

# To Inoculate or Not To Inoculate: The Factors that Influence the Decision on Flu Inoculation

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## Abstract

**Objective:** Patients' poor adherence to medical advice is a major obstacle to the effective delivery of health care. The present research focuses on how patient preferences and physician preconceptions may affect a patient's decision to comply with a physician's recommendation regarding flu inoculation.

**Methods:** A 2 (physician's recommendation: inoculate/not inoculate) by 3 (participant's a priori attitude: pro/neutral/against) by 2 (physician's gender: male/female) by 2 (treatment setting: private/public) between-within-subjects design was used. One hundred eight-seven participants were asked to read four scenarios presented in random order, describing the circumstances that occur when visiting a physician who provides information about the possibility of flu inoculation. The participants' a priori attitude toward this inoculation was then assessed. The key outcomes were the decision concerning flu inoculation and the certainty of that decision.

**Results:** In general, the decision on inoculation was negative. The participants who a priori objected to inoculation made a more negative choice than those who had neutral preferences and those who a priori approved of it. Compared with a negative recommendation, a positive recommendation by a physician was associated with a less negative decision. The participants were more certain when deciding against inoculation than in favor of it.

**Conclusion:** A positive physician's recommendation caused the participants' decision on inoculation to become less negative, but this suggestion was not sufficient to change the decision altogether. The participants' a priori preference appeared to be a much more compelling factor in deciding whether to inoculate, and it also affected the conviction of that decision.

**Keywords:** Decision making; Decision on flu inoculation; Patient's adherence; Physician's recommendation; Patient's preferences; Patient's attitudes; Patient-physician relationship; Certainty

## Introduction

The adherence of patients to the instructions given by their physician is one of the major factors influencing the effective delivery of health care. Adherence is defined as the extent to which a patient's behavior coincides with medical or health advice [1]. Unfortunately, according to the World Health Organization (WHO), patients' adherence to medical treatment and any kind of health behavior is rather poor [2]. Consequently, a substantial number of patients do not receive the maximum benefit of medical treatment, resulting in poor health outcomes, lower quality of life and increased health care costs [3,4].

One of the key examples of non-adherence to recommendations from the medical profession is related to flu inoculation. Although every year physicians remind the population about the need for vaccination, many people still suffer from the flu or from a complication after being ill with the flu. In addition to concerns regarding the non-adherence of patients to physicians' recommendation to be vaccinated against influenza, there is another issue: some physicians might recommend that patients not be vaccinated. A recommendation against influenza vaccination may be related to medical contraindications such as Guillain-Barre syndrome, HIV infection, salicylate therapy and pregnancy [5]. Another reason may be the physician's beliefs regarding the need for this type of flu prevention. For example, in a study conducted in Poland, it appeared that almost half of the physicians advised inoculation only for those patients who had a high risk of contracting the flu. Patients' adherence to a recommendation against inoculation may be particularly important in the case of a shortage of the vaccine and a high demand for it. However, to our knowledge, there

are no studies investigating the problem of non-adherence of patients to their physicians' recommendation against vaccination; however, this problem can certainly occur in a real-life context [6].

Studies examining the causal explanations of patients' adherence often reflect the assumption that a rational decision-making process guides the decision regarding whether to comply. This assumption is also found in the frequently cited Health Belief Model [7,8]. Thus, much of the research is devoted to the identification of the factors suggested by the HBM that affect health behavior. For example, the extent to which people perceive themselves as being in danger of becoming unwell and whether they appreciate how severe the flu can be. In the same vein, the alleged inoculation barriers such as the fear of side effects and discomfort or the cost of the vaccine are very regularly examined [9,10].

In contrast, the present research centers on how the expectations of a patient and his/her pre-conceptions of a physician may affect the decision to comply with the recommendation regarding flu inoculation. This focus is implied by two different developments. The first is a change in the patient-physician interaction. The second is a shift in the model that views human decision making as rational.

