WRIT 340 Project Wrapper

The most important skill I have practiced by writing the two papers is definitely the ability to do individual research from scratch. From being assigned a topic I have little prior knowledge on, to gathering resources to filtering out what is potentially useful and finally, and finally to composing a self-contained research paper, I become significantly more acquainted with and confident to writing well-rounded research papers starting from nothing but a prompt, or even more concisely, a few keywords, like “ethics of vaccine mandate.” As someone who will most likely go pursue further post-undergraduate education, mastering such skills early is certainly a huge gain.

In terms of challenges I face, writing such papers was originally out of my comfort zone, so prior to writing the Ikigai IMRaD, I had very little clue how I may end up structuring my paper and how I may design the survey to reflect my goals. Luckily, I had a eureka moment one night and things went smoother afterwards. After successfully designing my first paper, I was a bit more prepared for the second one. Initially, I thought communicating and coordinating among team members would be a potential problem for paper 2, but fortunately I was assigned simply the best teammates, and I absolutely enjoyed every minute working with Sami, Ben, and Jacob. Shoutouts to them.

Finally, a slight suggestion that I have is to provide more guidance for each group early on for the second paper. Although the prompt already provided sufficient context, given the abstract nature of health ethics, it still took my group at least a week to figure out what the paper is really about. In other words, while we know exactly what we need to do each part, we find it challenging to summarize the entire paper in, for example, one or two sentences. Other than that, I have nothing else to add.

Please accept my most sincere gratitude for your providing me a pleasant experience for WRIT150 and 340, both of which are known for their notoriety among the Chinese students. I *will* see you in fall!

— Qilin Ye

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# Rest Well and Prosper

An Analysis of Sleep Deprivation and Academic Wellness among Undergraduates

Qilin Ye

June 19, 2022

## Abstract

Flooded by the pandemic, political unrest, and economic pressures, current college students are constantly under pressure they should not yet face. It is therefore important to understand if there are ways that help students alleviate their stress and attain *Ikigai*, a Japanese word that roughly translates to "the reason that makes life worth living," that they deserve at this age. In this study, we examine one particular aspect — how well students are rested given their workload — and analyze the potential impact it has on students perception of their academic experience, which we call "academic *Ikigai*." The study involved sixteen (16) undergraduate students from the University of Southern California based on convenient sampling, spanning over the first six days of June 2022. The findings suggested that the less well-rested a student is, the more passive they are toward their academic *Ikigai*. The study also noted that, interestingly, although double-majors are significantly less well-rested than single-majors, there is no statistically significant difference between how they perceive their academic *Ikigai*. Finally, we discuss some potential directions for follow-up researches at the end.

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## 1 Introduction

Like any other freshmen, before my first semester at USC started, I made a few dozen friends who, like me, were about to begin their new chapter at USC. To better know everyone, I jotted down their majors. Needless to say, they covered a wide range of majors, from pre-med to STEM, from business to architecture, and so on. Yet, interestingly, after two years, a large portion of my friends have either declared or transferred into a math- or a coding-related major, or even both. My roommate, a religious study major, recently picked up Python. Half of BUAD (business administration) majors that I know are now CSBA (CS and business administration). Even I was no exception — admitted as a piano major, I now devote much more time on math and CS than piano.

Undoubtedly, this is partially because of my circle of friendship, which consists predominantly of Ascians,, since it is no secret that Asians, on average, are significantly more interested in majoring in STEM or computer science, as such majors are more likely to give them a stable and rewarding job upon graduation (Cueto; Wu). Nevertheless, this intriguing shift in preference of major is a phenomenon worth noting.

While many students attempt to transfer to majors that ensure a promising future, they are, however, not feeling more secure during their undergraduate studies despite having picked their "favorite" major. On the contrary, their average stress levels continue to increase, their mental health status declining. In 2021, a research conducted by Boston University suggested that college students had been demonstrating an unprecedented prevalence of anxiety due to the pandemic, political unrest, among all other factors (McAlpine).

While there is little what students can do to directly address the sources of stress that plague the entire society, they can nevertheless make individual efforts to make their undergraduate lives more fulfilling and pleasant, thereby attempting to achieve *Ikigai*. This paper discusses how USC undergraduate students' (perception of their) workload affects their academic *Ikigai* and how they can make improvements. In particular, we speculate that more abundant rest will contribute to achieving academic *Ikigai*. Data analysis on a convenience sampling via Google Form indeed suggests such a correlation, along with several other subsidiary findings.

## 2 Methods and Materials

In order to address the questions previously proposed, we designed a retrospective survey consisting of various qualitative and quantitative questions for later analysis. The survey was hosted by Google Forms. We distributed the survey between June 1 and June 6, collecting responses using a non-randomized convenience sampling on social media. 16 valid responses were recorded.

### Procedure

Before prompting participants to answer questions, we began the survey by a mandatory section of informed consent. We acknowledged the right of participants to abort the survey whenever they wanted prior to final submission, and we endeavored to protect their confidentiality. We indeed asked participants to input their USC emails, but this served merely as a validity checker since this survey was intended for USC undergraduates only. After data were collected, during data processing, a script would rule out all answers from invalid email addresses (i.e., one not ending with `@usc.edu` or an invalid USC username). Once all remaining answers were valid, the script would proceed to erase all email entries. We asked the participants to not disclose any identifying info throughout the remainder of the survey.

### Survey Design and Data Collection

The first section of the survey asked for participants' gender and year in school (e.g. sophomore).

The section of the survey proceeded to gather info on participants' major and how well-rested they were relative to their major. After recording their majors, we asked them the following questions.

($M_1$) How would you rate the difficulty of your major(s) among all USC undergraduate majors?

($M_2$) How would you rate your workload?

We asked two questions in succession in order to offset the intrinsically different workload between different majors. We also asked for participants' average hours of sleep per day ($S_a$) as well as their ideal hours ($S_i$), hoping that these two questions would help gaining insight into the extent of sleep-deprivation each participant faced.

For the third section, we asked questions to determine participants' academic *Ikigai* status. Following the four components of *Ikigai* — expertise, passion, demand, and money, we asked the participants to rate the following question on a number scale from $1$ to $5$, with $1$ being completely disagree and $5$ completely agree:

($I_1$) (Expertise) I am an expert or I am confident in becoming one in my area of study.

($I_2$) (Passion) I genuinely enjoy learning what I learn.

($I_3$) (Demand) The world currently needs more people of my major.

($I_4$) (Money) What I learn will lead to a well-paid job.

We also included several optional questions like "is there anything else you would like to add" which are rather pointless to be mentioned here, therefore omitted.

### Participants

Out of the $16$ participants who filled out valid responses, eleven ($11$) were male and five ($5$) female. Half ($8$) were sophomores (i.e., rising junior in Fall 2020), five ($5$) were freshmen (rising sophomore), and three ($3$) were juniors (rising seniors). Half ($8$) of the participants reported double majors, whereas the other half ($8$) reported single major.

Though no questions collected the ethnicity of the participants, since the survey was based on convenience sampling, we can safely assume that almost all participants are Asian.

### Tools for Assessment

Google Form generated a `.csv` file and equivalently a Google Spreadsheet containing all the responses. We designed a specific metric to calculate one's "Academic *Ikigai* Index", a number in $[0, 1]$, based on their answers to several questions. We also derive a "Sleep-Deprivation Index." Both will be further mentioned in the following section. For quantitative visualization we used Google Spreadsheet's built-in "chart" feature. For qualitative visualization, e.g., word cloud, we used Voyant, an online visualization tool for textual analysis.

## 3 Results

The survey collected a set of numeric responses from the participants. For notational convenience, we will denote each answer of interest using a different variable, as listed in the table below.

| Variable | Question | Range |
|---|---|---|
| $M_1$ | Difficulty of Major | $1$ – $5$ |
| $M_2$ | Academic workload | $1$ – $5$ |
| $S_a$ | Avg. hrs of sleep / day | $0$ – $24$ |
| $S_i$ | Ideal hrs of sleep / day | $0$ – $24$ |
| $I_1$ | Expertise in major | $1$ – $5$ |
| $I_2$ | Passion for major | $1$ – $5$ |
| $I_3$ | Workplace demand | $1$ – $5$ |
| $I_4$ | Earning money | $1$ – $5$ |

*Table 1: List of variables collected in the survey and also to be used in designing formulas below.*

### The Sleep-Deprivation Index, SDI

We first designed a formula to describe how well-rested a participant is, taking their major and the corresponding workload into account. Intuitively, the greater the disparity between one's ideal sleep time and actual sleep time, the less well-rested they are. On the other hand, when one faces a heavier workload, it is also reasonable to assume they are less likely to be well-rested. Therefore, a variable describing academic workload is required. In doing so we compute a weighted average of $M_1$ and $M_2$, taking $30\%$ of a major's difficulty and $70\%$ of experienced workload into account. We define

the Sleep-Depreviation Index, SDI, to be

$$\begin{aligned}\text{SDI} :&= \frac{S_i - S_a}{S_a} \cdot (0.3 \cdot M_1 + 0.7 \cdot M_2) \\ &= \frac{\text{ideal sleep} - \text{actual sleep}}{\text{actual sleep}} \cdot \text{major difficulty index.}\end{aligned} \tag{*}$$

Here we implicitly assumed SDI $\geqslant 0$. In an ideal situation where one sleeps as long as they wish to, $S_i = S_a$, resulting in SDI $= 0$. The more sleep-deprived one becomes, the higher the SDI is.

## The Academic *Ikigai* Index, AII

Having crafted the SDI, we then defined an Academic *Ikigai* Index using $I_1, I_2, I_3$, and $I_4$. The perfect situation is where a participant answers $5$ for all questions, namely, they are experts in their field, are extremely passionate about what they study, are studying something the world constantly needs, and will be able to make a significant amount of money. On the contrary, the least ideal situation is where a participant answers $1$ for all questions.

For each $I_i$, $1 \leqslant i \leqslant 4$, we wanted to find a function that maps $1$ (least) to $0$, $5$ (most) to $1$, and last but not least, $3$ (neutral) to $0.5$. Whereas linear scaling (i.e., $\{1,2,3,4,5\}$ to $\{0, 0.25, 0.5, 0.75, 1\}$ respectively) would have done the job, we chose a logistic scaling over it. Empirical data have shown that in a Likert scale from $1$ to $5$, $4$ is closer to $5$ than to $3$, and similarly $2$ to $1$ than $3$ (Harpe). Using a shifted logictic function composited with a linear scaling, we derive the following function:

$$f(I_i) := 0.5 + \underbrace{\frac{0.5}{1/(1+e^{-2}) - 0.5}}_{\text{linear scaling factor}} \cdot \underbrace{\left[\frac{1}{1+\exp(3-I_i)} - 0.5\right]}_{\text{shifted logistic}}.$$

In particular, the function defined as above satisfies $f(1) = 0, f(2) \approx 0.197, f(3) = 0.5, f(4) \approx 0.803$, and $f(5) = 1$.

