How Cohorts Diminish COVID-19 Transmission and Mental Health Concerns: Lessons Learned from the Pandemic

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CeeJay Berg

Faculty Mentor Linda Thunström

University of Wyoming | Department of Economics | Honors College

Abstract

This paper explores the benefits of cohorts on transmission of COVID-19 and student mental health by conducting a literature review and making a policy recommendation. Transmission of COVID-19 drew university administrators to implement changes to course delivery modes which often included sending students home and converting classes to online modality. While this addressed the high transmission, administrators were not yet aware of the significant negative mental health implications of isolation. An alternative transmission reduction method is cohorts, or smaller groups of students that continue to meet in person and foster connection among students. This literature review found from three different case studies that within COVID-19 cohorts, there was significantly reduced or no person-person transmission of the virus, and outside transmission was prevented from spreading within the cohorts. Since quarantine cohorts allow for social interaction despite periods of high transmission, they are also able to mitigate the severe negative mental health impacts felt from isolation. It is recommended that cohorts are implemented during periods of high transmission come a future virus.

1. Introduction

The COVID-19 pandemic led policy makers to promptly implement control measures which helped to control the spread but left mental health issues in the wake, an issue that could have been prevented by implementing cohorts. This issue was prominent on university campuses, as students who were already feeling anxiety from the unknowns caused by the pandemic were swiftly sent home or confined to their dorm rooms to temper viral spread. In both cases, students' classes switched to online delivery, removing students from their social networks. Isolation is a known cause of mental health issues, but when faced with fast-paced, difficult circumstances, decision makers chose policies that would control the virus.

Some groups came up with creative solutions when isolation was not possible. One answer to this problem is cohorts. Cohort policies break students up into smaller, more manageable groups through which it is easier to control mask wearing, social distancing, cleanliness, and other methods of virus mitigation. Cohorts allow students to maintain face-to-face contact with their peers. By reducing isolation, cohorts can presumably prevent the most severe mental health issues that arise during times of high uncertainty.

The aim of this study is to explore if cohorts increase the spread of the virus or effectively mitigate it. To conduct this analysis, this review examines the only three case studies published so far on cohorts. Background information on the policy decisions during high transmission and the effects of isolation on mental health is also reviewed.

Given that cohorts help to mitigate COVID-19 and that they prevent isolation, they are an attractive policy option for the next pandemic. This study contributes important information on the benefits of cohorts – particularly for universities.

Section 2 will describe the methods for selection of the case studies used in this review and the reasoning for the use of "cohorting" language. Section 3 provides background on the relationship between isolation and mental health during viruses. Section 4 provides the evidence on the effectiveness of cohorts for prevention of virus transmission by describing each of the three case studies I found. I conclude with section 5 by making an argument for cohort policies to be implemented and discussing the areas in which further research is needed.

2. Methods

I began my literature search through the University of Wyoming Libraries Database by searching, "covid-19 mental health students college university pod," which garnered 62 results mainly focused on mental health of students during the pandemic. To narrow things down to cohorts, I then searched for "covid-19 isolation pods," but this mainly produced results on physical pods that were used in hospitals. Among them I found one case study, "Innovative Cohort Process to Minimize COVID-19 Infection for Migrant Farmworkers during Travel to Iowa" (Johnson et al., 2022). I then switched to Google Scholar and searched "covid-19 quarantine pods" which is how I found the other two case studies; "COVID-19 Surveillance in Youth Soccer During Small Group Training: A Safe Return to Sports Activity" (Drezner et al., 2020) & "Administering a Physician Assistant Program During the COVID-19 Pandemic" (Handy et al., 2021). After over 30 hours of search, these were the only case studies specifically on cohort implementation and effectiveness in the COVID-19 pandemic I was able to find.

