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ORIGINAL PAPER

Persistence of Vaccine Hesitancy and Acceptance of the EU Covid Certificate Among French Students

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Abstract
Covid-19 vaccine hesitancy among young adults is a current public health issue that needs to be addressed considering the seasonally driven waves of disease and the administration of vaccine boosters. As a prevention measure, the EU Covid certificate had been implemented to increase vaccine uptake, but its application was controversial. Our study investigated students' opinions and attitudes towards Covid-19 vaccination and the EU Covid certificate through a mixed-methods design. An 18-item questionnaire was administered to 200 students during a vaccination campaign in September 2021 at the University of Bordeaux, France. Simultaneously, 30 students attended a semi-structured interview. Collected data were analyzed separately then discussed together through a parallel and convergent approach. Results showed that vaccine hesitancy was high among students, mostly from fear of short-term side effects. However, respondents decided to get vaccinated to obtain the EU Covid certificate, even if they considered it as a violation of their freedom. Straightforward communication about Covid-19 vaccination did not reach students, although this was a strong expectation from governmental and health institutions. Findings suggest that key health personnel should provide evidence-based information about vaccines in efforts of building trust with young people.

Keywords Vaccination · Covid-19 · Students · Mixed-methods

Introduction

Young adults have been considerably affected by new Covid-19 variants in late 2021 and beginning of 2022 [1]. The increased risk of infection and spread of Covid-19 among 20–30 years olds could be explained by several factors: feeling of invulnerability, limited respect of protective measures, of having asymptomatic forms of Covid-19 more often, and lack of awareness of being contagious. In particular, students were affected due to their close proximity within campuses, student parties, or other meeting situations. Classes provided a risk of gathering whereby protective measures may not have always been respected.

The high number of cases among young people has confirmed the importance of effective vaccination to stop the spread of the virus by reaching herd immunity [2]. Since December 2020, several vaccines have been authorized for use in the European Union (EU). In France, the vaccination campaign against Covid-19 began in January 2021 and the mRNA vaccines BioNTech Cominarty (Pfizer) and Spikevax (Moderna) have been the most widely used in young people [3]. After the vaccination of high-risk individuals (people over 65, obese, suffering from chronic illnesses, and professionals in contact with infected people), the vaccination campaign was extended to young adults starting in spring 2021. During summer 2021, half of the population aged 18–29 years had received at least one dose of a Covid-19 vaccine, against about 80% of the 64–74 years [4]. In autumn 2021, 80% of students had received a first dose and 65% of them were fully vaccinated according to the French Public Health Agency [5].

The introduction of the EU Covid certificate on July 21, 2021 has played an important role in the vaccine coverage among French young adults. This certificate was a digital

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or paper document presenting one of the following health conditions: complete vaccine scheme (two doses in 2021, three doses in 2022), negative test result within 72 h (or 48 h for antigen tests in the context of travel), or a positive result of a RT-PCR test or antigen test proving the recovery from the Covid-19 disease dating from at least 11 days and less than 6 months old. The certificate was mandatory to access leisure and culture services, restaurants, means of transport, and shopping malls.

Despite a considerable vaccination rate among students, probably due to the introduction of the EU Covid certificate, vaccine hesitancy was still high in this population [6]. Exploring the reasons for students' reluctance, attitudes, and doubts concerning Covid-19 vaccines could also have an impact on the decision to get vaccine booster shots.

The objective of this study was to explore students' opinions on Covid-19 vaccination and the EU Covid certificate to inform strategies and support vaccine uptake.

Methods

This was an exploratory study using a mixed-methods design, collecting and collating both quantitative and qualitative data. The convergent model was applied [7]. Concerning quantitative data, the study was conducted according to the STROBE Statement for cross-sectional studies [8]. As for qualitative data, the study followed the COREQ criteria checklist [9].

