The Path of Least Resistance

Identifying Supporters of Public and Active Transportation Projects

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The financing and implementation of transportation projects are more likely to be successful with the support of local communities. Hence, for cities and transportation agencies to develop strategies that will improve public acceptability and reduce resistance to funding transportation projects, it is important to understand differences in the levels of local support. This study used a factor-cluster analysis to segment a university population, to understand current levels of support toward transportation investments, and seek out important allies to endorse public and active transportation projects. The results of the study reveal five clusters of individuals with varying opinions toward transportation investments and distinct motivations. Strong advocates are the greatest allies for promoting public and active transportation investments. They support financing public and active transportation projects, and are well positioned to endorse the necessity and advantages of such investments. Highway and transit funders are motivated by their dissatisfaction with the current transportation system. Cycling advocates are valuable in publicizing the benefits of expanding the bicycle network. Infrequent commuters do not travel to the university as often as the other groups, and are supportive of transportation investments in general. Despite the overall positive opinion toward investing in public and active transportation projects, there is a minority of funding opponents who are generally against financing transportation projects. The results of this study will be helpful for policy makers intending to communicate the benefits of transportation projects to various community groups.

Although the social and economic benefits of investing in transportation infrastructure are unquestionable, the transportation sector is often underfunded, and as a consequence, necessary infrastructure maintenance and upgrades (*1–3*) are halted. In many regions, planning bodies, governments, and transport agencies have developed strategies to acquire funding for specific transportation projects, but these initiatives frequently lack public acceptance and political will. For example, in Canada, the results of a Metro Vancouver Transit Plebiscite, which was mandated by the province, showed overwhelming public resistance (62% in opposition) to introducing a 0.5% Metro Vancouver Congestion Improvement Tax to support the Mayors' Transportation and Transit Plan (*4*). Although the plan mostly focused on improvements to the public transit system, it also included proposals to expand the bicycle network and replace

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aging bridge infrastructure, benefiting different types of travelers and mode users (*5*).

Public acceptability of funding initiatives and infrastructure improvement programs is not always easy to obtain. Yet, financing and implementing transportation projects typically have higher success rates when local communities are supportive (*6, 7*). The first objective of this study was to measure the current level of support toward transportation infrastructure investment. The second objective was to differentiate and identify groups that would be important allies in promoting funding for public and active transportation infrastructure, as well as others who would require more persuasion to gain their support. Being able to identify supporters and understand the reasons why certain groups oppose transport-related investments is an important step toward identifying the path of least resistance.

The study used empirical data from a university travel survey, in which respondents identified their level of support for taxes to fund various transportation infrastructure investments (highway network, public transportation, bicycle network, pedestrian areas, and sidewalks). The underlying hypothesis was that within a given population, there will be different clusters of people with similar motivations and preferences, who will have similar opinions toward transportation investments. Hence, based on individuals' personal characteristics, commuting experience, and support for public and active transportation infrastructure investment, a factor-cluster analysis was conducted to identify and differentiate the groups.

The paper begins with a review of the current literature on public acceptability of public and active transportation infrastructure investments. It then proceeds with descriptions of the data and methods used in the study. This is followed by a presentation and discussion of the resulting groups from the factor-cluster analysis. Lastly, the paper concludes with policy implications and proposed directions for future research.

LITERATURE REVIEW

The current literature on public opinion toward investment in transportation infrastructure is limited. Studies have often focused on public acceptability of funding options and analyzed transportation ballot outcomes (*8–10*). For example, Hannay and Wachs (*9*) analyzed three local transportation sales tax votes in California, and found that the closer the voters lived to the proposed transportation projects, the more likely they would be to support the tax measures. The authors also found that income levels and political views influenced the level of support received. Haas and Estrada (*8*) studied how the process leading up to the election ballot influenced the outcome. These authors concluded that public participation, public

consensus about a congestion crisis, and the presence of prominent advocates are important factors affecting referendum results.

Other research has examined public opinion toward the allocation of funds to transportation infrastructure projects. For example, the Reason Foundation (11) surveyed 1,200 Americans on transportation spending priorities. The results showed that 62% of the sample believed that the government should prioritize funding for road and highway projects, compared with 30% who believed that the government should prioritize funding for mass transit projects instead. More recently, Gase et al. (12) surveyed registered voters in Los Angeles County on the presence and importance of pedestrian and cycling infrastructure in their community, as well as their travel behavior and preferences. Gase et al. (12) found that the majority of the 1,005 participants viewed pedestrian, cycling, and public transportation infrastructure as important and supported reallocating transportation funds to invest in active transportation infrastructure. The greatest support for pedestrian and cycling infrastructure was found among Latinos, African Americans, and those with lower educational attainment.

