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Student Research Report

An Analysis of the Evolution of Transportation Use at UBC: Impacts of COVID-19

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**An Analysis of the Evolution of Transportation Use at UBC: Impacts of
COVID-19**

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Executive Summary

Public transportation worldwide has become a major challenge due to the continuous spread of coronavirus disease 2019 (COVID-19). Whilst in the midst of a global pandemic, COVID-19 has changed the way we have lived and has impacted the way people have been able to travel (Shen et al., 2020). Thus, the purpose of our research project was to examine how the use of transportation among UBCV (University of British Columbia Vancouver campus) undergraduate students has changed and evolved during the COVID-19 pandemic. Furthermore, we also utilized our findings to offer recommendations on how students can engage in more active transportation (AT) rather than passive transportation (PT). PT is considered a form of movement where energy expenditure is minimal, AT generally entails walking and cycling (Rothman et al., 2021).

In the study, we conducted a cross-sectional survey of undergraduate students that attend Vancouver campus. 65 UBC undergraduate students were recruited and provided consent prior to completing our survey. Students were recruited through convenience sampling which included social media platforms (e.g., Facebook, Instagram, and Slack), and connection through peers. For our data analysis, we conducted a descriptive statistical analysis and qualitative analysis. Responses were collected through a Qualtrics survey consisting of 21 questions that provided us a better understanding of students' preferences with certain modes of transportation before, during, and after the pandemic. Quantitative data was collected through close-ended questions in the form of multiple-choice questions, a few Yes/No questions, and one 5-point Likert scale question. Qualitative data was also collected through the use of a few open-ended questions. about students' perspectives of AT and reasoning for changes in transportation methods.

Through the analysis of our study, we did not find significant changes in the number of participants who used bikes as their major mode of transportation between the pre pandemic era, during the pandemic, and post-pandemic era. It was found that more participants have used cars as their major mode of transportation during the pandemic compared to pre-pandemic era, and the trend is estimated to be increasing in the post-pandemic era. There was a decrease in participants who used public transportation as their major mode of transportation since the pandemic started. However, it is expected that the number would increase again after the pandemic. The majority of participants reported they did not want to bike to campus regardless of their accessibility to bikes or shared bikes. Most participants that live or will live around campus, indicated their preference of walking to campus as a method of active transportation. More directly, the majority of participants believed that health benefits gained from active transportation are important to them.

Based on these findings, recommendations were made that included adding affordable housing on UBC campus as the main reason students do not use some form of AT to travel to/from campus is that they live too far from campus, developing an affordable/free bike share program, safer bike storage where members don't not have to worry about bike theft/vandalism, increasing the frequency of buses at night for safety concerns, and lowering Upass prices.

Introduction and Literature Review

Nearly two years into the global pandemic, coronavirus disease 2019 (COVID-19), a highly transmissible virus that first originated in Wuhan, China in December of 2019, has definitely posed a serious threat to global public health (Shen et al., 2020). The virus has impacted how people have been able to travel around the world and due to the continuous worldwide spread, public transportation has become a challenge (Shen et al., 2020). In the study by Labonté-LeMoine and colleagues (2020), COVID-19 has made a significant difference in the way students have made use of transportation during the pandemic era in comparison to before the pandemic. Therefore, there is no doubt that this change in transportation methods occurred among students and faculty members of the University of British Columbia (UBC).

In the pre-pandemic era, the University of British Columbia implemented their 2020 Transportation plan with a goal to reduce the amount of vehicle traffic around the UBC area (The University of British Columbia, 2020). During 1997 - 2019, it has been found that Passive Transportation (PT) far exceeded Active Transportation (AT) based on the following data: the number of single occupant vehicles increased from 46,000 to 47,300, the number of transit users increased from 19,000 to 80,200, and in total, person trips increased from 106,100 to 148,800 (The University of British Columbia, 2020). Alternatively, bicycle, and pedestrian transport decreased from 2,700 to 2,500 and 1,400 to 1,300 respectively (The University of British Columbia, 2020). However, it is important to note that this data was gathered during the fall when the days were getting shorter/colder, and people might not have been as physically

active during the fall compared to summer. The data shows that the need to increase AT can help to decrease the amount of vehicle traffic (Liang, 2019) in the UBC area, which would be in alignment with UBC's 2020 transportation plan.

In the fall of 2020 during the midst of the COVID-19 pandemic, there was an average of approximately 63,400 weekday person trips to and from UBC (The University of British Columbia, 2020). Transit and single occupant vehicles remained the two most popular modes of transportation to UBC in 2020, but the number of people taking transit decreased from 80,200 in 2019 to 16,800 in 2020 (The University of British Columbia, 2020). The decline in weekday person trips and the usage of transit to get to UBC can be attributed to the COVID-19 pandemic, as fewer classes were being offered on campus and most staff and faculty would work from home (The University of British Columbia, 2020). UBC would see approximately 2,800 bicycle trips per day in 2020, the highest number achieved over the past 5 years (The University of British Columbia, 2020). An important outcome of the COVID-19 pandemic would be a 20% reduction in single occupant vehicle trips to and from UBC when compared to 1997 levels (The University of British Columbia, 2020), and further research should be done to explore how UBC can encourage more active or sustainable mode choices for transportation. Through the provision of more reliable and environmentally friendly public transport options, it may be possible to sustain the reduction in single occupant vehicle trips (Xia et al., 2017) to and from UBC.

By reaching the targeted 70% vaccination rate among people in all countries, the COVID-19 pandemic is predicted to be controlled and terminated by the end of 2022 (Ghebreyesus,

2021). With the return-to-school plans being gradually implemented, it is likely to witness the resumption of certain plans and actions committed by UBC, which several of them touch on public transportation, health promotion, and climate change.

The newest UBC Vancouver Climate Action Plan (CAP) is aiming to achieve a 45% decrease in commuting greenhouse gas emissions from 2010 levels by the end of 2030 (UBC Campus + Community Planning, 2021). Certain actions have taken place around campus, which includes establishing ongoing sustainable transportation programs and educating commuters about ways to reduce commuting emissions (UBC Campus + Community Planning, 2021). By the end of 2024, UBC is aiming to provide daily parking permits only to commuters and offer a subsidy for public transit passes for all commuting staff, hence reducing the use of single occupant vehicles among commuters while encouraging the use of public transportation (UBC Campus + Community Planning, 2021). According to Geng et al., (2013), it is effective to reduce the greenhouse gas emission by limiting the use of HOV while increasing the ridership on public transportation like buses, soon after the implementation and fulfillment of related regulations. Some long-term strategies have also been planned and are expected to be fulfilled in the following decades, the most important one being extending the SkyTrain connection to campus by 2032 (UBC Campus + Community Planning, 2021). In the UBC Campus Vision 2050 report, the university believes that the implementation of this extension would provide commuters a better connection to UBC, as well as helping UBC to decrease greenhouse gas emissions as the single occupant vehicles would be a less affordable commuting option when compared to rapid rail systems (UBC Campus + Community Planning, 2022).

