UNDER-REPRESENTATION IN NIGHT-TIME TRANSPORTATION

Metro Vancouver Night-time Transportation Users During the COVID-19 Pandemic

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UBC SCARP

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LAND ACKNOWLEDGEMENT

In the spirit of our research's inclusivity and engagement with under-represented groups within transportation planning, we want to acknowledge the traditional and unceded territories of the Musqueam, Squamish and Tsleil-Waututh Nations in which our research was conducted.

INTRODUCTION

On March 17, 2020, the province of British Columbia declared a public health emergency in response to the growing concerns of the COVID-19 pandemic (CBC News, 2020). Students from kindergarten to post-secondary moved to online learning, and businesses transitioned their workers to work remotely at home. As Metro Vancouver moved into a lockdown, public transportation started to see an impact on ridership. Transit faced an 83% decrease in ridership (Weisgarber & Scott, 2020) due to “physical distancing guidance / proximity anxiety” (James, 2020). In response, TransLink had to reduce their services significantly. Our team has identified a gap in reporting the impacts of COVID-19 on night-time transportation in Metro Vancouver. This lack of reporting on COVID-19’s impacts on night-time transportation highlights Metro Vancouver’s lack of attention given to night-time transportation investment and planning. Specifically, the City of Vancouver’s Transportation 2040 (City of Vancouver, 2012) does not include any mention of night-time transportation and TransLink 2050 Phase 1 (TransLink, 2019) only briefly mentions night-time transportation within it’s appendix. Prior to the pandemic, TransLink identified growing concerns to ensure people have a safe and affordable commute option at night-time (Desmond, 2019). Consideration of night-time transportation is crucial as about 17% of workers in large areas work late shifts, bringing in approximately $28 billion in wages (Aratani, 2019).

Promoting planning frameworks from justice, diversity, inclusion and equity perspectives has been shaping the work of the City of Vancouver Transportation Group (the City) based on its Equity Framework and Intersectionality Handbook. To our knowledge, there has been a lack of engagement with under-represented groups as the reports from TransLink and City of Vancouver stated above have not mentioned engagement with under-represented groups -- people who identify as women, LGBTQ+, low-income, people with disabilities and BIPOC. As BC plans for a Safe Restart for COVID-19, there has also been a lack of engagement of people with under-represented groups. Engagement of these groups are crucial, especially as anti-Asian violence, xenophobia, and vandalism has seen a recent surge in BC since the onset of the COVID-19 pandemic (Grochowski, 2020). Additionally, recent news surrounding women being followed when walking alone in public (Little, 2021) has shown the importance and timeliness of our research.

RESEARCH QUESTIONS

Our group aims to understand:

1. What are the barriers and challenges for under-represented groups in taking night-time transportation during COVID-19?
2. How can under-represented groups be meaningfully engaged in transportation planning work?

RESEARCH OBJECTIVES

This research aims to:

- Conduct a transportation needs assessment and analyze the representation demands of night transportation users during the COVID pandemic
- Improve the City of Vancouver's current public engagement process and transportation design with meaningful consultation and representation
- Identify how the pandemic has affected nightly transportation access and travel patterns

METHODOLOGY

Our project methodology consisted of 5 key different research areas and procedures:

1. One-on-one interviews with under-represented public transit users
2. A survey to broaden our sample size and data
3. A focus group
4. Visual-spatial data collection
5. Literature review

Our team conducted a mixed-methods approach to collect primary and review secondary research for our project. Upon completing a thorough literature review relevant to night-time transportation planning, we cross-referenced our literature review key findings with our project's objectives and goals to fill in gaps within our study. Themes within the literature review research include:

- Night-time transportation policies, practices & public engagement
- Public transportation planning & COVID-19
- Trends in transportation & socioeconomic factors
- Safety & security on public transportation

VERBAL-TEXTUAL DATA COLLECTION

Each person in our team of 6 conducted a 40-minute structured interview with individuals across Metro Vancouver who use night-time public transportation. Predetermined open-ended questions were developed to discuss a variety of themes (for more information see Appendix), including:

- Transit use
- COVID-19 related
- Public engagement & night-time transportation questions
- Demographic questions

METHODOLOGY

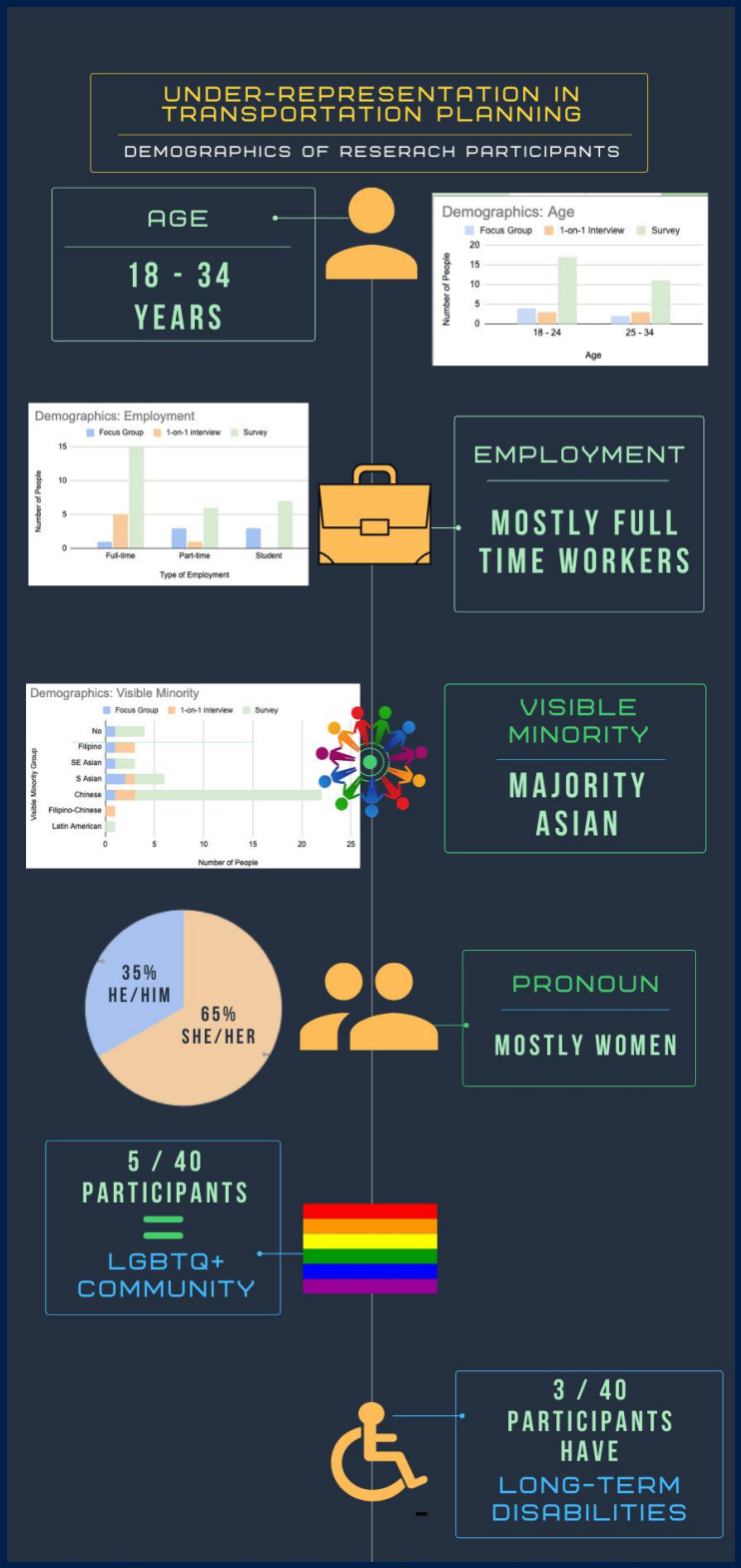

Figure 1: Demographics Infographic

These interviews complement our other qualitative data (survey and focus group) by providing a more in-depth understanding on the decision-making process to modes of transportation. The questions we asked were designed to address our primary research questions, project goals and objectives. All 6 interviewees identified as visible minorities from the ages of 23-28 (for more information, see Figure 1).

