Medical Student Perspectives on Their Role as Emerging Physicians During the COVID-19 Pandemic

Ravi Chinsky¹ · Alexander Morris¹ · Angela Suh¹ · Avery Hum¹ · Danielle Wolin¹ · Brian Harper¹ · William Blazey¹ · Sheldon Yao¹ · Bhuma Krishnamachari¹

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Abstract

The COVID-19 pandemic caused a large strain on the US medical system, with shortage of medical personnel being a key issue. The role of medical school students during a pandemic is not well established. Understanding the perspectives of medical students with regard to their role is essential in determining how to facilitate the use of their skills in combating the pandemic. To evaluate medical student perspectives on the COVID-19 pandemic, an anonymous online survey was distributed to medical students, primarily in the Northeastern United States. In the sample of 232 students, there were significant differences between students in different class years when assessing moral obligations to assist with the COVID-19 pandemic ($p=0.002$). A higher percentage of first and second year medical students (pre-clinical training, around 48%) felt that healthcare students are morally obligated to assist as compared to third and fourth year students (clinical training, 30.43% of third years and 23.19% of fourth years). In all class years, the majority said they would regret their decision if they had chosen not to study medicine (62.32% to 79.31%) and most students did not feel their motivation to become a physician had been decreased (84.78% to 87.50%). Though the study was limited because the majority of subjects were from New York, the results provide insight into medical students' attitudes about the COVID-19 pandemic and can be used in the planning of how best to utilize medical students in this and in future situations.

Keywords COVID-19 · Medical school · Students · Perspective · Pandemic · Healthcare · United States

✉ Bhuma Krishnamachari
bkrishna@nyit.edu

Ravi Chinsky
rchinsky@nyit.edu

Alexander Morris
amorri08@nyit.edu

Angela Suh
asuh01@nyit.edu

Avery Hum
ahum@nyit.edu

Danielle Wolin
dwolin@nyit.edu

Brian Harper
bharper@nyit.edu

William Blazey
wblazey@nyit.edu

Sheldon Yao
sheldon.yao@nyit.edu

Introduction

The unprecedented nature of the novel coronavirus disease (COVID-19) has taken an enormous toll on the healthcare community. The virus was first identified at the end of 2019 in Wuhan City, Hubei Province of China, where the city was faced with a group of patients diagnosed with pneumonia with an unidentified cause [1]. The virus, with severity that can range from minimal symptoms to severe respiratory failure with multiple organ failure, has a proclivity for older individuals with weakened immune systems and comorbidities, but younger, healthy people are not spared [2]. Since its identification as a respiratory virus that spreads through droplets, China and other nations closed their borders and quarantined their citizens to limit the spread [1]. Nevertheless, COVID-19 made its way around the world. As of July, 2021, according to the Centers for Disease Control (CDC), COVID-19 has affected 33,496,454 American people with 602,401 lives lost [3].

As a result of the rapid rise in critically ill COVID-19 patients, hospitals and clinics experienced medical staff

¹ New York Institute of Technology College of Osteopathic Medicine, 101 Northern Blvd, Glen Head, NY 11545, USA

shortages since the beginning of the global pandemic. It has been suggested that medical students could provide additional assistance; however, since their role in this or any pandemic is not well defined and student participation has varied across institutions. Participation has ranged from providing one-on-one patient care to the other extreme of having no involvement at all [4, 5].

This is not the first time medical students have been called to duty during a global health crisis. During the 1918 influenza pandemic, medical students in the USA graduated early from medical school and had expedited board examinations in an effort to increase the number of medical personnel [6, 7]. However, based on anecdotal stories from medical students at that time, it appears that these individuals felt ill equipped to tackle the challenges of that pandemic [7]. With minimal clinical exposure up to that point, newly minted physicians relied on information solely from school didactics to treat their patients, but were unsure if their treatments showed any improvement in their patients' conditions [6]. Furthermore, with many students learning while training, they were unable to respond rapidly and appropriately to deteriorating patients [6]. Despite these accounts, the emergence of the COVID-19 global pandemic has prompted nations to once again consider whether the clinical skills of medical students can be utilized.