UBC is also planning to better inspire AT among students and staff in the following decades. In the UBC Vancouver CAP 2030, one of the aims is to improve cycling experience on campus by adding secure bike storage and collaborating with government partners to construct dedicated bike lanes around campus (UBC Campus + Community Planning, 2021). Meanwhile, with the construction of the SkyTrain extension to UBC, presence of single occupant vehicles on the streets in the community would be significantly reduced, thereby the safety of pedestrian and bike lanes would be improved, particularly for those routes between surrounding neighborhoods (UBC Campus + Community Planning, 2022). With the construction of new protected bike lanes and the decreasing traffic flow in single occupant vehicles, cyclists would have a heavier separation from the road, which their risks of collisions or falls will also be reduced (Cicchino et al., 2020). Hence, commuters around the campus would be more likely to choose biking, and more students and staff will participate in AT in the future.

Despite the vast amount of research done in the aspect of transportation changes during the COVID-19 pandemic, there are a number of questions raised from the gaps of research. During the start of COVID-19, Beck and Hensher (2020) suggested that the lack of public transportation usage was due to public health restrictions and measures to mitigate the spread of the disease. However, current evidence proves that a relatively high number of individuals still rely on PT or individual transportation due to unsafe feelings (Harrington & Hadjiconstantinou, 2022). This gap between research serves as the basis of our main question of interest: given that the pandemic has been around for more than 2 years now, how does the concern of COVID-19 continue to impact one's mode of transportation? Also, research that

explores changes of perception in various transportation systems gathers information from samples that widely varies in jobs, socio-economic status, environment, and age (Harrington & Hadjiconstantinou, 2022; Nurhadi & Suryadari, 2021). Such differences in status bring rise to the question of whether similar results can apply to UBCV undergraduate students in particular. Furthermore, Harrington and Hadjiconstantinou (2022) data also presents a small increase in considering change in transport behaviors, even with insufficient environment for active transportations methods. With the focus on sustainable interventions at UBC and a bicycle-friendly campus (Tittley, 2000), are students willing to use COVID-19 as a stepping point to consider the usage of AT to be more aware of one's health, and address issues around physical inactivity?

In this study, we aimed to examine how the use of transportation among undergraduate students at UBC has changed and evolved since the beginning of the COVID-19 pandemic. Additionally, the study will also aim to describe transportation patterns and recommendations on how UBC undergraduate students can engage in more environmentally friendly and sustainable modes of transportation rather than relying on passive/individual transportation. With more people relying on PT or individual transportation such as single occupant vehicles, getting students to participate in active forms of transportation more often is important for addressing issues of physical inactivity and sedentary behaviors.

Methods

A cross-sectional, non-experimental study design was used for this study following the

course of 3 weeks, as the study took place in the second term of the 2021/2022 UBC Winter session. UBCV undergraduate students who met the inclusion criteria were asked to complete an online Qualtrics survey. The survey consisted of 21 questions that asked students how their mode of transportation has changed as a result of the COVID-19 pandemic, alongside how they feel about AT.

Participants

UBCV undergraduate students who did not live on the UBCV campus and commuted to and from school were eligible for the study. The rationale behind choosing undergraduate students was because they are a group of individuals that are of high concern who are getting low levels of physical activity with increased sedentary behavior during the pandemic (Bertrand, 2022). Furthermore, UBC graduate students, students taking asynchronous classes, students that commute to and from University of British Columbia Okanagan (UBCO) campus, UBC faculty and staff, and residents who live on the Vancouver campus were excluded from our study. UBC graduate students, faculty and staff were excluded to focus our data collection specifically on undergraduate students' experiences. Students who take asynchronous classes are excluded as they do not require any form of transportation. Residents who live on campus are excluded as they do not need to travel to and from campus.

Recruitment

Participants were recruited through convenience sampling, which included social media platforms (e.g., Facebook, Instagram, Slack) and connection through peers. 65 participants were recruited in total as they participated in our survey that consisted of both open and close-

ended questions in the form of short answers and multiple choice. Prior to completing the survey, a consent form was provided for the students. The consent form ensured that participation in the survey was completely voluntary, and students may refuse to participate or withdraw from the study at any given time.

Data Analysis

Responses were collected through a Qualtrics survey that provided a better understanding of students' preferences for certain modes of transportation before, during, and after the pandemic. Quantitative data was collected through closed-ended questions in the form of multiple-choice questions, Yes/No questions, and one 5-point Likert scale question which provided us a better understanding as to whether students agree or disagree with certain modes of AT. Qualitative data was also collected by asking open ended questions about students' perspectives of AT and reason for change in transportation methods. Furthermore, questions such as "*What do you think are some health benefits for taking active transportation?*" or "*Are there any changes UBC could make to encourage active transportation?*", intended to gather information about our participants' perspective and knowledge of AT, their preferences of AT, willingness to take on AT during COVID, and much more. AT methods in our study only included walking and biking as other AT methods (skateboarding, running, etc.) were excluded. The rationale behind this is because both walking and biking are more common methods of AT amongst students than skateboarding and running (Reynolds et al., 2010).

Results

All participants' currently enrolled year is available in Table 1, Appendix A. A total of 13 participants are in their first or second year while there are 52 participants in their third, fourth or fifth year in an undergraduate program in UBC Vancouver. Among those 52 participants, 44 of them reported that they have commuted or will commute to campus, while 7 of them reported that they have not or will not commute to campus (Table 2, Appendix A).