Data

This study used survey data collected between September 13 and 24, 2021. French-speaking students from the University of Bordeaux 18 years or older were eligible to participate. Students were recruited in a mobile vaccine clinic set by the local Student Health Center. They were informed about the vaccination campaign through the University's social media, website, and newsletters.

Self-administered questionnaires were completed by 200 students and 30 of these students performed a semi-structured interview. The survey was conducted in a clinic during a 15-min waiting period after having the vaccination. The study used a convenience sample based on feasibility reasons, i.e., limited number of surveyors (two medical doctors for the distribution of the questionnaires and a public health intern interviewing students). All students signed a consent form before participating in the study.

Data Collection Tools

The questionnaire was composed of 18 items divided in 3 sections: sociodemographic characteristics (sex; age; field of study; self-reported health); Covid-19-related questions (having a chronic illness or obesity as risk factors for Covid-19; having been infected with Covid-19; having family or friends being infected with Covid-19; fears about Covid-19 including contamination, mental health, family and friends' health, studies and economic situation); Covid-19 vaccination (reasons for getting vaccinated; opinions about Covid-19 vaccination; reasons for not getting vaccinated before; reasons for personal vaccine hesitancy; acceptance of vaccine booster doses); and opinions about the EU Covid certificate (decision to get vaccinated to obtain the certificate; necessity of the certificate to return to normal life; considering the certificate as a violation of freedom).

The semi-structured interview grid included three main questions: "What is your opinion about Covid-19 vaccination?", "What is your opinion about the EU Covid certificate?" and "What do you think about Covid-19-related communication?". Supplementary questions were asked depending on the course of the interview.

The Underlying Theoretical Model: The Health Belief Model

This study was constructed and conducted according to the Health Belief Model (HBM)[10]. This model is usually applied to predict a large variety of health behaviors like screening, vaccination, lifestyle, drug use, or healthcare [11, 12]. According to this model, individuals' beliefs about health problems are organized as: perceived susceptibility (subjective risk of developing a health problem); perceived severity (subjective assessment of the severity of a health problem); perceived benefits (subjective assessment of the value of engaging in a health-promoting behavior) and barriers (subjective assessment of the obstacles to health behavior change); modifying variables (demographic, psychosocial, and structural variables); cues to action (triggers for prompting engagement in health-promoting behaviors); and self-efficacy (subjective perception of competence to successfully perform a health behavior).

In this study, Covid-19 was treated as the health problem, vaccination was conceptualized as a benefit, and the EU Covid certificate was a cue or nudge [13] towards a positive health behavior. Modifying variables were also collected and the reasons for getting vaccinated or not provided clues on perceived severity and susceptibility concerning Covid-19.

Analyses

According to the mixed-methods convergent and parallel design, quantitative and qualitative data were firstly analyzed separately and then discussed jointly. For quantitative data, descriptive statistics were performed showing the number of participants and percentages utilizing the R program

(version 4.1.0., 2021-05-18). Semi-structured interviews were audio-recorded, fully transcribed in a word document, and analyzed one after the other through a thematic analysis.

Results

Quantitative Results

A total of 402 students accessed the mobile vaccine clinic and 146 were excluded since they were not French speaking. Of the 256 remaining students, 26 did not give their full consent to participate. Finally, 200 students completed the questionnaire and 30 answered to the semi-structured interview (Fig. 1).

Table 1 presents the sociodemographic characteristics of the sample.

Among the sample, 14.1% of respondents (n = 28) indicated they were at risk for Covid-19, 11.1% (n = 22) had already been infected with Covid-19, and 60.1% (n = 121) reported that at least one of their friends or family members had already been infected with Covid-19.

Opinions About Covid-19 and Vaccination

In relation to Covid-19, the sample was worried or very worried about many outcomes, including: the health of their family and friends 76.4% (n = 152); their studies 58.3% (n = 116); their economic situation 50.8% (n = 101); their mental well-being 42.7% (n = 85); and contracting Covid-19 38.2% (n = 76).

