Examining Perceptions of Autonomous Transit from the Perspective of Multi-Use Path Users

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Abstract

The emerging technology of autonomous vehicles has a multitude of ways in which it can drastically affect urban transportation. Given its improving ability of precise operation, one such way is the potential for driverless public transport to be implemented along narrow corridors with other road users. The purpose of this study is to investigate the perception of autonomous transportation for those who currently use one such corridor, the Okanagan Rail Trail (ORT) in Kelowna, British Columbia. This corridor runs through the heart of the city connecting major destinations such as Downtown Kelowna, a university, and an international airport. The idea is to offer transit services along a dedicated corridor, which could further increase the usage of this corridor, offer modal transfer, and increase safety by offering passive surveillance for the trail users. Given the space constraint, Autonomous Transit (AT) is considered to be a fitting technology for this application. However, the facility does not currently allow any heavy vehicles and is used by active transport users such as pedestrians, cyclists, e-scooter riders, among others. Hence, it is of critical importance to understand the existing users' perception towards this new transport mode. In order to analyze this impact, an intercept survey was developed to gather information regarding users' perspectives on AT along the ORT, their current rail trail usage, and their socio-demographic characteristics. 737 trail users were surveyed, and after data cleaning, 718 responses were found to be sufficiently complete for analysis. The data shows that 52% of trail users agree with a form of AT along the ORT, though 47% of those surveyed indicated they were not fully comfortable with the technology. A strong majority of 83% of surveyed respondents indicated that the transit vehicles should only operate within their own dedicated right-of-way. 34% of respondents indicated that this would reduce the use of their private vehicles, though this varied quite significantly through the different age categories, with 46% of those between 25 and 34 agreeing with the sentiment compared to only 25% of those between the ages of 65 to 74. The results shed light on the factors (such as trust and acceptance of emerging technologies, socio-demographics, and travel patterns) affecting the perception towards the implementation of a disruptive technology alongside vulnerable road users such as pedestrians and cyclists.

Keywords: Autonomous Transit; Pedestrians; Bicyclists; Rail Trail Corridor; Intercept Survey; Trust and Safety

Introduction

Traffic congestion, accidents, and pollution are common issues many cities are currently facing, which have led to the development of more sustainable transportation modes as an alternative to personal vehicles. One emerging transportation technology, Autonomous Vehicles (AVs), is believed to be a viable option for alleviating some of these issues. One method is by facilitating mode sharing — combining shared vehicles with full self-driving automation.

Due to their perceived potential in providing socio-technical solutions while meeting people's efficient mobility needs, there has been rapid progress in research and the development of Shared Autonomous Vehicles (SAVs) around the world (Kostorz et al., 2020; Levine et al., 2018). They are being pilot tested around the world in closed course and mixed traffic settings to provide a better understanding of how this new technology would be implemented in the future (Etminani-Ghasrodashti et al., 2022; Iclodean et al., 2020; Lundgren et al., 2020; Piatkowski, 2021). Yet, there are still many unknowns regarding the deployment of SAVs in corridors originally dedicated to active mobility users.

As the success of this new technology is closely correlated to its level of public acceptance, previous studies have sought to examine the perceptions of users regarding SAV usage and the factors likely to influence their level of acceptance of SAVs when they are integrated with public transit in mixed traffic settings.

In the past, surveys have been conducted on the interaction between vulnerable road users and autonomous vehicles (Blau et al., 2018; Pammer et al., 2021; Penmetsa et al., 2019; Pyrialakou et al., 2020; Rahman et al., 2021), however, these are done in settings where vehicles are the dominant form of transportation. This study aims to investigate active transport users' perception of introducing SAVs into a corridor that currently does not allow motorized vehicles.

Additionally, these studies are typically conducted online, either targeted towards the general public or cycling advocacy groups. This survey was intended to understand potential negative impacts and analyze preferred configuration, and as such we chose to refine our participant selection by conducting intercept surveys on the trail to capture the views of those who actively use the corridor.