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## Theoretical Framework of the Study

During the last decades, the relationship between patient and physician has moved away from physician paternalism toward a patient-centered approach in which a patient's desire for information and for shared decision making is taken into account. Shared decision making can enhance both the satisfaction and adherence of patients and can consequently have a positive influence on their health status [11,12]. Adopting shared decision making requires a physician to consider a patient's expectations and preferences even if they are irrational from a medical point of view [13].

Although traditionally it was assumed that preferences and decisions are the result of analyzing and thinking about a problem, this assumption began to change during the middle of the last century [14,15]. Researchers began to consider the notion that people usually do not have sufficient time or the skills to digest all the relevant information carefully and with the appropriate level of knowledge; thus, researchers started to revise the model of rational decision making. In this revision of the model, the role of intuitive modes of thinking was considered [16]. Consequently, more attention has been paid to the irrational causes of decisions, which can be found in the conceptual models of heuristics and biases in judgment by Tversky and Kahneman and in the lay epistemic theory by Kruglanski [17,18].

There is some evidence that biases, heuristics and/or stereotypes can also influence medical decisions. In the literature, the cognitive and affective biases and heuristics used by patients are described to show how the decision-making process may be distorted by context [19,20]. One example of the simplifications that may affect a patient's decision is the umbrella effect: trust in the institution carries over to the physicians who work within it and may therefore influence the relationship between the physician and patient [21]. All these simplifications in decision making may guide a patient's preferences about treatment and patient-centered medicine requires physicians to respect those preferences.

The present research scrutinized the impact of the variables implied by the two developments mentioned above on a patient's decision to follow a physician's recommendation. Firstly, we assessed the effect of patients' and physicians' convictions regarding inoculation; secondly, we examined the effect of patients' stereotypical beliefs regarding a physician's gender and type of clinic on their decision. Each of the factors is addressed below.

### Patients' a priori attitude

The expansion of patient-accessible medical information via mass media on the one hand, and the change from a paternalistic to a more equal patient-physician relationship on the other, have led to the possibility that patients visit a physician with a very clear view regarding certain medical treatments [22]. In the context of flu inoculation, it is easy to find information about its pros and cons, which may become the basis for a patient's preconceptions about this preventive behavior. This belief in cooperation together with the need for autonomy in the patient-physician interaction may strongly sway the process of decision making. Even when a physician recommendation is inconsistent with a patient's expectations, some patients will still tend to persist with their own point of view [23].

### Physicians' recommendation

Although—as noted above—a shift toward patient autonomy in medicine has been observed, there is still an obvious expectation that

patients will generally act upon a physician's recommendation. After all, the patients made the decision to go to the doctor and actively sought the physician's advice and despite changes in recent years regarding access to health information, professionals are still considered an important information source [24,25]. Thus, notwithstanding the findings on the lack of sufficient adherence, it is nevertheless anticipated that the opinion of a doctor will generally affect a patient's behavior. However, it is likely that the physician's recommendation will interact with the patient's preference. Specifically, we hypothesize that since patients would expect physicians to make a recommendation that is in accordance with the patients' preconceptions, they would adhere more to a recommendation that is consistent with their own inclination.

### Physicians' gender

Many psychological studies have demonstrated that stereotypes have a strong impact on basic cognitive processes. This in turn may result in different evaluations, expectations and patterns of behavior toward members of stereotyped groups [26]. This is particularly noticeable with respect to gender differences. Despite social changes, some studies still show the presence of strong gender stereotypes. For example, men are perceived as more capable of undertaking leadership tasks, and there have been reports of greater satisfaction with a male rather than a female leader. Women, on the other hand, are often perceived as lacking initiative and ambition and as unwilling to compete [27,28]. This has led to another component of gender stereotypes: the belief that men are more competent in their professional roles than women [29].

Consequently, the following question arises: Are female physicians as able as male physicians to overcome patients' resistance to medical treatment and encourage (or discourage) a particular preventive behavior?