Starting in March 2020, many universities, including those in the USA, England, Denmark, and Italy, offered accelerated training coursework to get more doctors out onto the front lines [4, 5, 8]. Although these universities were successful in mobilizing newly graduated doctors, these students may encounter the same difficulties as those in 1918. With no definitive treatment options as well as ineffective respiratory interventions, these students may not be educationally nor psychologically equipped for this challenge. The mental health strain caused by COVID-19 on medical professionals is illustrated by the suicide of a 49-year-old head of the Emergency Department in a New York City hospital after telling her family about the tremendous suffering and death she witnessed while taking care of coronavirus patients [9]. The detrimental effects on mental health of a pandemic were also seen during the 2012 Middle East respiratory syndrome (MERS) outbreak, during which there was a significant increase in stress and anxiety among medical students [6, 10]. Nevertheless, many medical students and civilians feel that despite these repercussions, healthcare personnel have a moral obligation to volunteer their services at a time when their expertise is most needed.

While there is an expectation that medical students completing their fourth year are ready to enter the workforce, there is no clear role for first, second, and third year medical students. With minimal clinical training at these stages of education, most of these individuals have been enlisted in volunteer services or developing their own activities to

support the medical system. For example, Harvard Medical School students created a COVID-19 response team that consisted of community awareness and activism [11]. Similarly, many schools throughout the nation have created virtual COVID-19 journal clubs [12]. Some have even suggested that matriculated medical students for the class of 2024 should be trained in infectious disease control in lieu of the first year of didactic studies so that they can offer a variety of services to patients and providers [13].

Though the COVID-19 pandemic creates numerous opportunities for medical students to aid in an acute crisis and learn medicine in unconventional ways, these new roles could become major sources of stress and anxiety in the long term. Most medical students are already experiencing an abrupt transition to online learning and have lost opportunities such as interpersonal collaboration, bench work research at medical schools, and hands-on clinical experiences [14]. The number of changes being made to their medical school curriculum could adversely affect learning and career prospects as well. It is also unclear whether current medical school students view volunteering during this pandemic as a moral obligation they owe to society.

The purpose of this study was to evaluate medical student perspectives with regard to obligations of healthcare students and professionals during the COVID-19 pandemic.

Methods

An anonymous, IRB-approved online survey was distributed to medical students primarily in the Northeastern United States but was available to all students who use social media platforms Facebook and Twitter. The survey was sent to all medical students at the New York Institute of Technology College of Osteopathic Medicine in both New York and Arkansas.

Questions for the survey were developed by modifying items from a previously published survey used during two separate influenza epidemics to examine medical students' knowledge of the current pandemic [6, 7]. Additionally, certain questions were derived from a validated Academic Motivation Scale (AMS) (normally used to gauge what motivates medical school students to become physicians) and were modified in order to reflect perspectives regarding this current pandemic [15–19]. Deriving our questions from the AMS in particular allows us to frame the student responses in the framework of the self-determination theory (SDT). The theory suggests that behavior can be intrinsically motivated, extrinsically motivated, or amotivated. The questions in the AMS specifically investigate the intrinsic motivation of students. Adapting these questions may allow us to better understand student motivations in the context

of the COVID-19 pandemic. The comprehensive survey is attached ([Appendix](#)).

The following steps were taken to validate our survey: face and content validity were assessed by an epidemiologist, biostatistician, three medical students who did not participate in the study, and three academic physicians. Reliability was assessed using Cronbach's α . Exploratory factor analysis identified only a single underlying subscale, with a Cronbach's α value = 0.79.

Statistical analysis was performed using SAS v 9.4. Differences between categorical responses were assessed via chi-square tests. Analyses were conducted on all medical student respondents as well as students whose hometown or medical school was located in New York State. An alpha of 0.05 was considered statistically significant.

Results

The survey had a total of 232 respondents. Of these participants, 131 identified New York State at their home state and 179 reported attending medical school in New York State.