The aim of the survey is to improve the understanding of how the implementation of SAVs along non-motorized corridors would affect the trail's current users. The literature review will provide an overview of research findings that work to shape, refine, and improve our study to better provide novel, useful, and accurate findings to benefit this field of research. This will be done by investigating current implementations of SAVs, analyzing past reports regarding surveys that had collected attitudinal data regarding a differing range of user interactions with autonomous technology, understanding past findings regarding vulnerable road users' perceptions of AV technology in areas with SAV pilot programs and surveys involving hypothetical SAV scenarios, and investigate the techniques these papers used to analyze the collected survey data.

Literature Review

While the technology for true fully AVs is not yet available, it is an industry that is undergoing rapid technological development. These self-driving vehicles have the potential to increase road safety for drivers and vulnerable road users, increase network efficiency, and increase mobility for those with disabilities (Azad et al., 2019; Dong et al., 2019; Levine et al., 2018; Pammer et al., 2021).

SAVs currently use AV technology in public transit or shared vehicles. Their benefits include alleviating last-mile issues in vehicle-reliant environments, reducing personal-vehicle trips (Ohnemus & Perl, 2016), and supplementing current transportation services through their accessibility, flexibility, and reliability (Etminani-Ghasrodashti et al., 2021).

Nevertheless, this technology is currently limited by both technology and current legislation. While it varies by location, the use of SAVs can be restricted to specifically designated road facilities. This has resulted in the technology to be commonly used as "feeder vehicles": short-distance, slow-moving shuttle buses operating in closed environments (such as parking lots or university campuses), typically to connect to larger transit services (Etminani-Ghasrodashti et al., 2022; Iclodean et al., 2020; Lundgren et al., 2020). This application attempts to solve the first/last-mile problem, which is a common barrier in the accessibility and flexibility of existing public transit systems (Etminani-Ghasrodashti et al., 2021; Kostorz et al., 2020; Levine et al., 2018). Before this technology becomes widespread, trust should be developed in both those who utilize SAVs, and the vulnerable road users whose safety will be greatly affected by their operation.

The term vulnerable road users refer to those who incur more risk when interacting with vehicles along road facilities, such as pedestrians, cyclists, those using mobility assistant devices, and users of other non-automotive modes. These users can be made to feel anxious due to a perception of under-prioritization of their modes of transportation, close proximity to fast-moving vehicles, and risks of collision (Pyrialakou et al., 2020). As these road users would incur the highest risk with the introduction of this new disruptive technology, more research is needed to investigate their perception of travelling in and within close proximity of SAVs.

This study seeks to bridge the literature gap by investigating the Okanagan Rail Trail's users' perceptions of operating shared autonomous vehicles along the route in which little conflicts from vehicular traffic streams currently exist. This requires a method in which to isolate the pool of survey respondents to ensure the attitudinal responses are collected from those who currently use the trail. Research shows that using an intercept survey allows guaranteed contact and onsite feedback from a targeted audience (Schneider, 2013), allowing us to collect survey data from our desired populace.

Previous surveys on autonomous vehicles can be broadly split into two categories: surveys where participants had previously experienced AVs and surveys for those who have not. Locations where pilot programs allow for limited use of AT along public roads provide an opportunity to collect data on the real perception of the technology as opposed to presenting hypothetical scenarios in a survey.

These studies show that there may be a positive correlation between one's exposure/familiarity with AVs and the corresponding perceived safety of the technology (Penmetsa et al., 2019; Pyrialakou et al., 2020). Hypothetical studies tend to be more common, likely due to how recently the technology has been developed and the limited number of locations where SAVs pilot programs have been able to begin.

There are many factors which may affect a vulnerable road user's perception regarding SAVs in a hypothetical scenario survey. These can be roughly categorized into sociodemographic characteristics including household income, age, employment, gender, and typical mode choice; operating characteristics such as vehicle speed, right-of-way allocation, and frequency; and factors regarding their current use of existing facilities including frequency travelled, distance travelled, and typical purpose of use (Blau et al., 2018).

For social demographics, age can often be a significant factor. Previous studies have shown a general trend of younger people being more trusting in newer technology, while older individuals tend to have lower levels of trust and higher levels of safety desired (Hossain & Fatmi, 2022; Piatkowski, 2021; Pyrialakou et al., 2020; Schoettle & Sivak, 2014). Pammer et al. specifically notes how their findings imply that with age, trust in human drivers increases, while trust in AV systems decrease. This is justified through existing crash statistics, demonstrating that elderly pedestrians and cyclists run a higher risk compared to other vulnerable road users (Vissers et al., 2017). Though, this statistical relationship is not the case in all studies.