Finally, we perform a weighted average of $I_1$ to $I_4$ to obtain our final Academic *Ikigai* Index, AII. We prescribe the weight of expertise, passion, demand, and money to be $0.15, 0.5, 0.15$, and $0.2$, respectively. That is,

$$\text{AII} := 0.15 \cdot f(I_1) + 0.5 \cdot f(I_2) + 0.15 \cdot f(I_3) + 0.2 \cdot f(I_4). \tag{**}$$

## The Processed Data

Since the research implemented a convenience sampling and most people that the author knows well are STEM-oriented, it was speculated beforehand that the majors of the participants would mostly consist of STEM majors. This is indeed confirmed once data was collected. Among the 16 responses collected, the most common majors were mathematics (5) and computer science (4), followed by CS-related majors (CS with business administration, CSBA, or CS with game design, CSGA) and applied math. These are shown in the following figure.

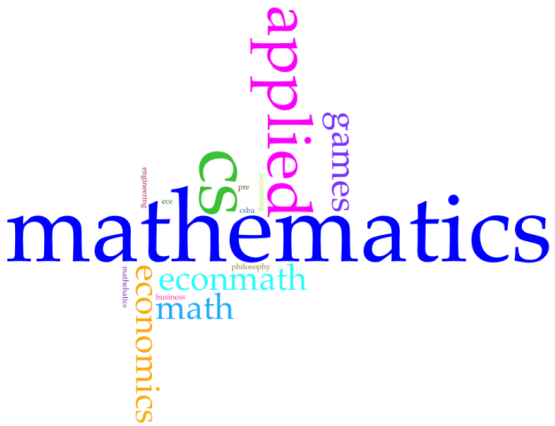



*Figure 2: A textual visualization of participants' majors using Voyant. The larger the font, the more frequent the word appears. In this sample, the two most common majors are "mathematics" and "CS."*

We computed the two indices for each survey response and plotted the data pairs in a scatterplot, as shown in the next figure.

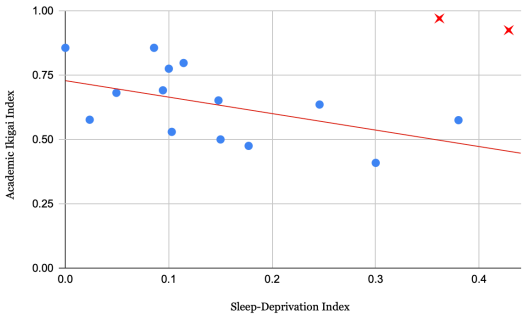



*Figure 3: Relationship between each individual's AII, as presented by the vertical axis, and SDI, the horizontal axis ($n = 16$). Excluding the two outliers on the topright marked as ×, there exists a negative correlation between the two indices, with $r \approx -0.65$ and linear best-fit line $y = 0.73 - 0.7x$. Data collected via Google Forms and provided by the participants.*

Assuming the two red ×'s on the topright are outliers (the reason for which will be discussed later) , there exists a negative correlation between the AII and the SDI: the more sleep-deprived a student is, the less they achieve academic *Ikigai*.

We were also interested in the potential correlation between SDI and some individual components of AII, in particular, "expertise," $I_1$, and "passion," $I_2$. We chose these two specifically because $I_1$ and $I_2$ are directly related to the participants' levels of stress whereas $I_3$ and $I_4$ are relatively more independent. Excluding outliers, we found a strong negative correlation between AII and $I_2$ ($r = -0.745$) and a weak but nevertheless negative correlation between AII and $I_1$ ($r = -0.109$). These are demonstrated in the figures below.

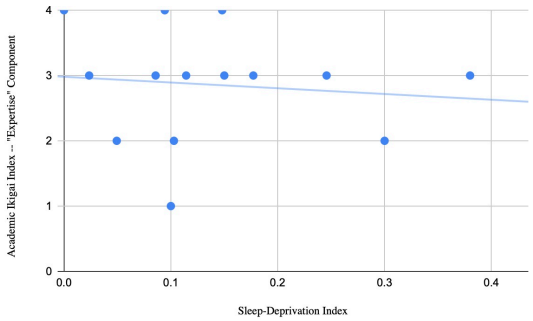



*Figure 4: Relationship between each individual's "expertise" component answer, represented by the vertical axis, and their computed SDI, represented by the horizontal axis, i.e., $I_1$ vs. SDI. The outliers from Figure 3 were excluded. Overall, there exists a (weak) correlation between $I_1$ and SDI ($r = -0.109$).*

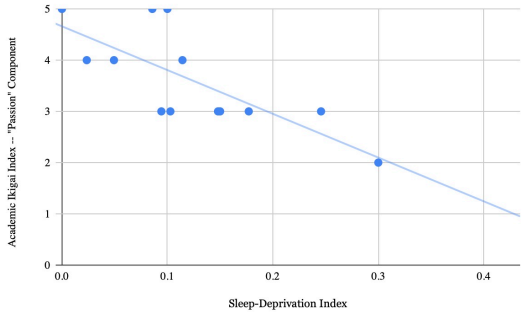
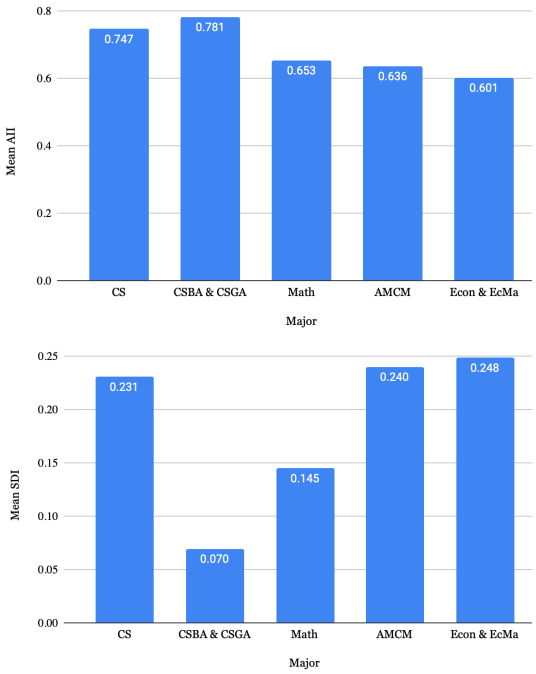



*Figure 5: Relationship between each individual's "passion" component answer, represented by the vertical axis, and their computed SDI, represented by the horizontal axis, i.e., $I_2$ vs. SDI. The outliers from Figure 3 were excluded. There exists a stronger correlation between $I_2$ and SDI ($r = -0.745$).*

Next up, we computed the mean SDI and AII according to the five major categories that appear most frequently: CS, CSBA or CSGA, mathematics, AMCM (applied mathematics), and economics or EcMa (Econ-Math).




*Figures 6 and 7. Mean AII (6) and SDI (7) of participants of several common majors. The horizontal axis shows the five most common majors based on survey response, and the vertical axis represents the mean AII (6) and SDI (7) of each major. If a respondent declared more than one major, their AII/SDI were multi-counted for different categories. The two outliers from Figure 2 were not included.*

Besides CS major, which exhibited both a relatively high mean AII and a mean SDI, the other four groups

seemed to follow the trend as illustrated in Figure 2. The mean SDI's of the other four categories increase, and their mean AII's decrease.

Finally, we subdivided our sample based on the number of majors each participant had. We analyzed the SDI and AII for each group, looking for statistically significant differences.

| Single Major | SDI | AII | Double Major | SDI | AII |
|---|---|---|---|---|---|
| CSGA | 0 | 0.856 | CS, Math | 0.1 | 0.775 |
| Math | 0.086 | 0.856 | ECE, Math | 0.103 | 0.529 |
| Math | 0.15 | 0.5 | CS, AMCM | 0.429 | 0.925 |
| Business | 0.3 | 0.409 | CSGA, AMCM | 0.114 | 0.758 |
| CS | 0.246 | 0.636 | Econ, Math | 0.380 | 0.575 |
| Math | 0.049 | 0.681 | EcMa, Phil | 0.362 | 0.971 |
| CSBA | 0.094 | 0.691 | Acct, CS | 0.148 | 0.652 |
| EcMa | 0.024 | 0.577 | Econ, AMCM | 0.177 | 0.475 |

*Table 8: A table showing the SDI and AII of each survey respondent. The ones on the left are those who declared a single major; the ones on the right are those who declared double major. Glossary: ECE for electrical and computer engineering; Acct for accounting; Phil for philosophy.*

By running Mann-Whitney $U$-test on the two indices separately, we found that students with multiple majors tend to have higher SDI than their single-major counterparts, meaning they tend to be more sleep-deprived, and the difference is statistically significant ($p \approx 0.032$). For AII, however, though the double-major group exhibited a larger mean AII, it was not statistically significant ($p \approx 0.318$ for right-tail; not significant for two-tail and left-tail Mann-Whitney, either).

```r
# For Mann-Whitney on SDI
x1<-c(0.100,0.103,0.429,0.114,0.380,0.362,0.148,0.177)
x2<-c(0.000,0.086,0.150,0.300,0.246,0.049,0.094,0.024)
wilcox.test(x1, x2, alternative = "greater", paired =
    FALSE, exact = TRUE, correct = TRUE)
# res$p.value = 0.03248
```

```r
# For Mann-Whitney on AII
x1<-c(0.775,0.529,0.925,0.758,0.575,0.971,0.652,0.475)
x2<-c(0.856,0.856,0.500,0.409,0.636,0.681,0.691,0.577)
wilcox.test(x1, x2, alternative = "greater", paired =
    FALSE, exact = FALSE, correct = TRUE)
# res$p.value = 0.3181
```

*Code Snippet 9: Implementation of right-tail Mann-Whitney $U$-test in $R$ to determine if SDI and AII are affected by the number of majors students declare. First group, $x_1$, represents the group of participants with $\geqslant 2$ majors; second group, $x_2$, consists of participants with one major only. There was a statistical significance between the SDI's of two groups, with group $1$ exhibiting significantly higher SDI's. No significance was found between the AII's of the two groups.*
*Note: outliers were included in this test; if removed, the two $p$-values would become $0.114$ and $0.373$, respectively.*

# 4 Discussion

Overall, the data collected and the indices computed matched our expectations on the relationship between the students' levels of well-restedness and perception of their academic experience. We would like to start, however, by addressing the issue of outliers spotted in the previous section.

As mentioned in almost all figures and tables, we excluded the two outliers. It was determined not quantitatively, but rather qualitatively. After reviewing the collected data, we noticed that these two participants both reported below-average hours of sleep per day, yet they both answered extraordinarily high numbers for the *Ikigai* questions — one responded $5, 5, 4, 5$ and the other $5, 5, 3, 5$, far more than anyone else, especially for the first two questions ($I_1$ and $I_2$). One plausible explanation for this is that those who made these responses are indeed outliers in terms of academic performance. Among my closest friends, there happens to be a few extraordinarily bright minds who, as undergraduates, are acquainted with researches and are already doing Ph.D.-level work, totally enjoying themselves in academia. In parametric statistical methods, the prime example being

regression, it is customary to exclude these outliers from analysis (Mahapatra). On the other hand, since ranked tests (e.g. Mann-Whitney) are nonparametric, we initially included outliers when computing statistical significance of the Mann-Whitney $U$-test.