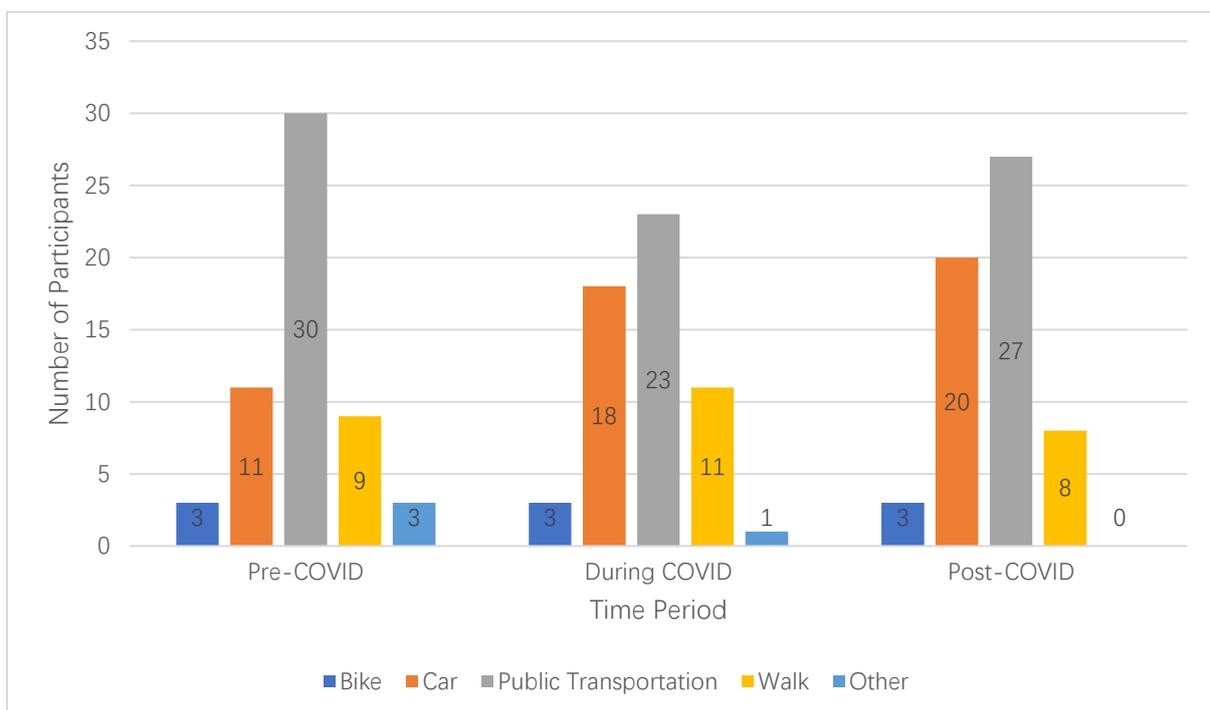


Figure 1. Change in participants' preferred mode(s) of transportation for commuting to campus between three different time periods.

Participants' preferred modes of transportation for commuting during the pre-COVID era, the ongoing pandemic, and the post-COVID era can be found in Table 3, Appendix A. According to Figure 1, there is no significant change in the number of participants who use bikes as their preferred mode of transportation between the 3 time periods. Meanwhile, more

participants have used cars as their preferred mode of transportation during the pandemic compared to the pre-pandemic era, and the trend is estimated to increase during the post-pandemic era (Figure 1). Furthermore, there has been a decrease in participants who use public transportation as their preferred mode of transportation since the pandemic started. However, it is expected that the number would increase again after the pandemic (Figure 1). Also, more participants chose to walk to campus during the pandemic compared to the pre-pandemic era, while the trend is estimated to decrease during the post-pandemic era (Figure 1).

Participants' reported reasons for the changes in their preferred modes of transportation for commuting could be found in Table 4, Appendix A. Most participants reported the safety concern regarding to potential infection of the COVID-19 virus by taking public transportation during the pandemic, such as one participant mentioned "Hygiene safety" and another participant mentioned "Commuting by bus is more time-consuming, and has been a potential life hazard (due to COVID)". Other participants reported that moving further away from the campus has also been a factor in affecting their preferred modes of transportation for commuting, such as one participant mentioned "Don't live on campus anymore" and another participant mentioned "Moving out of dorm".

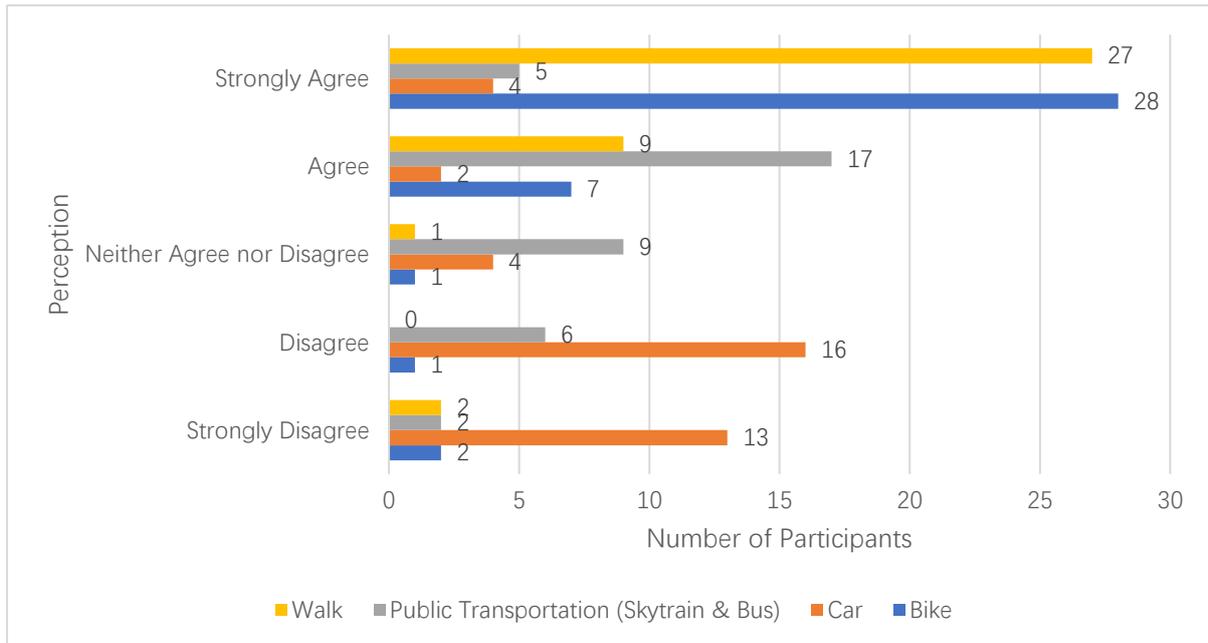


Figure 2. Participants' perception on different modes of transportation being an active transportation.