It has been demonstrated that other factors related to age can positively influence an individual's perception of commuting by AV, thus age isn't necessarily linearly related to technological trust (Piatkowski, 2021; Rahman et al., 2021). For gender, those who identify as women tend to be more risk-averse, with stronger preferences towards protected facilities, and less likely to be early adopters of SAV technology (Blau et al., 2018; Etminani-Ghasrodashti et al., 2022; Piatkowski, 2021; Schoettle & Sivak, 2014, etc.).

Income and employment often display conflicting findings across different studies. Some demonstrate a correlation between higher-income or full-time employment and higher perceived interest (Hossain & Fatmi, 2022; Schoettle & Sivak, 2014), while others are able to demonstrate opposing effects (Pyrialakou et al., 2020). One noted factor is the difference between interest in AV technology and willingness to use an SAV. It is shown that higher familiarity with AVs increases the acceptance of the technology and perceived safety (Pyrialakou et al., 2020), and that a higher income can correlate to a higher likelihood of purchasing vehicles with autonomous technology included (Hossain & Fatmi, 2022). High-income households tend to lean into car-dependency and are less likely to use forms of public transit (Ko et al., 2019).

Both operating characteristics and facility use tend to be very location specific, though low speeds and separated protected facilities are strongly preferred (Blau et al., 2018), with pedestrians displaying more trust for vehicles running autonomously compared to cyclists (Pammer et al., 2021; Pyrialakou et al., 2020). Longer commutes and proximity to an urban core correlate with support for vehicle autonomy (Hossain & Fatmi, 2022).

As described by Schneider (2013), conducting intercept surveys will enable capturing a refined subset of the population to gather perceptions purely from current trail users. Past research such as Blau (2018), Piatkowski (2021), etc., provides a thorough description of the various important influential factors that should be considered in assembling a survey, as well as methods to capture attitudinal data. Finally, insight gained from resources such as Borooah (2002) and Gaskin (2014) provided important context regarding proper implementation of exploratory factor analysis and ordered regression, as did the many papers which utilized them as in Al Haddad (2020), Bhaduri (2023), and Hossain (2022).

Methodology

Study Area and Survey Design

The data for this study comes from intercept surveys conducted at various locations along the Okanagan Rail Trail between the dates of September 17th, 2022 and September 29th, 2022 between 7 am and 7 pm.

Two methods of completion were provided: on-site forms which collected additional data regarding the time, day, and location in which the survey took place, and a take-home form directing respondents to an online survey, provided to those unable to spare the time to stop and participate in the survey. The survey consisted of three main sections: preferences regarding SAVs and their hypothetical implementation along the corridor, the nature of their current facility usage, and socio-demographic information.

The component regarding perceptions of SAV implementation was measured on a 5-point Likert scale with the following provided options: *Strongly Agree, Somewhat Agree, Neither Agree nor Disagree, Somewhat Disagree, Strongly Disagree.* This section involved nine questions regarding trail alignment (preference towards a separated right-of-way and willingness to reduce trail width to accommodate), effect on future use (how trip length, frequency, and purpose would be altered), thoughts on how this may affect accessibility for those with physical limitations, potential decrease in personal vehicle use, and overall support for implementing SAVs along the ORT.

The next module asked respondents about their current use of the trail. This included two multiple-choice questions regarding most common mode choices (*personal bike, walking/running, shared scooter, shared bike, mobility assistance device, and other)* and purposes of using the rail trail (*leisure, exercise, dog walking, commuting to work, commuting to school, running errands, connecting to a transit stop, and other).* Additionally, four questions focused on frequency: one regarding how frequent they use the trail (*daily, a few times a week, a few times a month, a few times a year)* and three questions regarding how often they use the trail to access Kelowna's downtown, the YLW Airport, and the University of British Columbia's (UBC) Okanagan campus — three key locations along the ORT. The options provided were *everyday, a few times a week, a few times a month, a few times a year,* and *never.*

In the last section respondents reported their socio-demographic information such as age (7 categories between *18–24* and *75 or older*), gender identity, preferred mode of transport (*driver, passenger, cyclist, pedestrian, public transit user, or multi-modal*), employment (employed *full-time, employed part-time, unemployed - looking for a job, unemployed - not looking for a job, retired,* or *a student*), postal code, work/school forward sortation area code, and annual household income (from 4 categories between *less than $50 000* and *$150 000 or more*).

