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SOME FACTORS AFFECTING THE DECISION ON NON-MANDATORY VACCINATION IN AN INFLUENZA PANDEMIC: COMPARISON OF PANDEMIC (H1N1) AND SEASONAL INFLUENZA VACCINATION

NEKATERI DEJAVNIKI ODLOČANJA ZA PROSTOVOLJNO CEPLJENJE V PRIMERU PANDEMIJE GRIPE: PRIMERJAVA CEPLJENJA PROTI PANDEMSKI GRIPI (H1N1) IN SEZONSKI GRIPI

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Abstract

Background: *The 2009 influenza pandemic caused by the influenza A (H1N1) 2009 virus was accompanied by a debate about whether or not to be vaccinated. The percentage of people who decided to be vaccinated was lower than in the case of seasonal influenza vaccination. We therefore compared factors influencing the decision on pandemic and seasonal influenza vaccination.*
Method: *Slovene inhabitants aged 18 and over (N=1383) completed an internet based survey on socio-demographic and health behaviour-related characteristics, personality traits, and characteristics of decision-making. Two stepwise logistic regression analyses were performed, one with an uptake of the pandemic influenza vaccine and the other with an uptake of the seasonal influenza vaccine as a dependent variable.*
Results: *In addition to common predictors of a decision in favour of the two vaccinations (age, gender, chronic illnesses, working in healthcare, trust in media news and vaccination side-effects in someone close), deciding in favour of vaccination against the pandemic virus was related to living with children and thoroughness in decision-making. It was also related to being vaccinated against seasonal influenza, trust in pandemic vaccine safety and professional information in favour of vaccination, and the decision of someone close.*
Conclusions: *In the face of the pandemic threat and lack of information, people behaved as they had in previous similar situations and according to the behaviour of people close to them and information from trusted sources. Concern for children and decision-making characteristics also became important. These factors should be considered in future crisis interventions.*

Key words: influenza A (H1N1) 2009, seasonal influenza, vaccination, logistic regression, decision-making, pandemic

Pregledni znanstveni članek
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Izvleček

Izhodišče: *Pandemijo gripe, ki jo je v letu 2009 povzročil virus influence A (H1N1), so spremljale polemike o tem, ali se je smiselno cepiti ali ne. Delež oseb, ki so se odločile za cepljenje, je bil nižji kot v primeru cepljenja proti sezonski gripi. Zato smo želeli dejavnike, ki so vplivali na odločitev za cepljenje proti pandemski gripi, primerjati z dejavniki, ki vplivajo na odločitev za cepljenje proti sezonski gripi.*
Metoda: *Polnoletni Slovenci (N=1383) so na spletnem vprašalniku poročali o svojih socialno-demografskih lastnostih in z zdravjem povezanih vedenjih, osebnostnih potezah in značilnostih odločanja. Izvedli smo dve logistični regresiji,*

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pri čemer je v prvi odvisno spremenljivko predstavljala odločitev o cepljenju proti pandemski gripi, v drugi pa odločitev glede cepljenja proti sezonski gripi.
Rezultati: *Poleg skupnih napovednikov, ki vplivajo na odločitev za obe cepljenji (starost, spol, kronične bolezni, zaposlitev v zdravstvu, zaupanje medijem in pojav morebitnih stranskih učinkov po nekem cepljenju pri bližnji osebi) je bilo cepljenje proti pandemski gripi povezano tudi s tem, ali posameznik živi z otroki ali ne, z njegovo temeljitostjo pri odločanju, z odločitvijo za cepljenje proti sezonski gripi, zaupanjem v varnost cepiva proti pandemski gripi in v strokovne informacije v prid cepljenju ter s podobno odločitvijo bližnje osebe.*
Zaključki: *V primeru grozeče pandemije in pomanjkljivih informacij se ljudje obnašajo v skladu s svojim vedenjem v preteklosti in z vedenjem bližnjih oseb ter v skladu z informacijami iz virov, ki jim zaupajo. Pomembna dejavnika, ki vplivata na odločitev o cepljenju, postaneta tudi skrb za otroke in temeljitost odločanja. Vse naštete dejavnike bi morali upoštevati pri načrtovanju kriznih ukepov v prihodnosti.*

Ključne besede: virus H1N1, sezonska gripa, cepljenje, logistična regresija, odločanje, epidemija

1 Background

During the pandemic of influenza A (H1N1) 2009, vaccination against this virus was strongly recommended by public health officials. Nevertheless, the vaccination rate remained very low in various countries (1–3). In Slovenia, it was approximately 5.1% by the end of the pandemic peak (4), while the usual annual vaccination rate against seasonal influenza is 7.3% (5). In several other countries, it was found that, even though the information provided during the 2009 outbreak of pandemic influenza generated high levels of concerns about the pandemic, it did not reassure adults of the safety and value of the pandemic influenza vaccine (6). It is believed that the low coverage rate was related to a lack of concern about the individual risk of influenza, the perceived risk of vaccine side effects and mistrust of information provided by public health or governmental authorities (7), resulting from the fact that alarming public health messages were counteracted by daily personal experiences that did not confirm the threat (8). We wanted to explore what factors might have led to the low coverage rate in Slovenia. The aims of our study were: (i) to explore what factors distinguish people who decided to be vaccinated against pandemic A (H1N1) influenza in 2009 from those who decided not to, and (ii) to examine whether the decision on receiving the pandemic influenza vaccine was affected by different factors than the decision about seasonal influenza vaccination, which at that time did not yet contain the pandemic A (H1N1) strain and was accepted in a situation without elements of panic present. Defining the main factors affecting the decision about the two vaccinations might help improve the strategies and conditions for future vaccination implementation.