When summarizing results from Figures 6 and 7, we treated CS major as an outlier as well, for it clearly defied the supposedly negative correlation between AII and SDI. This can, hopefully, be explained by the nature of CS major. On one hand, CS is notoriously known for being time consuming. Programmers need to spend a tremendous amount of time "debugging," trying to pinpoint the mistakes that were unintentionally made. That so many computer programmers become bald is not just a meme floating online, but also a reflection of how programmers are constantly short of rest. In the survey, all CS majors answered $4$ or $5$ for all SDI-related questions. On the other hand, CS majors are absolutely rewarding in terms of finding jobs and profiting. In the current industry where numerous fields such as machine learning are quickly expanding, the demand for programmers will continuously rise in the near future. Consequently, in the survey, we see that all CS majors answered high numbers for $I_3$ and $I_4$ (demand and money), thereby significantly boosting their AII. These factors combined lead to CS major having both a high AII and a high SDI.

Finally, the major findings in this research mostly agree with its predecessors. Early in 2006, researchers found out that increasing sleep loss or fragmentation turns detrimental to "an efficient consolidation of [declarative] knowledge and [procedural] skills." (Curcio). A decade and a half later, the claim still seems to hold: in Figure 4, a higher SDI weakly corresponds to a lower $I_1$, the *Ikigai* "expertise" self-rating. A more recent report suggested that one's extent of social anxiety is correlated to how abundant they sleep and also its quality, and a group of Chinese researches recently concluded that, for Chinese students, "[s]ocial anxiety significantly negatively associated with academic engagement" (Horenstein; Mou). Putting these all together, we see that a lower SDI leads to lower anxiety level which then leads to higher academic engagement, hence a higher *Ikigai* "passion" self-rating, as shown in Figure 5.

There are, however, several limitations that this research has encountered. The first and most obvious one is the inherent bias coming from convenience sampling. Since the author is heavily STEM-oriented, most of the resulting participants are too; this can be seen in Figure 2's word cloud, in which almost every single word is STEM-related. For the same reason, it is extremely likely that an overwhelming majority of the participants are Asians and in particular, Chinese. Therefore, the findings should not be casually generalized to a general USC student body, which is much more diverse, both in areas of study and in ethnicity. Should a more general research be conducted, the researchers should keep in mind the potential composition of their participant pool.

Another limitation is the lack of empirical data to support the formulas used to calculate SDI (*) and AII (**). Consequently, the formulas adopted in this study were more based on common sense, and by doing so, weights for $M_1, M_2, I_1, I_2, I_3$, and $I_4$ were more arbitrarily assigned. To solve this issue, a potential solution is to appeal to psychological methods by first designing questions that help quantifying the level of happiness and "sense of worthiness of life" of each participant. With these data recorded, the researchers can then post-determine the corresponding weights of each factor using mathematics tools, for example backpropagation. By doing so, the coefficients would seem less arbitrary, leading to more stable AII calculation even when fed with different data.

## 5 Conclusion

To reiterate, in this study, we found a negative correlation between the AII and the SDI, as expected. We also noticed that the "expertise" and "passion" components also form negative correlations with SDI, respectively, albeit the former being a weak one. We believed that SDI increases as students declare an extra major, yet their AII seems rather unchanged — at least in terms of statistical significance. These results obtained from USC undergraduate students seemed to support various previous related researches, although past experiments were conducted under a different context. To generalize our result, we suggest that future research be conducted on more general populations, e.g., on a sample of college students with random demographic background. Along with already established studies in methods to improve sleep quality, we may find a new way to help students achieve their academic *Ikigai*.

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Writing for Pre-Health Majors (Summer 2022)

# Exploration of Discord between Traditional and Public Health Ethics as Related to Vaccination Mandates – A Multicultural Perspective and Analysis

Sami R. Chmait, Jacob Ma, Ben Hanasabzadeh, and Qilin Ye

## 1. Introduction

As a collective authorship the decision to explore the ethical implications of vaccine mandates was simultaneously complicated and bolstered by the extinguishing of personal biases and thorough exploration of the unknown. With unanimous voice, we stressed and recognized the sensitive balance between ethical obedience of vaccine mandates as applied to both traditional and public heath ethics. To decern the ethical nature of vaccine mandates, a fourfold effort, summarized in figure 1, directed our mechanisms of inquiry. This effort included the expulsion of biases, neutral analysis of expert publications, comparative ethical analysis, and exploration of common morality. The culmination of these effort informed conclusions speaking to the ethicality of vaccine mandates.

A particular strength of the proceeding narrative is attendant to the bipartite perspectives brought to analyses per an author's country of origin – that being the United States or China. Understandings of mandate differences and similarities respective to country of origin, enabled findings of diverse perspectives to be equally broad in their application and relevance. As if in a symbiotic relationship, the diverse thinking became a cornerstone from which this paper established complex and multicultural conclusions related to mechanisms of the social, political, and economic implications of vaccine mandates. As later explored in detail, the ethics of vaccine mandates as compared between individual and public health ethics, are complicated by nuanced ideals. The collective authorship simultaneously recognized the magnitude of ethical balance required by vaccine mandates to elevate one's own health and that of their population while also hampering individual autonomy. Despite thorough effort, the collective authorship was not able to make a definitive conclusion of ethicality as later explored in detail; although initially frustrating, this challenge proved immensely informative as it underlines the complexity and shortcomings attributed to applying the Beauchamp-Childress health ethics to mechanisms of public health – both generally and in response to an emergent health crisis.

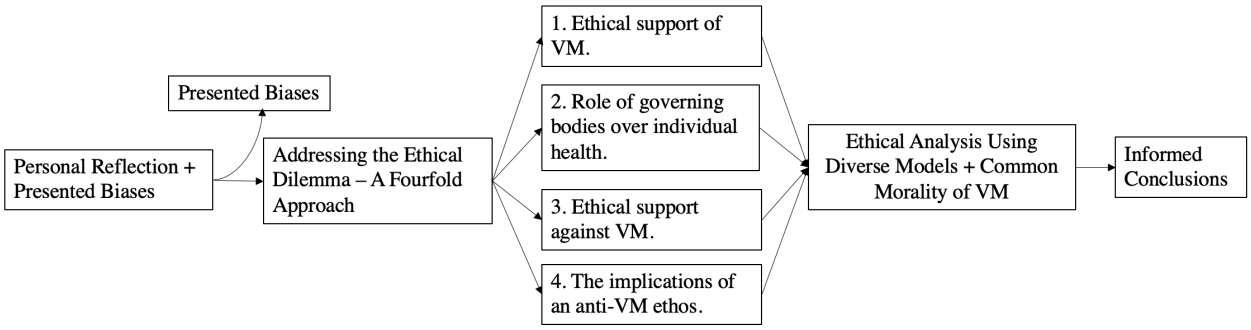



**Figure 1.** Demonstrates the mechanism of analysis used to assess the ethical parameters of vaccine mandates. VM: Vaccination mandates.

## 2. Assessments of Personality Profiles

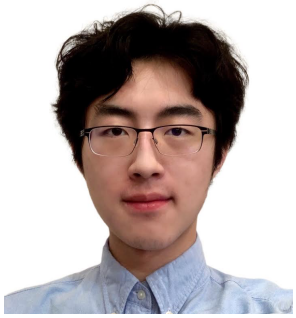
Despite the apparent myriad of health benefits, vaccination and its attendant mechanisms of accessibility invite complex political, economic, and social alignment. As related to the present manuscript, each author aimed to contribute free from said intrinsic biases. Still, perspectives instilled by upbringing, educational pursuit, and opinions have the capacity to permeate findings; as such, it is appropriate to present the authorship personality profile to highlight any sources of subtle proclivity.

| (a) Author | Basic Demographics | †Opinion on VM |
|---|---|---|
|  Sami R. Chmait | Age/ Gender Identity: 22/ Male<br><br>Country of Origin: USA<br><br>Country of Present Inhabitance: USA<br><br>Major/Minor: Biology/ Health Care Studies<br><br>Vaccination status: Fully Vaccinated | "Vaccinations mandates are a wonderfully powerful and effective means in establishing active immunity in the population. The positives to one's own health and that of the population are clear, however, present feelings of distrust related to vaccines illuminate a greater obstacle not yet addressed by providers." |
| Personal Reflection (SC): Directed by learned values wherein vaccinations are respected as a feat of modern medicine necessary in enhancing the longevity of one's own life and the lives of others, my personal appreciation of vaccinations cannot be understated. As a young male dedicated to expanding my knowledge and understanding of the biological sciences, I find that I have a fundamental support for mechanisms of sufficient vaccination outreach. As an individual of Lebanese heritage, I feel frustration at the neglect and hypocrisy established by those who reject this medical outreach and the voice of professionals as people from my ethnic roots receive no such luxury. Finally, as a proponent of education, I find anger in myself for not using my privilege to induce change. My biases and beliefs largely grew concurrently to my own development as a student. Growing up in a household with a parent in healthcare I was directly and indirectly exposed to the benefits of vaccinations. This continued into my college education where it seemed that so many classes would culminate in the demonstration of the ingenuity of vaccinations. These underlying biases predetermine the ethical model utilized and entry points of exploration as the starting emphasis was on non-maleficence supported by researched findings. | | |

| (b) Author | Basic Demographics | †Opinion on VM |
|---|---|---|

| | | |
|---|---|---|
|  Jingze Ma | Age/ Gender identity: 20/ Male<br><br>Country of Origin: China<br><br>Country of Present Inhabitance: USA<br><br>Major: Computer Science Games/ Applied Computational Math<br><br>Vaccination status: Fully Vaccinated | "I believe vaccination mandates work and help in the fight against the pandemic. I am worried about how mandatory vaccinations and accompanying political measures might influence other aspects of life." |
| Personal Reflection (JM): My initial perspectives are strongly biased in their emphasis on procedural justice and congruency with the value that all should be vaccinated. I assign the origin of these opinions as a product of my education and cultural background. As an international student originally living in an urban China, I was exposed to ideals which illustrate immunizations as beneficial to your health and family. Through my adolescents, I never heard anyone stand against immunization and discuss the ethical problems concerning mandated vaccines. After observing the efficiency of the China Health Code in its ability to regulate the spread of infection, I recognized my privilege and worried others would not be so fortunate as to receive the vaccine/ necessary preventative care so efficiently. | | |

| **(c) Author** | **Basic Demographics** | **†Opinion on VM** |
|---|---|---|
|  Ben Hanasabzadeh | Age/ Gender Identity: 24/ Male<br><br>Country of Origin: USA<br><br>Country of Present Inhabitance: USA<br><br>Major: Global Health<br><br>Vaccination status: Fully Vaccinated | "We have been able to eradicate various diseases globally with the usage of vaccines. The advantages and safety of vaccines are recognized by most, however vaccine mandates and medical critics of the vaccine have led to growing mistrust regarding its safety." |
| Personal Reflection (BH): People should have the choice of whether they want to get vaccinated or not. Additionally, people should not be restricted from public spaces for not being vaccinated. Being an Orthodox Jew contributes to my opinion on this; albeit, nothing directly from religion informs my opinion on this matter. I have been exposed to the experiences of others who did or did not get vaccinated. Both of which shaped my opinions and values on the importance of individual autonomy. In observing the growing distrust of the medical community in recent years, I was further inclined to support individual choice rather than the necessity of vaccine mandates. Some felt the vaccine was not ready or possibly not healthy for them, hence, why the medical community "forced" them to take it. I find that the Gert ethical model, consisting of 10 rules 5 focused on do no harm and the other 5 attributed to honesty, more closely parallel my own feelings related to vaccinations in the modern world. More so, I find that this model not only works well with my personal ethical views but also my ethical concerns surrounding vaccination requirements. These opinions directly influenced my questions and their emphasis on individual autonomy. | | |