Response Data

737 responses were submitted, with 718 sufficiently complete responses for initial data analysis after cleaning (See Table 1). The following resulted in a majority agreement (*Strongly Agree* or *Somewhat Agree*): *I would prefer if autonomous transit had its own dedicated right-of-way in the ORT corridor* (83.4%), *Having autonomous transit would increase the accessibility of the ORT for those with physical limitations* (69.4%), and *I would support having autonomous transit on the ORT* (52.3%), while the following resulting in a majority disagreeing (*Strongly Disagree* or *Somewhat Disagree*): *I would support decreasing the space for cyclists and pedestrians to make room for autonomous transit on the ORT* (72.4%). The results of the remaining five questions tended to be more evenly split between the five categories.

Table 1 | Summary of perceptions regarding the operation of autonomous transit along the Okanagan Rail Trail

Variable	Survey Question	n	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
Right-of-Way	I would prefer if autonomous transit had its own dedicated right-of-way in the ORT corridor (not shared with cyclists and pedestrians).	716	61.0%	22.3%	6.1%	4.1%	6.4%
Decrease Space	I would support decreasing the space for cyclists and pedestrians to make room for autonomous transit on the ORT.	713	5.8%	13.0%	8.8%	20.6%	51.8%
Increase Accessibility	Having autonomous transit would increase the accessibility of the ORT for those with physical limitations.	713	37.7%	31.7%	17.8%	5.2%	7.6%
Uncomfortable with Technology	I would feel uncomfortable with the technology used to operate autonomous transit.	714	16.4%	16.7%	20.4%	19.0%	27.5%
Increase Distance	Having access to autonomous transit would increase the distance I can travel along the ORT.	716	18.0%	19.0%	20.7%	11.9%	30.4%
Decrease Frequency	Having autonomous transit would decrease the frequency with which I use the ORT.	716	15.6%	17.2%	22.6%	16.2%	28.4%
Increase Purpose	Having access to autonomous transit would increase the purposes for which I use ORT (e.g. commuting).	717	14.4%	21.9%	16.9%	13.7%	33.2%
Decrease Personal Vehicle	Having autonomous transit on the ORT would decrease my use of personal vehicle.	717	11.7%	21.8%	17.9%	13.0%	35.7%
Support AT	I would support having autonomous transit on the ORT.	715	26.0%	26.3%	11.7%	11.5%	24.5%

An interesting note regarding the results for the support of AT along the ORT is the stark difference in perceptions depending on the medium in which the survey was filled out; of the 535 responses taken in person during the intercept survey, 56.3% indicated they agree, whereas with the 183 respondents who participated in the take-home survey, 51.6% indicated that they instead disagreed.

Questions regarding the current use of the trail (see Table 2) show that from those surveyed, a plurality use the trail on a weekly basis (46.0%) and most often visit downtown at a similar frequency (34.4%), whereas the other two listed locations (Kelowna Airport and UBC) are not frequented by a large proportion of travellers (response "Never" was selected 49.4% and 54.1% respectively). A vast majority of 91.0% of those surveyed often travel the trail by bike with the second most common mode being walking or running at 34.8%. The trail is most often used for exercise (79.2%) and leisure (70.7%), with 27.5% of respondents using the trail to commute to work.