Table 1 shows the perspectives of all medical students in study, broken down by class year. There were no statistically significant differences between students in terms of their opinions on whether healthcare students, retired healthcare workers, or healthcare employees with a scope of medical practice outside of the pandemic should be encouraged to volunteer in the event of healthcare worker shortage. Similarly, there were no statistically significant differences between students in terms of their opinions on whether the government is justified in requiring these groups of individuals to assist with the pandemic if there are insufficient volunteers, or whether these individuals should be legally penalized for refusal to comply with government requirements to assist with the pandemic. For these questions, the majority of students in all four class years answered “no.”

There were, however, statistically significant differences between class years in terms of opinions on whether there is a moral/ethical/professional obligation to volunteer in the event of healthcare worker shortage for these individuals. With regard to healthcare students ($p=0.002$), 48.28% ($n=14$) of first years and 48.86% ($n=43$) of second years answered “yes,” whereas 30.43% ($n=14$) of third years and 23.19% ($n=16$) of fourth years answered “yes.” With regard to retired healthcare workers ($p=0.004$), 37.93% ($n=11$) of first years answered “yes,” while 27.27% ($n=24$) of second years, 28.26% ($n=13$) of third years, and 14.49% ($n=10$) of fourth years answered “yes.” Finally, with regard to healthcare employees whose scope of medical practice is not aligned with pandemic care ($p=0.01$), 31.03% ($n=9$) of first years answered “yes” while 27.27% ($n=24$) of second years, 23.91% ($n=11$) of third years, and 33.33% ($n=23$) of fourth

years answered “yes.” These results are visually displayed in Fig. 1. Subgroup analysis looking only at students whose hometown is New York or whose medical school is in New York did not show any statistically significant differences between school years (data not shown).

Table 2 shows the differences between student classes in terms of their motivations for studying medicine. There were no statistically significant differences between school years in any of the survey items. In all class years, the majority said they would regret their decision if they had chosen not to study medicine (62.32% to 79.31%). The vast majority did not regret their choice to go to medical school (89.13% to 93.1%) and felt it would bother them if they could no longer study medicine (69.57% to 86.36%), and most would not stop studying medicine if they could be financially reimbursed (78.26% to 93.1%). Between 41.38 and 44.32% wouldn't consider any other profession than becoming a doctor. 65.52% to 82.61% felt the quality of their medical education had been affected. Most students did not feel their motivation to become a physician had not been decreased (84.78% to 87.50%), though only 43.48% to 68.18% said it increased their motivation. In the question related to work-life balance, 37.69% to 52.27% felt they would like to be a physician even if that would mean giving precedence to work over family. Table 3 shows similar results when the analysis was limited to those students whose hometown is New York state. However, in this group, there was a statistically significant difference ($p=0.02$) between school years when asked whether the COVID-19 pandemic increased motivation to become a physician, with only 35.48% ($n=11$) of third years indicating their motivation was increased, as compared to 69.23% ($n=9$) of first years, 71.11% ($n=32$) of second years, and 61.9% ($n=26$) of fourth years. Table 4 also shows similar results when the analysis was limited to those students whose medical school is in New York state, with no significant differences between class years.

Discussion

The goal of this study was to investigate how student physicians in different stages of their training view the obligations of medical students, current healthcare workers, and retired healthcare workers during a pandemic, as well as to gauge how the pandemic may be affecting their motivations to study medicine. In the popular media, there are many reports of medical students, physicians, and retirees volunteering themselves to assist in the pandemic, but this represents a selective snapshot of those who might have volunteered and not the general medical student population.

There is very little published research on the attitude of medical students during the COVID-19 pandemic, likely because this pandemic is so recent. The role of medical