Previous studies have found that various factors affect an individual's decision about different non-mandatory vaccinations. Choosing to be vaccinated against seasonal influenza is negatively related to the perceived likelihood of vaccine side-effects (9-12), doubts about the risk of influenza and the need for vaccination, concerns about vaccine effectiveness, dislike of injections (13), confidence in a good health status (14) and distrust of modern medicine (15). In contrast, the decision to be vaccinated against seasonal influenza is positively affected by the perception of being in a high-risk group (12, 15, 16), by older age (9), previous hospitalization and chronic illness (17), stronger fear of contracting the influenza (10), higher levels of perceived seriousness of the illness and higher levels of vaccination and knowledge about influenza (12), previous vaccinations (9, 15, 18) and perceived effectiveness of the vaccine (9). Cultural attitudes and beliefs about disease and immunization, social group norms about health behaviour, peer group influences and media coverage of vaccine-related issues may also be important (19). For example, Bigham and colleagues (20) reported a negative short-term effect of media coverage about the suspension of an immunization program in one country on the acceptance of such a program in another. Particularly for the acceptance of influenza immunization, it is decisive whether the media give sufficient (risk/benefit) information and whether the information inclines towards vaccination or not (21). Since the viability of public health interventions such as influenza vaccination is particularly susceptible to public perceptions created by media portrayals of the health risk (22), an individual's trust in the media might be the next most important factor. Recommendations from healthcare professionals, e.g., a doctor (16, 23) and the recommendations and advice of a health authority may also be important (1).

Studies of factors affecting a decision for or against pandemic vaccination found the perceived susceptibility

to the disease and the amount of danger associated with receiving the vaccine to be important, similarly as for seasonal influenza (1, 6, 8, 24, 25). In healthcare workers, the major barrier against being vaccinated against pandemic influenza was fear of side effects (1), which was more pronounced in those who received information on vaccine safety from television and radio (2). The vaccination rate was higher in people who also received seasonal influenza vaccination (1, 2, 8, 18, 25, 26), in medical professionals (2, 27), in older (2, 8) and more educated people (25) and in males (8, 25).

We wanted to explore further what affected the decision about vaccination against pandemic influenza in the general Slovenian population and, additionally, to examine the importance of different psychological traits that may direct a person's behaviour in an ambiguous situation when the decision is very difficult. Namely, it has previously been shown that personality dimensions are associated with protection-related motivations. For example, in individuals volunteering for HIV vaccine trials, neuroticism was positively related to perceived risk of HIV infection and a desire for protection from HIV (28). Anxiety level was related to the adoption of precautionary measures against SARS (29). One might expect psychological traits such as anxiety to become more prominent when making a decision on vaccination in a pandemic, such as the A (H1N1) 2009 influenza pandemic. Last but not least, decision-making characteristics might differentiate between people who decide to receive the vaccine from those who decide not to do so. In order to compare decision situations with similar content but different levels of ambiguity, we contrasted the factors affecting the acceptance of pandemic influenza vaccination with those affecting the acceptance of seasonal influenza vaccination.

2 Method

2.1 Instruments

We constructed an internet based questionnaire with three thematic sections. The first section included questions about basic socio-demographic factors, such as gender, age, education, employment status (we specifically checked for employment in healthcare), residence location and people living in the participant's household. In the health section, we checked for the presence of chronic illnesses in the respondent and in his/her close relatives or friends (those he/she sees regularly or lives with), whether or not he/she had been vaccinated for seasonal influenza in previous seasons and the current season, possible non-local side-effects of vaccines received and whether or not he/she had been vaccinated for pandemic influenza (the respondent, his/her children under the age of 18 and his/her close friends or family).

The psychological section of the survey focused on the frequency of following the news, trust in media news, trust in information for and against receiving the pandemic influenza vaccine given by healthcare professionals and trust in H1N1 influenza vaccine safety. Trust was measured on a 5-point scale (1 = I do not trust at all, 5 = I trust very much). Furthermore, we included three inventories: (i) STAI X-2 (30) for measuring trait anxiety, (ii) BFI-10 (31) for measuring personality dimensions (Extraversion, Conscientiousness, Neuroticism, Openness and Agreeableness) and (iii) a self-constructed Decision-making Inventory (DMI), based on the questionnaire used in the study by French and colleagues (32), with four new items added to the original 21. The same 4-point scale was used as in STAI X-2. In unweighted least squares factoring of DMI items, four items were excluded due to loadings lower than 0.30 and, after Oblimin rotation, an interpretable five-factor solution was obtained on the remaining items. Only the first two factors had satisfactory internal consistency (Cronbach's alpha coefficient higher than 0.60) and were used in further analysis. The first factor, *Control* (alpha = 0.80), consisted of six items. Five of them were items from the original questionnaire ('I enjoy making decisions', 'I remain calm when I have to make decisions very quickly', 'I feel in control of things', 'I prefer to avoid making decisions if I can' [reverse-coded], 'I find it difficult to think clearly when I have to decide something in a hurry' [reverse-coded]) and one item was new ('I make decisions fast'). The second factor (alpha = 0.66) consisted of four items. Three were the same as in the original four-item scale ('I plan well ahead', 'I work out all the pros and cons before making a decision', 'My decision-making is a deliberate logical process') and one item was new ('Before I accept a decision I double-check my information resources to make sure I have the right data'). This factor was called *Thoroughness in decision-making*. Average scores on each scale of the different inventories were obtained by averaging the scale items.