Table 2 | Survey results for current trail usage and socio-demographics

Description	n	Variable Statistics							
		Current Facility Usage							
		Daily	Weekly	Monthly	Yearly				
How often do you use the ORT?	715	189 (26.4%)	329 (46.0%)	121 (16.9%)	76 (10.6%)				
How frequently do you use the ORT to get to:		Everyday	Weekly	Monthly	Yearly	Never			
Downtown Kelowna	691	87 (12.6%)	238 (34.4%)	143 (20.7%)	92 (13.3%)	131 (19.0%)			
Kelowna Airport	666	22 (3.3%)	108 (16.2%)	87 (13.1%)	121 (18.2%)	328 (49.2%)			
UBC Okanagan	669	58 (8.7%)	110 (16.4%)	67 (10.0%)	72 (10.8%)	362 (54.1%)			
		Personal Bike	Walking / Running	Shared Scooter	Shared Bike	Mobility Aid	Other		
What are the most common modes of travel you use on the ORT?	715	651 (91.0%)	249 (34.8%)	14 (2.0%)	17 (2.4%)	8 (1.1%)	23 (3.2%)		
		Leisure	Exercise	Dog Walking	Commute to Work	Commute to School	Running Errands	Connecting to Transit	Other
What are the most common reasons you use the ORT?	713	504 (70.7%)	565 (79.2%)	67 (9.4%)	196 (27.5%)	81 (11.4%)	166 (23.3%)	36 (5.0%)	34 (4.8%)
		Socio-Demographics							
		18 – 24	25 – 34	35 – 44	45 – 54	55 – 64	65 – 74	≥ 75	
What is your age?	713	62 (8.7%)	106 (14.9%)	91 (12.8%)	87 (12.2%)	175 (24.5%)	150 (21.0%)	42 (5.9%)	
		Male	Female	Prefer not to disclose	Self-described				
What gender identity best describes you?	709	425 (59.9%)	266 (37.5%)	12 (1.7%)	6 (0.8%)				
		Auto-Driver	Auto-Passenger	Cyclist	Pedestrian	Public Transit	Multi-Modal		
How would you classify yourself as a traveller?	712	216 (30.3%)	18 (2.5%)	197 (27.7%)	35 (4.9%)	18 (2.5%)	228 (32.0%)		
		Full-Time	Part-Time	Unemployed, Looking	Unemployed, Not Looking	Retired	Student		
What best describes your employment status?	711	322 (45.3%)	62 (8.7%)	8 (1.1%)	12 (1.7%)	238 (33.5%)	69 (9.7%)		
		≤ $50 000	$50 000 - $99 999	$100 000 - $149 999	≥ $150 000				
What is your annual household income?	629	131 (20.8%)	223 (35.5%)	160 (25.4%)	115 (18.3%)				

Modelling Approach

Factor Analysis

Exploratory Factor Analysis (EFA) was used to extract latent attitudinal factors to describe the underlying relationships between the perception variables outlined in Table 1, aside from the response variable *Support Autonomous Transit*. Factor analysis is commonly used in research as a method of dimensionality reduction, a methodical way of finding an underlying structure of multiple variables using a smaller number of "factors", and latent variables representing unobserved factors. This allows researchers to better understand the patterns behind large collections of variables and reduce the computational requirements (Gaskin & Happell, 2014).

The factor analysis was performed using the extraction method of Generalized Least Squares with a Varimax rotation using Kaiser Normalization. Results of the factor loading can be seen in Table 3, with factor loadings below 0.4 suppressed. To assess the acceptability of the analysis, values such as the percent explained variance (55.8%), Kaiser-Meyer-Olkin test (KMO = 0.803), and Bartlett's Test of Sphericity (p=0.000) were considered. The number of factors outlined were confirmed both through using the Eigenvalue Greater than 1 rule, as well as confirmation with the Scree-plot.

Ordered Logit Model

This study makes use of the ordered logit model to analyse explanatory variables' effect on an individual's support of running SAVs along the ORT. The ordered logit model consists of an ordinal variable, y_i, which is a function of an unmeasured continuous latent variable, y_i^*. The basic representation of this model is as follows:

$$y_i^* = \sum_{k=1}^{K} \beta_k x_{ki} + \varepsilon_i \tag{1}$$

Where K is the number of explanatory variables, x_{ki} is the value of the k^{th} explanatory variable, β_k is the estimated coefficients corresponding to the explanatory variable, and ε_i represents the random error term. As y is an ordinal variable, y_i^* is discretized through its relations with the threshold values $\mu_0, \mu_1, \cdots, \mu_{J-1}$ where J represents the number of levels in the ordinal variable. For example, in the case of $J = 3$:

$y_i = 0$; when $y_i^* \leq \mu_0$

$y_i = 1$; when $\mu_0 < y_i^* \leq \mu_1$

$y_i = 2$; when $\mu_1 < y_i^*$

Where the probability of y_i^* resulting in discrete category j where $j = 0, 1, \cdots, J-1$:

$$P(y_i = j) = P\left(\mu_{j-1} < y_i^* \leq \mu_j\right) = \frac{e^{(x_i\beta\ -\ \mu_{j-1})}}{1 + e^{(x_i\beta\ -\ \mu_{j-1})}} - \frac{e^{(x_i\beta\ -\ \mu_j)}}{1 + e^{(x_i\beta\ -\ \mu_j)}} \tag{2}$$

Results

The factor analysis outlined in Table 3 resulted in two latent attitudinal factors: *Utilitarian Interest* and *Technological Interest*. The utilitarian interest is denoted by three variables all associated with intentions for future use, indicating that they would intend to utilize AT and increase the utility of the trail. The second factor outlines an individual's comfort with AV technology, willingness to sacrifice lane space for its implementation, acknowledges potential accessibility benefits for those with physical limitations, and indicates the running of AT along the trail corridor would not deter them from using it. This highlights an interest in having this technology running along the corridor and a belief in the benefit it may pose, though does not necessarily hold any indicators of their own intended use.

Table 3 | Factor loadings for EFA

	Latent Factor Loadings	
Variables	Utilitarian Interest	Technological Interest
Increase Trip Length	0.634	-
Increase Purposes	0.834	-
Decrease Personal Vehicle	0.604	-
Decrease Existing Space	-	0.417
Increase Accessibility	-	0.581
Uncomfortable with Technology	-	-0.402
Decrease Frequency	-	-0.464

The model outlined in Table 4 describes the relationship of explanatory variables with the support of implementing autonomous transit along the Okanagan Rail Trail. As expected, higher values in both latent class attitudinal factors demonstrate a higher likelihood of support, due to both factors representing different aspects of interest in the project.

Table 4 | Ordered Logit Model Results

Variables	**Definition**	**Coefficient**	**t-stat.**	
Constant	-	2.07	7.23	***
	Latent Factor Attitudinal Variables			
Utilitarian Interest	Interest in utility of SAVs	1.50	13.74	***
Technological Interest	Interest in technology of SAVs	2.90	18.37	***
	Current Facility Usage Variables			
UBC Frequency	Frequency of using ORT to access UBC	0.15	2.27	**
Shared Vehicle Usage	Uses shared bikes and/or shared scooters	-0.76	-1.68	*
Purpose: Leisure	Uses the ORT for leisure	0.33	1.78	*
Purpose: Exercise	Uses the ORT for exercise	-0.33	-1.61	
Purpose: Work	Uses the ORT to commute to work	-0.34	-1.59	

Variables	Definition	Coefficient	t-stat.	
	Socio-Demographic Variables			
Age: 18 – 34	Respondent is between the ages of 18 and 34	0.51	2.07	**
Age: 45 – 64	Respondent is between the ages of 45 and 64	0.37	1.93	*
Gender: Female	Respondent's gender identity is female	-0.29	-1.75	*
Mode: Pedestrian	Classified one's self as mainly a pedestrian	-0.83	-2.43	**
Employment: Student	Currently attending school	-0.66	-1.88	*
Employment: Full-time	Employed full time	0.28	1.39	
	Threshold Variables			
μ_0	Strongly Disagree | Somewhat Disagree	0	-	
μ_1	Somewhat Disagree | Neutral	1.29	12.54	***
μ_2	Neutral | Somewhat Agree	2.40	21.96	***
μ_3	Somewhat Agree | Strongly Agree	4.74	29.10	***
	Goodness-of-Fit Measures			
Log-Likelihood		-676.781		
Chi-Squared	$df = 13, \ p = 0.000$	683.539		
Pseudo R-Squared		0.336		

Note: *, **, and *** represent 90%, 95%, and 99% confidence intervals respectively

The model results suggest that those who frequently use shared vehicles (such as shared bikes or shared scooters) along the trail are less likely to support AT implementation. This may be due to the fact that these users already have a convenient mode of motorized transportation along the trail. Additionally, the descriptive statistics show that 83% of the individuals who indicated they use shared vehicles did not indicate that they were local to Kelowna. The userbase of shared vehicles in this survey may be more representative of tourists, who would likely not hold strong opinions regarding the trail layout.