| (d) Author | Basic Demographics | †Opinion on VM |
|---|---|---|
|  Qilin Ye | Age/ Gender Identity: 21/ Male<br><br>Country of Origin: China<br><br>Country of Present Inhabitance: USA<br><br>Major: Math, Computer Science, and Piano<br><br>Vaccination status: Fully Vaccinated | "Countless scientific data suggests vaccines aid in diseases prevention. At a global scale it is certainly worth the money and time invested on receiving the shot as compared to the potential costs of becoming infected. That being said, vaccine mandates can lead to social controversy." |
| Personal Reflection (QY): Having been born and raised in Beijing, I was constantly exposed to the benefit and necessity of vaccines both at an individual and population level. Consequently, I have been a consistent supporter of vaccines and vaccination outreach. During COVID, my beliefs were further cemented as I witnessed the positives of vaccines in saving China from a public health catastrophe. However, in light of recent events taking place in China, where several local governments imposed overly draconian lockdown measures in response to COVID while simultaneously ignoring the voice of the public, I came to realize that medical ethics extend far beyond beneficence. In particular, I placed emphasis on exploring individual autonomy and procedural justice components of public health treatments. | | |

**Tables 1a-d.** The complete personality assessment of the collective authorship. This section serves to inform readers of potential latent biases held by the authors as a whole and on an individual basis. †Author responses when asked their opinion on vaccine mandates *prior* to researching manuscript elements.

As a collective authorship, we are diverse in our origin, similar in our education, and in concurrence with our recognition of the benefits provided by vaccines. Hence, within the present coordinated analysis of vaccine mandates regarding the emergence, polarization, and accessibility, latent biases attendant to co-author opinions predetermine findings and the underlying narrative. Attempt to distill the root cause of biases is complicated by a myriad of confounding variables; however, upon detailed discussion of plausible sources, origins of particular significance include co-author demographics, present educational level, and political affiliation. Notable examples of this occurrence with respect to biomedical ethical principles (i.e., non-maleficence, beneficence, autonomy, and justice) are as follows. Regarding guiding questions of non-maleficence, particular emphasis was made on demonstrating the safety of vaccines per government protocols. Here, potential biases are embedded per co-author agreement that government and health care workers actively do no harm; a perspective not shared by all. More so, persistent emphasis on the benefit of vaccinations and their respective mechanisms of public outreach originate from learned values shared by the collective authorship. Alternatively, questions of beneficence underscored conditions of emergency approval as function of the rapidly emerging pandemic. With respect to autonomy, inquiry underwent bipartite analysis where mandates were explored both before and after COVID-19. As discussed, all co-authors noted the value of vaccines and therefore invited a skewed perspective with respect to presence of vaccine mandates in public and private sectors. Here, it is important to recognize

the mutual recognition of individual autonomy be considered, however, not placed over the health of a society as a whole. Essentially, the combined recognition of autonomy, necessity of justice, and clear demonstration of beneficence & non-maleficence predetermine the narrative as a function to promote individual and population health.

### 3a. Beauchamp-Childress Ethical Narrative – Visualized:

See next page.

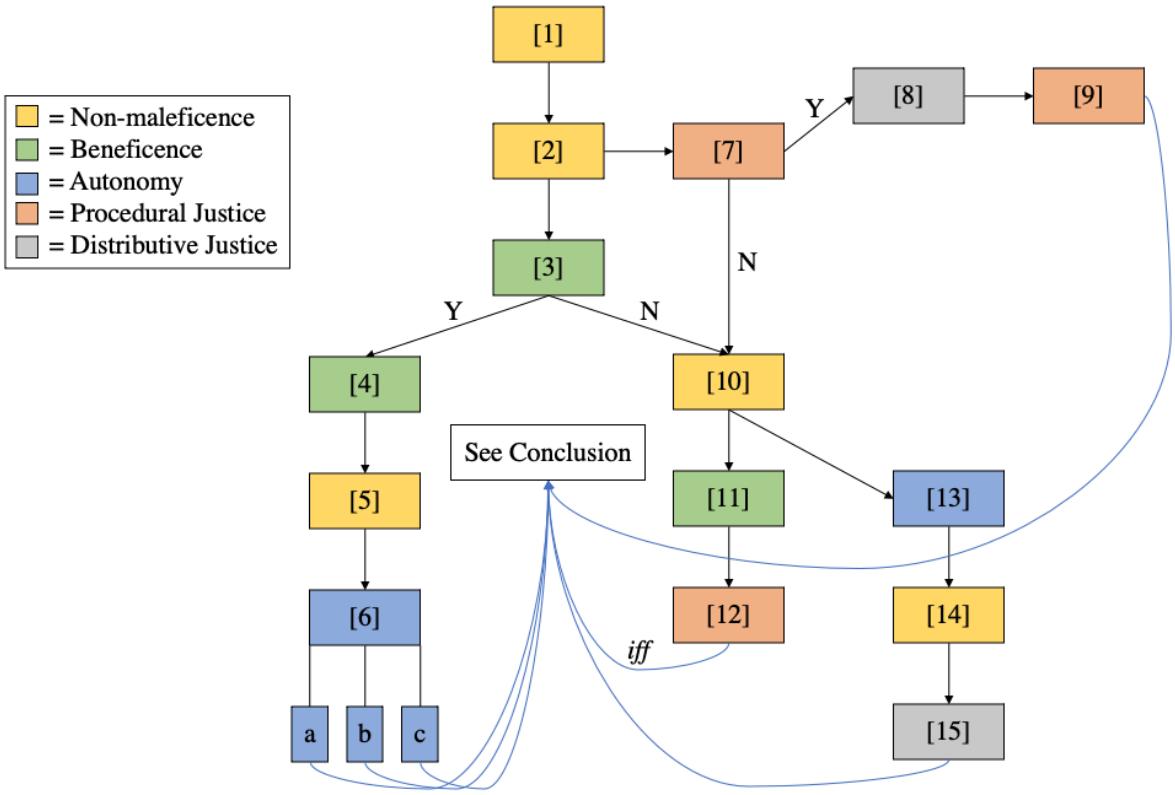



**Figure 2.** Illustrates the ethical inquiry narrative from which conclusions on the obedience or the lack thereof exists between vaccine mandates and Beauchamp-Childress ethical tenets. Figure numbering corresponds with Table 3 of the auxiliary materials.

### 3b. Beauchamp-Childress Ethical Narrative – An Analytical Approach:

Within the proceeding section, concepts of vaccine mandate ethical obedience or lack thereof were meticulously organized to illustrate a succinct narrative. Beginning with clear and power evidence demonstrating vaccine safety is followed by a transition into the ethical considerations with respect to vaccine mandates, the subsequent narrative was designed to be explored in full prior to consideration of conclusions. Essentially, in the four instances where findings progress to the conclusion (i.e., questions 6, 9, 12, and 15), the reader is encouraged to complete all avenues of inquiry prior to continuing to the conclusion. By this process, the reader is provided the complete narrative necessary to interpet the logical proof by which the relative ethicality of vaccine mandates is presented.

Prior to addressing the ethical narrative of vaccine mandates, a benchmark of vaccination understanding is necessary. Vaccination refers to the safe and effective processes by which an individual establishes immunity against a potentially harmful pathogen. Immunity can be subcategorized into two mechanisms of protection, active and passive. Active immunity involves an individual's own immune system protecting the individual whereas passive immunity refers to the protection contingent on the presence of immunity in those around you [1]. The aforementioned modalities of immunity are interconnected as by definition the immune population consists of those with active immunity protecting other who are unable to receive vaccinations for health, social, or personal reasons. The mechanism of active immunity sees your body's immune system establish protections against future pathogens per previous exposure to the entity. This previous introduction, induced by vaccination, informs your immune system to create antibodies; however, in this instance the vaccine contains killed or diluted variants of the pathogen. Use of killed or diluted pathogens significantly lessens the likelihood for adverse complications associated with infection [1]. The benefits of vaccinations to an individual's health is summarized by the World Health Organization (WHO) as "our immune systems are designed to remember. Once exposed to one or more doses of a vaccine, we typically remain protected against a disease for years, decades or even a lifetime" (WHO, 2021).

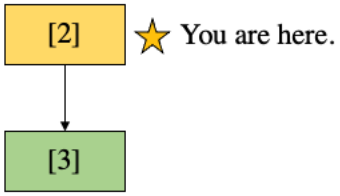
Having provided a framework of understanding related to the necessity and health benefits of vaccinations, both in respect to an individual and a communities health, we transition into our leading question.

| | |
|---|---|
| Question [1]: Are vaccines safe? | [1] ★ You are here. |

Examining the safety of vaccinations precedes all subsequent inquiry as any counterindication or falsification would yield the remaining line of questioning unethical as by definition it is a violation of non-maleficence. Hence, with unequivocal confidence and extensive effort by researchers, all current findings parallel in their claim that vaccines are safe aside from rare instances [2]. To the vast majority of global populations, vaccine supply is the safest it has been in history with billions of peoples receiving health benefits. Adverse health reactions are generally transient and limited to mild soreness and/or moderate symptoms. As presented by the National Center for Immunization and Respiratory Diseases (NCIRD), "the disease-prevention benefits of getting vaccines are much greater than the possible side effects for almost all children. The only exceptions to this are cases in which a child has a serious chronic medical condition like cancer or a disease that weakens the immune system, or has had a severe allergic reaction to a previous vaccine dose" (NCIRD, 2022). Hence, in relation to the leading question, the act of vaccination serves the best health interests of the individual and community where they exist. Associated negatives are largely outweighed by the enhancement to ward infection, a demonstration of congruence with non-maleficence. Additionally, conditions wherein an underlying health condition serves as a counterindication for vaccinations is rare and require the general population be vaccinated for the protection of said individual.

A cornerstone of vaccination safety skepticism is the erroneous conclusion that vaccinations are correlated with autism and the capacity to overload a child's immune system. To both of these statements, scientific studies and reviews have continually demonstrated no correlation between vaccines & autism and vaccines & overstressing an immune system [2]. Essentially, this sediment originates from the false belief that vaccines over stimulate adolescent immune systems as the recipient is acutely provided a high dose of antigens; in truth, even with multiple vaccinations provided in the same day, the proportion from vaccines only equates to a minuscule fraction of antigens encountered by daily activates. The benefits of vaccines empower the individual to ward adverse vaccine-preventable complications and greatly outweigh the rare negatives. Demonstrations of this feat and the attendant benefits have and continue to be seen.