Throughout this paper, I refer to the process of splitting people into smaller groups to control for other COVID-19 mitigation methods as "cohorts" or "cohorting" for the sake of consistency. The three foundational papers to this study refer to them as cohorts, pods, and small

groups, but the fundamental meaning is the same throughout them. This lack of consistency demonstrates the scarcity of these articles. The critical conversation in this area is still developing.

The specifics of implementation are not in question for the purposes of this review, as they should be flexible and policy makers should have creative ideas about how to implement them to their best capacity in their respective communities. Rather the purposes of this review are to highlight the benefits of cohorts and encourage they be implementation, leaving the how up to the decision makers.

In the following section I provide background on the relationship between isolation and mental health during disease outbreaks.

3. Background: Isolation and Mental Health During Viruses

There were significant negative impacts to mental health due to the COVID-19 pandemic. A literature review published early in the pandemic found that mental health issues were proving to be a common response even then. (Rajkumar, 2020) At the peak of the pandemic there was a much higher frequency and prevalence of OCD symptoms among college students in China (Guangjun Ji et al, 2020) and after being sent home from classes, 24.9% of college students at a University in China were found to be experiencing some form of anxiety ranging from moderate to severe. (Cao Wenjun et al. 2020) Students who were of a lower socio-economic status or those without consistent access to the internet were more likely to report significant negative mental health impacts.

Beyond general anxiety about the pandemic, isolation can have negative impacts on mental health. Before the novel corona virus, COVID-19, a study into the mental health of

people who were quarantined due to a SARS virus found that people put considerable distress on those who were quarantined, and that these psychological issues may be persistent long after the quarantine and isolation have ended. (Jeong H. et al, 2016) Isolation and quarantine have been commonly implemented tools to lower the spread of COVID-19 as well, and so these issues are likely to be present long after this virus eases in severity. When universities shifted course delivery methods online, they also shifted many students to be isolated at home or in their dorm rooms. At best, student's social circles were severely limited due to the shift. Social support is negatively correlated with anxiety in college students at a statistically significant level (Cao Wenjun et al. 2020), so the limiting of student's social circles can have anxiety inducing effects. Universities should implement social support structures such as cohorts into their COVID-19 policies and procedures to lessen student anxiety. The duration of isolation does not have statistically significant impacts across studies, but students tend to report the most severe impacts at the peak of the virus or when first being sent home to quarantine. (Zheng et al., 2021) This suggests that as students were able to build social support networks at home or build up strategies to connecting with their preexisting support networks using online methods, they were able to mitigate some of the negative impacts. Cohorts would allow Universities to build these tools into their delivery structure rather than put the burden on the student to develop them on their own.

4. Evidence: Cohorts Slow the Spread of COVID-19

To decrease the negative impacts felt by COVID-19 and isolation as well as mitigate the spread of the virus, students should be instructed and quarantined in cohorts, or smaller groups. In conducting this literature review, three case studies were found on the effectiveness of the use of cohorts, for migrant farm workers, for youth soccer in Seattle, and for the University of Utah Physician's Assistant program. All the studies found that in the duration of the study COVID-19 transmission was diminished. The two studies pertaining to students and youth showed that throughout the duration of the study there was no person-to-person transmission of the virus. These case studies explored in more detail below present a significant finding, as they show that the cohort method of quarantining is *remarkably effective* for mitigating the spread of COVID-19. In addition, since students or workers are still able to connect with their social groups and their peers when the cohort method of virus mitigation and quarantining is implemented, cohorts are a viable way to mitigate the mental health impacts due to the virus. Students felt significant anxiety when sent home due to the pandemic and since cohorts allow students to remain on campus, they are also able to lessen the negative impact of this anxiety. Many students also struggled with anxiety about contracting or spreading the virus. These case studies outline the strength of cohorts in preventing the spread – thereby mitigating this anxiety felt by students as well.