Participants' perception on different modes of transportation being an active transportation can be found in Table 5, Appendix A. 27 participants strongly agreed and 9 participants agreed with walking being a mode of active transportation respectively (Figure 2). 17 participants agreed with public transportation being a mode of active transportation, while 9 participants neither agree nor disagree with it (Figure 2). 16 participants strongly disagreed and 13 participants disagreed with driving being a mode of active transportation respectively (Figure 2). Meanwhile, 28 participants strongly agreed and 7 participants agreed with biking as a mode of active transportation (Figure 2). In general, most participants perceive walking and biking as a mode of active transportation, while most participants do not perceive driving as a mode of active transportation. For public transportation, more participants agreed with it being a mode of active transportation, but a certain number of participants would neither agree nor

disagree with it.

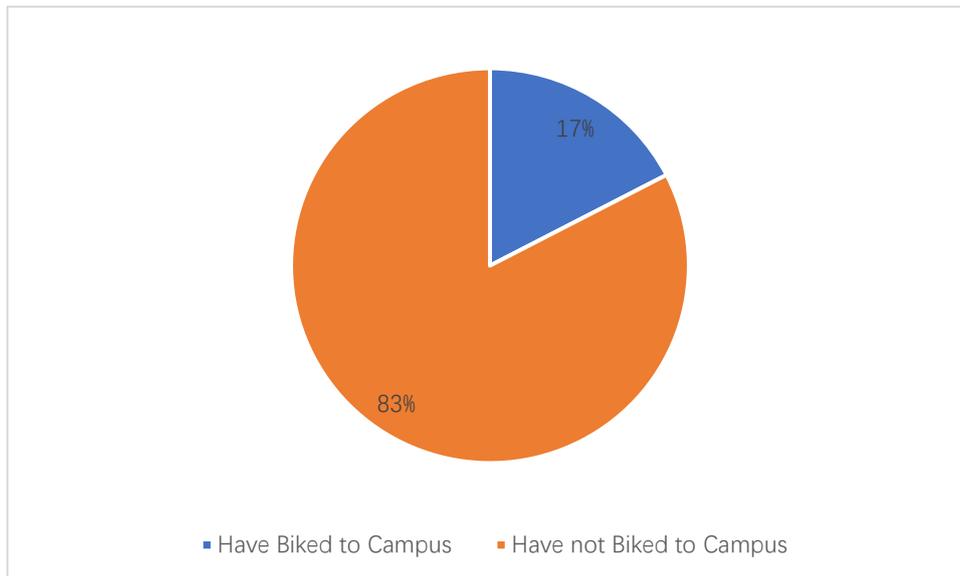


Figure 3. Participants' experience in biking to campus if they have the access.

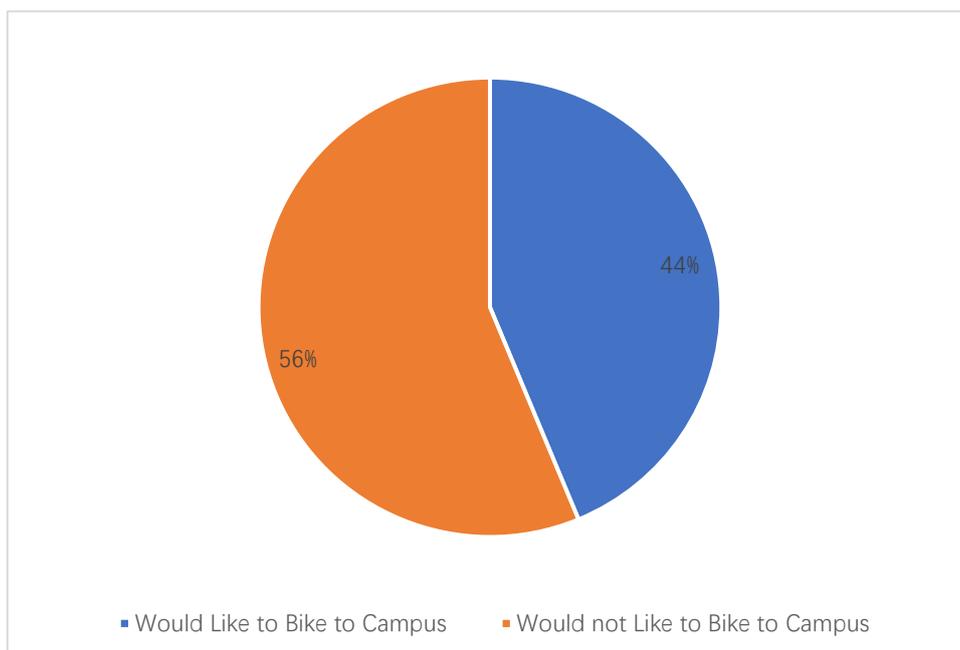


Figure 4. Participants' interest in biking to campus if they will gain the access.

According to Table 6, Appendix A, 23 participants have access to bikes/shared bikes and 16 participants do not have access. For participants who have access to bikes/shared bikes, 17% of them have biked to campus before while 83% of them have not biked to campus before (Figure 3). For participants who do not have access to bikes/shared bikes, 44% of them indicated they would like to bike to campus if they will have the access while 56% of them would not like to bike to campus if they will have the access (Figure 4). Hence, more participants reported a minimal level of interest in biking to campus regardless of their accessibility to bikes/shared bikes.

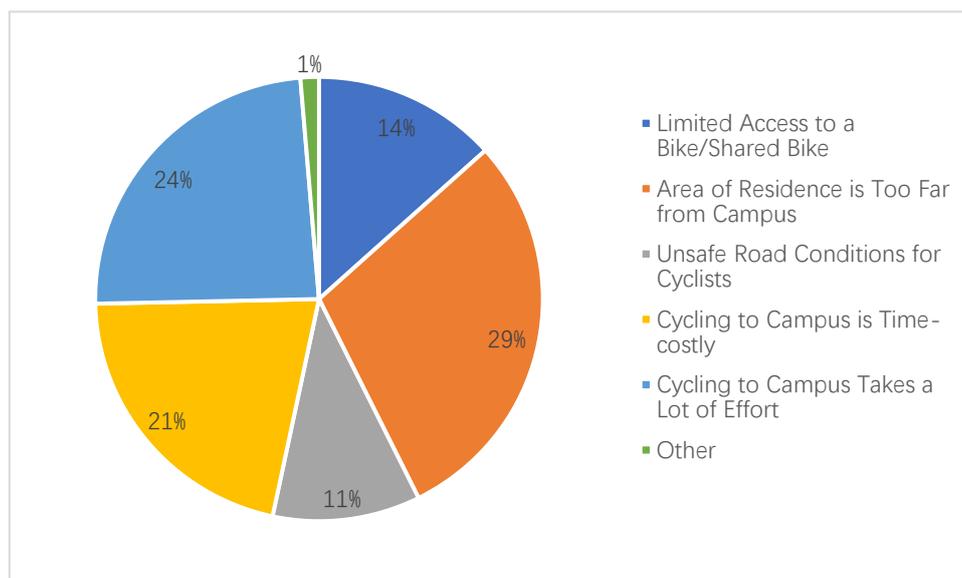


Figure 5. Participants' reported barrier for biking to campus by percentage.