Table 1 Perspectives of all medical students in study, broken down by class year

		Year 1 <i>n</i> = 29 <i>N</i> (%)	Year 2 <i>n</i> = 88 <i>N</i> (%)	Year 3 <i>n</i> = 46 <i>N</i> (%)	Year 4 <i>n</i> = 69 <i>N</i> (%)	<i>p</i> value
In the event of healthcare worker shortage:						
Health sciences students should be encouraged to volunteer	Yes	14 (48.28)	52 (59.09)	28 (60.87)	41 (59.42)	0.52
	No	5 (17.24)	16 (18.18)	11 (23.91)	16 (23.19)	
	Not sure	10 (34.48)	20 (22.73)	7 (15.22)	12 (17.39)	
Retired healthcare workers should be encouraged to volunteer	Yes	12 (41.38)	46 (52.27)	23 (50)	31 (44.93)	0.28
	No	7 (24.14)	21 (23.86)	17 (36.96)	24 (34.78)	
	Not sure	10 (34.48)	21 (23.86)	6 (13.04)	14 (20.29)	
Healthcare employees should be encouraged to volunteer even when the scope of medical practice is not aligned with their contracted job	Yes	9 (31.03)	33 (37.5)	20 (43.48)	28 (40.58)	0.21
	No	11 (37.93)	29 (32.95)	17 (36.96)	32 (46.38)	
	Not sure	9 (31.03)	26 (29.55)	9 (19.57)	9 (13.04)	
There is a moral/ethical/professional obligation to volunteer in the event of healthcare worker shortage for these individuals:						
Healthcare students	Yes	14 (48.28)	43 (48.86)	14 (30.43)	16 (23.19)	0.002
	No	9 (31.03)	27 (30.68)	24 (52.17)	44 (63.77)	
	Not sure	6 (20.69)	18 (20.45)	8 (17.39)	9 (13.04)	
Retired healthcare workers	Yes	11 (37.93)	24 (27.27)	13 (28.26)	10 (14.49)	0.004
	No	9 (31.03)	45 (51.14)	28 (60.87)	51 (73.91)	
	Not sure	9 (31.03)	19 (21.59)	5 (10.87)	8 (11.59)	
Healthcare employees, even when the scope of medical practice is not aligned with their contracted job	Yes	9 (31.03)	24 (27.27)	11 (23.91)	23 (33.33)	0.01
	No	14 (48.28)	35 (39.77)	28 (60.87)	40 (57.97)	
	Not sure	6 (20.69)	29 (32.95)	7 (15.22)	6 (8.7)	
The government is justified in requiring these individuals to assist with the pandemic if there are insufficient volunteers:						
Health sciences students	Yes	8 (27.59)	19 (21.59)	7 (15.22)	15 (21.74)	0.60
	No	17 (58.62)	53 (60.23)	35 (76.09)	44 (63.77)	
	Not sure	4 (13.79)	16 (18.18)	4 (8.7)	10 (14.49)	
Retired healthcare professionals	Yes	6 (20.69)	13 (14.77)	7 (15.22)	12 (17.39)	0.58
	No	17 (58.62)	56 (63.64)	35 (76.09)	46 (66.67)	
	Not sure	6 (20.69)	19 (21.59)	4 (8.7)	11 (15.94)	
Healthcare professionals, even when the scope of medical practice is not aligned with their contracted job	Yes	5 (17.24)	20 (22.73)	10 (21.74)	21 (30.43)	0.69
	No	19 (65.52)	54 (61.36)	27 (58.7)	41 (59.42)	
	Not sure	5 (17.24)	14 (15.91)	9 (19.57)	7 (10.14)	
The following individuals should be legally penalized for refusal to comply with government requirements to assist with the pandemic:						
Health sciences students	Yes	0 (0)	4 (4.55)	0 (0)	1 (1.45)	0.25
	No	27 (93.1)	83 (94.32)	45 (97.83)	67 (97.1)	
	Not sure	2 (6.9)	1 (1.14)	1 (2.17)	1 (1.45)	
Retired healthcare professionals	Yes	0 (0)	3 (3.41)	0 (0)	1 (1.45)	0.17
	No	27 (93.1)	82 (93.18)	46 (100)	68 (98.55)	
	Not sure	2 (6.9)	3 (3.41)	0 (0)	0 (0)	
Healthcare employees, even when the scope of medical practice is not aligned with their contracted job	Yes	0 (0)	8 (9.09)	3 (6.52)	2 (2.9)	0.17
	No	26 (89.66)	77 (87.5)	41 (89.13)	66 (95.65)	
	Not sure	3 (10.34)	3 (3.41)	2 (4.35)	1 (1.45)	

students has been assessed with prior pandemics. In a survey of 243 Belgian medical students during the H5N1 virus outbreak in Europe, 70% reported that they would be willing to provide primary medical care and 82.3% indicated that they would be willing to take care of patients affected by an epidemic disease [20].