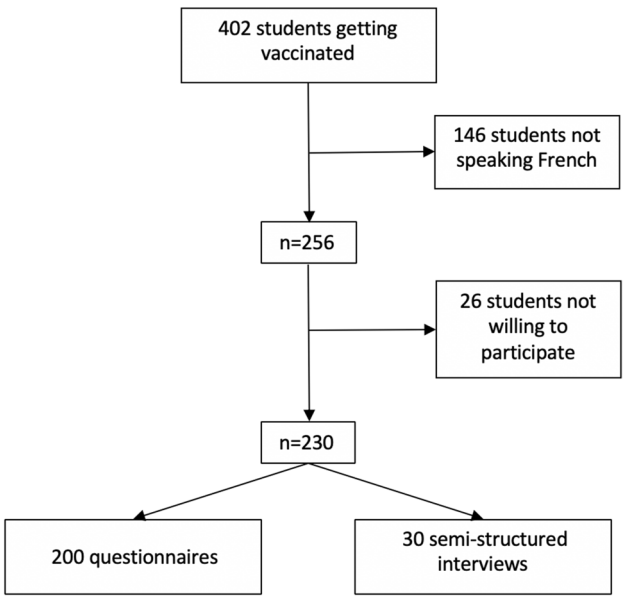

Fig. 1 Flow-chart of the study

Table 1 Description of the sample (n = 200)

	n	%
Sex (1 missing value)		
Female	107	(54.0%)
Male	92	(46.0%)
Age		
18–21	124	(62.3%)
22–25	61	(30.7%)
> 25	14	(7.0%)
Field of study		
Sciences	63	(31.7%)
Medical studies	2	(1.0%)
Other health-related studies	3	(1.5%)
Humanities and Social Sciences	35	(17.6%)
Economics, Law	41	(20.6%)
Other	55	(27.6%)
Self-reported health		
Very good	95	(47.7%)
Good	88	(44.2%)
Average	13	(6.5%)
Bad	3	(1.5%)
Very bad	0	(0.0%)

Among reasons to get vaccinated, the most common response was obtaining the EU Covid certificate (75.9%, n = 75), followed by protecting family and friends (46.7%, n = 93), self-protecting (42.2%, n = 84), and contributing to herd immunity (40.2%, n = 80). The fact that the mobile vaccine clinic was easily reachable and free of charge was also mentioned (37.7%, n = 75), as well as the fact that the RT-PCR tests would have to be paid in the future (34.2%, n = 68). The answers "since my work obliges me to get vaccinated" and "since my family or friends are asking me to get vaccinated" were mentioned by 35 students (17.6%) and 18 students (9.0%), respectively.

Regarding general beliefs about vaccines, 70.4% (n = 131) of the sample totally or partially trusted vaccines despite some doubts about their safety or effectiveness; 21.5% (n = 40) did not have any opinion, while 8.1% (n = 15) were rather against or totally against vaccines. Regarding Covid-19 vaccines, 54.8% (n = 104) of the sample totally or partially trusted them despite some doubts about their safety or effectiveness, and 22.1% (n = 42) had no opinion. However, 23.2% (n = 44) were rather against or totally against Covid-19 vaccines.

The first reason for not having been vaccinated before is the fear of side effects (44.2%, n = 88). Then, the following reasons were reported: hesitancy (41.7%, n = 83); lack of time (33.7% n = 67); not having found a timeslot in a clinic (15.6%, n = 31); and being against vaccination (7.0%, n = 14).

A total of 73.9% (n = 148) participants declared that they were hesitant or against vaccination before coming to the clinic. The main reasons were fear of short-term side effects (52.3%, n = 104) and doubts on the effectiveness of the vaccine (40.2%, n = 80). Other reasons were fear of long-term side effects (26.6%, n = 53), not being sure about the need of getting vaccinated (23.1%, n = 46), and the refusal of being used as a guinea pig (21.1%, n = 42). Only 6.0% (n = 12) of the sample cited the fact that substances of the vaccine were dangerous. Finally, 35.7% (n = 71) were ready to get vaccine booster doses each year similar to the flu, 57.8% (n = 115) were not ready, and 6.5% (n = 13) did not have any opinion.