Participants' reported barriers for biking to campus could be found in Table 7, Appendix A. Area of residence is too far from campus (29%), cycling to campus takes a lot of effort (24%), and cycling to campus is time-costly (21%) were the top 3 reported barriers for biking

to campus (Figure 5). Meanwhile, less participants perceive the limited access to a bike/shared bike (14%) and unsafe road conditions for cyclists (11%) as major barriers for biking to campus (Figure 5).

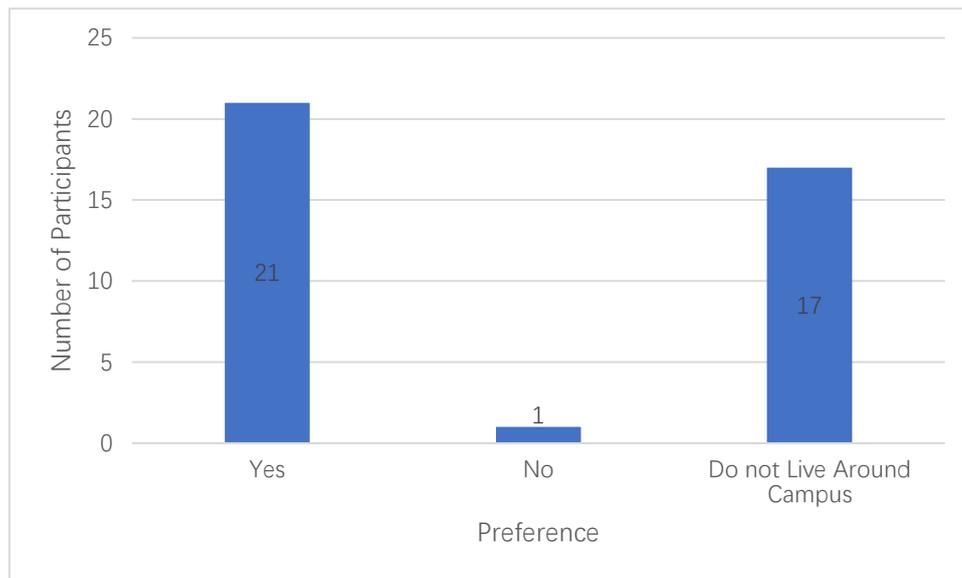


Figure 6. Participants' preference on walking to campus.

According to Table 8, Appendix A and Figure 6, except those 17 participants who do not live around campus, 21 participants would prefer to walk to campus for commuting while only participant reported no interest in walking to campus for commuting.

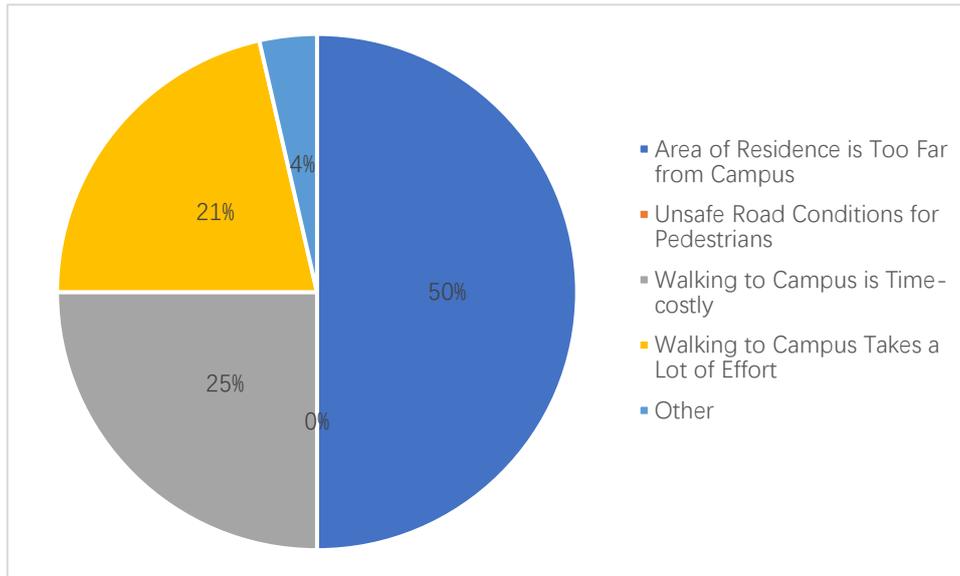


Figure 7. Participants' reported barrier for walking to campus by percentage.

Participants' reported barriers for walking to campus could be found in Table 9, Appendix A. Area of residence is too far from campus has been the most recognized barrier for walking to campus as 50% of the participants agreed with it (Figure 7). Meanwhile, walking to campus is time-costly (25%), and walking to campus takes a lot of effort (21%) were another 2 major barriers reported by participants for walking to campus (Figure 7).

Participants' perceived health benefits for taking active transportation could be found in Table 10, Appendix A. Most participants believed that taking active transportation would help them to improve their physical health through physiological pathways, such as one participant mentioned that active transportation could provide "Better cardio and heart health" and another participant mentioned "Reduction of chronic disease and obesity". Meanwhile, the participants have reported that taking active transportation would help them to improve their mental health, as one participant mentioned "Improved overall physical and mental health" and another

participant mentioned “Movement of the body leads to increased physiological and mental changes”. Also, the participants believed that taking active transportation would help them to improve their social-emotional wellness, as one participant mentioned that taking active transportation would facilitate “Social interactions”.