In total, we had 40 participants: 6 focus group participants, 6 one-on-one interviewees, and 28 participants in the online survey we conducted in a week period. Figure 1 below is an infographic that provides a brief overview of the demographics of our participants. The infographic reveals that the age range of our participants is between 18 – 34 years old. Additionally, the infographic shows that the participants are mostly employed full-time and women. Out of the visible minority groups, the majority of the participants are from an Asian ethnic background, with Chinese being the most predominant one. 5 of the 40 participants identified as being a part of the LGBTQ+ community and 3 of the 40 participants have a long-term disability.

METHODOLOGY

Our survey served as another collection of qualitative data, allowing us to broaden and diversify our sample size. Survey questions themes include (see Appendix):

- Demographic and modes of transportation
- Barriers to night-time transportation
- Public engagement & night-time transportation
- COVID-19 impacts
- Improvements for night-time transportation planning

Our survey responses were key in furthering our understanding of the public's views and opinions on Vancouver's night-time transportation. Our survey received 28 completed responses in total. For more information see Appendix.

The focus group conducted by our team provided an opportunity to gain insights from a collective of individuals across the Metro Vancouver area. The 6 focus group participants represented women, BIPOC, LGBTQ+ communities and peoples with disabilities. Question themes within the focus group include:

- Challenges/barriers of using night-time transportation
- Improvements for night-time transportation planning
- COVID-19 related
- Public engagement & night-time transportation

The focus group transcript can be found within our Appendix.

VISUAL-SPATIAL DATA COLLECTION

Using a mixed-methods approach to collecting visual-spatial data, our team compiled a variety of techniques to capture participant voices. Visual-spatial categories include:

- Mapping of participant transportation routes
- Bar graphs
- Pie charts
- Image plotting
- Word cloud
- Participant drawings
- Infographics

METHODOLOGY

During our focus group, our team asked our participants to draw out the route of transportation they would take during night-time. The maps of transportation routes taken by our study participants allowed us to analyze unique environmental factors in the data we collected from individual participants. Additionally, we had our participants draw on photos of a SkyTrain station to identify what makes them feel safe and unsafe. This helped further our understanding of how our participants felt in regards to the built environment and their safety.

LITERATURE REVIEW

The following literature review has informed the methodological and analytical approaches in assessing our study. Existing literature on night-time employment and night-time transportation has identified three major themes: socioeconomic status of night-time workers, accessibility of night-time transportation, and the perception of crime and security needs of women.

Socioeconomic Status

People who have greater financial resources and are of higher economic status have a lesser burden of paying the transportation costs to attend and return from night-time events or their workplaces. While London's transportation plan acknowledges night-time workers, the plan focuses on the need for workers to access shops and services at night rather than improving workers' accessibility to employment (McArthur et al., 2019). According to a bus user survey in London, 51% of night bus passengers commute to and from work and 57% of night bus passengers have an annual household income of less than £20,000 (McArthur et al., 2019). This figure is striking as the mean annual household income in London is £51,770, which indicates that most night bus riders are economically disadvantaged (McArthur et al., 2019). Furthermore, Krovi and Barnes (2000) found that minorities, particularly minority women, were more likely to use transit as a mode of transportation at all household income levels while also having lower rates of vehicle ownership. This is due to the underlying social, demographic, and situational factors that minorities experience more than White populations (Krovi & Barnes, 2000).

METHODOLOGY

Accessibility

Spatial patterns of the location of homes to employment and the physical design of transportation infrastructure are two main challenges for minority groups and low-income households when experiencing night-time transportation. Low-income households may choose to live in the urban core because of the transit options available, choosing cheaper transportation over cheaper housing, or other factors (Hart & Lownes, 2013). This decision has been undermined by the suburbanization of jobs and the likeliness that night-time jobs are often low-income jobs. Without proper spatial access to transit that provides access to low-income jobs and temporal frequency of service, the low-income households in the urban core are unable to benefit from transit services creating an economic burden. Minority groups report having higher travel times as income rises (Krovi & Barnes, 2000). This is due to the willingness to travel further to find better paying careers as many minorities may be living in areas that have a dearth of low-skilled employment opportunities.

Chandra et al. (2017) evaluated the accessibility of physical design elements for night-time walking and bicycling for low-income shift workers. The study has found that areas with high concentrations of low-income employment in the retail, trade, accommodation and food services sectors were in need of improvements to the streetlight systems to encourage increased walking and bicycling to transit stops. This is juxtaposed with areas containing a high concentration of low-income employment in the industry sector of health care and social services, where these areas were found to have high night-time accessibility for walking and biking. Chandra et al. (2017) suggests that night-time accessibility could be improved with the inclusion of accurate waiting times at transit stops and a more in-depth analysis and evaluation of the physical environment and the characteristics that are conducive to night-time walking and bicycling.

METHODOLOGY

Safety and Under-Represented Groups

Constraining urban environments include the perception of crime, bad weather, and efficient commutes to and from home. McArthur et al. (2019) quotes Hine and Mitchell (2001), "the creation of a barrier-free environment is important for quality of opportunity, yet transport disadvantages persist, particularly relating to issues of safety and accessibility for women, children, older and disabled groups and deprived populations located further away from employment clusters". Furthermore, McArthur et al. (2019) finds that transit users display different travel behaviours at night due to security and safety issues. In particular, a study in Barcelona found that women working at night tend to take longer and indirect public transportation routes due to safety and vulnerability implications at and around transport stations (McArthur et al., 2019). Smith argues that understanding crime and fear of crime on public transport can have a "substantial effect on ridership" (Smith, 2008). A study from the United Kingdom has found that the number of transit trips can increase by 10% if passengers felt more secure – specifically during off-peak times (Smith, 2008). Trip chains include women's journey from one destination to another, like return-from-work, in which there are many stops during the journey (i.e. picking up her children from school). Smith argues that assessing trip chains is crucial in encouraging greater use of public transport and also to gain an understanding of the vulnerabilities women face during transportation. An example Smith provides is when a woman is carrying shopping bags, she is more vulnerable to having her bag snatched or is less able to guard herself from sexual rubbing on a crowded vehicle (Smith, 2008). Women were more likely to choose nonstandard work schedules because of their greater role in caregiving. Of significance, sex differences were much greater than race-ethnicity differences (Presser, 2003).

Thomas Sanchez's article "Moving to equity: Addressing inequitable effects of transportation policies on minorities" (Sanchez, 2003) has a brief discussion on participation from minority groups. However, his recommendations may not be applicable in a Canadian context as he focuses on barriers from an American regulation context. Sanchez did caution that some officials in New Mexico felt that public meetings were those who are already familiar with the transportation process, and so the state conducts focus groups of randomly selected citizens to help inform its planning process (Sanchez, 2003).

LIMITATIONS

Understanding our study's limitations is crucial for placing context into our findings. Limitations include:

1. Time constraints
2. Limited data collection (through sample size & selection)
3. COVID-19
4. Lack of previous research studies

The limited timeframe in which we had to complete our research impeded our study. The small sample size of our survey respondents may create discrepancies in accurately representing the general public and public transportation users. While our study participants were representative of a number of under-represented groups in transportation planning (BIPOC, women, LGBTQ+, people with disabilities), the limited time frame did not allow us to diversify participant voices. Of our visible minorities across all methods of data collection, a majority of them were of Asian ethnicity. Vancouver is a culturally diverse city, thus having representatives of other BIPOC communities would have more accurately portrayed the city's under-represented public transportation users.