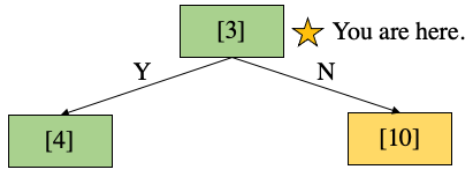
Although admittedly rhetorical, the aforementioned question illustrates a guiding principle of the proceeding paper. The collective authorship finds no dispute with the safety of vaccinations, expert opinion consensus exists – immunization work. To further illustrate this point, we followed the leading question with inquiry of the past successes of vaccine mandates against global health crises.

| | |
|---|---|
| Question [2]: Have vaccinations previously demonstrated efficacy in their ability to eradicate global health crises? |  |

Exploring the historical application and effectiveness of vaccine mandates demonstrates their usefulness in the modern globalized world. The first vaccine created in the late 17th century protected against smallpox infections. This smallpox vaccine was then used globally throughout the 18th and 19th century leading to the global eradication of smallpox in 1977. Although medical protocols such as the isolation of exposed individuals attributed to the successful eradication of smallpox, vaccinations are decorated as the primary catalyst in halting the spread [3]. In 1967 the WHO began a global initiative to eradicate smallpox. The initiative required all participating countries to begin mass vaccinations for smallpox, quick identification of their cases, and quarantining of exposed individuals [4,5]. These protocols facilitated the timely eradication of smallpox. In this instance, population health was favored over the autonomy of an individual as it demonstrated efficiency in preventing the transmission and contraction of the virus.

At this point the reader is expected to have followed our logical reasoning. The essence of the first two questions demonstrate the safety of vaccines and previous iterations of vaccines mandate success. The collective authorship believed these points were necessary in wholistically engaging the narrative. Continuing from the prior inquiry, our *driving question* is ensues.

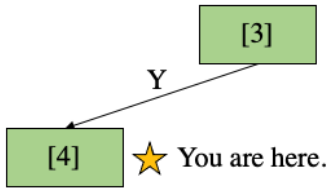
Question [3]: Are vaccine mandates ethical?




As of July 19, 2022, there are over 89,900,000 cases and 1,020,000 deaths attendant to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) in the United States [6]. As explored, vaccinations have demonstrated the capacity to greatly reduced the spread and possibility of severe adverse outcomes. The barrier between the return to 'normal life' and continued mask use/ fear of infection is having a greater proportion of the population vaccinated. Despite this understanding and demonstrated efficacy in instances of global health crises, rates of vaccination remain low as a result of vaccination hesitancy. Attendant to low vaccination rates and growing rates of infections, governing bodies (i.e., federal and state governments, health care systems, school districts, and private companies) proposed vaccine mandates [7]. These mandates require participating individuals to be vaccinated otherwise they would not be invited onto their respective campuses. There are obvious ethical issues to these mandates as to be explored in detail.

Traditional medical ethics focus on the individual's health through application of the Beauchamp-Childress model. Here care must respect autonomy, elicit beneficence, practice non-maleficence, and exhibit justice. Alternatively, public health ethics involves protecting community well-being [7]. Hence, there is a fundamental conflict between the two models as traditional ethical frameworks are not appropriate for justifying public health initiatives. As explored by Sween et. al., public health ethics focus on a population beneficence, non-maleficence, and justice over individual autonomy [7]. Therefore, mandating vaccines is justified within a public health ethical model while simultaneously violating tenets of traditional ethical models. There is no clear indication that a certain model is a better justification for public health initiatives as it depends on the perspective by which ethicality is observed.

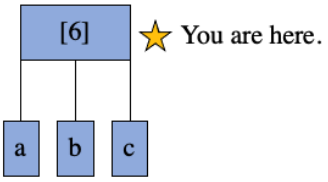
If you have answered yes for question 3, see question 4-6. If you have answered no for question 3, see question 10-15.

| Question [4]: Which conditions demonstrate vaccine mandates as ethically appropriate? |   |
|---|---|
| Necessary in demonstrating vaccine mandates as ethically appropriate requires a twofold approach. Firstly, defining the elements of mandatory vaccinations and secondly, applying said elements into situations which illustrate the mandates as ethical. The constituents of a mandatory vaccination differ greatly depending on the site of its application. For instance, the parameters of mandates are different in private workplaces such as personal companies and public places such as schools and hospitals. At a macrolevel, differences extend across countries and their territories. In most applications mandatory vaccination requires individuals be vaccinated otherwise face risk of penalties including limitations on daily activities to severe punishments such as criminal charges. Previous research on the ethicality of vaccine mandates present that by definition, “coercion or the severity of the penalty can take a number of different forms from relatively mild to moderate, or severe. We call all these measures mandatory, although terms like mandatory and compulsory are interchangeable in the vaccination debate” (Savulescu, 2021). Hence, as related to exemptions based on cultural and practical lifestyle, it is worth recognizing that even if exemptions exist, any vaccination involving coercion and/ or restrictions on personal liberties could be defined as a mandate. Alternatively, mandatory immunizations would be considered ethically appropriate when applied to high-risk populations such as senior citizens or those who are immunocompromised. With evidence showing selective mandatory vaccination would remove grave public health threats such as COVID-19, the mandate would be justified based on the harm principle [9]. Hence, mandatory vaccinations could be considered ethical under certain conditions, such as selective vaccination towards high-risk populations. | |

| Question [5]: What are the longitudinal effects of vaccine mandates? |   |
|---|---|

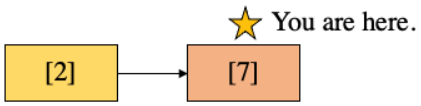
A vaccine mandate is not the forced requirement of compliance with vaccinations but rather the ability of establishment (i.e., businesses, schools, and others) to legally deny entry or service to those non-compliant. Although greatly prevalent in present times, vaccine mandates are not a novel method of addressing population health crises. Previous iterations of mandates are present in schools and international travel; in these instances, much as with COVID-19 vaccine mandates, few exemptions exist [10]. The persistence of vaccine mandates can be judged on their efficacy in both past and present instances of application. As summarized by Dr. Drew, a biology and medicine journalist, vaccine mandates emerged as early as 1835 in response to a nationwide efforts to eradicate smallpox in Britain; here, parents who elected not to immunize their children were fined [10]. Reminiscent to the mandates of today, those electing not to vaccinate their children faced ramifications; in this case, those opposed claimed financial repercussions infringed on bodily autonomy. Further investigation of 1835 mandates illustrate a fundamental flaw with respect to the application of the mandates. Namely, the act of actively penalizing those who do not conform violates an individual's bodily liberty. Reformed perspectives present new iterations of mandates wherein noncompliant individuals face passive repercussions such as limited entry or services. Although seemingly mild, this newfound approach empowers the individual to maintain their personal liberties without direct repercussions; albeit, it is necessary to acknowledge the social ramifications and clear disruption to daily life attendant to mandates in any capacity.

Mechanisms of public health initiatives are most effective as a product of education, outreach, and public commitment. Mandates are considered a desperate remedy to a rapidly evolving health crisis. The implications of these mandates are potentially coercive in nature and catalysts of public distrust, social separation, and aggressive responses by those opposed. Of the other perspective, supporters recognize the benefits of mandates as a means to increase the health standards of communities and increase vaccination uptake without punishing people through financial burden. Considering both sides of the argument, the efficacy of early COVID-19 vaccine mandates can now be explored. In a study by Kreps et. al., 1,245 Americans were sampled to illuminate the efficacy of early COVID-19 mandates. The principal findings indicate that mandates failed to demonstrate significant change in respect to vaccination behavior among an American cohort [11]. Kreps et. al. concludes that mandates alone are not sufficient to promote vaccination and rather invite a separation of peoples depending on vaccination status [11]. Essentially, against the intended purpose wherein mandates would spur a greater rate of vaccinations, findings suggest the opposed population would rather discontinue economic and social activities where vaccinations were needed. Therefore, the long term effects of these mandates were socially divisive.

| | |
|---|---|
| Question [6]: Given an individual is mandated to receive a vaccine per their institution's policy, under which conditions should they be considered exempt (i.e., regarding (a) health, (b) religious, and/or (c) personal choice)? |  <br>See conclusion (1/4). |

The United States has had mandated vaccines enforced on local levels historically; attendant to modern health crises, these mandates have expanded into private workplaces and schools. Mandates do allow for exemptions under inimitable circumstances, but more often than not, have limiting qualification requirements. The exemptions for vaccination in the United States are different depending on each state. Vaccination for children is a nationwide requirement to attend school. In a state-by-state basis, an unvaccinated child may still attend school, however to different capacities (i.e., virtually, hybrid, and/or behind a clear screen). All 50 states provide exemption on the basis that it is medically indicated [12]. Although this exemption is acceptable in every state, the means of acquiring it fluctuate. In more restrictive states, a person must show documentation of severe allergic reactions to the first dosage of the vaccine or must have a history of severe allergies to components within the vaccine. Alternatively, in less restrictive states, merely declaring you have a medical exemption is substantial [12]. Medical exemptions generally allow the student or worker to continue with in-person attendance, but only if they qualify for the exemption in their own state. Otherwise, if a person does not qualify, they may have to attend school remotely or can even lose their jobs if they remain unvaccinated. Alternate forms of exemption further illustrate the strict parameters of mandate exemption. Take religious exemptions, these exemptions are accepted by forty-four states, each of which with their own qualification requirements. All states who do not accept the religious exemption also do not accept philosophical exemption. This exemption is the least common with only fifteen states honoring it. The philosophical exemption empowers parents who have moral disputes or beliefs against the vaccine from having their child vaccinated [13 & 14]. In summary, vaccine exemptions are accepted nationwide when medically indicated; albeit, limited by stringent criteria and difficulty of access.

For exploration of the ethical parameters of governing bodies on vaccine mandates, and more broadly an individual's health, continue with question 7.

| Question [7]: Should governing bodies enforce health mandates? What are the legal implications? |  |
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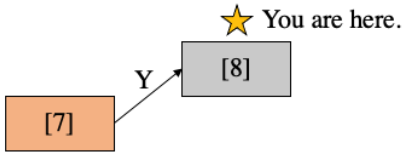
The United States federal government has played a large role in the public health of its citizens. Based on rulings from the supreme court the role of the federal government is limited regarding health mandates. When it comes to health recommendations or guidance for United States citizens, the CDC acts on a federal level to impose regulations. During the COVID-19 pandemic the CDC imposed a federal mask mandate on all public transport. This mandate was later struck down by the supreme court arguing that the CDC has no authority to impose such a mandate [15 & 16]. From this, states and counties were left decide if and where mask mandates would be imposed. Similarly, OSHA, another federal agency imposed a vaccine mandate for large businesses with the option for weekly testing as an expensive alternative if the business does not require vaccination. This mandate was later struck down by the supreme court for the same reason as the CDC's case [17]. When it comes to federal mandates, the supreme court has ruled against health mandates at a federal level, however the supreme court recognizes that a state and county level mandates are acceptable [18]. Both federal and state entities are part of the government but the laws regarding enforcement of public health mandates differ greatly. Per these parameters, the ethical implications enable an individual's liberty to be better recognized as mandates differ among cohorts of citizens depending on relative area of inhabitance. Where a federal mandate requiring masking on nationwide public transportation, a county-by-county mandate is better representative of the wishes of its constituents. This manner of addressing public health mandates more accurately respects an individual's autonomy at county rather than federal levels.