Case Study 1 – Migrant Farm Workers (Johnson et al., 2022)

Among migrant farm workers, cohorts were able to decrease the transmission of COVID-19 from 12.7% to 3.5% -- a testament to their effectiveness. In the case study, “Innovative Cohort Process to Minimize COVID-19 Infection for Migrant Farmworkers During Travel to Iowa” by Caroline Johnson, FNP-BC et al., health care providers at Proteus, Inc. pursue the use

of cohorts to slow the spread of COVID-19 at farms in Iowa. Workers at Proteus tried several methods to slow the spread of COVID-19 among workers, including holding town halls, mass testing events, provision of temporary housing, and provision of masks. Upon arrival workers would share living space, dining space, and commute to work sites together. This method led to "Infection transmission and illness [that] burdened local rural EMS services as well as alarmed local hospitals and regional emergency management professionals, as the outbreak progressed." So, for the next round of immigrant workers they came up with a different strategy – cohorts. From their departure in Mexico migrant workers a pilot group of workers and their close contacts were tracked until they arrived in Iowa. While traveling on the bs each worker was assigned a seat for the entirety of the journey, and once they arrived based on their seats, the workers were assigned to groups of two to five, with which they would share housing. Proteus conducted mass testing again, and this time positive workers quarantined with the group they travelled with. Proteus was then able to provide subsequent testing to those within the positive worker's travel cohort. The study found that:

"In July of 2020, prior to implementation of the cohorting process, Proteus tested 251 workers at the farm. In those workers, thirty-two individuals tested positive (12.7% positivity rate). Four uninsured and uninsurable individuals eventually required hospital transfers. After implementation of the cohorting process, the positivity rate was 3.5%. Six of 170 workers tested positive. None required hospital transfers or admissions, reducing the impact on local hospitals and emergency medical services. In August, Proteus spent $8935 to support hotel housing for the intervention group. Assuming consistent positivity rates between two groups without intervention, the cohorting process prevented isolation of an estimated 21 workers that would have resulted in 1700 hours of lost work. Implementation of this process increased productivity

and had a positive impact on the employer's operation." This study shows Cohorts are a successful method of lowering the transmission of COVID-19.

Case Study 2 – Youth Soccer in Seattle (Drezner et al., 2020)

Beyond migrant workers, cohorts proved to be an effective method of mitigating transmission among youth (ages 7 to 18). In Washington States largest youth soccer club, comprised of 1906 players, only two contracted COVID-19 in a six week period. In Seattle, youth soccer is quintesential to the mental health and wellbeing of youth and so, it was included in phase 2 of the governor's reopening plan. The case study "COVID-19 Surveillance in Youth Soccer During Small Group Training: A Safe Return to Sports Activity" by Jonathan A. Drezner, MD. Et al monitored the spread of COVID-19 within youth soccer as part of the phase 2 reopening. To control the spread, the soccer teams were divided into groups of 5 or less that could share the same quadrant on the soccer field. The players were required to weear a mask to and from training, but during training they were optional. The players were required to maintain physical distancing within the quadrant, and coaches were encouraged to develop programming that allowed players to maintain the physical distance. The avaerage number of new cases in King County, home of the youth soccer program, was 81.8, and within the players of youth soccer, was 35.

The implementation of cohorts made it easier for coaches to control for the other mitigation factors, such as physical distancing. The study points out that the two cases that did arise, were both attributed to community gatherings outside of the youth soccer program. Cohorts gave coaches and staff the ability to create an enviornment "with high awareness and compliance with safety protocols" that led to the low transmission of COVID-19.