Timeframes also proved too short to diversify our methods of finding participants. In particular, the inability to gain ethics approval for specific methods of finding participants. A poster which we intended to distribute to bus stations, various Skytrain and Canada Line stations to find study participants was not approved in time by UBC's ethics board. The COVID-19 pandemic furthermore placed constraints on our project and our ability to increase the sample size. Since the COVID-19 pandemic, transit ridership has decreased substantially, making it harder for the team to find people to participate in the study who still currently use night-time public transportation. Moreover, we found that many night shift workers' hours did not align with the night-time hours defined by TransLink. Therefore, we had to shift our definition of night-time to be anytime after 9:00 pm in comparison to the 11:50 pm defined by TransLink.

LIMITATIONS

Lastly, finding previous research studies with relevance to our study's goals and objectives was difficult. Vancouver's "Transportation 2040 Plan is a long-term strategic vision for the city that will help guide transportation and land use decisions, and public investments" (City of Vancouver, 2012). Our team reviewed the plan, and there is no reference anywhere in the document about investments, planning or decisions on night-time public transportation planning. The Council report we found was vague and mentioned briefly of the inability to implement a 24 hour SkyTrain in Vancouver, as well as the potential to implement a shadow skytrain bus line (City of Vancouver, 2019). Measures to address safety concerns and public engagement were missing in the report. Additionally, due to the recentness of COVID-19, there have been minimal publications surrounding the impacts of COVID-19 on transportation, specifically night-time transportation. With this in mind, our study can help reduce this gap in research for the future needs of night-time transportation planning in Vancouver.

KEY FINDINGS

After an analysis of keywords, a coding plan was developed (see Appendix) to support our mixed methods analysis that included responses to our survey, individual interviews and the focus group. In developing our coding plan, we grouped exact keywords and allusions to codes together, grouped them into subcategories and then main categories. In doing so, four key themes emerged that helped answer our research questions. The themes of the four major categories are: Transit Uses, Transit Services and Operations, Transit Social Environment and Perceived Safety, and Engagement.

KEY FINDINGS

Under the category of Transit Uses, three subcategories were identified including Mode of transportation, Purpose of trip, and the Decision Making underlying the transit use. Subcodes for the mode of transportation refer to the different public and private options that are available in the Metro Vancouver area. These subcodes were consolidated into more generalized codes. The most commonly mentioned code was the bus at 60.4%. The bus code refers to both buses that operate during the regular transit hours as well as the NightBus that operates throughout the night-time hours. References under the code of car were the second most common mode mentioned at 19.8%.This included both personal vehicle use as well as rideshare services such as Uber, taxis, and EVO. SkyTrain followed closely behind at 16.4% and includes all of the different SkyTrain lines. Additionally, there were also codes for walking (3.1%) and the SeaBus (0.2%). Two codes were identified under the subcategory of Purpose of trip. Employment or work was the most common code making up 77.3% of the subcategory with the remaining being references to social, recreational, or dining purposes at 22.7%. Lastly there were 10 codes produced under the subcategory of Decision Making. References to safety were the most common at 42.0%. This was followed by wait times (18.7%), distance (8.7%), convenience (8.0%), and expenses (6.7%).

Table 1. Transit Uses from Mixed-Method Coding

Subcategory	Code	Percentage
Mode	Bus	60.4%
	Car	19.8%
	SkyTrain	16.4%
	Walking	3.1%
	SeaBus	0.2%
Purpose	Employment / Work	77.3%
	Social/Recreational/Dining	22.7%
Decision Making	Safety	42.0%
	Wait Time	18.7%
	Distance	8.7%
	Convenience	8.0%
	Expenses	6.7%
	Time of Day	4.7%
	Uncomfortable	4.7%
	Duration	2.7%
	Location	2.0%
	Unreliable	2.0%

KEY FINDINGS

Looking at Transit Services and Operations, four subcategories were prominent, including areas of interest, the built environment, temporal aspects, and surveillance. Areas of interest revealed the geographical locations in the Metro Vancouver area that participants frequented and where they identified barriers. The top three areas of interest were downtown Vancouver (45.5%), Surrey (20.0%) and Joyce Station (9.1%). The built environment subcategory outlined the structural components at bus and train stations, including the bus and route itself. Barriers of concern were mostly described at bus stations (42.6%) regarding lighting and nearby landmarks, and at train stations (26.2%) regarding the platform and train entrance and exits. Temporal aspects were another component of transit services, specifically in regards to scheduling (88.2%). Participants mentioned struggles with frequency and timing of night-time transit, in addition to reliability. The last subcategory was surveillance, relating to physical personnel and automatic alert systems such as panic buttons. The presence of transit staff, such as evening janitorial staff or transit officers at train platforms was the largest concern (47.7%), the second biggest concern being the presence of other passengers (31.8%). Additionally, the panic button on SkyTrains was mentioned (13.6%), as well as police (6.8%).

Table 2. Transit Services & Operations from Mixed-Method Coding

Subcategory	Code	Percentage
Areas of Interest	Downtown	45.5%
	Surrey	20.0%
	Joyce (Station)	9.1%
	New Westminster	5.5%
	Stadium-Chinatown	5.5%
	East Vancouver	5.5%
	Richmond	3.6%
	Commercial-Broadway	3.6%
	Patterson (Station)	1.8%
Built Environment	Bus Station / Stop	42.6%
	Train Station	26.2%
	Bus	18.0%
	Route	13.1%
Temporal	Scheduling	88.2%
	Transit App	11.8%
Surveillance	Staff	47.7%
	Other Passengers	31.8%
	Panic Button / Alert System	13.6%
	Police	6.8%

KEY FINDINGS

Acknowledging the social environment may have challenges for passengers on night-time transit, the mixed-method coding highlighted two categories of perceived safety, namely the social contract and COVID-19. Social contract describes any interactions that participants perceived as negative on night-time transit. The top three concerns were intoxication (30.0%), creepiness (30.0%) and aggression (15.0%). Other resulting codes include assault, quiet, women, conflict, and discrimination. Notably, the code of 'women' refers to the socially recognized vulnerability women experience in transit as well as night-time travelling. Racist incursions under the social contract was coded as it was a concern based on the literature review, in addition to events at the onset of the COVID-19 pandemic, but received no mentions. Perceived safety during the COVID-19 pandemic was a pronounced finding, with the most concerns regarding masks and the mask mandate on public transit (29.8%). This was followed by cleanliness of public transit (25.5%) and enforcement of masking, social distancing, and other public health regulations in place by transit officers and staff (13.8%). Other concerns also include social distancing as an unspoken rule between passengers, general concerns of risk of exposure to COVID-19 on transit and at platforms, and the use and availability of sanitizer on transit.

Table 3. Transit Social Environment & Perceived Safety from Mixed-Method Coding

Subcategory	Code	Percentage
Social Contract	Intoxication	30.0%
	Creepiness	30.0%
	Aggression	15.0%
	Assault	7.5%
	Quiet	7.5%
	Women	5.0%
	Conflict	2.5%
	Discrimination	2.5%
	Racist	0.0%
COVID-19	Masks/ Mask Mandate	29.8%
	Cleanliness	25.5%
	Enforcement	13.8%
	Social Distancing/ Requirements	12.8%
	Exposure/ Risk	10.6%
	Sanitizer	7.4%

KEY FINDINGS

Table 4. Engagement from Mixed-Method Coding

Subcategory	Code	Percentage
Barriers	Convenience / Inconvenience	60.0%
	Attention	40.0%
	Time	0.0%
Channels	Electronic	61.5%
	Non-Electronic	33.3%
	Phone (Voice)	5.1%

In references made to engagement from the City of Vancouver, Translink, or other agencies related to transportation services potential channels for future engagement were identified as well as some of the barriers to participation that respondents experience. Under the subcategory of barriers there were codes representing different issues such as convenience (60.0%), attention (40.0%), and time (0.0%). Participants did not discuss the current barriers as much as was anticipated, but were eager to provide preferable channels for future engagement. These channels were coded as electronic (61.5%), non-electronic (33.3%), and voice (5.1%). Electronic channels included online surveys, chats, and social media as well as through the Transit app. The non-electronic channels were paper surveys, customer service stations, and being approached in person.