The few papers that have been published on medical students during the COVID-19 pandemic show conflicting results. In a study from South Korea, 213 medical students, 180 graduates, and 181 professors were administered an online survey examining the role of medical students during the pandemic. In this study, 86.3% of the students felt that

Fig. 1 Moral/ethical/professional obligation to volunteer in the event of healthcare worker shortage

“focusing on the medical education and learning as trainees” is the proper role of a medical student. In contrast, 20.7% agreed with “acting as an assistant for healthcare professionals,” and 8.5% responded that they would like “be actively involved in clinical practice” [21].

A study from Baylor College of Medicine in Houston, TX, in which a survey was administered to 512 medical students showed that 32.3% ($n = 164$) preferred in-person clinical experiences. More than half of the respondents ($n = 287$, 55.5%) reported that they volunteered to assist with the pandemic in clinical and non-clinical settings. Rates of volunteering were lowest in the first and fourth year classes, with 2.3% of the fourth and 9.7% of the first year students reporting that they volunteered [22].

It is possible that the difference in results across research studies stems from cultural differences between study populations. Contrary to the study at Baylor College of Medicine, a study in a Chinese medical student population found that of 552 survey participants, 85.6% of the respondents were “glad to volunteer.” Senior students expressed more interest in volunteering than junior students [23].

Our data show that medical students significantly differed in their opinions regarding whether health sciences students and retired healthcare workers, and current healthcare employees have a moral, ethical, or professional obligation to volunteer in the event of a healthcare worker shortage. In the case of health sciences students and retired healthcare workers, first year students in particular were more likely to answer “yes” to these questions, while third and fourth year students consistently answered “no.”

Our findings that fourth year students had the lowest rates of reporting that health students are ethically obligated to assist with the pandemic are consistent with the result seen in the Baylor College of Medicine study, suggesting that advanced level students may be less willing to take on roles that may place them at risk. However, it should be noted that when asked whether health students should be encouraged to volunteer, the responses were mostly affirmative across all classes. Students from all the class years were not supportive of requiring health professional students to volunteer and even less supportive of legally penalizing healthcare students for not volunteering.

Table 2 Motivation to study medicine: all students

		Year 1 <i>n</i> = 29 <i>N</i> (%)	Year 2 <i>n</i> = 88 <i>N</i> (%)	Year 3 <i>n</i> = 46 <i>N</i> (%)	Year 4 <i>n</i> = 69 <i>N</i> (%)	<i>p</i> value
I would always regret my decision if I hadn't availed myself of the opportunity to study medicine	Yes	23 (79.31)	56 (63.64)	26 (56.52)	43 (62.32)	0.58
	No	2 (6.9)	14 (15.91)	10 (21.74)	13 (18.84)	
	Not sure	4 (13.79)	18 (20.45)	10 (21.74)	13 (18.84)	
I regret my choice to go to medical school	Yes	0 (0)	0 (0)	2 (4.35)	3 (4.35)	0.32
	No	27 (93.1)	79 (89.77)	41 (89.13)	63 (91.3)	
	Not sure	2 (6.9)	9 (10.23)	3 (6.52)	3 (4.35)	
I wouldn't consider any other profession than becoming a doctor	Yes	12 (41.38)	39 (44.32)	18 (39.13)	29 (42.03)	0.49
	No	8 (27.59)	30 (34.09)	20 (43.48)	30 (43.48)	
	Not sure	9 (31.03)	19 (21.59)	8 (17.39)	10 (14.49)	
It wouldn't really bother me too much if I could no longer study medicine	Yes	4 (13.79)	3 (3.41)	10 (21.74)	6 (8.7)	0.06
	No	22 (75.86)	76 (86.36)	32 (69.57)	55 (79.71)	
	Not sure	3 (10.34)	9 (10.23)	4 (8.7)	8 (11.59)	
I would like to become a doctor, even if that would mean giving precedence to my work over my family	Yes	14 (48.28)	46 (52.27)	21 (45.65)	26 (37.68)	0.58
	No	7 (24.14)	22 (25)	16 (34.78)	23 (33.33)	
	Not sure	8 (27.59)	20 (22.73)	9 (19.57)	20 (28.99)	
I would stop studying medicine if I could be financially reimbursed	Yes	1 (3.45)	3 (3.41)	2 (4.35)	9 (13.04)	0.09
	No	27 (93.1)	79 (89.77)	37 (80.43)	54 (78.26)	
	Not sure	1 (3.45)	6 (6.82)	7 (15.22)	6 (8.7)	
The COVID-19 pandemic has lowered my motivation to become a physician	Yes	4 (13.79)	4 (4.55)	4 (8.7)	7 (10.14)	0.46
	No	25 (86.21)	77 (87.5)	39 (84.78)	59 (85.51)	
	Not sure	0 (0)	7 (7.95)	3 (6.52)	3 (4.35)	
The COVID-19 pandemic has increased my motivation to become a physician	Yes	18 (62.07)	60 (68.18)	20 (43.48)	40 (57.97)	0.11
	No	10 (34.48)	21 (23.86)	22 (47.83)	21 (30.43)	
	Not sure	1 (3.45)	7 (7.95)	4 (8.7)	8 (11.59)	
The COVID-19 pandemic has negatively affected the quality of my education	Yes	19 (65.52)	59 (67.05)	36 (78.26)	57 (82.61)	0.30
	No	7 (24.14)	16 (18.18)	6 (13.04)	7 (10.14)	
	Not sure	3 (10.34)	13 (14.77)	4 (8.7)	5 (7.25)	