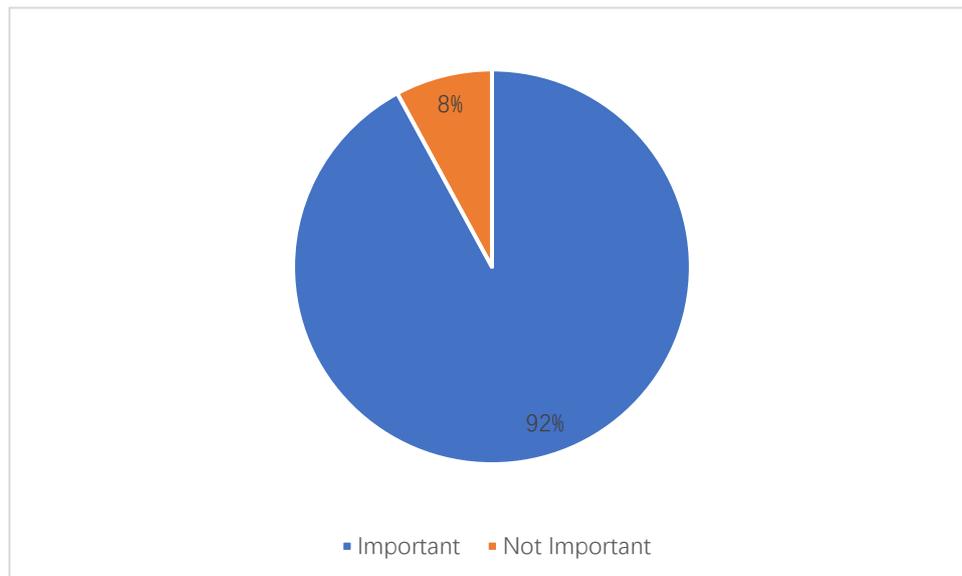


Figure 8. Participants' perception on health benefits gained from active transportation in percentage.

According to Table 11, Appendix A, 35 participants believed that health benefits gained from taking active transportation are important to them while 3 participants did not. More directly, 92% of the participants felt that the mentioned health benefits from taking active transportation are important to them while only 8% of the participants felt that health benefits gained from taking active transportation were not important to them (Figure 8).

Participants' reported recommendations for UBC to furtherly promote active transportation can be found in Table 12, Appendix A. Several participants would like to see an

increase in accessibility and reduction in barriers for biking to campus, like one participant mentioned “UBC could provide rental service for bikes on a semester or monthly basis” and another participant mentioned “More secure bike storage options”. Meanwhile, some participants would like to see a further expansion in public transportation accessibility in the UBC area, such as “More frequent buses later at night, every 5-10 minutes instead of 15-30” and “Sky train station at UBC”. Also, several participants would like to see some modifications in the university’s policies, such as adding “Specialized active transportation days” and “Lower Upass price”.

Discussion

Our study found that more participants shifted towards using cars as their preferred mode of transportation during the pandemic in comparison to the pre-pandemic era. Similarly, more participants also chose to walk to campus during the pandemic in comparison to the pre-pandemic era. Our data demonstrate that safety concerns were a contributing factor in why students changed their mode of transportation from public transport to a different mode during the pandemic. These findings are consistent with the literature, which reported the sharp decline in people taking public transit to UBC during the pandemic (The University of British Columbia, 2020). Our data suggest that the 3 most common barriers to biking to campus were distance, the effort required, and the time cost necessary. Policy changes intended to promote the use of a bike to commute to UBC should target students who live a moderate distance away from UBC, and further research should be done to learn more about what is considered a

“reasonable” time cost for biking to campus. Our survey suggests that students do consider the health benefits of active transportation to be important, which indicates that students are somewhat aware of the issues pertaining to physical inactivity. Therefore, we concluded that students are willing to use COVID-19 as a stepping point to take into account their own usage of AT to be more aware of their own health while addressing issues related to physical inactivity.

Limitations

One of our main limitations to the study was that we excluded first and second year students during our data analysis. The rationale behind our decision was that first and second year undergraduate students have not experienced commuting to and from UBCV pre-pandemic, meaning that they did not have the experience to speak for. Further research could be done to include first- or second-year students, when conducting an in depth research of transportation changes from during the pandemic to after the pandemic.

Another limitation was the participants’ backgrounds. As our participants of the study consisted of anyone who was doing their undergraduate degree at UBCV, our survey did not ask students’ faculty they are in or the background they have. This could be critical information of one’s perception on AT. We acknowledge that individuals’ faculties or backgrounds in activity (i.e., varsity athlete, (dis)ability, etc.) might highly impact one’s decision to partake in AT especially in terms of the transition into COVID-19. For example, some individuals with athletic backgrounds might partake more in AT than others, or individuals within the Faculty of Kinesiology might partake more in AT as they are more exposed to benefits of AT. The results that we found within this study may not reflect students in other faculties. We suggest that

future research focuses on the individuals' backgrounds to analyze the impact it makes on one's decision in terms of AT and the changes due to COVID-19.

Recommendations

Our recommendations are geared towards encouraging students to participate in more AT to/from campus. As mentioned throughout our findings, we noticed that the main reason students do not bike or walk to/from campus is due to their area of residence being too far. With a portion of students stating that they would walk or bike to campus if they lived closer, we suggest adding affordable housing on or around the UBC campus. With the other two main barriers of walking or biking to campus being: it is too time-costly or takes too much effort, adding affordable housing around the UBC campus could bring more people to participate in AT while being a student at UBC.

Another reason students avoid using a form of AT to commute to/from campus is because they do not have access to a bike. Our suggestion is creating an affordable bike program for all UBC students, not just those who have a UBC postal code. The discount on the UBC HOPR bike program is for people with UBC postal codes, living on campus paying \$89 for a 365-day pass and non-residence students paying \$129 for a 365-day pass (HOPR, 2019). This would encourage students who live outside the UBC campus to bike more to/from campus or around campus in general.

Furthermore, students mentioned that they would like to have safer bike storage. Even with UBC having a 24-hr campus patrol and a well-lit bike storage in 2018 over 70 bikes were

stolen in between Aug1st-Oct1st (Robinson, 2018). This shows us that it is still “too easy” to steal bikes on campus. Following the UBC transportation and planning partnership with the AMS bike co-op, we recommend adding even more closed off bike storage locations throughout campus, with access only to students/staff of UBC campus (UBC Campus & Community Planning, 2019). This recommendation would allow students to bike to campus without worrying about the unwanted burden of their bike being stolen or vandalized while they are in class.

Since public transportation is the most common form of transportation to/from campus, our final 2 recommendations focus on public transportation. First is to increase the frequency of buses at night on the UBC campus. As there were many students who reported not feeling safe commuting to/from UBC. According to Moovit (2022) the number 99 bus Commercial/Broadway station after 10pm varies from every 15 min to a 30 min wait at times. This bus is the main source of commuteing to/from UBC solely due to the route it runs and should never have a student waiting at night for 30 minutes. Unfortunately, there are times when students may have to wait alone and could face some sort of assault. For instance, since the COVID-19 pandemic has hit Canada, there has been a major increase in sexual assaults on the UBC campus (CTVNewsVancouver, 2022). Our findings found that the second most popular form of transportation to/from campus was using an automobile. If we were to increase the frequency of buses at night, it could allow those students who felt unsafe using public transportation to leave the car at home next time around.