### Treatment setting

The reported study was conducted in Poland where the 1989 reform of the healthcare system allowed patients to choose between private and public health care. Patients very often choose to visit private physicians, although they must pay to do so. The results of the survey conducted in Poland show that private health care is perceived more positively than public health care because of the more pleasant atmosphere and the higher level of physician engagement with and respect for patients. The mentioned factors are likely to persuade patients to view private physicians as more reliable and trustworthy. Furthermore, in private clinics, especially in small fee-for-service practices, patients may feel more satisfied because they chose their physician themselves [30]. This freedom of choice is important because after a decision is made, people tend to focus on the rational reasons for that decision and attempt to convince themselves that it was the best they could have made [31]. All this presumably means that patients will be more willing to accept and follow the advice of private rather than public doctors.

In sum, this study aims to examine the effect of patients' a priori attitude, physicians' recommendation, physicians' gender and the treatment setting on patients' decision regarding inoculation. In addition, we take into account the degree to which participants feel certain about their decision. The certainty that people feel about their decision may affect their post-decision behavior. That is, the more certain people feel about their decision, the less they may search for additional information in general and contradictory information in particular. This is the moment when, according to Kruglanski's lay epistemology theory, the freezing stage has taken place [18]. As a result of gaining confidence from the possession of knowledge, people

are willing to act in a way that is consistent with their decision (e.g. to inoculate or not to inoculate) and do not want to change their minds. In this light, the more certain patients are about their decision when declaring that they will abide by a physician's recommendation, the more likely it is that the expected behavior (not only the declaration) will occur.

## Methods

### Participants

One hundred eighty-seven participants (111 women and 76 men) aged 19-61 took part in the study. The mean age was 32.99 ( $SD=10.57$ ), and the mean years of schooling was 15.04 ( $SD=2.91$ ).

### Procedure

Flu inoculation was chosen because the flu has been a widely discussed public health problem every autumn for the past several years. The data for the current study were collected in the late autumn; thus, for many people, the decision whether to inoculate was a real and not hypothetical problem. This realistic and salient context increased the study's ecological validity.

The study was approved by the Ethics Committee at Psychology Institute (the name of the University has been deleted to maintain the integrity of the review process). The participants were recruited by four interviewers. After describing the study to the participants and informing them that it is anonymous and not obligatory and that they may stop and leave at any given moment, the patients' verbal consent was obtained. The people who agreed to participate in the study met with an interviewer in their own homes or in another convenient setting, and each participant completed the paper-and-pencil questionnaire individually.

## Measures

### Patients' a priori attitude

The participants' a priori attitude was measured by one question, to which they replied using a scale from 1 ('It is very important to avoid inoculation') to 5 ('It is very important to be inoculated'). The mid-point of the scale (3) represented 'No preference'. For the analysis, the scale was recoded to 3 values: negative ( $N=46$ ), neutral ( $N=74$ ) and positive ( $N=67$ ).

### The scenarios

Each questionnaire included four scenarios illustrating a visit to a physician who informs the patient about the possibility of flu inoculation. There were two versions of the recommendation (a between factor). In the first, the physicians recommended receiving the flu inoculation in all four scenarios. In the second, they advised avoiding inoculation in all four scenarios. Both types of recommendation were accompanied by a brief, medically sound justification. The scenarios also differed by the physician's gender and by the treatment setting (public/private clinic); both of these were considered within factors. The order of the scenarios varied. The participants were randomly assigned to the "recommendation pro" or "recommendation against" group.

### Decision regarding inoculation

After reading each scenario, the participants were asked to decide whether they would inoculate. They answered on a scale from 0 ('I'm absolutely sure I will not inoculate') to 100 ('I'm absolutely sure I will inoculate').