2.2 Procedure

The study was conducted with the approval of the ethical committee of the Department of Psychology, University of Ljubljana. The survey was available online. The participants were recruited via an e-mail in which the aim of the study was explained. The snowball principle was used — the first mails were sent to the authors'

various personal contacts, who were asked to spread the invitation e-mail further to several acquaintances, in order to reach as wide an audience as possible. Despite that, healthcare workers were over-represented in the sample (since one of the authors works in the healthcare area). We therefore later treated *working in healthcare* as a special variable in the analysis.

2.3 Participants

Slovene inhabitants older than 18 years (N = 1383) completed the survey from the 3rd to 11th of February, 2010, when the survey had to be terminated because the Ministry of Health of the Republic of Slovenia announced that they intended to publish the content of the contract with the H1N1 vaccine provider, which could affect the responses of participants. The average age of the respondents was 37.07 years (SD = 12.05). The age structure was as follows: 23.8% of participants were 18–27 years old, 35.7% 28–37 years, 19.5% 38–47 years, 13.8% 48–57 years, 6% 58–67 years, 0.9% 68–77 years and 0.3% were more than 78 years old. The majority (74.0%) of the sample were female (n = 1023). They had completed an average of 14.7 years of schooling (SD = 2.2). The majority (72.6%) were employed (including 19.1% in healthcare), 5.4% were unemployed (compared to 10.6% in the general population), 5.6% retired and 16.5% were students. One third (32.7%) reported having had at least one chronic illness. The pandemic influenza vaccine was received by 223 (16.1%) and the seasonal influenza vaccine was received by 255 (18.4%) participants.

2.4 Data analysis

Two forward stepwise binary logistic regressions based on the likelihood ratio test (with entry at p = 0.05 and removal at p = 0.10) were performed with SPSS/PASW Statistics 18, in order to identify the most important factors affecting the decision about vaccination. With the first regression, having received the seasonal influenza vaccination was used as a dependent variable and it was predicted with variables related to general characteristics, i.e., age, years of formal education, psychological traits etc. (see Tables 1 and 2 for the list of variables). With the second regression, vaccination against the pandemic influenza was predicted in two blocks. In Block 1, the same variables as in the seasonal influenza vaccination model were entered and in Block 2, variables related to the pandemic influenza vaccination — vaccination against seasonal influenza in the current and previous seasons, trust in professional information in favour of or against pandemic vaccination, trust in pandemic influenza vaccine safety and whether someone close to a respondent had received the pandemic influenza vaccine — were additionally entered in the model. For statistical inference, the level of alpha error was set to 0.05.

3 Results

In Tables 1 and 2, those who received the pandemic influenza vaccine are compared to the rest of the sample and also those who received the seasonal influenza vaccination are compared to those who did not. There is a lot of overlap in the results of the two sets. In the group vaccinated against pandemic (or seasonal) influenza, there was a slightly lower percentage of females and of those who reported that people close to them had a history of non-local side-effects after vaccination. A higher percentage was employed or retired, lived in a city and lived with their partners and children. More people in the group vaccinated against pandemic influenza than in the non-vaccinated group regularly receive the seasonal influenza vaccine and also received it in the current season. A higher percentage vaccinated their children against seasonal and pandemic influenza and reported that they had close relatives or friends who received the vaccine.

Table 1. Comparison of groups making different decisions about vaccination against pandemic influenza virus and seasonal influenza virus.

Tabela 1. Primerjava skupine oseb, ki so se odločile za cepljenje proti pandemski in proti sezonski gripi, s skupino oseb, ki se za cepljenji ni odločila.

	Received vaccination against pandemic influenza / Cepljenje proti pandemski gripi			Received vaccination against seasonal influenza / Cepljenje proti sezonski gripi	
Variable / Spremenljivka	No / Ne (*n* = 1160)	Yes / Da (*n* = 223)		No / Ne (*n* = 1128)	Yes / Da (*n* = 255)
Females/ Ženske	872 (75.2)	151 (67.7)		848 (75.2)	175 (68.6)
Employment/ Zaposlitveni status					
Employed/ Zaposlen	825 (71.1)	179 (80.3)		804 (71.3)	200 (78.4)
Unemployed/ Nezaposlen	66 (5.7)	8 (3.6)		68 (6.0)	6 (2.4)
Retired/ Upokojen	55 (4.7)	22 (9.9)		51 (4.5)	26 (10.2)
Student/ Študent	214 (18.4)	14 (6.3)		205 (18.2)	23 (9.0)
Employed in healthcare/ Zaposlen v zdravstvu	116 (10.0)	76 (34.1)		110 (9.8)	82 (32.2)
Residence location/ Kraj bivanja					
City/ Mesto	752 (64.8)	166 (74.4)		733 (65.0)	185 (72.5)
Town/ Kraj	185 (15.9)	31 (14.4)		176 (15.6)	40 (15.7)
Countryside/ Vas	223 (19.2)	26 (11.7)		219 (19.4)	30 (11.8)
Lives with a partner/ Živi s partnerjem	687 (59.2)	165 (74.0)		675 (59.8)	177 (69.4)
Had non-local side effects after vaccination[a]/ Prisotnost sistemskih stranskih učinkov po cepljenju[a]	70 (6.0)	17 (7.6)		68 (6.0)	19 (7.5)
Someone close had non-local side effects after vaccination[a]/ Bližnji je imel sistemske stranske učinke po cepljenju	118 (10.2)	10 (4.5)		112 (9.9)	16 (6.3)
Was vaccinated this season against seasonal flu/ V tej sezoni se je cepil proti sezonski gripi	131 (11.3)	124 (55.6)		--	--
Usually vaccinated against seasonal flu/ Navadno se cepi	102 (8.8)	104 (46.6)		24 (2.1)	182 (71.4)
Someone close received the pandemic vaccine/ Bližnji se je cepil proti pandemski gripi	339 (29.2)	176 (78.9)		370 (32.8)	145 (56.9)
Frequency of following news[b]/ Pogostost spremljanja novic[b]					
Less than once a week/ Manj kot enkrat na teden	59 (5.1)	7 (3.1)		59 (5.2)	7 (2.7)
Once a week/ Enkrat na teden	71 (6.1)	10 (4.5)		74 (6.6)	7 (2.7)
A couple of times a week/ Nekajkrat na teden	377 (32.5)	63 (28.3)		363 (32.2)	77 (30.2)
Once a day/ Enkrat dnevno	362 (31.2)	72 (32.3)		346 (30.7)	88 (34.5)
Several times a day/ Večkrat dnevno	290 (25.0)	71 (31.8)		285 (25.3)	76 (29.8)