ANALYSIS

BARRIERS & CHALLENGES FOR UNDER-REPRESENTED GROUPS

CONVENIENCE / SCHEDULING / WAIT TIME

The findings from this research show which areas of the Metro Vancouver region are of particular interest and concern for our research participants. These areas were identified along with issues related to the quality of the transit services and concerns of safety. While this does not provide a comprehensive look at all of the potential problem areas in the Metro Vancouver region, as it is limited to the experiences of our participants, it does begin to recognize some common nodes. The Downtown area was the most commonly mentioned, which is likely due to the convergence of bus routes and SkyTrain lines in that area, including the central hub for night-time service known as the NightBus District. Also, it is an area with a high density of services, amenities, and employment opportunities, which makes it a common travel destination. Areas near the periphery of the metro region were also common, which shows a travel pattern going in and out of the metro core among our participants that could be representative of night-time travelers in general.

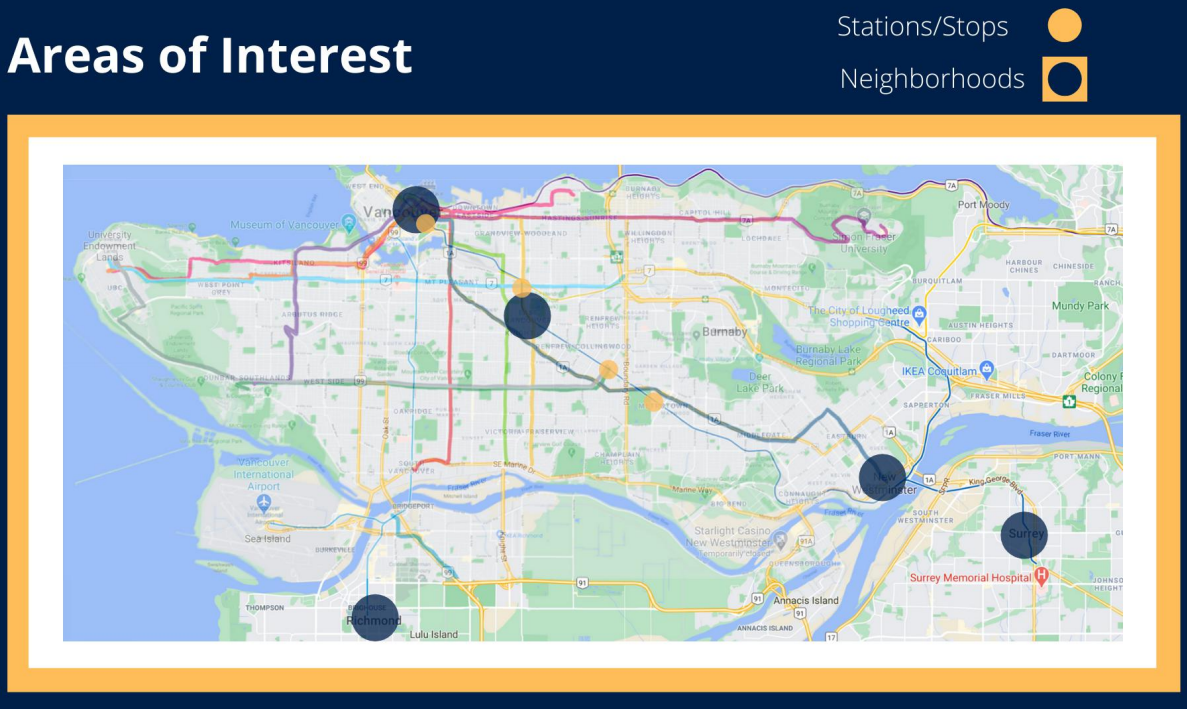

Figure 2. "Areas of Interest" based on participant responses

ANALYSIS

A significant portion of our participants (29.63% of survey participants) were using transit for the purpose of going to work, so this travel pattern could show that people are not able, or choose not, to live near their place of employment. Important for us to note was the concept of the "whole journey," The whole journey consists of more than the trip on public transportation as that is "just one-half of the whole journey" (Smith, 2008, p. 119). Rather, the journey can be built up of more complex travel patterns in which there are many stops during the journey (Smith, 2008). This spatial pattern, without having access to transit services, can lead to increased reliance on private transportation modes such as personal vehicles as shown by Hart and Lownes (2013). Recent research has also found that people plan to drive more post-Covid (Watts, 2020). While there were a substantial number of references to cars (19.8%) throughout the research, there was still a majority of references to buses (60.4%) indicating that our participants are still using and reliant on effective and efficient transit services.

References to timing, frequency, and convenience were often mentioned as considerations that participants were taking into account when making transportation decisions. These considerations are both temporal and spatial, but ultimately contribute to an increased time spent travelling. Participants expressed being less likely to use transit services when their destinations were farther away as the discrepancy in the time consumed between taking transit or taking a car seems to grow with distance. Because of the decrease in service during the night-time hours the time required to make longer trips on transit is exacerbated due to fewer route options resulting in indirect trips and often the necessity of linking multiple transit lines or modes together through transfers. One participant identified having to transfer between three different bus routes to travel from Surrey to Vancouver, which requires much more time than the alternative option of driving.

"But then leaving work takes like three hours because of the way the buses are set up. So, then it makes more sense to me to drive because I save like, you know, two hours and 30 minutes."

- Interview Participant

ANALYSIS

The frequency and timing of transit services also impact the overall travel time and this impact is even greater when having to utilize multiple routes or lines. Participants often complained of poor timing and infrequent service meaning they spent a significant portion of their trip waiting or forced to use different modes of transportation.

"Night-time trains coming from work is kind of like timing-based and whatnot. So going home is a little weird. And if I miss it, then it's kind of like Uber or taxi. Yeah, that's like, more money unnecessarily spent."

- Interview Participant

Transit services, particularly bus services, can be unpredictable and often not reliable to be following their posted schedules. Users may miss the bus or train they need to catch to get to work on time or to make the transfer for the next leg of their trip. Unreliable timing and scheduling paired with the infrequent service contributes to the amount of time users spend traveling and particularly the time spent waiting at transit stops and stations. Participants expressed that having to wait for transit can be uncomfortable, suspicious, and unsafe (Figure 3). Specifically, an interviewee mentioned the fear of being approached or assaulted. Concern of safety was the most mentioned reason behind participants' transit decision making and a major barrier to using public transit services.

Figure 3: Word cloud of focus group participants when asked "In one word how do you feel when taking transit at night alone?"