The final recommendation would be to allow an exemption for those who do not use any

form of public transportation but still have to pay for the U-pass out of their tuition. At this moment there is no exemption for people who do not use a form of public transportation (Eligibility and exemptions, 2022). UBC should be encouraging people who live around the area to bike/walk to campus rather than bussing, as an overwhelming number of participants responded that they would walk to campus if they lived in the area. Also, there were a portion of students who avoided buses due to congestion. By forcing U-passes on students around campus, it can flood the buses creating more congestion and discouraging people who live far from campus from using public transportation over their car.

Appendix A

Table 1. Participants' current enrolled year.

Year	Number of Participants
1	7
2	6
3	18
4	28
5	6

Table 2. Participants' commuting experience.

Have Commuted/Will Commute to Campus	Have not Commuted/Will not Commute to Campus
44	7

Table 3. Participants' preferred modes of transportation for commuting during 3 time periods.

Time Period	Bike	Car	Public Transportation (Skytrain and Bus)	Walk	Other
Prior to March 2020 (Pre- COVID)	3	11	30	9	3

Between March 2020 and Now (During COVID)	3	18	23	11	1
When the COVID-19 Pandemic Ends (Post- COVID)	3	20	27	8	0

Table 4. Participants' reported reasons for the changes in their preferred modes of transportation for commuting to campus.

"During the pandemic, I took public transportation less"
"Don't live on campus anymore"
"Having to bring a car to Vancouver due to limited travel options, safety concerns due to COVID"
"Moved off campus"
"Hygiene safety"
"The only time my mode of transportation changes is when it gets too cold to bike and I have to stick to driving to campus"
"COVID safety"

“Walking to avoid congestion on transit”
“Feeling unsafe on public transportation”
“Location”
“Commuting by bus is more time-consuming, and has been a potential life hazard (due to COVID). Driving to school is faster and safer. When I live in my room (3-4 days /week) I walk in open spaces for maximum safety”
“Moving out of dorm”
“Getting my license”
“Before the start of the pandemic, I was more adventurous in trying out different modes of transportation to get to class faster”

Table 5. Participants’ perception on different modes of transportation being an active transportation.

Mode of Transportation	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Bike	2	1	1	7	28
Car	13	16	4	2	4
Public Transportation (Skytrain & Bus)	2	6	9	17	5

Walk	2	0	1	9	27
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Table 6. Participants' accessibility to bikes/shared bikes and their biking experience to campus.

Have Access to Bikes/Shared Bikes		Do not Have Access to Bikes/Shared Bikes	
Have Biked to Campus	Have not Biked to Campus	Would Like to Bike to Campus	Would not Like to Bike to Campus
4	19	7	9

Table 7. Participants' reported barrier for biking to campus.

Barrier	Number of Participants
Limited Access to a Bike/Shared Bike	10
Area of Residence is Too Far from Campus	22
Unsafe Road Conditions for Cyclists	8
Cycling to Campus is Time-costly	16
Cycling to Campus Takes a Lot of Effort	18
Other	1

Table 8. Participants' walking experience to campus.

	Yes	No	Do not Live Around Campus
Participants' Preference on	21	1	17

Walking to Campus			
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Table 9. Participants' reported barrier for walking to campus.

Barrier	Number of Participants
Area of Residence is Too Far from Campus	14
Unsafe Road Conditions for Pedestrians	0
Walking to Campus is Time-costly	7
Walking to Campus Takes a Lot of Effort	6
Other	1

Table 10. Participants' reported health benefits for taking active transportation.

“Well-being, mental health, fitness, evolutionarily matches how we used to exercise, circadian rhythm”
“Improved overall physical and mental health”
“Physical and mental health and avoiding COVID exposure”
“Increase heart rate, increase in mental health”
“Cardiovascular health”
“Cardiovascular fitness”
“Heart health”
“Better cardiovascular health, better mental health”
“Human and health and environmental health”

“Social interactions”
“Better cardio and heart health”
“Better overall health by adding cardio to our daily schedule”
“Reduction of chronic disease and obesity”
“You get to take a mental break and improve your physical health with the natural release of endorphins”
“Stamina”
“Get away from sedentary time”
“Daily exercise without going to the gym”
“Cardiovascular health improvements, mental health improvements”
“Fresh perspectives on life when engaging in new routes/stimulus while actively transporting to school”
“Exercise”
“Improved cardio fitness, weight loss”
“Increase cardio-vascular activity”
“Active transportation provides an opportunity to engage in physical activity. There are several benefits to physical activity such as reducing risk of cardiovascular disease, obesity, type 2 diabetes, and other chronic diseases”
“Stamina”
“Improved cardio, better bone health, better mental health”
“Increased fitness”
“Daily dose of exercise”

“Movement of the body leads to increased physiological and mental changes”
“Improved endurance, you can reach your daily step goal, improved mental health”
“Decreased stress, better mood, better physical health, improved mental health”
“Exercise, better health, fresh air”
“More energy”
“Increased exercise”
“Health”
“Increased physical activity, reduce sedentary time, improved cardiovascular health, better mood”
“Having some physical activity”
“Mental and overall health”
“Enhance physical and mental wellbeing, reduce risk for obesity or disease”

Table 11. Participants’ perception on the health benefits gained from active transportation.

