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COVID-19 vaccination refusal among college students: Global trends and action priorities

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Dear Editors

A recent global review of 19,991 students and trainees in healthcare professions from 39 countries found that 18.9% of these students refused to obtain COVID-19 vaccines (Mustapha et al., 2021). Compared to college students in other fields, students in healthcare professions could have higher COVID-19 vaccination rates (e.g., due to being a priority group, having greater access to vaccines, or due to their knowledge about medical and health sciences). Also, the preferences and perspectives of non-healthcare related and non-medical college/university students on COVID-19 vaccinations are not well known. Therefore, we assessed COVID-19 vaccination refusal rates among college/university students who were pursuing higher education in non-medical and non-health related fields.

We searched databases such as PubMed, EBSCO Host, Google Scholar, CINAHL, and pre-print servers using the following keywords: "college", "university", "student", "vaccination", "vaccine", "COVID-19", "coronavirus", "hesitancy", "refusal", "beliefs", "attitude", "willingness", "perceptions", and "preferences". The inclusion criteria for the studies in this review were: published in the English language, conducted with non-healthcare professions college students, students were clearly labeled as university or college students, data for studies was collected between May 2020–August 2021, and studies quantitatively assessed vaccination refusal or hesitancy rates. COVID-19 vaccination refusal rates data were extracted from studies if the study participants were "unlikely", "refused", "declined", or "disagreed" with obtaining vaccination. Pooled prevalence rates for COVID-19 vaccination refusal were computed from the studies (with 95% confidence intervals) by using random-effects modeling.

A total of 27 studies were included in this global review of non-health related college/university students' COVID-19 vaccination refusal rates from 17 countries [Table 1] [See Supplementary Materials]. The overall rate of COVID-19 vaccination refusal among 31,948 college/university students around the world was 22% (95%CI = 18.5–26.1). Our findings indicate that students pursuing college education in non-health related/non-medical fields are more likely to refuse COVID-19 vaccines compared to college students in health and medical fields (22% vs. 18.9%). (Mustapha et al., 2021). However, the major COVID-19 vaccine-related concerns reported by college students in this review are very similar to the concerns of medical/healthcare students, healthcare providers, and the general population (i.e., concerns about safety, side effects, efficacy, misinformation, and mistrust) (Biswas et al., 2021; Mustapha et al., 2021; Khubchandani and Macias, 2021). Similar to studies worldwide and from various population groups, our review also found that males, those with a history of flu vaccinations, and those who perceived themselves to be at higher risk and severity of COVID-19

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Table 1
Summary of Worldwide COVID-19 Vaccination Refusal Rates and Reasons in College Students [Referred in Supplementary Materials.

Author/Year	Country/ Study Period	Sample size	Hesitancy Rate	Reasons for Refusal and Enablers for Willingness
Barello et al. 2020	Italy NA	735	13.9%	Reasons: Complexity of information and contrasting feelings. Enablers: High awareness, health background, and literacy.
Synnott, 2020	USA NA	591	29.8%	Reasons: Concerns about vaccine safety, side effects, and lack of information. Enablers: Male gender
Biswas et al., 2021	Bangladesh NA	322	32.3%	Reasons: Concerns about vaccine side effects, efficacy, low familiarity with vaccine. Enablers: Belief that vaccine will stop the spread of COVID-19
Baloran, 2020	Philippines May 2020	530	18.7%	Reasons: Concerns about vaccine safety, side effects, and health risks. Enablers: Business, economics, and education disciplines (i.e., non-media students)
Guzoglu et. al, 2021	Cyprus/ Turkey June 2020	327	15.5%	Reasons: Concerns about side-effects and efficacy, trust in own immune system. Cultural factors and/or the governments of these countries.
Pastorino et. al, 2021	Italy July 2020	162*	18.5%	Reasons: Lower grade/education level in college, and lower perceived severity of COVID-19. Enablers: Male gender, flu vaccination history, and higher perceived risk of COVID-19 infection.
Patil et al., 2021	USA July 2020	256	51.5%	Reasons: Black race, republican party affiliation, lower concerns about COVID-19 infection. Enablers: Higher health literacy, higher perceived risk and severity of COVID-19 infection.
		1,249*	14.3%	
Gruner et al. 2021	Germany Aug 2020			Reasons: Low trust in government and healthcare system, and lower perceived risk of COVID-19. Enablers: Male gender and fear of COVID-19 related infection and risks.
Mant et al., 2021	Canada Sept 2020	1,269	19.9%	Reasons: Concerns about insufficient testing, safety, and side effects. Mistrust in govt/ pharma. Enablers: Affected by or higher perceived severity of COVID-19, recommendation by a doctor.
Qiao et al. 2020	USA Oct 2020	1062	24.3%	Reasons: Concerns about vaccine safety, effectiveness, characteristics (i.e., country producing, speedy development, & vaccine administration methods), social media information/ usage. Enablers: Duration of protection, accessibility, and receiving authoritative and trusted advice.
Mo et al., 2021	China Nov 2020	6922	21.1%	Reasons: Younger age, lower education grade in college, and social media usage. Enablers: Male gender, higher perceived benefits of vaccines, and positive descriptive norms.
Graupensperger et al. 2020	USA Nov 2020	647	8.4%	Reasons: Concerns about side effects & efficacy, speedy development/ inadequate testing of vaccines, and vaccines could cause COVID-19 infections or make sick. Enablers: Social norms and peer perceptions, and having health insurance
Szymd et al. 2021	Poland Dec 2020	1284*	21.7%	Reasons: Concerns about side effects and complications of COVID vaccine, civil rights