These results indicate that when being asked to volunteer their clinical skills, students may respond best to encouragement, rather than the use of guilt and/or legal ramifications. This is consistent with self-determination theory, which suggests that a student must be interested in a particular task, as well as have their needs of competence, autonomy, and relatedness met [24, 25]. When the students feel they are being forced to participate in an activity regardless of their own values or interests, their autonomy is compromised [26].

The difference in answers between medical student years 1–4 may also be attributed to the difference in the day-to-day experience from the pre-clinical years (years 1 and 2) to the clinical years (years 3 and 4). First and second year medical students' experiences in healthcare delivery settings may be limited to their experiences prior to attending medical school as well as occasional clinical exposure outside of didactic studies. Third and fourth year students, on the other hand, are currently involved in healthcare delivery and were witnesses to how healthcare organizations responded to the

beginnings of the COVID-19 pandemic. Furthermore, the vast majority of third and fourth year students were pulled from their rotations when the pandemic grew to critical mass. This may have further shaped their beliefs on their own role and obligations during this pandemic as unnecessary, and at worst a burden to an overtaxed healthcare system.

In terms of motivations to study medicine, in all class years, the majority of participants seemed to view the study of medicine in a positive light, in that they did not regret their decision. However, many did feel that the quality of their medical education had been affected. While most students did not report a reduced motivation to become a physician, many also did not feel that it increased their motivation. When the analysis was limited to those students whose hometown is New York state, there was a difference between school years in that first, second, and fourth year students largely reported an increased motivation, while far fewer third year medical students reported