If you have answered yes for question 7, see question 8-9. If you have answered no for question 7, see question 10-15.

| | |
|---|---|
| Question [8]: Given a governing body can enforce health mandates, to what capacity should these institutions be involved in the economics of said mandate? |  |

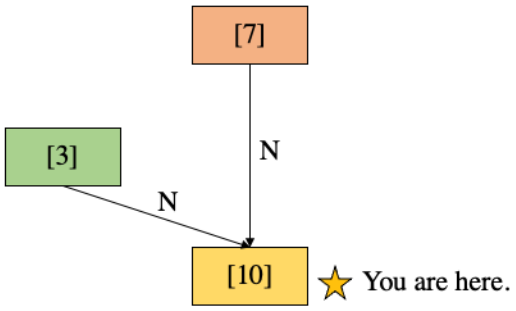
In the United States most healthcare costs are the responsibility of the patient whether in the form of insurance or out-of-pocket costs. On the federal level, only some vaccinations and healthcare services are offered for free and in many cases free healthcare is only available to lower income families and/or children. Some states offer free healthcare or subsidized healthcare for low-income families. Before mandates were imposed, the vaccine was already being paid for by the federal government; hence, enabling easy, quick, and an accessible means of vaccination nationwide [15]. The federal mandates came after the fact, and it can be argued that mandated vaccinations would have elevated social unrest had recipients needed to pay for the injections. When looking at other mandates such as the mask mandate, we see the government offered N-95 masks free to everyone [19]. This methodology extends to the mandated vaccines which were either subsidized by insurance or the federal government entirely. Hence, any government produced public health mandate must be funded by the government such that all of America's diverse peoples are provided equal access to the treatment. Through exploration of ethical tenets, principles of this system align with distributive justice in the ability to ensure equal distribution.

| | |
|---|---|
| Question [9]: At a global stage, how have two economically developed nations, the United States and China, implemented systems of vaccine mandates? |  <br>See conclusion (2/4). |

With different social contexts and cultural atmospheres, both the China and the United States demonstrate diversity in their respective implementations of the vaccination mandates. In response to COVID-19, China implemented the 'Health Code.' The 'Health Code' is a public health initiative meant to reduce transmission of the virus by dictating and limiting every aspects of a citizens life per their relative COVID-19 status. In the case a citizen presents with the 'Red Code,' meaning they are COVID-19 positive, they are required to quarantine and report the positive test to those they have interacted with. China's 'Health Code' effectively serves as a national digital travel inoculation passport, specific only to COVID-19 [20]. Per the demonstrated success of this public health system, other countries including Australia and New Zealand, adopted similar measures for the best interest of public health. Alternatively, United States vaccination mandates vary greatly depending on the state and county. With respect to California, only indoor dining requires proof of vaccination while public workplaces may only require a mask be worn. Applying a similar system to China, the University of Southern California (USC) implemented the 'Trojan Check.' Per use of this COVID-19 status modality, USC became proficient in lowering its incidences of positive COVID-19 individuals. Thorough investigation of both of these systems align with the essence of public health ethics where individual autonomy is less emphasized than the beneficence, non-maleficence, and justice provided to the greater population. Both nations implement certain degrees of mandatory vaccinations, with China leaning toward large-scale regulations while the United States empowers the states and counties to present regulations.

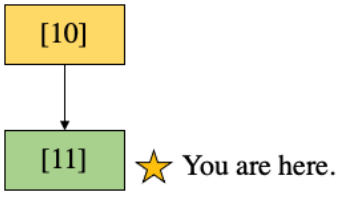
As previously explored, the diverse authorship enabled the narrative to be explored through an international perspective. This serves to expand the generalizability of findings as avenues of inquiry are not limited to American perspectives and examples. More so, this enabled cross comparison between cultures highlighting positives and negatives attendant to explored mandate models.

If you have answered no for either questions 3 and 7 or both, continue with question 10. The justification of this conjoining is by principle of the proceeding questions. Namely, question 3 asks the binary question of whether or not vaccine mandates are ethical and in extension, question 7 inquires if governing bodies should have a role in health care autonomy. Answering no to either of these leads us to question 10.

| Question [10]: Under which conditions are immunization mandates ethically inappropriate? |  |
|---|---|
| There are several scenarios in which vaccination mandates become unethical. In general, mandates should be used as a last resort, and it is inappropriate to impose it when less restrictive alternatives are reasonable and available. One scenario is when the level of risk and health concern raised by a certain disease is not sufficiently high to justify the restrictions imposed by the mandate [22]. In doing so, individual freedoms and autonomy are violated. Another scenario is when the society itself is unable to sustain a full-scale mandates. For example, if the supply of vaccines is inadequate for a society-wide immunization, it becomes significantly harder and more unfair for the underprivileged to receive vaccines and meet the mandate requirements. There are certainly more scenarios, aside from the above two, in which imposing vaccination mandates is unethical. Therefore, for policy makers, before imposing a mandate, it is essential to consider various social, economic, and political factors and conclude whether or not such a mandate would be ethically appropriate. | |

For exploration of the ethical parameters of vaccine mandates considering an acting global pandemic please continue with questions 11 & 12.

For exploration of the an individual's right to challenge vaccine mandates even at the cost of individual and population health see questions 13-15.

| Question [11]: Consider an emergent global health crisis such as the COVID pandemic; in what ways could immunization mandates be ethically inappropriate? |  |
|---|---|

Any immunization mandate that violates individual consent and beneficence is considered ethically inappropriate. Even if in an emergent global health crisis, ethical and appropriate mandatory immunizations should be regulated and decided upon pandemic status, with a basis of acknowledging the public with adequate and up-to-date information. If limitations cast upon unvaccinated people significantly disrupt one's autonomy without reasonable exchange for one's beneficence, the mandate is considered invalid and inappropriate. A researcher from DePaul University in Chicago indicates persuasive outreach, information, and appeals to the protective conscience of communities would be the ethical options for the moral mandates in the COVID pandemic [23]. Thus, misinformation and deception of information has the potential to decrease vaccination compliance and further deteriorate future public health initiatives.

| | |
|---|---|
| Question [12]: Given conditions for emergency use authorization, how should immunization mandates be altered? | [12] ☆ You are here.<br>See conclusion (3/4). |

A misconception at the cornerstone of anti-vaccination ideals is the speed at which the COVID-19 vaccine was developed is negatively correlated with its efficacy and safety. Essentially, those in opposition to the vaccine indicate the rapid development time as insufficient to fully demonstrate vaccine safety. To illuminate this false narrative, it is essential to define emergency use authorization (EUA). As explained by food and drug administration (FDA), "EUA is a mechanism to facilitate the availability and use of medical countermeasures, including vaccines, during public health emergencies" (FDA, 2020). The fallacy of EUA applied to the COVID-19 vaccine result from popular media wherein EUA was incorrectly presented as a mechanism that allows an *insufficiently* tested product be released into the public when responding to global health crises. In truth, COVID-19 vaccines from Pfizer and Moderna were the products of non-novel methodologies. Additionally, vaccine researchers followed strict testing steps, albeit, on an overlapping schedule to increase the rate of data collection. Although it is true that companies began producing vaccines for the public prior to FDA authorization, upon deeper analysis this preemptive vaccine generation enabled immediate response to the eventual approval [24]. There was no intention of providing the vaccine prior to approval but rather it was a deliberate effort by companies to rapidly respond an emergent health crisis as soon as the FDA cleared the treatment. Although effective in providing vaccines to the public, this expedited schedule became a topic of false reports and hampered the initial rhetoric on COVID-19 vaccinations.

As previously explored, public health initiatives are most effective as a product of education, outreach, and public commitment – of significantly lesser preference are mandates. Mandates are considered a desperate remedy to a rapidly evolving health crisis. Hence, as applied here, the failure to present the vaccine as FDA approved prior to public use invited lesser numbers and opposition; in turn, yielding mandates that were socially divisive and predetermined by economic wellbeing. Hence, elements of education and appropriate presentation of safety are necessary in having a mandate exist in the first place. As stated by Jeremy Ward an NIH sociologist, the future is unlikely to exist without mandates, all things related to the mandate involve a cost to benefit ratio; as the pandemic increased in magnitude the cost-benefit ratio switched and thereby mandates became necessary in protecting the populations health [24]. In turn, the necessity of vaccine mandates reached a threshold whereupon it superseded the negatives – loss of individual liberties. As further explored, individual autonomy does not cease to exist when mandates are enforced. Modalities of health passes enable individuals who elect not to be vaccinated to participate in normal life under the condition that they have either completely recovered from a past infection or can provide a negative test result [25]. This mechanism preserves an individual's right to deny the vaccines while simultaneously protecting their community through obedience with health pass parameters. Mandates of the future need to capitalize on the clearly defined benefits, move away from individual punishment, and be clear in their mechanisms of production.

A necessary inquiry addressed in the present paper is the role of vaccine mandates broadly; equally important is recognition of the role of governing bodies in public health when faced with an emergent health crisis such as COVID-19. In the case of a global health crises, we invite the return to the driving question, that is the propriety of vaccine mandates only with the caveat that there is a pandemic at the global scale. With recognition of these parameter, we can conclude, if and only if conditions of emergency approval, efficacy, and safety are demonstrated we return to the driving question to reassess the ethicality of the mandates as a function of their necessity.

The subsequent avenue of inquiries are contingent on recognition of vaccine mandates as inherently unethical whereupon said requirements are explored in a social setting. Namely in relation to one's own right to share false information on vaccinations.

If you answer no, vaccine mandates should not exist, and recognize the first amendment [26] then you should consider question 13-15.

| Question [13]: Should an individual against vaccine mandates be able to spread fraudulent information on immunizations? |   |
|---|---|

All Americans are given the right to express themselves in any capacity – this includes misinformation. While certain actions need to be taken against fraudulent information, penalization or silencing are a violation of one's first amendment rights [26]. Although private companies have implemented systems by which fraudulent information is identified to the viewer, banning or prohibiting this rhetoric infringes on personal liberties. Despite the clear ramifications of false rhetoric, an individual should be empowered to have and share their beliefs. Those who recognize statements as fraudulent have a responsibly to correct the post, tweet, or claim. From the perspective of governments and social media platforms, depriving those who spread misinformation their rights to speak is an inevitably flawed solution when addressing misinformation. With an intrinsically unclear boundary of what constitutes misinformation, it is likely that people who legitimately express their concerns towards vaccinations can be misclassified and fall victim under such censorship [26]. Nevertheless, the possibility of people deliberately attempting to spread malicious misinformation should not be overlooked [27]. If an account is dedicated to misinformation with an emphasis on malic, private companies are responsible for halting statements which compromise public safety. As a growing number of individuals rely on online information to assess the state of global and community news, malicious fraudulent information is potentially damaging; mechanisms of halting including flagging the post as misinformation.

