all mothers of toddlers. It also focusses only on female attitudes to vaccination and does not include fathers in the study. Secondly, emotionality and its impacts can be analysed from different points of views, we could not cover all of them due to personal capacity, no financial support and due to the time-schedule of the research.

Conclusions

Despite the enormous success of the vaccination program in Slovakia and the decreasing number of people infected with dangerous diseases or preventable diseases, the thinking surrounding the importance of vaccination has changed from a tool that encourages collective immunity to a compulsory tool of the state to support the pharmaceutical business. There are increasing numbers of parents who refuse to vaccinate their children. Fear of potentially deadly diseases has been replaced by the fear of real and, more often, imaginary side effects of vaccination. This is only encouraged by the emotional feelings of parents and emotional arguments against vaccination which are based on the long-term studies.

Our findings show the great impact of the negative frame effect on attitudes towards childhood vaccination. It is not easy to find a solution to this problem. However, most important is continuing the public education and increasing awareness about vaccination side effects, and addressing vaccine refusal by respectfully listening to parental concerns and discussing the risks of non-vaccination. The study showed that publishing the risks about non-vaccination and the consequences of fatal diseases is more effective in increasing the willingness to get vaccinated than promoting the positive aspects of vaccines and its safety.

Conflict of interests

The author has no conflict of interests to declare.

Ethical considerations

All respondents – the mothers involved in the research, were informed about the study goals before the data collection, and it was emphasized that participation is voluntary and anonymous. In completing the questionnaire, they automatically agree to participation in the research.

Vplyv emócií na rozhodovanie matiek o očkovaní detí

Souhrn

Úvod: Kampane proti očkovaní sa rozšírili a majú silný negatívny dopad na rodičovské odmietanie základného očkovania napriek skutočnosti, že smrteľné ochorenia boli výrazne potlačené a znížené vďaka povinným očkovacím programom, ktoré sú platné na Slovensku.

Metódy: Základným výskumným nástrojom bol dotazník upravený na základe slovenskej verejnej zdravotníckej inštitúcie na zhromažďovanie údajov, cieľom bola analýza postojov k očkovaní u 875 matiek dvojročných detí a zistenie vplyvu emocionality na rozhodovací proces.

Výsledky: Výsledky výskumu ukázali koreláciu medzi postojmi k očkovaní a premennými, ako je vek ($p = 0,136$), rodičovstvo ($p = 0,037$), regionálny okres ($p = 0,326$), emocionálne pozadie ($p = 0,043$) a životné skúsenosti ($p = 0,015$). Tieto emócie majú významný vplyv na rozhodovanie o očkovaní v prvom kroku a determinujú racionálne závery o detskom očkovaní ($p = 0,025$).

Diskusia: Na vzorke 875 žien sa zistilo, že na odmietnutie očkovania majú vplyv viaceré faktory vrátane rodinného zázemia, vnímanie zdravého životného štýlu a aspektov prirodzeného imunitného systému detí, uvedomenie si rizík chorôb; vnímané nevýhody vakcín; jeho nepriaznivé účinky v porovnaní s účinnosťou a negatívne skúsenosti s očkovaním v rodinnom alebo sociálnom prostredí vo vzťahu k emocionálnym účinkom.

Záver: Väčšina rodičov požaduje nepovinné očkovanie a sú presvedčení, že očkovanie by malo byť na slobodnej voľbe každého. Na druhej strane to môže priniesť veľký chaos do vakcinačného systému, naruší preventívne stratégie a kolektívnu imunitu a zároveň prispieť k rozšíreniu starých a nových závažných ochorení medzi väčšinovú populáciu.

Kľúčové slová: dočatá; emocionalita; očkovanie; rámcový efekt rozhodovania; rozhodovací proces

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