Opinions on EU Covid Certificate

The EU Covid certificate was the reason to get vaccinated for one third of the sample (36.2%, n = 72); 22.6% (n = 45) declared that the certificate did not influence their decision to get vaccinated.

For 47.3% (n = 94) of participants, the certificate was necessary to return to normal life, but 34.2% (n = 68) declared the opposite, and 18.6% (n = 37) did not have any opinion.

The majority of the sample indicated that the EU certificate was a violation of freedom) (n = 127, 63.8%); 13.0% (n = 26) declared the opposite, and 23.0% (n = 46) did not have any opinion.

Qualitative Results

Participants of the semi-structured interviews were 16 females and 14 males from different fields of study: modern languages, history, neuroscience, and engineering. No participant interviewed had been infected with Covid-19.

Opinions about Covid-19 and Vaccination

More than half of interviewed students had mixed opinions or did not accept the Covid-19 vaccination. Reasons for getting vaccinated were obligation for work or study and access to public spaces.

> *I really did it out of constraint because for my studies I was asked for a certificate to go and work in a company […] and if I want to obtain this internship I absolutely have to do it and then because I haven't had a life for two months. I haven't been able to do anything for two months now… Well, I was finishing my research thesis, so it didn't bother me too much, but since I've just finished it, I'd like to do things that I can't anymore currently do.*
> *It is to vaccinate myself, to access all the services elsewhere and also to travel. I had problems traveling, because I am Moroccan and when I go there is always the fact of getting vaccinated which is very important suddenly, it is always necessary to do a PCR test before 72h.*

Some students had been vaccinated to promote herd immunity, to protect themselves, and/or to protect others.

> *Well, first of all to protect myself from the virus and to protect other people who are elderly or who do not have the capacity to protect themselves against the virus.*
> *But as I am a person who respects others, I get vaccinated because… Already to protect those around me and then to protect myself too anyway.*

The main factors of vaccine hesitation were the fear of side effects, the lack of hindsight, and the short time of production.

> *When I see the speed at which it was developed, I tell myself that there is still... For me it was a little too fast perhaps, but because I have this perspective, that I have studied cases etc… For example, we were working on Pasteur etc…*
> *I heard it was 5 years to be sure that a vaccine was valid. So, it's been, well, in December it will be two years.*
> *There will be undesirable effects 10 to 15 years later.*

In this line, doubts about the content and the reliability or effectiveness of the different vaccines were described. As the number of required doses constantly changes doubts of vaccine effectiveness arises.

> *And then it's also cool to get out of this crisis, if it goes through vaccination, well after that, we don't know, we're talking about the third dose... If it's to get vaccinated every 3 months, it's is a bit too bad. But yes, if we want to get out of the crisis and restart, that's good too.*

Opinions on EU Covid Certificate

The EU Covid certificate was poorly received by the majority of respondents. The interviewees explained that they understood its implementation but remained reluctant about its application and the deprivation of liberty it engendered. Some respondents mentioned that it was a draconian measure.

Students noted that the certificate was useless because it did not guarantee vaccinated people from transmitting the virus to those who were not vaccinated.

And having the certificate to go to restaurants knowing very well that even if you have it and you go to restaurants you can very well catch the disease. […] And we can very well transmit it. So, sometimes the certificate is a little useless. Because it comes to the same thing not having one…

Covid-19-Related Communication

More than half of the students mentioned poor communication about vaccines. According to them, miscommunication resulted in an upsurge in vaccine hesitancy. The sources of information were considered as very important for the construction of their opinion.

Well, I asked about the various "health scandals" that have already taken place, contaminated blood, growth hormones and all that. At that time, each time, the government or other, the pharmaceutical companies assured the population that it was without risk and all that, yet there were deaths, sick people…

Some side effects had also been widely reported by the mass media and this influenced vaccine decision-making.