ANALYSIS

PERCEIVED SAFETY WITH THE SOCIAL & BUILT ENVIRONMENT

Understanding crime and fear of crime on public transport can have a "substantial effect on ridership" (Smith, 2008, p.118). The data we have collected has proven this statement true as safety was the top concern and reason behind participants' decision making in relation to public transit. For the majority of participants even their other reasons for their decision making were in some way linked to concerns of safety. There were features of the built environment that participants identified as influential to their perceived safety. The most commonly mentioned feature of the built environment was lights or lighting. The presence of lights and adequate lighting both on transit services and at transit stops and stations was associated with an increased awareness of surroundings and overall sense of safety. Participants expressed feeling more isolated and alone when referencing bus stops or train stations with insufficient or no lighting. Another commonly mentioned feature was an enclosure that creates some level of separation and protection such as a bus shelter. This type of shelter provides protection not only from the elements such as wind and rain but also from the potential threat that other people may pose. However, it was also expressed that having access to exits was important so that if participants felt uncomfortable or threatened they would have an opportunity to remove themselves from the situation or escape danger.

"There is no access in the far area, so if someone was to corner you there is no way to get out. So similar to the last one would prefer to be by the stairs."

- Focus Group Participant
when shown a photo of SkyTrain station

ANALYSIS

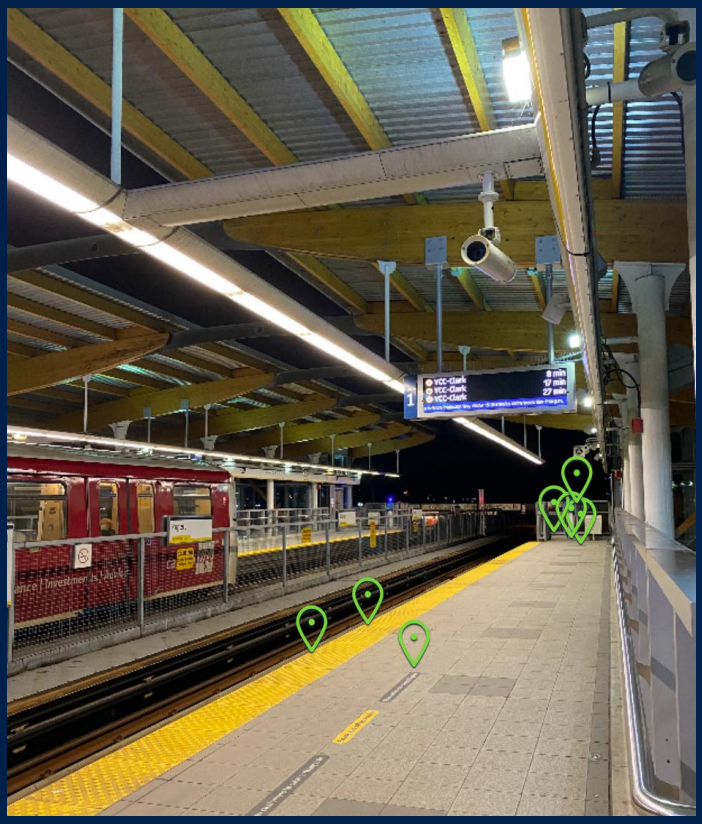

Figure 4. Image plotting of areas where focus group participants perceived as less safe at the Skytrain station.

The preferences for these features of the built environment demonstrates a concern with mitigating the risk of danger an individual may face and it could be inferred that the root concern for personal safety is ultimately the potential threat that other people sharing the same space could present. Other passengers as well as transit staff and security were associated with both positive and negative effects on participants' perceived safety. For most participants there was a positive association with increased safety when there were higher levels of surveillance. This included formal surveillance from sources such as security officers and police, but also from the general presence of other people such as transit operators, station attendants, and other passengers.

"For me personally, the question for me being safe on the skytrain is whether or not someone would intervene on my behalf. If a situation arose where I would need help or assistance from someone else. Do I trust the people in the skytrain to pull the silent alarm if I needed, to trust them to press the big red button to contact skytrain authorities?"

- Focus Group Participant

ANALYSIS

Forms of formal surveillance such as security officers or police officers carry with them a certain amount of authority that can be reassuring to some transit users. If an issue were to arise individuals in these positions have the jurisdiction to intervene. However, often minority individuals do not have good relations with enforcement agencies, such as police officers, and their presence could lead to a decreased feeling of perceived safety for these individuals.

Although most participants expressed feeling safer in the presence of other people while taking transit, there were some differing opinions. Some participants explained that the presence of other passengers also meant the presence of a potential threat and when no one is around they feel safest.

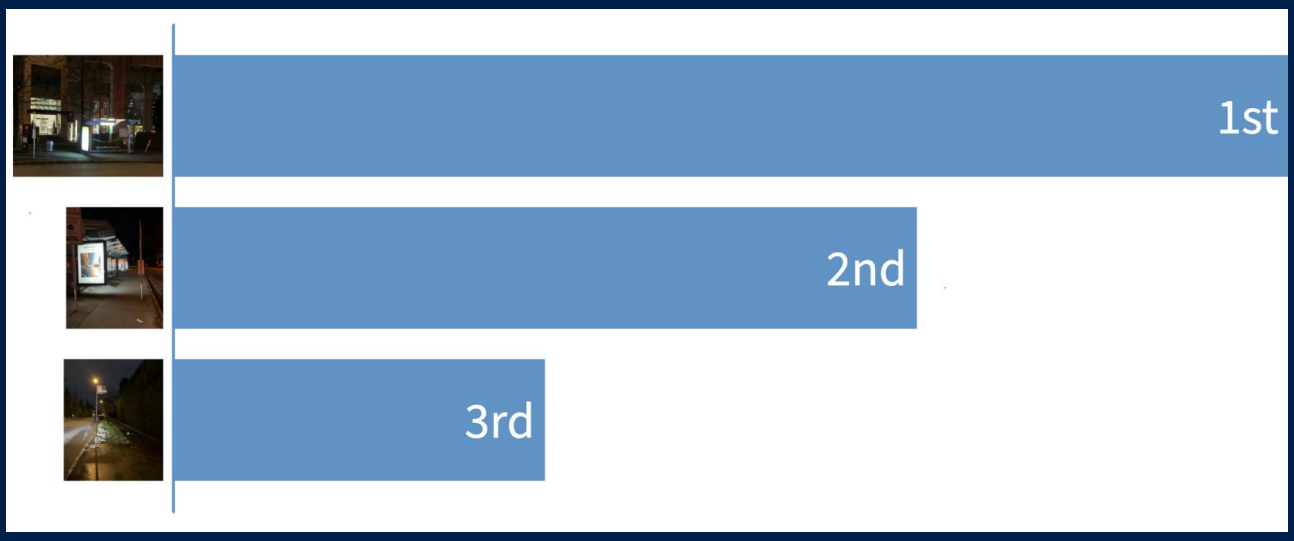

Figure 5. Focus group participant rankings of selected bus stop images from most safe to least safe. (See Appendix for enlarged images)

"I have maybe a contrasting opinion where I feel like the third one is actually the most safe because I think my impression is when you're around lots of people, there's a higher chance of me for example, getting attacked or something happening."

- Focus Group Participant

ANALYSIS

This was an interesting point of divergence and there may be potential implications related to the identity of the participants on each side of this opinion. The majority of our participants agreed that the presence of other people made them feel safer and the majority of our participants also identified as women. The participants who expressed feeling safer when no other individuals were present or did not have significant concerns for their physical safety while using night-time transit identified as men.

"I feel like as a woman we're always feeling unsafe, even during the day"

- Focus Group Participant

This exemplifies how gender identity has a significant impact on an individual's perceived safety. Additionally, participants often spoke of feeling unsafe when in the presence of unruly and disruptive individuals. Often these individuals were thought to be intoxicated and most of these encounters were said to occur near Downtown and other entertainment districts. Intoxicated individuals could present potential instances for conflict, such as harassment or assault. Although participants did not mention incidents of assaults or being followed by individuals, Vancouver's recent increases in stalking in the Downtown area create further senses of discomfort for vulnerable populations while commuting alone (Little, 2021).