Case Study 3 – University of Utah Physician's Assistant Program (Handy, et al. 2021)

Cohorts are also a practical tool for mitigate the spread of COVID-19 within the classrooms of college campuses. In the case study "Administering a Physician Assistant Program During the COVID-19 Pandemic" by Rod Handy, PhD, MBA Et al. decision makers at the University of Utah implemented cohorts to navigate the struggle of online delivery in their PA program, and found that (similar to the youth soccer program in Seattle) cohorts were able to prevent the spread of COVID-19 within the program. The physicians assistant program at University of Utah relies on hands-on experiences, and the virus presented a serious threat to their success. The Universiy of Utah Physicians Asiistant Program (UPAP) used cohorts to continue their in person instruction. Students in the UPAP were split into cohorts of 8 to 15, depending on the physical space needed to maintain 6 feet of distance. Each cohort was assigned days in which they could attend classes in person while the others attended virtually. The cohort system meant that when there was a positive case only the students within a certain cohort would need to quarantine, allowing for continued in-person instruction for the other cohorts. In addition to cohorts, students were required to to follow a "safety concientious" protocol, in which they would wear masks, report symptoms, and avoid coming to class with any symptoms. From October 14th to December 6th of 2020, 12.5% of the students tested positive, and 4 cohorts had to be quarantined. However, the study notes " At the time of writing, the UPAP program does not have any known contact-to-contact positive cases of COVID-19 within our student, staff, and faculty community." The positive cases they experienced are attributed to social gatherings outside of program enviornment. Within the bounds of the program, cohorts are an effective method for minimizing the spread of the virus.

5. Conclusion: Cohorts Should be Implemented by Policy Makers

This study examined the impact cohorts have on virus transmission by conducting a literature review. The existing literature suggests that cohorts do not increase virus spread. This shows that in times of lockdowns (e.g., when a new virus is spreading in the population, and the only control measure is reduced physical contacts), we should look to implementing cohorts. Especially given the fact that they prevent isolation and allow people to maintain social contact with others, thereby potentially reducing or preventing the significant costs of isolation on mental health.

In the event of the next pandemic, the reccomended policy is to implement cohorts. University administrators and other decision makers should seriously consider the implementation of cohorts to help with both the spread of the virus and the mental health of the students. The case studies outlined above illistrate the strength of cohorts at slowing the spread of viruses. Cohorts then lessen the toll that a pandemic takes on student mental health in two ways – they lower the anxiety students feel about being sent home from a pandemic (Cao et al., 2020) and they prevent the negative impacts on mental health from isolation (Kim et al., 2017).

This review is based on only three studies, the only three published at the time. More research is needed on the efficiency of cohorts. There may have been instances in which cohorts were less effective than was shown in these cases, but those did not get published. An experiment on cohorts would be valuable for the decision makers in the next pandemic.

Furthermore, this study is limited in that only one of the cases focuses on university students. The aim of the study is to propose the best policy for universities in the case of the next contagious virus. While cohorts proved to be an effective measure in one case study, there is more research to be done on the effectiveness within university student groups.

More research is also needed on the relationship between cohorts and mental health directly. The case studies outlined in this literature review do not consider the mental health impacts of the pandemic on the groups outlined within, as preventing the spread of the virus was their main concern. Cohorts connect to mental health still by preventing the anxiety felt by being sent home (Zheng et al., 2021) and by preventing the negative impacts of isolation as outlined above. However, research that explores the relationship between cohorts and student mental health is needed to strengthen the adoption of cohorts.

As University's and decision makers within look past COVID-19, more research is to be done on how cohorts can be relied on to foster better mental health and student success. COVID-19 showed administrators at universities that campus wide changes can happen quickly. Living learning communities and peer to peer mentorship foster student success (Gamlath, 2021), and both tools could be strengthened by cohorts and the lessons learned from them in the pandemic.

The case study about the UPAP mentioned above states, "It should be noted that all students from both cohorts stayed in school, with no recognized attrition during this time period." More research then should be conducted on the retention effects of cohorts both during the pandemic and moving forward to determine if cohorts have a place on campuses as we begin to move away from COVID-19 policies. In this time when fast-paced campus changes can – and often need to – happen we must look further into the future implementation of cohorts and the impacts they have on student wellbeing and overall student success moving forward.

From this study, I conclude that cohorts should be implemented rather than isolation during periods of disease outbreak and high disease transmission moving forward.

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