Usually follows news and gets informed about events …[b]/ Navadno spremlja novice in se informira …[b]					
On TV/ Na TV	510 (44.0)	113 (50.7)		497 (44.1)	126 (49.4)
In newspapers/ V časopisju	91 (7.9)	24 (10.8)		93 (8.3)	22 (8.6)
On internet/ Na internetu	442 (38.1)	60 (26.9)		423 (37.5)	79 (31.0)
On radio/ Preko radia	102 (8.8)	26 (11.7)		101 (9.0)	27 (10.6)
Elsewhere/ Drugje	14 (1.2)	0 (0.0)		13 (1.2)	1 (0.4)
Lives with children/ Živi z otroki	455 (39.2)	120 (53.8)		452 (40.1)	123 (48.2)
Had his/her children under age 18 vaccinated this season against seasonal flu[c]/ V tej sezoni je cepil svoje mladoletne otroke proti sezonski gripi[c]	10 (2.9[c])	16 (18.2[d])		3 (0.9)	23 (27.4)
Had his/her children under age 18 vaccinated against the pandemic/ Svoje mladoletne otroke je cepil proti pandemski gripi	0 (0.0[c])	37 (42.0[d])		14 (4.0)	23 (27.4)

Note. The frequency of the category within each group (and percentage in parenthesis) is shown. / Znotraj vsake skupine je prikazana pogostost kategorije spremenljivke (v oklepajih odstotki).
[a] Vaccination was not defined with a specific vaccine. / Cepljenje ni bilo posebej opedeljeno.[b]Data for one non-vaccinated participant was missing./ Manjka podatek ene osebe. [c]Percentage of 342 (i.e., the number of those who had children under age 18) was calculated. / Izračunali smo odstotek od 342 oseb, ki so imele mladoletne otroke. [d]Percentage of 88 (i.e., the number of those who had children under age 18) was calculated. / Izračunali smo odstotek od 88 oseb, ki so imele mladoletne otroke.

Table 2 shows that people who received either the pandemic or the seasonal influenza vaccine were on average older and reported a larger number of personal chronic illnesses than respondents who did not get vaccinated. Vaccinated respondents had a higher trust in media news, a much higher trust in information in favour of receiving the pandemic influenza vaccine and trust in vaccine safety and lower trust in information against pandemic vaccination. They also stated a higher probability that they would be vaccinated against seasonal and pandemic influenza next year. Vaccinated and non-vaccinated respondents did not differ notably in terms of the measured psychological traits, although the first reported being slightly more thorough in the process of making decisions than the latter.

The results of binary logistic regression for predicting the decision about pandemic vaccination are shown in Table 3. When comparing general factors that affect receiving seasonal influenza and pandemic influenza vaccination, it can be seen that several general variables entered both models: working in healthcare, age, trust in media news, gender, education, number of personal chronic illnesses, which all increased vaccination, and someone close having non-local side effects after vaccination, which decreased it. In addition, receiving the pandemic vaccine was positively predicted by thoroughness in making decisions, education and living with children.

Table 2. Means (and standard deviations in parenthesis) for interval variables with respect to being vaccinated against pandemic influenza and being vaccinated against seasonal influenza.
Tabela 2. Povprečja (v oklepajih standadni odkloni) za intervalne spremenljivke pri skupini oseb, ki se je odločila za cepljenje proti pandemski gripi in proti sezonski gripi, in skupini oseb, ki se za to ni odločila.