PERCEIVED SAFETY WITH COVID-19

It is imperative to note this study took place entirely during the COVID-19 pandemic. Passengers on public transit were required to wear a mask covering nose and mouth, and social distancing was in effect prior to the mask mandate in British Columbia in August 2020. COVID-19 in general was an identified barrier in taking any transit, regardless of day- or night-time. Regardless of ethnic background and identified gender, all respondents in our study said they limit their trips outside of their homes to reduce exposure. Our findings echo the reduced ridership many municipalities experienced after the onset of the COVID-19 pandemic (Weisgarber & Scott, 2020).

ANALYSIS

"I don't take transit to go to the grocery store anymore, which I did a lot."

- Focus Group Participant

For those required to take transit during the COVID-19 pandemic, this study offers a better understanding of the impact of COVID-19 on public transportation, especially among under-represented individuals and during night-time hours. From individual interviews, it was acknowledged that night-time transit had its benefits during the COVID-19 pandemic because there were less passengers during the night-time, which allowed for more social distancing and decrease of exposure (Hu et al., 2021). Since there are less passengers, there was also less worry over whether they may have to wait for the next available bus, in case a bus was "full" due to reduced capacity and the elimination of standing occupants on the bus.

Despite this advantage, taking public transit during the COVID-19 pandemic was mostly met with challenges. The participants' responses highlight major concerns with face masks, cleanliness of transit, and enforcement of the mask mandate as well as social distancing. As previously mentioned, other concerns also include social distancing as an unspoken rule between passengers, general concerns of risk of exposure to COVID-19 on transit and at platforms, and the use and availability of sanitizer on transit.

"... I hope they put sanitizer on all the buses, for passengers. It will feel more safe if they have that on the bus."

- Interview Participant

ANALYSIS

More specifically, nearly 30% of COVID-19 concerns in this study were regarding face masks on transit. The uncertainty of COVID-19 transmission on transit led to a mask mandate in Metro Vancouver intended to protect passengers in addressing their concerns with increased risk of transmission for those who have no choice but to take transit for their essential activities. Despite the mandate, concerns persist regarding other passengers and their ability and willingness to follow the mask mandate. Passengers who must take transit, especially during the night-time, are put at risk in dealing with other passengers, in addition to the non-COVID-19 safety concerns mentioned previously. Many participants explained that while mask compliance is generally followed, it takes only one individual to not comply and put everyone else onboard at risk. Participants explicitly mentioned they do not feel comfortable confronting other passengers about mask compliance or social distancing in fear that the confrontation could become aggressive or physical. Additionally, some bus drivers themselves do not follow the mask mandate, which is a poor exemplar of appropriate pandemic behaviour on transit. Despite having a curtain or plastic screen protection between the bus driver and passengers, our participants claimed they were still concerned about the bus being a small, confined area in which air circulation is not ideal.

"It's scary to tell people to put their mask on."

- Interview Participant

Some participants explained that this reluctance to enforce COVID-19 safety practices extends beyond the passengers to also bus drivers.

"you see [...] people wearing masks, but then you don't see the bus driver wearing a mask. [...] are you leading by example with that? [...] I just feel like it doesn't make sense when you have a mandatory mask sign and then the bus driver's not wearing a mask it just doesn't make sense right? It doesn't lead by example."

- Interview Participant

ANALYSIS

On a bus, with the only staff member being the bus driver, there are challenges in ensuring every passenger follows the mask mandate and social distancing requirement. This may be especially the case when passengers are not sober.

"I understand why bus drivers can be hesitant to enforce rules like no masks and no drinking - I get it because there is potential for aggression on the receiving end for them. But unfortunate that if the bus driver isn't enforcing the rule no one else would enforce the rules."

- Focus Group Participant

Overall cleanliness of transit was a second major concern among study participants (25.5%). This includes cleanliness of transit infrastructure itself, such as the bus or the train, as well as other passengers on transit. Participants voiced distrust with the cleanliness of transit infrastructure and the efforts employed by transit organizations in ensuring the safety of passengers. This criticism is not reflective of the cleaning staff employed to do the cleaning, but rather the transit organization's commitment to ensuring the cleanliness of transit to ensure passengers comfort in taking public transportation during a pandemic. Despite a finding in this study, this barrier is not limited to just under-represented groups taking transit, but all potential passengers taking transit during a pandemic. Mindful actions by transit organizations must be taken in addressing this barrier to show a commitment in making public transportation a clean and safe mode of transportation that abides by COVID-19 sanitation requirements. Some participants mentioned the use of hand sanitizer and its availability in buses and at train stations may be a start in underscoring transit's dedication to providing a safer transit experience.

ANALYSIS

At the time of this report, one calendar year of the COVID-19 pandemic has elapsed, and our findings spotlight the concerns regarding the mask mandate and social distancing are not only with compliance by other passengers, but on its enforcement by transit personnel, cited as 13.8% of COVID-19 perceived safety concerns in this study. Specifically focusing on transit personnel such as bus drivers, and security and transit officers, participants referenced a lack of enforcement by all transit staff. Passengers are unlikely to speak up to those who are not following the mandate or social distancing requirements as they may wish to avoid confrontations that could lead to increased concerns of potential physical altercations that may jeopardize their personal safety. Fortunately, our findings show none of our participants experienced a racially-targeted incident while taking transit, but this finding could be confounded by our participants' active avoidance of taking transit during the COVID-19 pandemic. At a time when racially-motivated incidents are on the rise during COVID-19, this component of the pandemic should not be ignored in guiding transportation decision making. In 2020 alone, hate crimes in Vancouver increased by 97% overall and anti-Asian hate crimes went up 717% (Sajan & Mangione, 2021).

Our findings also demonstrate the perception of security and transit officers as an authority for enforcement. Transit officers and staff are put in a position of authority to ensure the safety of passengers on public transportation, and to passengers this may mean stepping in to regulate the mask mandate. In addition to the general cleanliness of transit, our participants also voiced their distrust in the willingness of transit personnel in exercising their ability to enforce when necessary. This perceived lack of enforcement in protecting passenger safety will continue to be a barrier in under-represented groups taking transit during the COVID-19 pandemic because they will continue to see transit as increasing their risk of exposure to COVID-19 due to the inaction of transit personnel.

Consequently, improvements to mitigating the barriers of taking night-time transit under COVID-19 restrictions will need to address convenience and scheduling of night-time transit such that it ameliorates both social safety and COVID-19 safety concerns raised by under-represented groups.

ANALYSIS

MEANINGFUL ENGAGEMENT WITH UNDER-REPRESENTED GROUPS

As supported by our literature review, night-time transit is usually taken by night-time workers and members of under-represented groups (Rosenbloom, 2006). Hine and Mitchell (2001) mentions that "transport policy has been shaped by the notion of a universal disembodied subject which has been aided by the reluctance of transport policy to include a social agenda to be addressed" (p.434). The inclusion of a social agenda is necessary to create a barrier-free environment for equality of opportunity, particularly relating to transportation issues of safety and accessibility for women, children, older and disabled groups and other under-represented populations. At large, under-represented groups are not engaged and this is supported by our data. As seen in Figure 6, all respondents felt their voicees are not heard in transportation decision making processes, Therefore, focus should be on under-represented groups for meaningful engagement and future outreach in transportation planning. These data provides valuable insights as to how under-represented groups may be meaningfully engaged, specifically focusing on two components - convenience and feedback that is received.