	Important	Not Important
Participants' Perception on Health Benefits Gained from Active Transportation	35	3

Table 12. Participants’ reported recommendations for UBC to promote active transportation.\

“Less bikes being stolen”
“Free housing on campus for all students, or rent subsidies for off-campus housing in the

area”
“Free bikes”
“Safe bike storage”
“Maybe start a yearly event where 1 day a year people leave cars at home and take a form of active transportation to travel to campus”
“Give access to free bikes or allow free parking on the outer area of UBC for the people who have no choice to drive in, they can park out the ubc boundary and bike in. As some active transportation is better than none”
“More frequent buses later at night, every 5-10 minutes instead of 15-30”
“Sky train”
“Bike lanes”
“Sky train station at UBC”
“Lower upass price”
“UBC could provide rental service for bikes on a semester or monthly basis.”
“Access to other transportations”
“Specialized active transportation days”
“Add more bikes for long distance transport.”
“Monetary incentives, low cost/free bike borrowing program, free bike lock-up storage, better security of areas with bike racks”
“Prizes, credits, safe storage for bikes, sort of like an insurance, free meals”
“Making safer places to put bikes at UBC. Especially when living on campus, lots of stolen bike parts”

“More secure bike storage options”
“Even cheaper upass costs, ability for exemption for students living close to campus”
“Free bike accessible for students”
“More reliable and affordable shared bike programs and re-opening of bike kitchen to build a community”

Appendix B

Consent Form

CLASS PROJECT: Health Promotion and Physical Activity (KIN 464)

Participant Consent Form

An Analysis of the Evolution of Transportation Use at UBC: Impacts of COVID-19 Pandemic (pre, during, and post)

Group 3

Principal Investigator:

Dr. Andrea Bundon (Assistant Professor, School of Kinesiology, Faculty of Education)

Sessional Instructor:

Dr. Negin Riazi (School of Kinesiology, Faculty of Education)

The purpose of the class project:

To gather knowledge and expertise from community members on how transportation use has changed for UBC community members between pre, during, and post pandemic. It will also look into how we could get more students engaged in active transportation.

Study Procedures:

With your permission, we are asking you to participate in a survey. You may only complete the survey once.

With the information gathered, students will critically examine how different individuals understand or engage in health promoting activities or health promotion initiatives.

Project outcomes:

The information gathered will be part of a written report for the class project. The written report

will be shared with campus partners involved with the project. Summaries of findings will also be posted on the following websites. **No personal information/information that could identify participants will be included in these reports or shared with campus partners.**

UBC SEEDS Program Library:

<https://sustain.ubc.ca/courses-degrees/alternative-credit-options/seeds-sustainability-program/seeds-sustainability-library>

Potential benefits of class project:

There are no explicit benefits to you by taking part in this class project. However, the survey will provide you with the opportunity to voice your opinion on your experiences with health promoting activities or initiatives in a broad sense and will provide the students with an opportunity to learn from your experiences.

Confidentiality:

Maintaining the confidentiality of the participants involved in the research is paramount, and no names of participants will be collected.

At the completion of the course, all data (i.e. notes) and signed consent forms will be stored on a secure electronic drive by Drs. Riazi and Bundon. All data and consent forms will be destroyed 1 year after completion of the course.

Risks:

The risks associated with participating in this research are minimal. There are no known physical, economic, or social risks associated with participation in this study. You should know that your participation is completely voluntary and you are free to **withdraw from the study** and there will not be negative impacts related to your withdrawal. If you withdraw from the study, all of the information you have shared up until that point will be destroyed.

Contact for information about the study:

If you have any questions about this class project, you can contact Negin Riazi by email at negin.riazi@ubc.ca.

Research ethics complaints:

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or e-mail RSIL@ors.ubc.ca . or call toll free 1-877-822-8598.

Consent:

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time.

Link to the survey

https://ubc.ca1.qualtrics.com/jfe/form/SV_9QrFCIf6TK0FMjk

Social Media Recruitment Material

KIN 464: Health Promotion and Physical Activity Class-based Project

If you are an undergraduate student who
travels to/from UBC we would love to
speak to you!

As part of a course-based research project (KIN 464), we are conducting a study on how the transportation methods changed prior to, during and after the COVID-19 pandemic.

If you are a UBC Vancouver undergraduate student we would love to hear from you/for you to complete a survey.

More information at: https://ubc.ca1.qualtrics.com/jfe/form/SV_9QrFCIf6TK0FMjk

Please note that this post is public and anyone who likes, comments or shares the link will, by doing so, be associated with the study. The Principal Investigator on this project is Dr. Andrea Bundon (andrea.bundon@ubc.ca) and Dr. Negin Riazi (negin.riazi@ubc.ca) is the sessional instructor for the course.

Survey Questions

1. What year are you currently in?

- First year
- Second year
- Third year
- Fourth year
- Fifth year

2. Have you commuted or will you commute to school for class?

- Yes
- No

3. Before the university transformed to an online setting due to COVID-19 pandemic in March 2020, which mode(s) of transportation did you choose for commuting?

- Bike
- Car
- Public transportation (skytrain & bus)
- Walk
- Other

4. If you choose “Other”, please specify the mode(s) of transportation you used.

(Blank space)

5. During the COVID-19 pandemic (March 2020 – currently), which mode(s) of transportation do you choose for commuting?

- Bike
- Car
- Public transportation (skytrain & bus)
- Walk
- Other

6. If you choose “Other”, please specify the mode(s) of transportation you are using.

(Blank space)

7. When the COVID-19 pandemic ends, which mode(s) of transportation will you choose for commuting?

- Bike
- Car
- Public transportation (skytrain & bus)
- Walk
- Other

8. If you choose “Other”, please specify the mode(s) of transportation you will use.

(Blank space)

9. If your preferred mode(s) of transportation have changed or will change, what would be the reasons for the changes?

(Blank space)

10. In the following modes of transportation, please indicate how much you believe it to be a form of active transportation.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Bike					
Car					
Public transportation (skytrain & bus)					
Walk					

11. Do you have access to a bike/shared bike?

- Yes
- No

12. If you have access to a bike/shared bike, have you ever biked to campus from your area of residence?

- Yes
- No

13. If you do not have access to a bike/shared bike, would you like cycling to campus from your area of residence once you have the access?

- Yes
- No

14. If you have not biked/will not bike to campus, which ones of the following statements applied/will apply to you?

- Limited access to a bike/shared bike
- Area of residence is too far from campus
- Unsafe road conditions for cyclists
- Cycling to campus is time-costly
- Cycling to campus takes a lot of effort
- Other

15. If you choose “Other”, please provide the barrier most applicable to you.

(Blank space)

16. If you have lived around campus or will live around campus, would you consider walking to campus? (Single-choice question)

- Yes
- No
- I do not live around campus/will not live around campus

17. If you have not/will not walk to campus, which ones of the following statements applied/will apply to you?

- Area of residence is too far from campus
- Unsafe road conditions for pedestrians
- Walking to campus is time-costly
- Walking to campus takes a lot of effort
- Other

18. If you choose “Other”, please provide the barrier most applicable to you.

(Blank space)

19. What do you think are some health benefits for taking active transportation?

(Blank space)

20. Are the health benefits gained from active transportation important to you?

- Yes
- No

21. Are there any changes UBC could make to encourage active transportation?

(Blank space)

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