Individuals who use the trail as a form of exercise are less likely to show support for SAVs as motorized transport would not assist in exercise, though those who use the trail for leisure purposes appear to have higher support. This may be due to the transit's capability to transport them further from the origin of their trip (likely near downtown due to the dense population) to more scenic locations along the trail, as well as the interest in a new novel way to experience the trail. Additionally, those who classify themselves as mainly pedestrians show a negative response, likely related to how as a vulnerable road user, they may consider running motorized vehicles along the trail as a safety concern and have less comfort travelling at-grade with vehicles compared to cyclists.

The results demonstrate a positive measure of support from the ages of 18 to 34 as well as 45 to 64. This could represent the bulk of commuters to both school and work, and those more inclined to AV technology. In line with previous studies, those who identify as female show less support for SAV along the trail, likely due to a higher desire for safety and less interest in AV technology (Cartenì, 2020).

One interesting result of the model is shown through the intersection of whether an individual commutes using the trail and the reason they are commuting. For students who commute using the ORT (as indicated by the frequency in which they use the trail to access UBC) the result is positive, while students in general show a negative result. Conversely, if you use the trail to commute to work the model estimates a negative result, while those employed full-time show a positive result. The conflicting result for workers is one that may be easier to explain — those who commute using the trail may not want motorized vehicles taking up space and decreasing perceived safety, while those interviewed along the trail who are employed full-time see an opportunity in the new mode to avoid congestion along their commute. While with students, there could be a few factors influencing the opposite results. For those who currently commute along the trail, it is possible that they are more comfortable with AV technology and have a higher perceived safety. Commuting by trail may be less of a choice and more of a necessity due to lower ownership of private vehicles, and UBC's proximity to the rail trail solving one end of the first/last mile issue (compared to work locations that may still require off-trail cycling to arrive at one's location of work). UBC's proximity to the trail may also be the source of the negative result for students who do not commute using the trail. For students who were surveyed along the trail yet do not use the trail to commute, it is possible their trips along the trail would both start and end at the university and be used for the purpose of exercise and leisure while staying near the campus and thus SAVs could be viewed as more of a hinderance than a benefit. Similar conclusions could be drawn for students who use the trail infrequently due to travel between the trail and their home being burdensome or infeasible. Further studies would be required to investigate the validity of these hypotheses.

Conclusions

As technology progresses, it is important to consider and study the ramifications it will have on society. In the case of AVs, there is strong potential to use this technology to enhance public transit, enabling a fleet of smaller, slower shuttles with dynamic routes to help address the first and last-mile issue. With increases in safety and an ability to operate along smaller right-of-ways, comes the potential to introduce these vehicles to congestion-free active transport corridors. To ensure such a project would effectively bolster transportation alternatives to personal vehicles, the perception of trail users needs to be gathered to ensure the operation of SAVs would not dissuade individuals from using the trails in the future.

This study sought to further develop knowledge on this subject by deploying an intercept survey along the Okanagan Rail Trail to collect data regarding current users' perceptions, facility usage, and socio-demographics. After exploratory factor analysis was performed to understand latent attitudinal factors affecting users' perceptions and preferences regarding AT along the trail, an ordered logit model was developed to understand the statistical relationship between collected predictor variables and support for the implementation of autonomous transit, measured on a 5-point Likert scale from *Strongly Agree* to *Strongly Disagree*. The model demonstrated strong effects from attitudinal factors, displayed effect of current mode choices, re-affirmed statistical relationships shown in past surveys such as gender and age's role in AV support, and outlined a fascinating disparity between perceptions of different commuters.

The findings may also have implications for future policy. The strong preference towards a separated right of way from survey data would likely quell concerns regarding safety or interference with trail commuters. Additionally, plans and strategies should be implemented to promote higher interest in the general student population due to the proximity of the rail trail to the UBC Okanagan campus. A future study regarding perceptions of a larger populace beyond current trail users should be administered to interpret the potential benefit this mode of transportation may provide.

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