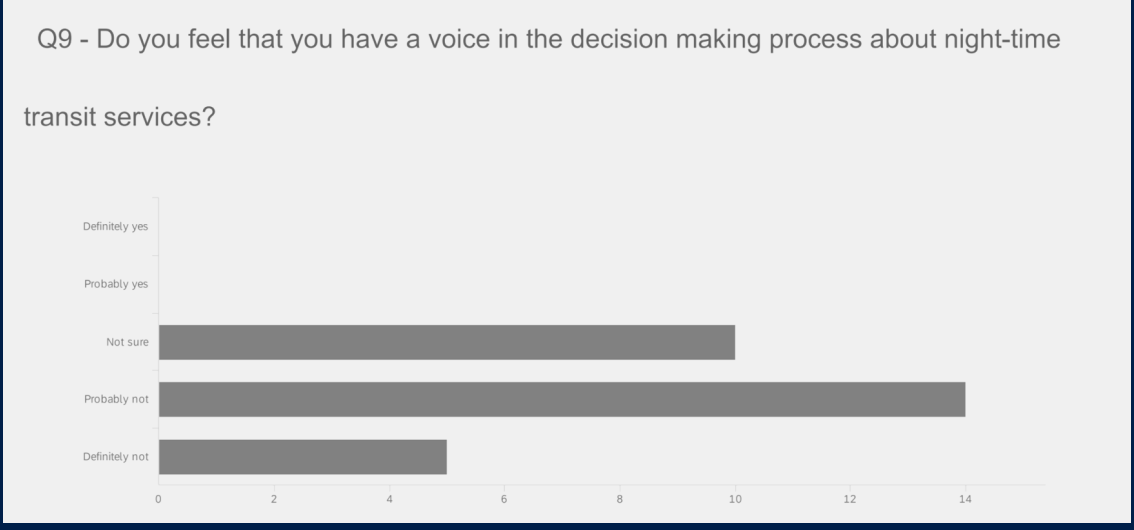

Figure 6. Qualtrics survey, question #9, bar graph. Likert scale from yes to no reflecting respondents' perception of their influence in the decision making process about night-time transit services. Single response only.

ANALYSIS

CONVENIENCE

This study shows night-time transit already consumes a lot of time and transit users are not likely to participate in outreach activities that add to that time. McArthur et al. (2019) notes that night shift workers experience physical exhaustion, isolation and lack access to collective representation. This, therefore, limits the ability of night shift workers to advocate for a greater recognition of their rights and experiences in night-time planning strategies. Data from our study offer some insight on how under-represented groups are open to dedicating time to provide feedback, but the opportunity to do so must be made conveniently accessible, with the least amount of interruption to passengers' trips or daily activities. These data also imply the best way to reach under-represented groups may be through online channels, as a majority of participants referenced the use of social media, online surveys or live chat. This reiterates the importance of availability, as many individuals may utilize their smartphones to provide feedback at their convenience. This is particularly the case if there was a shortened URL posted in buses and trains for passengers to visit while taking transit, or a QR code to scan to quickly access a feedback channel. As some participants voiced the communication methods of transit organizations are outdated, it is worth considering creating different methods for online feedback other than simple online surveys. Acknowledging the fact that not all transit users have a smartphone, other communication channels must also exist to truly represent the population. In this study, participants were not opposed to in-person feedback channels, such as customer service booths posted at specific stations. Or booths at special events where potential passengers may approach representatives of transit to speak directly about any feedback they may have. Participants were adverse to the idea of transit representatives approaching them randomly on the street, they specifically highlighted engagement would be best if the passengers approached the transit representatives. Of note, some participants suggested they may be more inclined to provide feedback if transit organizations offered incentives such as a chance to win a free month of transit (focus group participant).

ANALYSIS

RECEIVED FEEDBACK

As all respondents in this study did not feel as though their voices were heard in the transportation decision-making process, this emphasizes the need for a recipient of all engagement, whether it is through online or offline methods. The takeaway here is that under-represented groups need to feel their feedback is received by the transit organization in order to show it truly matters. Otherwise, it may seem any feedback they are willing to provide falls on deaf ears. This is why many participants would be eager to speak in a live chat format, or with a transit representative at events, as this is a stronger representation that their feedback is actually received by a transit organization. This is also why incentives were mentioned as a factor in the feedback process, because it demonstrates transit organizations are indeed hearing the feedback and offering a reward for actively participating in the decision-making process.

Attempts to improve meaningful engagement with under-represented groups should consider the convenience of engagement by utilizing a focus of online channels, supported by in-person opportunities such that under-represented groups feel heard in the transportation decision making process.

RECOMMENDATIONS

The analysis and findings based on our surveys, individual interviews and the focus group have pointed to a number of recommendations on how the night-time transit experience in the Metro Vancouver area may be improved, especially during the COVID-19 pandemic. These recommendations are grouped into five themes: service frequency and reliability, security and surveillance, infrastructure upgrades, enforcement of COVID-19 regulations, and engagement.

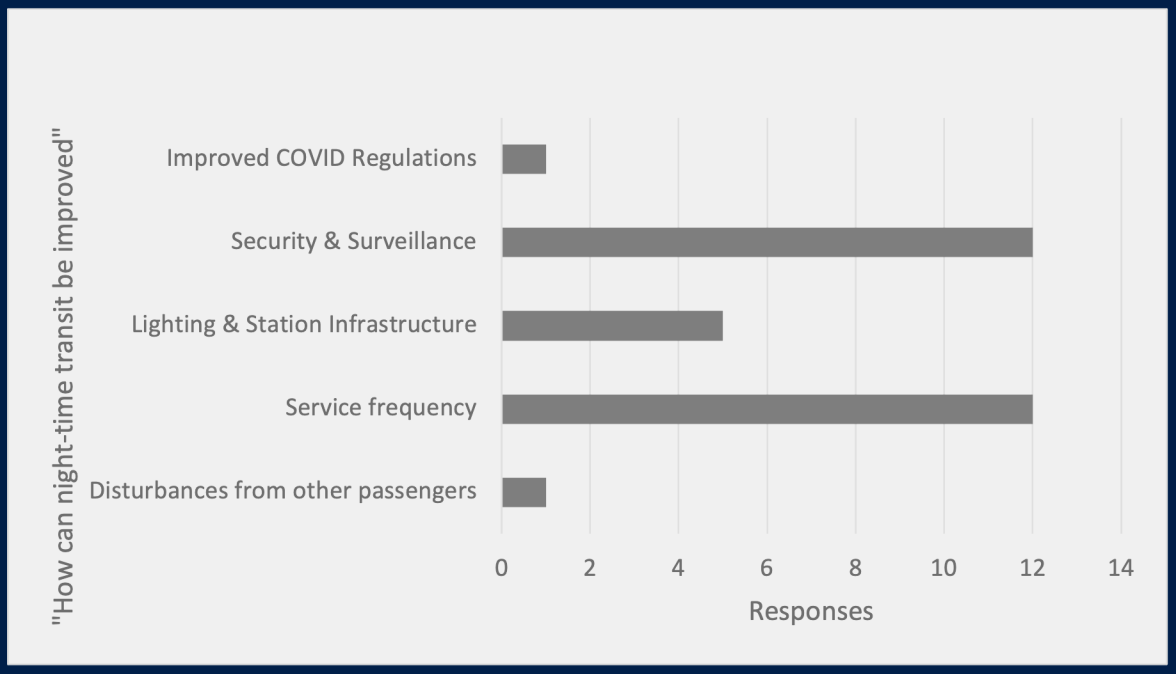

Figure 7. Bar graph of question #13 responses of Qualtrics survey

1

Service frequency is identified as a key area for improvement for night-time transportation. However, as TransLink had to decrease services due to the impacts of COVID-19 (Weisgarber & Scott, 2020), improvements should prioritize the reliability of transit services. For example, available transit apps should be improved to provide more accurate information such that users may plan accordingly and avoid unnecessary waiting time at the bus stop, especially for night-time routes where waiting at stops poses a safety risk. Increasing the accessibility for information regarding the real-time location of the next bus should also be considered.