Table 3 Motivation to study medicine: students with hometown in New York State

		Year 1 <i>n</i> = 13 <i>N</i> (%)	Year 2 <i>n</i> = 45 <i>N</i> (%)	Year 3 <i>n</i> = 31 <i>N</i> (%)	Year 4 <i>n</i> = 42 <i>N</i> (%)	<i>p</i> value
I would always regret my decision if I hadn't availed myself of the opportunity to study medicine	Yes	11 (84.62)	24 (53.33)	17 (54.84)	29 (69.05)	0.28
	No	2 (15.38)	8 (17.78)	7 (22.58)	6 (14.29)	
	Not sure	0 (0)	13 (28.89)	7 (22.58)	7 (16.67)	
I regret my choice to go to medical school	Yes	0 (0)	0 (0)	1 (3.23)	1 (2.38)	0.83
	No	12 (92.31)	41 (91.11)	29 (93.55)	39 (92.86)	
	Not sure	1 (7.69)	4 (8.89)	1 (3.23)	2 (4.76)	
I wouldn't consider any other profession than becoming a doctor	Yes	5 (38.46)	18 (40)	11 (35.48)	22 (52.38)	0.75
	No	5 (38.46)	19 (42.22)	14 (45.16)	16 (38.1)	
	Not sure	3 (23.08)	8 (17.78)	6 (19.35)	4 (9.52)	
It wouldn't really bother me too much if I could no longer study medicine	Yes	4 (30.77)	2 (4.44)	6 (19.35)	4 (9.52)	0.10
	No	7 (53.85)	40 (88.89)	23 (74.19)	33 (78.57)	
	Not sure	2 (15.38)	3 (6.67)	2 (6.45)	5 (11.9)	
I would like to become a doctor, even if that would mean giving precedence to my work over my family	Yes	4 (30.77)	2 (4.44)	6 (19.35)	4 (9.52)	0.94
	No	7 (53.85)	40 (88.89)	23 (74.19)	33 (78.57)	
	Not sure	2 (15.38)	3 (6.67)	2 (6.45)	5 (11.9)	
I would stop studying medicine if I could be financially reimbursed	Yes	1 (7.69)	0 (0)	0 (0)	5 (11.9)	0.13
	No	11 (84.62)	40 (88.89)	27 (87.1)	31 (73.81)	
	Not sure	1 (7.69)	5 (11.11)	4 (12.9)	6 (14.29)	
The COVID-19 pandemic has lowered my motivation to become a physician	Yes	2 (15.38)	2 (4.44)	4 (12.9)	5 (11.9)	0.60
	No	11 (84.62)	38 (84.44)	25 (80.65)	35 (83.33)	
	Not sure	0 (0)	5 (11.11)	2 (6.45)	2 (4.76)	
The COVID-19 pandemic has increased my motivation to become a physician	Yes	9 (69.23)	32 (71.11)	11 (35.48)	26 (61.9)	0.02
	No	4 (30.77)	9 (20)	18 (58.06)	11 (26.19)	
	Not sure	0 (0)	4 (8.89)	2 (6.45)	5 (11.9)	
The COVID-19 pandemic has negatively affected the quality of my education	Yes	9 (69.23)	31 (68.89)	26 (83.87)	35 (83.33)	0.34
	No	2 (15.38)	8 (17.78)	7 (22.58)	6 (14.29)	
	Not sure	0 (0)	13 (28.89)	7 (22.58)	7 (16.67)	

an increased motivation. It is of note that at the time this survey was delivered, New York City was the epicenter of the coronavirus pandemic. The responses seen in third year medical students may be rooted in the fact that, under normal circumstances, they would have gained a much stronger understanding of how hospitals operate but were unable to acquire this during the pandemic.

Medical students in their clinical education years (third and fourth years) also witnessed how the COVID-19 pandemic was handled early on. As students who would soon be entering the workforce, fourth year students may have felt more prepared for chaotic medical situations. In third year students, the combination of the disruption to their clinical education, the well-publicized lack of appropriate protective equipment for healthcare workers, and multiple reports of hospitals forcing their employees to work in unsafe conditions may have contributed to a lack of increased motivation [27].

Finally, it is noteworthy that the majority of students across all class years reported that COVID-19 negatively affected the quality of their education. This may have most acutely affected third and fourth year rotations to determine their prospective specialty and by extension much of their future career. It is therefore encouraging that students still felt motivated to study medicine despite the disruptions in their studies.