	Vaccinated against pandemic influenza / Cepljenje proti pandemski gripi			Vaccinated against seasonal influenza / Cepljenje proti sezonski gripi	
Variable/ Spremenljivka	No / Ne (n = 1160)	Yes / Da (n = 223)		No / Ne (n = 1128)	Yes / Da (n = 255)
Age/ Starost	36.06 (11.57)	42.27 (13.15)		35.29 (11.42)	42.11 (13.46)
Education (in years of schooling)/ Izobrazba (v letih šolanja)	14.55 (2.18)	15.34 (2.15)		14.58 (2.19)	15.12 (2.15)
Number of reported personal chronic illnesses Število kroničnih bolezni	0.41 (0.69)	0.62 (0.92)		0.40 (0.69)	0.62 (0.91)
Number of reported chronic illnesses in close friends and family/ Število kroničnih bolezni pri bližnjih	1.27 (1.40)	1.05 (1.28)		1.23 (1.38)	1.25 (1.40)
Trust in media news/ Zaupanje v novice v medijih	2.93 (0.76)[a]	3.09 (0.69)		2.93 (0.76)[b]	3.05 (0.70)
Trust in professional information in favour of pandemic influenza vaccination/ Zaupanje strokovnim informacijam v prid cepljenju proti pandemski gripi	2.21 (0.95)[a]	3.54 (0.87)		2.28 (0.99)[b]	3.03 (1.12)
Trust in professional information against pandemic influenza vaccination/ Zaupanje strokovnim informacijam proti cepljenju proti pandemski gripi	2.98 (0.97)[a]	2.70 (0.95)		2.98 (0.96)[b]	2.73 (0.99)
Trust in pandemic influenza vaccine safety/ Zaupanje v varnost cepiva proti pandemski gripi	2.16 (0.99)[a]	3.75 (0.89)		2.98 (0.96)[b]	2.73 (0.99)
STAI X-2 – Average response/ Povprečje odgovorov na STAI X-2	1.71 (0.40)	1.71 (0.39)		1.71 (0.41)	1.73 (0.39)
DMI – Control/ Kontrola	2.93 (0.54)	2.97 (0.55)		2.93 (0.54)	2.98 (0.54)
DMI – Thoroughness/ Temeljitost odločanja	2.72 (0.58)	2.84 (0.60)		2.73 (0.58)	2.81 (0.59)
BFI-10 – Extraversion/ Ekstravertiranost	3.79 (0.86)	3.76 (0.88)		3.78 (0.86)	3.78 (0.87)
BFI-10 – Accepting/ Sprejemljivost	3.93 (0.67)	3.91 (0.64)		3.94 (0.66)	3.89 (0.70)
BFI-10 – Conscientiousness/ Vestnost	4.01 (0.74)	4.01 (0.74)		4.00 (0.74)	4.07 (0.72)
BFI-10 – Neuroticism/ Nevrotičnost	2.56 (0.81)	2.56 (0.77)		2.56 (0.82)	2.54 (0.75)
BFI-10 – Openness/ Odprtost za izkušnje	3.76 (0.92)	3.67 (0.85)		3.77 (0.92)	3.65 (0.87)

Note. DMI denotes self-constructed Decision-making Inventory. / DMI je Vprašalnik o odločanju, ki smo ga sestavili sami. [a]n = 1159. [b]n = 1157.

In Block 2, when predictors related to influenza vaccinations were successively entered into the model for predicting vaccination against pandemic influenza, several variables from Block 1 became non-significant. Because a history of side-effects in people that are close, trust in media news, gender and education were related to trust in pandemic influenza vaccine safety, which was the strongest predictor of being vaccinated, they lost their predictive power when this predictor was entered in Block 2. When being vaccinated against seasonal influenza was entered as an independent variable in Step 3, the number of personal chronic illnesses lost some of its predictive power. When trust in professional information in favour of vaccination was entered in the final step, thoroughness in decision-making failed to reach statistical significance, whereas (dis)trust in media coverage became statistically significant. Finally, the model included all variables entered in Block 2 and some from Block 1. Receiving the H1N1 vaccination increased with receiving the seasonal influenza vaccine (approximately 4.5 times) and having close relatives or friends who had been vaccinated against the pandemic virus (5.4 times). Being vaccinated also increased with trust in pandemic vaccine safety and trust in professional information in favour of vaccination (3 times and 1.9 times per one point on the scale of trust, respectively). When controlling for these factors, the probability of being vaccinated remained higher for older people, those working in healthcare and those living with children but decreased for those with higher trust in media coverage (by 31% per one point increase on the scale of trust).

Table 3. Results of stepwise binary logistic regressions for predicting the decision about pandemic and seasonal influenza vaccination.

Tabela 3. Rezultati postopne binarne logistične regresije za napovedovanje odločitve o cepljenju proti pandemski in sezonski gripi.

	Step/ Korak								
Predictor/ Napovednik	1	2	3	4	5	6	7	8	9
Seasonal influenza vaccination / Cepljenje proti sezonski gripi									
Works in healthcare/ Zaposlen v zdravstvu	4.38***	4.25***	4.53***	4.72***	4.68***	4.76***			
Age/ Starost		1.04***	1.04***	1.03***	1.04***	1.03***			
Gender/ Spol			0.64**	0.65**	0.66*	0.67*			
Number of personal chronic illnesses/ Število kroničnih bolezni				1.26*	1.25*	1.26*			
Trust in media news/ Zaupanje v novice v medijih					1.24*	1.23**			
Someone close had side effects[a] after vaccination/ Bližnji je imel stranske učinke po cepljenju[a]						0.57*			
Pandemic influenza vaccination: Block 1/ Cepljenje proti pandemski gripi: Blok 1									
Works in healthcare/ Zaposlen v zdravstvu	4.64***	4.51***	4.66***	4.62***	4.93***	4.47***	4.64***	4.53***	4.62***
Age/ Starost		1.04***	1.04***	1.04***	1.04***	1.04***	1.03***	1.03***	1.03***
Someone close had side effects[a] after vaccination / Bližnji je imel stranske učinke po cepljenju[a]			0.36**	0.37**	0.39**	0.38**	0.37**	0.35**	0.36**
Trust in media news/ Zaupanje v novice v medijih				1.37**	1.36**	1.34**	1.33*	1.34**	1.33**
Gender/ Spol					0.63**	0.64**	0.65*	0.65*	0.67*
Education (years of schooling)/ Izobrazba (v letih šolanja)						1.09*	1.11**	1.11**	1.10*