Based on these answers, two indices were calculated. The first represented the decision and was constructed by subtracting 50 from the score. In this way, the scale ranged from -50 to +50, where a negative number represented a decision against inoculation and a positive number indicated a decision in favor of inoculation. A score of zero represented indecision. The second index represented the certainty with which the decision was made. It was created by calculating the absolute difference between the score and 50. The index ranged from zero to 50, where zero represented no certainty and 50 represented maximum certainty (regardless of the direction of the decision).

## Results

To examine the effect of the independent variables on the decision of the participants, we performed a 2 by 3 by 2 by 2 between-within-subjects ANOVA. The between-subjects factors were the physicians' recommendation (pro inoculation/against inoculation) and the participants' a priori attitude (pro/neutral/against). The two within-subjects factors were the physicians' gender (male/female) and the treatment setting (private/public). The dependent measures were the decision indices. Table 1 presents the results of the ANOVA (Table 1).

Table 1 shows that the ANOVA yielded two significant main effects: one two-way interaction and one three-way interaction. The first shows that those who a priori objected to inoculation made a more negative decision ( $M=-26.31$ ,  $SD=24.22$ ) than those who had neutral preferences ( $M=-12.23$ ,  $SD=24.28$ ). The latter participants made a more negative decision than those who a priori approved of inoculation ( $M=9.63$ ,  $SD=28.15$ ). The Bonferroni a posteriori tests demonstrate that all three preference levels differed significantly. It is interesting to note that the general mean of the decisions across the three preference levels was negative ( $M=-8.53$ ,  $SD=30.25$ ).

The second main effect was that of the physician's recommendation. A positive recommendation was associated with a less negative decision ( $M=-2.09$ ,  $SD=28.11$ ) than a negative recommendation ( $M=-17.57$ ,  $SD=28.85$ ).

To ensure that the a priori attitude of the participants was not related to a priori demographic characteristics, we performed one-way

Source	SS	df	MS	F	$\Delta\eta^2$
Clinic	205.92	1	205.92	1.92	0.01
Gender	65.89	1	65.89	1.40	0.01
Rec	31720.50	1	31720.50	12.70**	0.07
Attitude	118654.85	2	59327.43	23.75**	.22
Clinic X Rec	160.12	1	160.12	1.49	0.01
Clinic X Attitude	923.41	2	461.70	4.30*	0.05
Gender X Clinic	6.24	1	6.24	0.18	0.00
Gender X Rec	83.31	1	83.31	1.77	0.01
Gender X Attitude	18.77	2	9.39	0.20	0.00
Rec X Attitude	3245.91	2	1622.96	0.65	0.01
Clinic X Rec X Attitude	33.69	2	16.84	0.17	0.00
Gender X Rec X Attitude	223.96	2	111.98	2.38	0.03
Gender X Clinic X Rec	8.26	1	8.26	0.24	0.00
Gender X Clinic X Attitude	278.79	2	139.45	4.04*	0.05
Gender X Clinic X Rec X Attitude	156.08	2	78.04	2.26	0.03
Error	5899.85	171	34.50		

Note: Clinic: type of clinic; Gender: physician's gender; Rec: physician's recommendation; Attitude: participant's a priori attitude toward inoculation  
\* $p<.05$  \*\* $p<0.01$

Table 1: Decision whether to be inoculated – Anova's results.

ANOVAs on participants' age and years of education as a function of their attitude. There was no significant outcome. Additionally, using  $\chi^2$ , we ensured that the gender of the participants was not related to their attitude. The next significant result was a two-way interaction of the participants' a priori attitude by treatment setting. Table 2 present the cell means.

Table 2 confirms that among the participants whose a priori attitude toward inoculation was neutral, the inoculation decision was less negative for those who visited a public clinic than for those who visited a private clinic and was less positive than that of participants who had a positive attitude toward inoculation. The Bonferroni a posteriori tests, however, show that the effect of the treatment setting was significant only in the last case. Finally, the ANOVA shows the three-way interaction of treatment setting by physician's gender by participant's a priori attitude; however, the Bonferroni a posteriori tests show that the effect of a physician's gender in the various conditions was not significant.