Mmh, let's say that there is so much to gain from it, whether economically or health-wise, that it doesn't matter if there are a few people who have sequelae and die from the vaccine… Thrombosis, I don't know, there aren't that many, but there are. Well, that's a little annoying. We do not say it too much, without saying that we are hiding things or anything, but the communication of the government and others is not completely objective. Here.

One of the students explained that he would have preferred that several experts met during a television program in order to respond to the concerns shared by a large part of the population.

Discussion

In this non-selected sample of students getting vaccinated against Covid-19, we found an alarming high frequency of vaccine hesitancy (74% in the quantitative part of the study and nearly all students in the qualitative one). In the literature, levels of Covid-19 vaccine hesitancy among students are disparate: 7.4% in Czech Republic [14, 15], 10% in Lebanon [16], 10.6% in India [17], 13.9% in Italy [18], and 46% in Egypt [19]. The main reason for these discrepancies might be due to the different measurements and definitions of vaccine hesitancy across studies, as well as local Covid-19 prevalence and mortality.

Students were especially afraid of short-term side effects and their trust in Covid-19 vaccines was mitigated by their doubts on vaccines' validity. Lack of trust is a major factor to address to limit the spread of the Covid-19 disease [20]. Student hesitancy was also propelled by the rapid development of vaccines. These findings corroborated previous research reporting the main reason for vaccine hesitancy among students were side effects, in both a Turkish [21] and Chinese study [22]. Concerns about the speed of the vaccine roll out, safety, and efficacy have also been mentioned as motivations for vaccine hesitancy among young adults [23]. In general, better knowledge of the development process, side effects, and action-mechanisms of vaccines are protective factors against vaccine hesitancy [24]. Thus, it is important to increase vaccine literacy among students through educational interventions [25].

Nevertheless, the main reason for student vaccination was obtaining the EU Covid certificate. Participants were more worried about their social needs, i.e., outings, going to the restaurant or cinema, doing shopping, etc., than being infected. Wishing to return to a normal life was reported as the main driver of Covid-19 vaccine acceptance in research conducted among Italian students [26]. In this sense, the EU Covid certificate can be considered as a non-negligible nudge for vaccination and, therefore, as more important than perceived barriers and severity of the disease according to the HBM.

The majority of students in both questionnaires and interviews considered the EU Covid certificate as a violation of their freedom. This is confirmed in some editorials underlying the unethical nature of this instrument [27, 28]. Paradoxically, students conceived that the violation of their freedom was the solution to be free and return to normal life.

Protecting family and friends was another reason for getting vaccinated, more than the impact of the pandemic on other personal aspects, such as economic situation or mental health. Some other studies have showed that altruism and prosocial attitudes were associated with intention to get vaccinated [29, 30]. In parallel to a study conducted in Italy, perceived risk of Covid-19 was not among the main reasons for getting vaccinated [18]. Our participants were not afraid of being infected, perhaps because of the perceived minor effects of the disease from University students. The same attitude can be observed in the general population, whereby hesitant individuals consider vaccination to be a greater risk than the virus itself [25]. When reviewing these finding through the lens of The HBM, the perceived severity of the disease is lower than the problems or fears generated by the behavior supposed to avoid this disease, i.e., vaccination.

In parallel, a specific trait of the participants is a low complacency of the disease and a feeling of invulnerability. Indeed, less than half of the sample were worried about being infected and vaccinated to protect themselves. This

suggests a need for specific educational messages towards this population to describe the severity of Covid-19, in particular the long-term health consequences without threat and fear. It has already been shown that the perceived risk of Covid-19 is not the main reason why "vaccine accepting" students are vaccinated [18]. Furthermore, more than half of the sample was not ready to receive vaccine booster shots.

Finally, the lack of clear and transparent communication about vaccines was widely mentioned by respondents. Existing campaigns were not considered as sufficiently informative and useful. This may have encouraged an upsurge in fears about the Covid-19 vaccination and side effects. Indeed, several participants criticized the government, as well as health institutions for limited vaccine information. Students complaints about unclarity of vaccine-related communication were also reported in previous research [31].