Number of personal chronic illnesses/ Število kroničnih bolezni							1.32**	1.35**	1.36**
Lives with children/ Živi z otroki								1.39*	1.39*
Thoroughness in decision-making/ Temeljitost odločanja									1.32*
Pandemic influenza vaccination: Block 2/ Cepljenje proti pandemski gripi: Blok 2									
Works in healthcare/ Zaposlen v zdravstvu	3.44***	3.07***	2.34**	2.09**					
Age/ Starost	1.03***	1.04***	1.03**	1.04***					
Someone close had side effects[a] after vaccination / Bližnji je imel stranske učinke po cepljenju[a]	0.50	0.50	0.47	0.49					
Trust in media news/ Zaupanje v novice v medijih	0.90	0.86	0.84	0.69*					
Gender/ Spol	1.14	1.01	1.09	1.07					
Education (years of schooling)/ Izobrazba (v letih šolanja)	0.99	0.96	0.95	0.94					
Number of personal chronic illnesses/ Število kroničnih bolezni	1.39**	1.39*	1.29	1.28					
Lives with children/ Živi z otroki	1.84**	2.29***	2.33***	2.32***					
Thoroughness in decision-making/ Temeljitost odločanja	1.58**	1.57*	1.50*	1.37					
Trust in pandemic influenza vaccine safety/ Zaupanje v varnost cepiva proti pandemski gripi	5.04***	4.43***	4.15***	3.04***					
Someone close received the pandemic vaccine/ Bližnji se je cepil proti pandemski gripi		5.82***	5.51***	5.43***					
Received the seasonal flu vaccine[b]/ Cepil se je[b]			4.64***	4.47***					
Trust in professional information in favour of pandemic vaccination/ Zaupanje v strokovne informacije v prid cepljenju proti pandemski gripi				1.86***					

Note. The odds ratios for predictors entered in the model are shown for each regression step,. After the final step, the models had the following characteristics: for the seasonal influenza vaccination model - Hosmer-Lemeshow $\chi^2(8) = 11.93$, $p = 0.154$, Nagelkerke $R^2 = 0.158$; for Block 1 of the pandemic influenza vaccination model - Hosmer-Lemeshow $\chi^2(8) = 12.31$, $p = 0.138$, Nagelkerke $R^2 = 0.189$; for Block 2 of the pandemic influenza vaccination model - Hosmer-Lemeshow $\chi^2(8) = 6.40$, $p = 0.603$, Nagelkerke $R^2 = 0.659$. /
Opombe. Za vsak korak regresije pri posameznem napovedniku prikazujemo razmerja verjetja. Po zadnjem koraku so imeli modeli naslednje značilnosti: za napovedovanje cepljenja proti sezonski gripi Hosmer-Lemeshow $\chi^2(8) = 11.93$, $p = .154$, Nagelkerke $R^2 = .158$; za blok 1 napovedovanja cepljenja proti pandemski gripi Hosmer-Lemeshow $\chi^2(8) = 12.31$, $p = .138$, Nagelkerke $R^2 = .189$, za blok 2 pa Hosmer-Lemeshow $\chi^2(8) = 6.40$, $p = .603$, Nagelkerke $R^2 = .659$.
[a]A shot was not defined with a specific vaccine. / Cepljenje ni bilo posebej opredeljeno. [b]In the current season. / V trenutni sezoni.
*$p < .05$.**$p < .01$.***$p < .001$.

4 Discussion

Our study confirmed the importance of some already known factors of vaccination behaviour. However, our study also revealed some previously unknown factors influencing the decision for or against pandemic and seasonal influenza vaccination.

People who had higher trust in pandemic vaccine safety and in professional information in favour of vaccination and lower trust in the news provided by the media showed a greater tendency to be vaccinated against pandemic influenza. It seems that people who decided to be vaccinated relied mostly on professional information and disregarded information not originating from professionals. Rachiotis and colleagues (2) similarly found that healthcare workers who had received information about pandemic influenza vaccine safety from television and radio demonstrated an increased risk of reporting a negative attitude towards the vaccination due to a fear of side effects, whereas those who received information on vaccine safety from medical journals and professional institutions documented a higher probability of deciding to be vaccinated. Our results indicate that the mass media played a negative role in the process of deciding about vaccination.

Deciding in favour of pandemic vaccination increased among those who were vaccinated against seasonal influenza. This result is in line with the findings of other studies (2, 16, 25, 26, 33). It seems that when deciding about pandemic immunization, people relied on their experiences with seasonal influenza vaccination and simply behaved as they were accustomed to do in a similar context.

The likelihood of being vaccinated against pandemic influenza was largely increased if one's close relatives or friends had also been vaccinated. Similar findings have been previously reported in relation to seasonal influenza vaccination (9, 21, 23). Social pressures often influence (positively or negatively) an individual's decision (21). People may act in concert with the perceived behaviour of members of their peer group (19) and also in correlation with the observed consequences of such behaviour. Participants whose close friends or relatives had systemic reactions to a vaccination were less inclined towards both kinds of vaccinations, probably because they had a higher awareness of possible side effects, based on their experience.

Comparison of pandemic influenza and seasonal influenza vaccination indicates that similar factors affect the decision in both cases. These findings are in line with those of Poland (7). In our study, higher acceptance was found in older people and people with chronic illnesses, who are considered to be at greater risk due to a higher probability of serious influenza complications. People working in healthcare are also considered to be at greater risk of getting influenza and it is believed that their immunization may reduce the risk of influenza spread and prevent their absence from work during a pandemic. Vaccination was heavily promoted in these groups, which is probably one of the reasons for them receiving both types of influenza vaccine more frequently than other respondents.