There were limitations to this study that should be addressed in future research. The majority of respondents were from the Northeast United States and in particular, New York. This is significant because the majority of responses were coming from a city and state considered the epicenter of the pandemic in the USA at that time point. While an attempt was made to distribute the survey across the country through the use of social media, it was not as effective as expected. If the sample were more comprehensive, the results might have varied more

Table 4 Motivation to study medicine: students attending medical school in New York State

		Year 1 <i>n</i> = 22 <i>N</i> (%)	Year 2 <i>n</i> = 61 <i>N</i> (%)	Year 3 <i>n</i> = 37 <i>N</i> (%)	Year 4 <i>n</i> = 59 <i>N</i> (%)	<i>p</i> value
I would always regret my decision if I hadn't availed myself of the opportunity to study medicine	Yes	18 (81.82)	36 (59.02)	21 (56.76)	39 (66.1)	0.45
	No	2 (9.09)	10 (16.39)	8 (21.62)	11 (18.64)	
	Not sure	2 (9.09)	15 (24.59)	8 (21.62)	9 (15.25)	
I regret my choice to go to medical school	Yes	0 (0)	0 (0)	1 (2.7)	3 (5.08)	0.48
	No	20 (90.91)	56 (91.8)	34 (91.89)	54 (91.53)	
	Not sure	2 (9.09)	5 (8.2)	2 (5.41)	2 (3.39)	
I wouldn't consider any other profession than becoming a doctor	Yes	10 (45.45)	24 (39.34)	15 (40.54)	26 (44.07)	0.85
	No	6 (27.27)	25 (40.98)	16 (43.24)	24 (40.68)	
	Not sure	6 (27.27)	12 (19.67)	6 (16.22)	9 (15.25)	
It wouldn't really bother me too much if I could no longer study medicine	Yes	4 (18.18)	2 (3.28)	7 (18.92)	5 (8.47)	0.12
	No	15 (68.18)	55 (90.16)	28 (75.68)	48 (81.36)	
	Not sure	3 (13.64)	4 (6.56)	2 (5.41)	6 (10.17)	
I would like to become a doctor, even if that would mean giving precedence to my work over my family	Yes	11 (50)	31 (50.82)	17 (45.95)	24 (40.68)	0.91
	No	6 (27.27)	16 (26.23)	13 (35.14)	20 (33.9)	
	Not sure	5 (22.73)	14 (22.95)	7 (18.92)	15 (25.42)	
I would stop studying medicine if I could be financially reimbursed	Yes	1 (4.55)	0 (0)	1 (2.7)	7 (11.86)	0.10
	No	20 (90.91)	55 (90.16)	31 (83.78)	46 (77.97)	
	Not sure	1 (4.55)	6 (9.84)	5 (13.51)	5 (10.17)	
The COVID-19 pandemic has lowered my motivation to become a physician	Yes	3 (13.64)	3 (4.92)	4 (10.81)	6 (10.17)	0.58
	No	19 (86.36)	52 (85.25)	31 (83.78)	50 (84.75)	
	Not sure	0 (0)	6 (9.84)	2 (5.41)	3 (5.08)	
The COVID-19 pandemic has increased my motivation to become a physician	Yes	15 (68.18)	43 (70.49)	16 (43.24)	37 (62.71)	0.11
	No	6 (27.27)	13 (21.31)	18 (48.65)	15 (25.42)	
	Not sure	1 (4.55)	5 (8.2)	3 (8.11)	7 (11.86)	
The COVID-19 pandemic has negatively affected the quality of my education	Yes	12 (54.55)	39 (63.93)	30 (81.08)	49 (83.05)	0.05
	No	7 (31.82)	11 (18.03)	5 (13.51)	5 (8.47)	
	Not sure	3 (13.64)	11 (18.03)	2 (5.41)	5 (8.47)	

depending on the geographical location of respondents. An additional limitation of the study was that we did not take into account the mental or physical health of the medical students. Students who may themselves have been affected with COVID-19 or those who are struggling with anxiety or depression may not volunteer due to health reasons as opposed to making the decision based on their beliefs. In a study assessing anxiety and depression levels among medical students in Nepal, several were found to be suffering from these mental health issues during the COVID-19 shutdown [28].

Despite the study limitations, it is important to acquire a full understanding of how medical students' attitudes towards the medical profession have been shaped by the pandemic, as this may give insight into their future

willingness to work in another pandemic as residents and attending physicians. Future studies should be repeated with larger national and international samples.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s40670-021-01374-z>.

Declarations

Ethical Approval The study was IRB approved.

Informed Consent The study did not require informed consent as it was considered exempt by the IRB.

Conflict of Interest The authors declare no competing interests.

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