In addition to the investigation of the effect of the independent variables on the decision to be inoculated, the present data also allows an inspection of the certainty associated with that decision. In the analysis of certainty, we included the decision as an additional factor. That is, since the direction of the decision (positive or negative) could have an impact on the certainty of the decision it was essential to include it in the analysis. Consequently, we performed four ANOVAs in which the independent measures were a participant's a priori attitude (three levels); a physician's recommendation (two levels) and a participant's decision (two levels). We classified the decision as negative (below zero) and positive (above zero). The people who were indecisive (exactly zero) were excluded from the analysis because their certainty was zero (by definition). The dependent measures were the certainty associated with each decision under each of the four within-participants conditions (type of clinic and physician's gender)<sup>1</sup>. The four analyses yielded two salient effects. The first was a significant effect on a participant's decision. Table 3 shows this for the four analyses.

Table 4 shows that the participants were more certain when making a negative decision than a positive one (the effect is not significant only in the case of certainty of declared decision regarding situation described in scenario 2). The second significant effect was that of the decision by the participant's motivation interaction. Table 5 shows that the participants were more certain when their decision corresponded to their a priori attitude. However, the Bonferroni a posteriori tests show that in all four analyses, a participant's preferences did not have a significant effect on their certainty when they made a negative decision. In contrast, when making a positive decision, neutral a priori preferences were associated with considerably lower certainty than preferences to inoculate.

## Discussion

The presented study investigated the impact of people's a priori attitude toward flu inoculation, physician's recommendation, physician's gender and treatment setting on the decision to be inoculated and on the certainty of this decision. The first important result showed that in general the participants decided against flu inoculation, although a greater percentage of the participants had a positive a priori attitude toward inoculation; thus, it could be expected that the patients' decision would be in favor of inoculation. However, this result is consistent with many study findings that demonstrate poor adherence toward

<sup>1</sup> The decision to perform four separate ANOVAs rather than use the within design was a consequence of the fact that the participants made four decisions about inoculation in four different situations. Therefore, even if they decided to inoculate four times, those decisions may have differed in their level of certainty.

	Negative attitude N=44	Neutral attitude N=70	Positive attitude N=63	Total
Private clinic	-26.32 ± 24.58	-12.81 ± 24.18	11.54 ± 28.16	-11.62
Public clinic	-26.30 ± 24.59	-11.64 ± 24.70	7.72 ± 30.23	-10.98
Total mean	-27.27	-13.37	6.74	-11.30

Note: Minus value means negative decision (against inoculation)

**Table 2:** Participants' decision as a function of their a priori attitude and treatment setting.

	SS	df	MS	F	$\Delta\eta^2$
Cer1	2934.500	1	2934.500	13.634**	0.09
Cer2	592.516	1	592.516	2.703	0.02
Cer3	1483.429	1	1483.429	6.964**	0.05
Cer4	968.718	1	968.718	4.858*	0.03

\*=p<0.05 \*\*=p<0.01

Note: Cer 1 – certainty of declared decision regarding situation described in scenario 1; Cer 2 – certainty of declared decision regarding situation described in scenario 2; etc

**Table 3:** Effect of participants' decision on their certainty.

	Cer1	Cer2	Cer3	Cer4
Negative Decision	35.15 (14.13)	33.63 (14.86)	34.23 (14.67)	33.86 (15.03)
Positive Decision	26.16 (16.40)	28.73 (16.28)	27.15 (15.51)	28.29 (15.38)

Note: Cer 1 – certainty of declared decision regarding situation described in scenario 1; Cer 2 – certainty of declared decision regarding situation described in scenario 2; etc.