Specific to pandemic vaccination (but not to seasonal influenza vaccination) was that a higher proportion of participants living with children were vaccinated. Some other studies have come to a similar finding (8, 26). This is not surprising, since the vaccination was promoted among children and among people who could transmit the virus to a baby in the family. However, less than half of vaccinated respondents with underage children also had their children vaccinated, although children were considered to be a group at higher risk due to higher exposure to the virus in the pre-school and school environment. This indicates that parents had reservations about having their children vaccinated. Tozzi and colleagues (3), too, reported that only 12.8% of mothers were willing to have their children vaccinated and 44.4% had doubts. In our sample, parents were reluctant to have their children vaccinated against both pandemic and seasonal influenza virus. Why someone is willing to receive vaccination himself or herself but, at the same time, refuses to allow his/her child to be vaccinated too, needs to be examined in the future. There is a need to develop appropriate activities if such behaviour by parents in a pandemic is considered to be sub-optimal.

No evidence was found that characteristics such as general anxiety and personality dimensions are directly related to the decision about pandemic influenza vaccination. However, thoroughness in decision-making was a statistically significant predictor of vaccination against pandemic influenza in the Block 1 model and also in Block 2 until trust in professional information in favour of vaccination was entered into the model. Thoroughness in making decisions did not predict seasonal influenza vaccination. Our results may indicate that, in the context of a pandemic threat, people who were vaccinated against the pandemic virus tried harder to gather and analyze all of the information available to them, invested more time and effort during the decision-making process and explored more options. They also had higher trust in experts' opinions and there was a higher probability that people close to

them also received the vaccine. Greater reliance on social comparison information and dependence on others when making decisions has been previously found to be related to maximization tendencies, i.e., seeking an optimal solution instead of selecting the option that seems to address most needs (34). It would be interesting to explore further whether and how maximization tendencies are related to decision-making in a crisis.

Our study has some limitations. Younger people, females and more highly educated people were over-represented in our sample. This may to some extent be a consequence of our sampling method and sampling biases inherent to internet-based surveys (35). Future studies should consider a different sampling procedure and traditional paper-and-pencil survey administration, although they may need more time to collect data and risk the higher probability of unexpected events occurring during the study, which may affect the responses of participants (as was the case in our study with the aforementioned announcement of the Ministry of Health). The higher proportion of persons vaccinated in our sample may be related to the over-representation of the healthcare group and higher levels of education but may also indicate that the invitation to participate in the survey appealed in particular to those who had been vaccinated, perhaps because they wanted to receive confirmation of their decision. However, the results of the logistic regressions should not be affected by these limitations. Our study managed to replicate some findings from previous studies on both pandemic and seasonal influenza vaccination, so we believe that our conclusions are reliable. Moreover, we yielded similar results by simulating data weighted according to population characteristics (gender, age, education and employment status).

5 Conclusion

We found that worry about children and reliance on social comparison and the opinion of experts promoted a decision to be vaccinated against pandemic influenza, whereas professional doubts related to the vaccine, media coverage and fear of vaccine side-effects led to a decision against vaccination. Our findings may be of benefit in planning vaccination strategies in forthcoming influenza seasons. In the case of a pandemic threatening, more attention needs to be directed into (i) providing models that accord with the vaccination implementation strategy and (ii) educating and informing the general public about the influenza, the vaccine, vaccine manufacturing process, risk factors etc., with particular emphasis on risk communication in the mass media “that will not only inform but also create an atmosphere of mutual trust and solidarity” (36). Explaining the advantages and disadvantages of vaccination versus non-vaccination would help in achieving appropriate awareness among the public and assist the empowerment of an individual in regard to his/her health.

References

1. Chor JS, Ngai KL, Goggins WB, Wong MCS, Wong SYS, Lee N, et al. Willingness of Hong Kong healthcare workers to accept pre-pandemic influenza vaccination at different WHO alert levels: two questionnaire surveys. BMJ 2009; 339: b3391.
2. Rachiotis G, Mouchtouri VA, Kremastinou J, Gourgoulianis K, Hadjichristodoulou C. Low acceptance of vaccination against the 2009 pandemic influenza A(H1N1) among healthcare workers in Greece. Euro Surveill 2010; 15: 19486. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19486.
3. Tozzi AE, Gesualdo F, Romano M, Caione D. Parental attitude toward influenza A(H1N1)v vaccination in Italy. Vaccine 2009; 27: 6807
4. Report on vaccination against the pandemic influenza. Ljubljana: IVZ, 2010. Available February 4, 2010 from: http://www.ivz.si/javne_datoteke/datoteke/1782-POROCILOcocceplјenjucprotic pandemskicgripi_04_02_10.doc.
5. Analysis of execution of immunisation programme in Slovenia in 2008 – annual report. Ljubljana: IVZ, 2010. Available February 4, 2010 from: http://www.ivz.si/javne_datoteke/datoteke/2119-Analizaizvajanja_IP_2008.pdf.
6. Maurer J, Uscher-Pines L, Harris KM. Perceived seriousness of seasonal and A (H1N1) influenzas, attitudes toward vaccination, and vaccine uptake among U.S. adults: does the source of information matter? Prev Med 2010; 51:185-7.
7. Poland GA. The 2009-2010 influenza pandemic: effects on pandemic and seasonal vaccine uptake and lessons learned for seasonal vaccination campaigns. Vaccine 2010; 28 (Suppl 4): D3-13.
8. Schwarzinger M, Flicoteaux R, Cortarenoda S, Obadia Y, Moatti JP. Low acceptability of A/H1N1 pandemic vaccination in French adult population: did public health policy fuel public dissonance? PLoS One 2010; 5: e10199.
9. Chapman GB, Coups EJ. Predictors of influenza vaccine acceptance among healthy adults. Prev Med 1999; 29: 249-62.
10. Mayo A, Cobler S. Influenza vaccines and patient decision making: what we need to know. J Am Acad Nurse Pract 2004; 16: 402-10.
11. Qureshi AM, Hughes NJ, Murphy E, Primrose WR. Factors influencing uptake of influenza vaccination among hospital-based health care workers. Occup Med 2004; 54: 197-201.
12. Shahrabani S, Benzion U, Yom Din G. Factors affecting nurses' decision to get the influenza vaccine. Euro J Health Econ 2009; 10: 227-31.
13. Ofstead CL, Tucker SJ, Beebe TJ, Poland GA. Influenza vaccination among registered nurses: information receipt, knowledge, and decision-making at an institution with a multifaceted educational program. Infect Control Hosp Epidemiol2008; 29: 99-106.
14. Kalinowski P, Piechnik B, Pocińska K, Szarek K, Karwat ID. Knowledge of methods of prophylaxis and treatment of influenza