A global perspective illustrates the privilege of free speech is not shared by all. In China there are legal charges attendant to fraudulent information which challenge public safety. Additionally, unlike the United States, any claims that question the safety COVID-19 vaccines and testing can result in immediate ban from social media platforms. As shared by Jiaxing Li of South China Morning Post, an influencer posting statements questioning the safety and efficacy of COVID-19 vaccines was banned as it violated Weibo's, the Chinese twitter platform, terms of services [28]. In this case, China has taken a more deliberate effort in halting the spread of misinformation through aggressive mechanisms including immediate social media bans and potential legal ramifications. Although this silences questioning related to public health mandates, it simultaneously violates individual liberties as statements are completely retracted from platforms.

| Question [14]: Given fraudulent information on vaccinations exists, what is the responsibility of clinicians to debunk misinformation? |   |
|---|---|

Clinicians can address vaccine fraudulent information through a twofold methodology, first by actively debunking misinformation and secondly by reducing misinformation in the future. When it comes to addressing misinformation, clinicians can coordinate with social media platforms or governments to correct fake information. Past research demonstrates that refuting a false claims while keeping it visible is the most effective way to debunk misinformation on social media [29]. Therefore, when a false post appears, medical professionals can provide the correct piece of information via text or link, and social media companies can flag the original post/ attach the professional comments. By doing so, the readers are informed of both arguments and are provided the opportunity to make informed decisions. Should they agree with the professionals, they will also understand what goes wrong in the false claims and will be able to identify similar false claims in the future. On the other hand, when it comes to preventing future misinformation, medical professionals can work with web developers by making medical knowledge more accessible online. Currently, many medical websites are ill-structured and layman-viewers are unable to find a clear answers to their questions [30]. By being more proactive, clinicians can share medical knowledge on social media more frequently, or rework their findings such that they are more easily interpreted and identified. Once scientific knowledge becomes more accessible to the general public, future debunking is made easier per its compounding effects. In summary, clinicians should work on addressing currently existing false claims while also designing mechanisms to impeded misinformation from existing in the first place.

| Question [15]: What are the effects of fraudulent information related to vaccine mandates on public health? | [15] ★ You are here.<br>See conclusion (4/4). |
|---|---|

As previously explored an individual is empowered to spread misinformation as it is an intrinsic liberty; despite this, it is essential to explore the ramifications of fraudulent information related to vaccine mandates. More specifically, the correlated negative effects on public health explored through social, economic, and political pretenses. By nature of social media platforms, an individuals' feed is curated to their interest. Thereby, there is a propensity to push a specific narrative depending on location, political alignment, and social elements. The downstream effects of this can leave an underserved population at increased risk for misinformation and potentially harm. In analysis of COVID-19 fraudulent information, Lanier et. al. explored instances of disinformation by filtering through tweets which used the terms #scamdemic and #plandemic; with over 220,000 tweets analyzed, it was found that one in five accounts were suspended [31]. Lanier et. al. concludes that, "social media has democratized speech, it also permits users to disseminate potentially unverified or misleading information that endangers people's lives and public health interventions" (Lanier, 2022). In accordance with Lanier, the effects of disinformation on public health include opposition to public health mechanisms and at worst, potential morbidity and mortality of those affected. It is important to recognize the inequality of harm projected by fraudulent information. Those without privileges such as education, access to public health outreach, and among other social determinates on health are particularly susceptible to these fraudulent and harming claims. In study by Montagni et. al., it was found that there is a positive correlation between an individual's capacity to detect fake news through education & health literacy programs and likelihood to be vaccinated [32]. The logical deduction from these findings indicate that fraudulent information hampers an individual's likelihood to be vaccinated. Thereby, at a public health level this compromises the wellbeing of the population as it clearly violates of non-maleficence.

At this point each of the four avenues of inquiry have been explored in detail. We ask that you continue with exploration of alternate ethical models and thorough review of common morality as presented below.

## 4. Exploration of the Gert Model in situ of Beauchamp-Childress Model – A statement of differences highlighted by a clinical scenario

Gert's 10 Rules of common morality establish a framework wherein an individual is empowered to determine and interpret their own view on mortality. Secondary to that, the Gert Model stratifies principles by a predetermined ranking respective of harm. Per statement of the negative, do not, the presented values indicate a binary model where identification of rule violation is immoral and easily identified. Powerful to this model is the interconnectedness of moralities, any violation of a tenet would simultaneously violate another. This enables clear justification of what is and what is not considered moral when responding to ethical situations in medicine. It is important to recognize that the Gert's 10 model is emblematic of moral norms and reminiscent of religious tents. This system, unlike other models of medical ethics, highlights five basic harms death, pain, disability, loss of liberties, and loss of pleasure. Within the model itself the first five rules establish tenets by which any of the five basic harms are directly avoided, the second five establish mechanisms to prevent indirect manifestations of said harms. To best illustrate the application of Gert's Model as applied to the ethicality of vaccine mandates, a clinical scenario between a provider and patient was fabricated.

*As part of Patient X's universities protocol, all students are required to get the vaccine in order to continue attending in-person classes. X has worries that the vaccination has not yet undergone appropriate testing and EUA does not recognize individuals with diabetes. Additionally, X feels that her university has compromised her liberties as not being allowed to return to campus appears as a coercive measure. The following is a conversation between Patient X and her provider.*

Patient: I want to do my part. I want to be safe for myself and those around me. I just worry that the vaccine might not be safe for me.

Provider: I recognize your hesitation and I realize that nothing is ever guaranteed. I can tell you this, findings have repeatedly demonstrated this as a safe preventative measure. I am not going to tell you what to do, however I am going to empower you to make the best decision for yourself.

Patient: My university requires me to get vaccinated. If I don't, they will not allow me to attend in the fall and I would need to do another semester online.

Provider: Here is what I can provide you, assurance that this vaccine is safe. My duty is to make sure you are safe and your autonomy is protected in either case.

Patient: For my own self relief can you show me evidence that I will be safe post vaccination.

*Provider and Patient review medical literature and have an open discussion about the possible negatives and the associated positives.*

Patient: I guess I am confused why I need it now? I take the appropriate precautions to not get sick.

Provider: I do not want this to skew your position on the matter, but I want you to recognize that you should not give up your own pleasure. Not everyone is going to be as responsible as you are, just by attending in-person you put yourself at risk.

Patient: I hadn't considered that. Would you be able to write a note of medical exception saying I am allergic to the vaccine?

Provider: Any fabricated medical document is unlawful; I won't be able to write you that note. I want to remind you that there is no recording of stating diabetes is a counterindication for getting vaccinated. From a medical standpoint, your safety is virtually uncompromised.

*Patient ponders what was just shared and elects to proceed with the vaccination.*

## 5. Exploration of the Jonsen Model in situ of Beauchamp-Childress Model – A statement of differences highlighted by a clinical scenario

The Jonsen 4-model emphasizes medical professionalism and includes four detailed dimensions guiding medical decision-making: medical indications, patient preferences, quality of life, and contextual features. Among the many differences between the Jonsen model and traditional bioethics models, the Jonsen model provides a series of inquiry related to principals of beneficence, non-maleficence, autonomy, and justice. Although reminiscent to Beauchamp-Childress model, the Jonsen Model enables advanced medical ethical questions to be addressed. Each of the four components included many sub-inquiries to which a provider can respond specifically with respect to a patient's condition. The implications of this model enable complex medical scenarios be addressed fairly with the patients best interests. To best illustrate the application of the Jonsen Model as applied to the ethicality of vaccine mandates, a clinical scenario between a provider and patient was fabricated.

*Patient Y is a 27-year-old married male with a household of five. Y is reluctant to take the vaccination due to fear of potential side effects. Y recognizes that without vaccination, life would become less convenient as many public places would inhibit entry. Y came to a COVID-19 vaccination clinic to seek advice from a provider.*

Patient Y: I know everyone wants me to get vaccinated, but I'm not sure if receiving a shot will actually benefit my health. I feel forced to get it as many restaurants and shops are open to vaccinated people only. I can't seem to go anywhere anymore.

Provider: I understand your fear of the vaccine. It came from development to our front door in a matter of months. Let me assure you that despite the speed of its production, this is an FDA approved preventative treatments and no evidence suggests that it is unsafe to people like you.

Patient Y: Won't I be chronically sick? I read that online. The only reason I am here is because I miss going to restaurants with the family.

Provider: In that respect, this vaccine will improve your day to day. It will not only protect the health of you and your family, but it will also allow you to resume those activities. I want to assure you that most

side effects will wear off naturally in a few days, and plenty of studies have shown that it is extremely rare that any long-term side effects persist.

Patient Y: That's reassuring to hear, I guess I need to pay more to scientific research than random online posts. However, if I'm unlucky and start to develop long-term side effects, I fear I may cause extra burden to my family. We are not in a really well economic situation, you know.

Provider: Nothing is easy when it comes to health-related decisions, and of course you can discuss this topic with your family. Tell them your concerns so that you all can collectively decide what is best for you.

Patient Y: Yes, I think I should do that.

Provider: By all means. Just keep in mind that our conversation today serves merely as a discussion. Clearly, as a medical professional, I would hope that everyone gets vaccinated. I believe getting vaccinated is for your own good, but equally important it helps protect people around you; especially, the susceptible like your parents and children. But in the end, it is really your choice. Try to be as objective as possible when bringing this matter up to your family.

*Patient ponders what was just shared and leaves the clinic equipped with information to share with his family.*

## 6. Common Morality

Within the preceding section the common morality related to vaccine mandates will be explored through the past and present by American and Chinese perspectives. Of note, exploration of the accepted ethical views are separated by international cultures and addressed by the collective authorship based on relative expertise. Due to the apparent relation between anti-vaccination sediment and vaccine mandates, many ideas of accepted ethical views are established recognizing said framework. Additionally, use of COVID-19 provided contemporary accounts of the ethicality of vaccine mandates.

As contemporary instances of vaccine mandate opposition continue dominate media, an informed analysis illustrates this mechanism of public health outreach has been successfully utilized in past United States health crises (figure 3). As demonstrated by figure 3, vaccine mandates were implemented as early as the 19$^{th}$ century as a gatekeeping feature enabling children to attend schools. In contemporary applications, similar mandates exist. As previously explored, the exemptions of this mandate across the United States are rare. By nature of these mandates promoting an individual's health and demonstration of efficacy & safety, applied to the traditional medical ethics, the mandates themselves compliant with beneficence and non-maleficence. However, by their required nature, the mandates violate individual autonomy. Although contemporary models work to address the neglect of autonomy and the limited capacity of outreach, exemptions are rare and the distribution is innately dictated by social, political, and economic determinants. Hence, despite clear benefit to population health, the ethics of vaccine mandates in the United States are highly nuanced and complicated by cofactors.