RECOMMENDATIONS

2

Security and surveillance is another key area for improvement identified by our study participants. Therefore, there should be measures such as increasing the presence of transit staff to provide order maintenance and reduce or mediate conflicts on the bus and SkyTrain. Safety concerns revolving COVID-19 should be addressed with active enforcement of COVID-19 protocols and consequences when necessary, such that the burden is not on the passenger.

3

Infrastructure upgrades to meet the current needs of night-time transit users is another recommendation. The older and outdated components of the transit system, including lighting and alarm system, should be upgraded. More lighting on the bus and at the bus stop is commonly recommended by interviewees as it helps increase the visibility for both transit users and drivers, and provide a better sense of safety during all phases of transit experiences. In addition, barriers are recommended by some of the interviewees to be added to the SkyTrain platform to ensure safety of all users and staff.

4

COVID-19 regulations should be another priority of transit services. All interviewees emphasized more protocols should be in place in support of COVID-19 regulations. For example, frequent checks for adherence of the mask policy and increased enforcement by the bus driver and security officers were discussed at lengths by our study participants. Some of the interviewees also suggested installation of hand sanitizer on the bus to ensure cleanliness and reduction of exposure to COVID-19.

RECOMMENDATIONS

5

Increase engagement with under-represented groups in Metro Vancouver. We recommend to increase the application of social media as a platform to engage citizens. Feedback booths near the SkyTrain station, QR codes advertised on the buses, SkyTrains, and stations are also ways to improve engagement. Additionally, providing more incentives such as monetary rewards can increase engagement. When it is safe to have events again, it is recommended for transit services to increase engagement at community events. We also recommend the use of successful case studies to improve consultation with all under-represented groups in transportation planning, such as the recent engagement of Musqueam and the City of Vancouver to expand the Canada Line (Howell, 2020). Additionally, increased engagement with transit users provides the opportunity to increase awareness of hate crimes, such as the recent increased attacks on the Asian community since the COVID-19 pandemic. Anti-racism posters with detailed instructions on how to report hate crimes could be placed at potential feedback booths or in advertisements on social media.

FUTURE RESEARCH

Our study provides a general understanding of the barriers to night-time transportation and the impacts of COVID-19 on transit. There are still many challenges worth being addressed. One of the challenges night-time transit users face is the increased risk of accidents from reckless driving behaviours during the night. Roads with low or no lighting, glare from headlights, and fluctuations in vision are contributing factors to the disproportionately high rate of car accidents and fatalities that occur between dusk and dawn. The National Highway Traffic Safety Administration and the National Safety Council cite the fatality rate at night (6 p.m.-6 a.m.) to be three times higher than the daytime rate. Increased risk of car accidents has been reported in case of driving home from a night shift (Stutt et al., 2003).

FUTURE RESEARCH

Moreover, due to more prevalent use of alcohol by drivers at night, impaired driving behaviours are not uncommon among traffic accidents that happen in the night time. Since the pandemic, especially, alcohol consumption has even increased due to the lack of a regular schedule, boredom, stress, and loneliness. Recent research by NANOS has found increased alcohol consumption and cannabis consumption in some populations (NANOS Research, 2020). Therefore, further research can focus on how this issue may lead to more intoxicated drivers that may get involved in some of the night time car accidents. Expanding focus from public transit to all modes of night-time transportation can provide more comprehensive insights on future transportation planning to address safety issues.

CONCLUSION

Due to the timeliness of the COVID-19 pandemic and the limited research on night-time transportation, there is a need to further explore the impacts that COVID-19 has on night-time transportation, particularly for under-represented groups. We identify that further engagement with other stakeholders, such as municipalities, and transit organizations is needed. We hope that our work will be able to provide actionable recommendations for transit organizations to incorporate when considering planning for night-time transportation in Metro Vancouver and for engagement of under-represented groups.

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APPENDIX

One-on-One Interview Guide

Transit Use

1. Do you take night-time public transit?
2. How often do you use night-time public transit? (Daily, weekly, irregular)
3. What kind of transit do you take (Bus, SkyTrain)? What form of transportation, if any, do you have to take to get to transit? (Is the transit stop close to you, etc)
    a. What routes/lines do you use?
4. What is your main purpose of taking transit? (Is it to work, school, etc)
    a. Are you an essential worker?
    b. What field of work are you in that you have to transit to?
5. What do you like about night-time transit? What do you not like? How can it be improved?
6. Do you feel safe taking night-time transit? If not, what can be done to improve safety?

COVID-19

1. Has COVID-19 impacted your travel routine at all? If so, in what way?
    a. Do you have to wait long periods of time to board a bus because of capacity limitations?
    b. Has this impacted your day-to-day schedule at all (child care responsibilities, change shifts)
2. Do you feel comfortable taking transit since COVID-19 rules and protocols?
3. What is your experience taking night-time transit post-implementation of COVID-19 rules and protocols? (Is there appropriate social distancing, sanitation schedules, people following mask mandates, etc)
4. What is your experience taking night-time transit (both pre and during COVID responses can be accepted) (TURNING POINT)

Engagement

1. Do you feel like there are enough outreach and invitation for people to be involved in these improvements?
2. Have you ever been asked/engaged? (Have you attended feedback sessions or been engaged through outreach ie. PNE)
    a. If yes, what kind of engagement was it? What was your role in the engagement?
    b. If yes, what did you like and dislike about the engagement?
    c. Did you feel like your voice was heard? Was your feedback received?
3. If you want to be engaged, what is your preferred method of engagement? What platforms?

APPENDIX

Focus Group Interview Guide

Questioning Route

1. What type of transportation are you taking at night?
    a. What bus routes do you take?
2. How would you describe your night-time transit experience? Are there any challenges to your night-time travels?
3. What kind of improvements do you want to see?
4. Has COVID19 affected your travels? In what way?
5. Have you had a chance to provide feedback for any services in Metro Vancouver?
    a. If yes, can you describe your experience?
    b. Do you feel like your feedback actually matters?
6. In the future, what do you think would be the best way for you to provide feedback?

Visual Data

1. Draw your usual travel route.
2. In one word how do you feel when taking transit at night alone?
3. Rank the following bus stops in the order that makes you feel safest.
4. Please click on areas that make you feel safe in this Skytrain station.
5. Please click on areas that make you feel less safe in this Skytrain station.

APPENDIX

Survey Questionnaire

Questioning Route

1. Currently, how often do you use night-time (11:50pm-5am) transit services? (e.g., Bus, SeaBus, SkyTrain, Canada Line)What bus routes do you take?What kind of improvements do you want to see?
2. What time frame do you typically take night-time transit?
3. Which night-time transit services/lines do you use?
4. For what purpose do you use night-time transit services?
5. Are you considered an essential worker?
6. What barriers prevent you from taking night-time transit services?
7. Do you feel that you have a voice in the decision making process about night-time transit services?
8. Have you participated in any City of Vancouver or Translink online survey or public consultation on transit services?
9. Before the COVID-19 Pandemic, how often did you use night-time (11:50pm-5am) transit services? (e.g., Bus, SeaBus, SkyTrain, Canada Line)
10. Are there any parts of your transportation route that make you feel unsafe?
11. How could night-time transit be improved?

Demographic Questions

1. What is your age?
2. Are you currently employed?
3. Which of these describes your household income last year?
4. Do you own a car or have access to a private vehicle?
5. Do you have a driver's license?
6. What best describes your living arrangement?
7. Are you the primary caregiver for any children or other dependents?
8. Do you identify as a visible minority in Canada?
9. What pronouns do you use?
10. Do you identify as part of the LGBTQ+ community?
11. Do you have any long term disabilities or impairments?

APPENDIX

Figure 5 Enlarged Images of bus stops in Metro Vancouver Area