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Table 1 (*continued*)

Author/Year	Country/ Study Period	Sample size	Hesitancy Rate	Reasons for Refusal and Enablers for Willingness
				limitations. Enablers: History of vaccinations, higher grade in college, fear of COVID-19 spread.
Bai et al. 2021	China Jan 2021	2881	23.7%	Reasons: Concerns about safety and efficacy of COVID vaccines, lower perceived risk of COVID-19 Enablers: Urban resident, encouraged by family, trust in vaccine benefits/ effects.
Tavolacci et al. 2021	France Jan 2021	3,089	17.1%	Reasons: Concerns about side effects, rapid development of vaccine, wait for more information. Enablers: Male gender, older age, perceived risk of COVID-19 to self and others, vaccine trust.
Tsegaw Taye et. al., 2021	Ethiopia Jan 2021	134*	43.3%	Reasons: Concerns about side effects, efficacy, & information, low perceived risk of COVID-19 Enablers: Higher knowledge of COVID and family members' engagement in COVID-19 prevention
Dratva et. al., 2021	Switzerland Jan 2021	1297	21.5%	Reasons: Lower perceived risk of COVID and confidence in vaccines, and information overload. Enablers: Male gender, older age, past flu vaccination, trust in the government strategy
Al-Mulla et. al, 2021	Qatar Feb 2021	231*	50.2%	Reasons: Concerns about safety, side effects, efficacy, speedy trials, and low trust in vaccines. Enablers: Male gender, higher age & education level, flu vaccination history, travel requirements.
Walker et. al. 2021	China March 2021	330	30.6%	Reasons: Concerns about side effects, affordability, and authenticity of COVID-19 vaccines.

Table 1 (*continued*)

Author/Year	Country/ Study Period	Sample size	Hesitancy Rate	Reasons for Refusal and Enablers for Willingness
				Enablers: High knowledge and perceived risk of COVID-19 infection, trust in vaccine
Varol et. al. 2021	Netherlands March 2021	434	20%	Reasons: Concerns about safety, side effects, and rapid development of COVID-19 vaccines. Enablers: Trust in government, quality control, and the pharmaceutical industry. Higher self-efficacy and risk perception, prosocial norms and trust about vaccines.
Kecojevic et. al. 2021	USA March 2021	457	36.3%	Reasons: Concerns about safety, efficacy, side effects. Mistrust in vaccine related information. Enablers: Older age, Whites, flu vaccination history, family member got vaccine.
Sharma et. al. 2021	USA March 2021	282	47.5%	Reasons: Political affiliation, lower belief in vaccine benefits, lower confidence.
Galle et. al. 2021	Italy Apr 2021	3,226	2%	Reasons: Concerns about vaccine safety and efficacy, and older age and grade in college. Enablers: Male gender, annual flu vaccination history, greater knowledge about vaccines.
Almalki et. al., 2021	Saudi Arabia April 2021	407	6.2%	Reasons: Concerns of side effects & expedited trials, lack of trust & belief of no need for vaccine Enablers: Past flu vaccination, trust in government, health system, and community leaders.
Salerno et. al., 2021	Italy May 2021	2667	13.3%	Reasons: Negative attitude towards vaccines & medicine, higher conspiracy and negative beliefs about side effects, efficacy, importance of vaccines and

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Table 1 (*continued*)

Author/Year	Country/ Study Period	Sample size	Hesitancy Rate	Reasons for Refusal and Enablers for Willingness
				speedy trials of the COVID-19 vaccines. Enablers: Male sex, previous COVID test, higher agreeableness, and emotional stability.
Nwangwu et. al., 2021	Nigeria May 2021	364	50%	Reasons: Indifference towards and disagreement with effective curing and protecting vaccine and treatment modalities for COVID-19 in Nigeria. Enablers: NA
Riad et. al., 2021	Czech Republic June 2021	793	22.9%	Reasons: Concerns about side effects and rushed testing of vaccines, lower knowledge, lack of information, and trust in pharma/ healthcare providers, social media. Enablers: Male sex, older age, flu vaccination history, high perceived risk of COVID-19
Overall = 27 studies	17 countries	31, 948 Students	22% 95%Ci = (18.5–26.1)	Top reasons: Concerns about vaccine safety, side effects, efficacy; lack of vaccine information or misinformation; mistrust or lower trust in vaccines, social media. Top enablers: Male gender, flu vaccination history, and higher perceived risk of COVID-19.