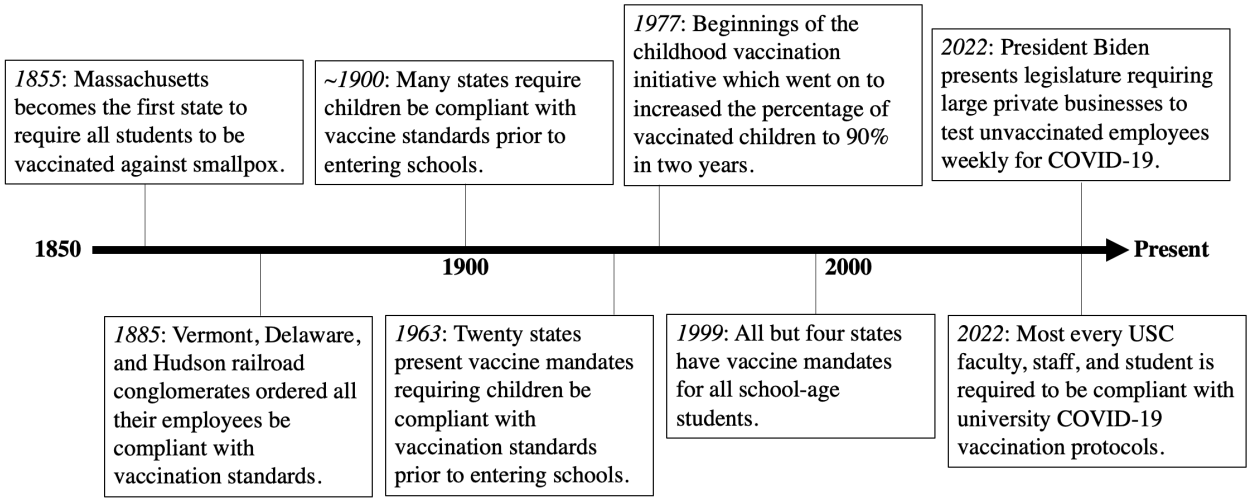



**Figure 3.** Demonstrates a timeline of previous implementations of vaccine mandates in response to American health crises. The presented instances were informed by [33, 34, and 35].

Having demonstrated effectiveness in the ability to halt rapid COVID-19 transmissions and hospitalization rates, the FDA enabled EUA of three COVID 19 vaccines. Despite the clear benefits to both individual and population health, rates of vaccination remain low. As previously explored in detail, the response to low vaccination rates were vaccine mandates. Against traditional medical ethics, public health ethics involve the protection of public well-being over individual autonomy. Per this fact, it is inappropriate to attempt to justify vaccine mandates through use of traditional medical ethic tenets. As explained by Sween et. al., "public health ethics focuses on collective beneficence, nonmaleficence, and justice over individual autonomy" (Sween, 2022). Hence, as applied to public health ethics, the vaccine mandate prioritizes public wellbeing as it maximizes individual and population health at the cost of individual autonomy. This approach highlights principals of utilitarianism wherein the proper choice is the one which benefits the greatest number of people rather than an individual's goals [7]. This communal approach is then ethically justified as parameters of this model are confirmed (i.e., the vaccine is an efficacious and safe treatment which benefits the public with few negatives). When recognizing the compliance of vaccine mandates through a public health ethics perspective, it is important to recognize the potential of ethical violations. Namely, by nature of an EUA treatment, the known long-term effects are impossible to definitively know. Thereby, requiring participation in what is effectively ongoing research has a potential of non-maleficence. Per this imbalance, it is difficult to clearly state the historical and modern ethicality of vaccine mandates as many caveats need to be considered.

In exploration of a global perspective, the voice of anti-vaccination is not prevalent in Chinese cultures. According to a large-scale national study, the prevalence of COVID-19 vaccine hesitancy was modest in China. With virtually unanimous compliance, the only recorded deviations were the mild drop boosters administered. Differently than American governments, the Chinese government is not responsible for any potential risks caused by vaccinations [36]. Moreover, there are no religious and philosophical exemptions in China and rather only medical exemptions are honored. For instance, only patients with chronic hepatitis B and a carrier of hepatitis B virus, or patients who already has hepatitis B surface antibody in their body's, could be exempted Hepatitis B vaccine [36]. Exploration of the ethos related to

vaccine mandates with a Chinese perspective is complicated as the culture is largely compliant and actively discouraged/ impeded from speaking against the public health mandates.

## 7. Conclusion

As a collective authorship we assert that given the present evidence and deduced pathway of inquiry, the current iteration of vaccine mandates are ethically moral and immoral in respect to public and individual ethical models respectively. Health experts should continue to refine this mechanism of public health such that shortcoming attendant to dismal of individual autonomy and inequitable outreach can be revised. Despite the systems' evolution over time and incremental efforts to improve individual autonomy, the mechanism itself is inherently coercive. Exploration of the parameters of vaccination mandates, the role of government in an individual's health choices, recognition of the EUA, and the balance between one's free speech and their potentially negative implications demonstrate vaccine mandates as dynamic in the ways they simultaneously obey and challenge tenets of medical ethics. Without defining the nuance, a singular claim fails to provide sufficient justification of whether or not the mandate is truly ethical. From this we conclude that intentions of improving population health at the expenditure of individual's autonomy is at most ethically acceptable per a public health ethic perspective. As a collective authorship we find that subjecting individuals to act potentially against their beliefs has tumultuous implications in future applications. In other words, we believe it is imperative to recognize that prior instances of mandate successes do not serve as an ethical justification for future initiatives. Rather, each instance of a public health mandate needs to be reassessed and thoroughly investigated in respect to its ethicality as a function of the society's ethos. In essence we agree that it is to the best interest of public health mandate to consider both public and induvial health ethics when proposing policy. Hence, in respect to public health ethics we concur that vaccine mandates are ethical; however, in respect to individual health ethics we discern that vaccine mandates fundamentally violate one's autonomy. In recognition of this conclusion, we postulate that medical ethical models, both public and individual, are equally powerful & necessary in response to global health crises and produced mandates.

## 8. Auxiliary Reflections and Materials

| **Authors** | **Informed Conclusions** |
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|---|---|
| Sami R. Chmait | - With recognition of safety and effectiveness of vaccinations, the implications of a mandate with respect to non-maleficence and beneficence provided to the general public is clear.<br><br>- A cornerstone of vaccination safety skepticism is the erroneous conclusion that vaccinations are correlated with autism and the capacity to overload a child's immune system. To both of these statements, scientific studies and reviews have continually demonstrated no correlation between vaccines & autism and vaccines & overstressing an immune system.<br><br>- The persistence of vaccine mandates can be judged on their efficacy in both past and present instances of improving population health.<br><br>- The fallacy of EUA applied to the COVID-19 vaccine result from popular media wherein EUA was incorrectly presented as a mechanism that allows *insufficiently* tested products be released into the public when responding to global health crises.<br><br>- The effects of disinformation on public health include opposition to public health mechanisms and at worst, potential morbidity and mortality of those affected.<br><br>- Vaccine mandates prioritizes public wellbeing at the cost of individual autonomy. This approach highlights principals of utilitarianism wherein the proper choice is the one which benefits the greatest number of people rather than an individual's goals.<br><br>- It is to the best interest of public health mandates to consider both public and induvial health ethics when proposing policy as neither model is sufficient in definitively presenting the ethicality of these public health initiatives. |
| Jingze Ma | - Generally speaking, mandatory vaccination largely consists of penalties of differing severity; such penalties include limitations of daily activities to criminal punishment.<br><br>- Despite inclusion of religious and medical exemptions, any vaccination involving coercion and restriction on personal liberty can be defined as a mandate. |

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| Ben Hanasabzadeh | - Vaccinations along with alternate modern medical protocols enabled the eradication viruses and has minimized the deadly effects of many more<br><br>- Populations who refuse or are hesitant to get vaccines per their various reasonings face social repercussions. Exemptions are essential whether it is for medical, religious, or philosophical reasons and criteria for exemptions should be accessible.<br><br>- Government and medical organizations should focus on educating those who do not trust the safety of vaccinations and transform their views instead of forcing it upon them.<br><br>- Mandated preventative medical care creates a financial burden; for this reason, it is the responsibility of those who implemented the policy to pay for the service. |
| Qilin Ye | - It is important to carefully handle misinformation regarding vaccinations online. Evidence has shown that it is better to flag misinformation instead of straight-up deleting or banning the corresponding accounts.<br><br>- Health agencies should be more involved in distributing professional knowledge to the public by making use of online social platforms.<br><br>- Before imposing a mandate, governments should carefully analyze whether the situation is serious enough to justify such action and consider the potential repercussions coming from the society. |

**Table 2.** Summary of each authors profound conclusions and learned perspectives.

| **Beauchamp-Childress Ethical Tenets** | **Corresponding Questions** |
|---|---|
| Non-maleficence | - **[Question 1]** Are vaccines safe?<br>- **[Question 2]** Have vaccinations previously demonstrated efficacy in their ability to eradicate global health crises?<br>- **[Question 5]** What are the longitudinal effects of vaccine mandates?<br>- **[Question 10]** Under which conditions are immunization mandates ethically inappropriate?<br>- **[Question 14]** Given fraudulent information on vaccinations exists, what is the responsibility of clinicians to debunk misinformation? |
| Beneficence | - **[Question 3]** Are vaccine mandates ethical?<br>- **[Question 4]** Which conditions demonstrate vaccine mandates as ethically appropriate?<br>- **[Question 11]** Consider an emergent global health crisis such as the COVID pandemic; in what ways could immunization mandates be ethically inappropriate? |

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| Autonomy | - **[Question 6]** Given an individual is mandated to receive a vaccine per their institution's policy, under which conditions should they be considered exempt (i.e., regarding (a) health, (b) religious, and/or (c) personal choice)?<br>- **[Question 13]** Should an individual against vaccine mandates be able to spread fraudulent information on immunizations? |
| Procedural Justice | - **[Question 7]** Should governing bodies enforce health mandates? What are the legal implications?<br>- **[Question 9]** At a global stage, how have two economically developed nations, the United States and China, implemented their systems of vaccine mandates?<br>- **[Question 12]** Given conditions for emergency use authorization, how should immunization mandates be altered? |
| Distributive Justice | - **[Question 8]** Given a governing body can enforce health mandates, to what capacity should these institutions be involved in the economics of said mandate?<br>- **[Question 15]** What are the effects of fraudulent information related to vaccine mandates on public health? |

**Table 3.** Questions ordered with respect to their corresponding Beauchamp-Childress ethical tenet. Numbering corresponds to the order of questions as presented in Figure 2 and the subsequent narrative.

## 9. Editor's Note

Dear Reader –

Speaking for the collective authorship, I would like to personally thank you for engaging with our narrative related to the ethicality of vaccine mandates. Being a contentious topic littered with immense complexity claiming a singular answer on whether the mandates are or are not ethical would be a colossal oversimplification. Rather we presented and thoroughly organized our inquiries, removed our biases, and explored the ethicality of mandates through neutral analysis of expert publications, comparative ethical models, and exploration of common morality. Despite our efforts, we want you to recognize the presence of latent biases and interpret our findings through your own perspectives. We invite your disagreement with our conclusions for it is only through this disagreement can mechanisms of public health be further improved.

I would like to further recognize a strength of the present paper. Namely, the diversity of the authors enabled the tone and applicability to be broad in its uses and powerful in its statements. Additionally, I want to highlight that portions dedicated to Chinese perspectives were written by native Chinese people and cited Chinese manuscripts/documents to preserve the authenticity of statements. To Jacob Ma, Ben Hanasabzadeh, and Qilin Ye, I would like to recognize all the effort and time dedicated to this piece. To Dr. Dana Milstein, I would like to thank you for the guidance and lessons you provided.

Signed,
The Editor

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