and its complications among first year students. Przegl Epidemiol 2005; 59: 69-74.
15. Telford R, Rogers A. What influences elderly peoples' decisions about whether to accept the influenza vaccination? A qualitative study. Health Educ Res 2003; 18: 743-53.
16. Colley E. Influenza vaccination in adults with a long-term condition. Community Pract 2008; 81: 25-28.
17. Shahrabani S, Benzion U. The effects of socioeconomic factors on the decision to be vaccinated: the case of influenza shot vaccination. Isr Med Assoc J 2006; 8: 630-4.
18. Van D, McLaws M, Crimmins J, MacIntyre C, Seale H. University life and pandemic influenza: attitudes and intended behaviour of staff and students towards pandemic (H1N1) 2009. BMC Public Health 2009; 10: 130.
19. Sturm LA, Mays RM, Zimet GD. Parental beliefs and decision making about child and adolescent immunization: from polio to sexually transmitted infections. J Dev Behav Pediatr 2005; 26: 441-452.
20. Bigham M, Schiefele D, Dobson S. Impact of the media on vaccine uptake in British Columbia's grade 6 hepatitis B immunization program. Canada Communicable Disease Report 1999; 25(10): 4. Available from: http://198.103.98.77/publicat/ccdr-rmtc/99vol25/dr2510ea.html.
21. Baeyens JP, Lang PO, Michel JP. Willingness to vaccinate and to be vaccinated in adults. Aging Clin Exp Res 2009; 21: 244-249.
22. May T. Public communication, risk perception, and the viability of preventive vaccination against communicable diseases. Bioethics 2005; 19: 407-421.
23. Lin CJ, Nowalk MP, Zimmerman RK, Feng-Shou K, Zoffel L, Hoberman A et al. Beliefs and attitudes about influenza immunization among parents of children with chronic medical conditions over a two-year period. J Urban Healt. 2006; 83: 874-483.
24. Rundall TG, Wheeler JR. Factors associated with utilization of the swine influenza vaccination program among senior citizens in Tompkins County. Med Care 1979; 17: 191-200.
25. Raude J, Caille-Brillet AL, Setbon M. The 2009 pandemic H1N1 influenza vaccination in France: who accepted to receive the vaccine and why? PLoSCurr 2010; 19: RRN1188.
26. Vaux S, Van Cauteren D, Guthmann JP, Le Strat Y, Vaillant V, de Valk H, Lévy-Bruhl D. Influenza vaccination coverage against seasonal and pandemic influenza and their determinants in France: a cross-sectional survey. BMC Public Health 2011;11: 30.
27. La Torre G, Di Thiene D, Cadeddu C, Ricciardi W, Boccia A. Behaviours regarding preventive measures against pandemic H1N1 influenza among Italian healthcare workers. Eurosurveill 2009; 14: 19432. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19432.
28. Johnson MO. Personality correlates of HIV vaccine trial participation. Pers Indiv Differ 2000; 29: 459-467.
29. Leung GM, Quah S, Ho LM, Ho SY, Hedley AJ, Lee HP. et al. A tale of two cities: community psychobehavioral surveillance and related impact on outbreak control in Hong Kong and Singapore during the Severe Acute Respiratory Syndrome epidemic. Infect Cont Hosp Epidem 2004; 25: 1033-1041.
30. Spielberger CD, Gorsuch LR, Lushene RE. STAI Manual for the state-trait anxiety inventory. Palo Alto: Consulting Psychologists Press, 1970.
31. Rammstedt B, John OP. Measuring personality in one minute or less: a 10-item short version of the big five inventory in English and German. J Res Pers 2007; 41: 203-212.
32. French DJ, West RJ, Elander J, Wilding JM. Decision-making style, driving style, and self-reported involvement in road traffic accidents. Ergonomics 1993; 36: 627-644.
33. Pareek M, Clark T, Dillon H, Kumar R, Stephenson I. Willingness of healthcare workers to accept voluntary stockpiled H5N1 vaccine in advance of pandemic activity. Vaccine 2009; 27: 1242-1247.
34. Schwartz B, Ward A, Monterosso J, Lyubomirsky S, White K, Lehman DR. Maximizing versus satisficing: happiness is a matter of choice. J Per Soc Psychol 2002; 83: 1178-1197.
35. Lenhart A, Horrigan J, Rainie L, Allen K, Boyce A, Madden M. et al. The ever-shifting Internet population: a new look at Internet access and the digital divide. Available April 16, 2003 from: http://www.pewinternet.org/~/media//Files/Reports/2003/PIP_Shifting_Net_Pop_Report.pdf.pdf.
36. Kotalik J. Preparing for an influenza pandemic: ethical issues. Bioethics 2005; 19: 422-431.