*Indicates that the participants were part of a larger sample. A total of 27 studies with 31,948 participants have been included in this Table. Data collection month instead of publication date for the study have been arranged in chronological order in the table. NA indicates that the data collection period was not mentioned in the study.

infections were more likely to accept vaccines (Mustapha et al., 2021; Khubchandani and Macias, 2021; Biswas et al., 2021). Social media has emerged as a unique influencer worldwide, especially in this college student population, and should be harnessed to promote COVID-19 vaccinations along with efforts to curb misinformation (Florko, 2021; Riad et al., 2021; Qiao et. al, 2021; Mo et al., 2021; Dratva et al., 2021).

Given the rising rates of morbidity and mortality from COVID-19 in young adults and the unique attributes of this population, concerted action is needed to increase the uptake of COVID-19 vaccines in students at institutes of higher education (IHE). Mandates seem to be an easy, equitable, and definitive solution for vaccinating students at IHE, but remain a radioactive proposition for several reasons. For example, in the United States, the majority (>50%) of the public supports a mandate for COVID-19 vaccines in colleges and universities, but there have also been legal challenges to such mandates (i.e., based on public values and exemption rights, confusing rules and loopholes, regional and national political climate and laws surrounding vaccinations, etc.) (Haeder, 2021; Kesslen et al., 2021). In many countries, the challenges relate to logistics (e.g., availability of vaccines, keeping track of unvaccinated students, allowing exemptions, etc.). Above all, IHE have social and financial considerations to balance as mandate-related decisions may affect enrollment and public reputation. As an alternate, based on a comprehensive review of the literature, results from Table 1, and guidance from professional organizations, we propose the following action priorities for individual IHE to increase COVID-19 vaccine uptake in students (CDC, 2021; Florko, 2021; Sharma et al., 2021; Khubchandani and Macias, 2021; Dratva et al., 2021; American College Health Association, 2021; Mant et al., 2021).

First, create student, faculty, and staff-led COVID-19 vaccination, prevention, and mitigation teams to inform university/college administration practices and policies on COVID-19. Engage student organizations and leaders in these efforts.

Second, deploy surveillance systems and conduct assessments to keep a track of COVID-19 vaccination rates and cases around the college/university. Display the information on easily accessible websites with daily updates on COVID-19 vaccination and case rates.

Third, sustained and multimodal communication strategies (e.g., print and electronic) should be adopted to promote COVID-19 vaccines among college populations at various avenues (e.g., cafeteria, traffic stop, emails, etc.). Given the importance and influence of new technologies and social media in this population, communication, marketing, and awareness campaigns for vaccinations should utilize such platforms with strategies designed and led by students. Provide background information and scientific justification on COVID-19 prevention practices (e.g., vaccinations and masks).

Fourth, employ student health centers as on-site COVID-19 vaccination and testing centers. In the absence of student health centers on college campuses, partner with local clinics, primary healthcare centers, or healthcare facilities to provide vaccination and testing.

Fifth, create a campus climate for vaccination (e.g., provide incentives for vaccination, hold contests for reaching vaccination milestones, celebrate accomplishments of high vaccination and low case rates, etc.). Make communities a partner in these campaigns and ventures.

Sixth, organize regular community gatherings, town halls, and seminars to address concerns of students on vaccines, the latest developments and information on vaccines (e.g., safety and effectiveness), and to discuss community and global COVID-19 trends and updates. Engage medical and scientific experts, locally trusted voices, and vaccinated individuals to promote COVID-19 vaccinations and other measures to prevent and limit the spread of the virus.

Finally, in regions with vaccine shortage or where unvaccinated students are allowed on campuses, expand on-site and community partnerships for testing, promote mask-wearing, social distancing, and hygiene measures using the aforementioned strategies.

IHE are replete with resources such as large community presence and spaces for vaccination, scientific experts and advocates for societal wellbeing, capacity for community awareness and public health messaging, and the ability to influence community social, cultural, and political norms. Thus, IHE should serve as conduits for mass uptake of COVID-19 vaccinations not only in the student population but also among community members. IHE also contribute to the social, cultural, and economic fabrics of the neighboring communities and society in general. For optimum functioning of IHE and in turn, our societies, it is imperative that IHE assume the role of vaccinating student populations with the available COVID-19 vaccines and serve as role models for communities and regions.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bbi.2021.10.006.

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