**Table 4:** Level of certainty as a function of decision.

Participant's decision	Participant's a priori attitude	Cer1	Cer2	Cer3	Cer4
Negative Decision	Negative	38.534	38.292	39.142	38.367
	Neutral	33.625	32.086	32.600	33.006
	Positive	32.286	28.232	29.759	28.528
Positive Decision	Negative	22.615	32.350	26.321	29.458
	Neutral	16.857**	17.917*	19.062*	17.250**
	Positive	32.750	33.060	31.790	33.781

Note: Results of Bonferroni a posteriori test - difference between certainty of positive decision when a priori attitude was neutral and certainty of positive decision when a priori attitude was positive significant at \* =p<0.05 and \*\* =p<0.01

**Table 5:** Participants' certainty as a function of their a priori position toward inoculation and participants' decision.

inoculation in most industrialized countries, and the same is true in Poland where the research was conducted [32].

It is possible that the inconsistency between the general opinion about inoculation and the decision may arise due to perceived flu susceptibility. According to the Health Belief Model [8], perceived susceptibility is one of the more powerful elements that prompt people to adopt healthier behaviors. Lower perceived risk is associated with a lower likelihood of engaging in behaviors that decrease risk. In fact, studies conducted in Poland show that the most frequently mentioned reason for not receiving a flu inoculation was good health [33]. In addition, perceived susceptibility is commonly assessed in relation to unrealistic optimism-the mistaken belief that one's chances of experiencing a negative event are lower than that of one's peers [34]. A substantial body of research has revealed that people tend to rate their own susceptibility to health risks as being comparably lower than that of others [35]. It may be assumed that when asked about their willingness to have a flu inoculation, the participants in our study decided against it because of their unrealistic optimism. In general, they think that flu inoculation is useful (but for others rather than for themselves).

The inconsistency of the positive attitude toward flu inoculation and the decision not to inoculate may also be explained by the existing (real or perceived) discrepancy between the individual and community benefits of inoculation. Use of the polio vaccine (OPV) in the US in the 1990s is such an example [36]. Once polio had been effectively controlled in the US, thus preventing the indigenous transmission of polio, the risks of the vaccine (VAPP) may have been greater than the risk of disease. However, if people decided not to inoculate because of their individual risk/benefit analyses, polio would likely have been reintroduced into the US. It could be assumed that the same way of thinking may be characteristic of people who generally accept the benefits of flu inoculation but do not wish to inoculate themselves because the individual risks of immunization seem to outweigh the benefits (for them).

It is also noteworthy that the participants were more certain when deciding against inoculation than when deciding in favor. This finding is important in light of the evidence that certainty is strongly associated with actual behavior [37,38]. Certainty associated with the participants' a priori attitude could also explain the alleged contradiction between the greater number of participants who held an a priori position in favor of inoculation than those who opposed it on the one hand and the general intention to avoid inoculation on the other. It is possible that the greater impact on the decision of the participants with a negative a priori conviction was because they were more certain about their attitude than their counterparts.

The interesting result is that the certainty of the decision regarding inoculation interacted not with the physician's recommendation but with the participant's a priori attitude. The result is a pattern of certainty as a function of a participant's a priori position toward inoculation and decision. The people whose preconception about inoculation was neutral were less certain of their decision to inoculate than those who opposed it. Maybe this tendency arises because people with a negative attitude toward inoculation were more certain of that attitude and were also more certain after making a decision that was consistent with that attitude, while people with a neutral attitude were unsure about inoculation and were consequently less certain about their decision. The clearest consequence of this finding seems to be a practical one. It can be assumed that patients whose attitude toward inoculation was neutral and whose decision was pro-inoculation need to have their decision and their certainty about the decision reinforced more than other patients do.

The next important discoveries relate to the main effects of the physician's recommendation and the participant's a priori attitude toward flu inoculation. A positive physician's recommendation meant that the participants' decision against inoculation became less negative. However, a positive physician's recommendation was not sufficient to change a negative decision into a positive one. The participants' a priori preference toward inoculation appeared to be the much more compelling factor for predicting their decision whether to inoculate, and it also influenced their certainty about their decision. Moreover, only the participants' a priori attitude and not the physicians' recommendation interacted with the other variables, which also confirmed the importance of this factor.