This study has many strengths, including being one of the first studies to utilize a mixed-methods design to assess the barriers and levers of Covid-19 vaccine decision-making among college students [23]. The majority of previous research has been conducted before the launch of vaccination campaigns worldwide and have mostly reported the prevalence of hesitancy and associated factors through a quantitative approach [14, 15, 18, 32]. These methodologies limited the depth of information given on young adults' vaccine hesitancy. Furthermore, the uniqueness of our study resided in the recruitment of the sample. Participants were interviewed when getting vaccinated in a mobile vaccine clinic. Results showed an evident paradox between students' high levels of hesitancy and factual vaccine uptake.

There were two novel contributions arising from this work. First, acceptance of the EU Covid-19 certificate had been rarely studied before, especially among young people. Prior manuscripts have been limited to argue the ethical, legal, and policy validity of the EU Covid certificate [27, 33, 34]. In our study, we explored the opinions about the application of this certificate through a field investigation and found that it played a key role in factual vaccine uptake among students. Participants felt forced to get vaccinated notwithstanding their doubts to return to a normal life.

Second, we found that the majority of interviewed students were not ready to take a Covid-19 vaccine booster shot. This finding must be interpreted in the light that our study was conducted a few months before the implementation of an influential French campaign to administer booster shots among young adults. Interestingly, students already had some hesitancy about repeated injections. To the best of our knowledge, acceptance of multiple boosters has not been reported so far.

Finally, our results support the idea that young people criticized the government and health institutions for providing limited information on vaccines.

Limitations

The main limitation of the study is the non-representativeness of the sample with a selection bias due to the fact that the participants were getting vaccinated. However, the sample was mainly composed of students who were hesitant about vaccines against Covid-19 until very recently and who made their decision to be vaccinated later than their peers. Furthermore, our sample did not include many healthcare students, whose knowledge about vaccination is inherently different from other students. The field of study should be considered when designing campaigns promoting vaccination on college campuses. In addition, the quantitative sample size was small, as such, the descriptive results should be taken with caution, even if they allow certain trends to be highlighted.

Conclusions and Implications for Practice

Our results were directed towards different actors of student's health, e.g., health personnel, clinicians, and health services providers, who are all attempting to find possible strategies to reduce Covid-19 vaccine hesitancy among young adults. This study suggests that proposing solutions like the EU Covid certificate is a straightforward nudge for vaccination, but its application remain controversial. It is preferable to disseminate clear information on the balance between benefit, i.e., vaccine coverage, and risk, i.e., minimal short-term side effects. Guaranteeing the effectiveness of vaccines is important as well. These arguments must be evidence-based and communicated in a transparent way. Communication emphasizing the contribution of vaccination to the protection of family and friends could also reduce hesitation among students. On the other hand, it remains necessary to inform young people of the seriousness of Covid-19 in all age groups. As influential health advocates, health personnel should be trained to talk about vaccination effectively considering all recommendations issued from this study.

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Author Contributions QC and IM conceived the study; QC and KGR collected the data; QC and KGR carried out the initial analysis; QC and IM wrote the manuscript; ACR, LG and CT critically reviewed and revised the manuscript. All authors approved of the final version of the manuscript.

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Data Availability The data that support the findings of this study are available on request from the corresponding author [IM].

Code Availability Not applicable.

Declarations

Conflict of interest No potential competing interest was reported by the authors.

Ethical Approval The study follows the principles of the Declaration of Helsinki and the collection, storage and analysis of the data comply with the General Data Protection Regulation (EU GDPR). The study was approved by the Ethical Committee of the University of Bordeaux.

Consent to Participate All the study participants signed an informed consent agreeing to provide data and availability for the survey and semi-structured interviews.

Consent for Publication The Authors provide the consent for publication data or figure in the manuscript.

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