Taken together, the effects of a physician's recommendation and a patient's a priori attitude show how crucial shared decision making is in the patient-physician relationship. As mentioned above, according to patient-oriented medicine, a physician should consider a patient's expectations and beliefs even if they are irrational from a medical point of view [13]. This approach underscores the notion that physicians

should know a patient's preferences toward a preventive behavior and recognize potential obstacles that may prevent the patient from acting as instructed. The present results strongly support this approach because they indicate that patients are more influenced by their a priori attitude than by a physician's guidance. Failing to recognize this effect may result in physicians being less efficient in their duties. From this standpoint, patient-centered medicine is not only ethical (empowerment of the patient) but also practical. It may encourage better patient compliance and subsequently higher effectiveness of a treatment, and it may also result in fewer malpractice claims against health care professionals.

Another effect found was the interaction between a priori attitude toward inoculation and treatment setting on the decision regarding inoculation; however, it was significant only when this attitude was positive. In this case, the participants who visited private clinics were more willing to inoculate than those who visited public clinics. It seems that the participants were sensitive to the type of clinic only when they had positive expectations regarding receiving a treatment (based on their a priori attitude). They did not think that the physicians in private clinics were better (there was no significant setting by recommendation interaction). However, it seems that participants felt that they would receive better treatment in a private clinic. This conclusion is consistent with other studies that show that in Poland, private clinics are viewed as better than public treatment settings [30,39]. It is well known that the public hospitals are overcrowded and that patients must wait in long queues to see a physician. Notwithstanding the fact that payment is required for private treatment (here, inoculation), the advantages of comfortable and patient-oriented private health care are too tempting to resist.

The assumed effect of a physician's gender was not found. This may also confirm the results that showed that the factors associated with the physicians, including gender, were not very important in the patients' decision regarding whether to inoculate. It is also possible that primary care is not stereotypically associated with female or male physicians.

Before concluding, it is important to mention that the data were collected using scenarios and that the dependent measure reflected the participants' intention rather than their actual behavior. It is conceivable that in a real-life context their decision may differ and that their certainty about it may be lower or higher. It is also essential to state that in the case of a laboratory experiment, the artificial situation may cause the participants' behavior to be unrepresentative. If we were to carry out a natural experiment in a clinic that involved interviewing actual patients, we would encounter problems with sample selection and randomization. Additionally, it would be difficult to control other extraneous variables. In this situation, we decided to use scenarios because other studies that have followed this approach (e.g. to investigate the intention to take genetic tests) have found this method to be suitable for predicting genetic test uptake [40]. This study's ecological validity is reinforced by the fact that the data were collected at a time when the flu posed an actual public danger.

Despite the above-mentioned limitations, this study contributes to the existing literature on patient-centered medicine, which acknowledges the importance of the patient's ideas regarding treatment [41]. The results show that a patient's a priori attitude toward a solution suggested by a physician is one of the most important factors that influence his/her decision on what to do. This indicates the need for physicians to recognize the preferences of their patients and to discuss these preferences with them in the hope of convincing them to follow the correct path or finding a solution that is acceptable to both. It should be remembered that a patient's attitude toward flu inoculation is

usually formed before they even meet a physician. Nonetheless, because the impact of a physician's recommendation is much weaker than that of a patient's preconception regarding inoculation, the acceptance of flu inoculation may be increased more successfully through a wide educational program rather than during a visit to a clinic.

The present study focuses on the decision regarding flu inoculation (which is a preventive behavior). It would be interesting to test the general application of these results in cases in which a patient suffers from a specific illness and the suggested treatments are more invasive, last longer or are more painful than a flu injection. It would also be worthwhile to assess how cultural factors might influence the impact of patients' preconception on their decision-making process. It may be connected to patients' trust of the healthcare system in their particular country or to that country's cultural model of the patient-physician relationship.

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