In another instance, The Gilmore Research Group (13) was commissioned to conduct a study for the Washington State Department of Transportation, on attitudes toward pedestrian and cycling infrastructure planning in Washington State. The objective of their study was multifold. They were interested in understanding the current active transportation mode share, as well as obstacles deterring people from using active transportation. However, the goal of the study was to garner an understanding of the public opinion toward financing pedestrian and cycling facility improvements. The Gilmore Research Group (13) surveyed 400 randomly selected adult residents by telephone and found that of the survey sample, 98% had at least one working motor vehicle in their household, but only 62% had a bicycle. According to their findings, there was a consensus that the government should provide additional pedestrian facilities to improve walking conditions in communities. Yet, only 48% of the survey respondents were willing to support additional spending on pedestrian infrastructure, assuming that it would not require an increase in taxes. The level of support dropped to 21% if new taxes were needed.

To improve cycling conditions, respondents suggested that the government should provide additional cycling facilities, improve existing facilities, and create safer cycling environments. However, support for increased spending on cycling infrastructure significantly depended on whether new taxes were necessary, and the majority did not support additional taxes. Respondents who were opposed to additional taxes to fund pedestrian and cycling infrastructure typically believed that they were already paying too many taxes, and that there were other, more important projects that the government should fund. Overall, the survey respondents believed that government spending on transportation projects should be prioritized in the following order: (a) expanding the public transportation network, (b) expanding the road network and widening highways, (c) creating safer walking and cycling environments, and (d) expanding the cycling network and trails.

Only recently have academic researchers developed interest in acquiring a deeper understanding of public opinion toward transportation infrastructure projects. For example, Smart (14) set out to assess the determinants of public opinion toward public transportation spending, and found that the volatility of gasoline prices influenced Americans' willingness to support mass transit expenditures. Other significant factors were political views and place of birth. Foreign-born residents in this study were found to be more likely to support public transportation investment than native-born citizens were. Interestingly, income was not a significant factor.

Manville and Cummins (15) also conducted a study to understand why American voters support public transportation. The authors examined the discrepancy between support for public transportation spending and low public transportation ridership. They found that although transit users generally support increased transit spending, transit supporters might not necessarily be transit users. Thus, Manville and Cummins (15) cautioned against associating transit supporters with transit users. At least in the United States, transit supporters and transit users often have different demographic characteristics; relative to transit users, transit supporters are wealthier, better educated, less likely to be immigrants, and more likely to live in single-family homes (15). Furthermore, Manville and Cummins (15) proposed that transit supporters are motivated by their beliefs that transit can reduce congestion, improve environmental quality, provide access for the poor and socially disadvantaged groups, revitalize cities, and create jobs. In other words, transit supporters in the United States may view public transit as a solution to social problems, rather than a method of transportation (15).

In summary, the existing literature, albeit scarce, suggests that personal characteristics such as education, ethnicity, and political views may partially account for a person's opinion toward transportation investment. However, the cited studies were all situated in American contexts, and therefore factors such as ethnicity and race may not play as large a role in determining public acceptability elsewhere.

Other important determinants include a person's proximity to a proposed project and acknowledgment of a congestion crisis. In other words, it seems that perceived personal benefits may affect an individual's opinion toward transportation projects. However, if funding a project requires additional taxes from residents, public acceptability is likely to decline. The studies also demonstrated the influence of prominent advocates, public participation, and gasoline price volatility. Nevertheless, the existing literature on public opinion toward investment in transportation infrastructure is sparse. Hence, this study attempted to expand the existing literature by developing an understanding of different opinions toward various transportation infrastructure investments and underlying motivations, as found in the context of a population of Canadian university students, staff, and faculty.

METHODOLOGY

Data

The study used data from the 2013 McGill Commuter Survey, an online university-wide travel survey conducted over a span of 35 days during March and April 2013. A total of 20,851 McGill University students, staff, and faculty were randomly selected to complete the survey, and prizes were offered as incentives for participation (16). The response rate of the survey was 32%, which is comparable to previous surveys conducted at other North American universities (17, 18). The initial data inspection resulted in a data set containing 5,599 observations (16). However, due to further data requirements, the final sample that was used was reduced to 2,319 observations. These included only respondents whose travel destination was to McGill University's Downtown campus, and did not include individuals traveling to McGill University's suburban Macdonald campus,

as the provision of transportation infrastructure is very different in the two areas.

In the survey, respondents documented details about their typical commuting experience from their home location to McGill University for a cold and snowy day, and similarly for a warm and dry day. For the purposes of this study, one of these weather conditions was randomly selected for each individual and linked to only one commuting trip, which is a method that has been previously tested and applied (19). The survey included questions to capture information such as commute duration, commute frequency, modes used, and mode satisfaction. The respondents also reported sociodemographic information, mode preference, home selection criteria, and personal opinion toward various transportation investments. Individuals who had incomplete responses, selected prefer not to answer, or answered I don't know for general (not mode-specific) questions were removed, to ensure a complete set of responses for each observation. The final set of responses was entered into a factor-cluster analysis, as described in the following subsection, to identify and differentiate between supporters of and opponents against investing in public and active transportation projects.

Methods

The study used a two-step approach to isolate clusters of individuals within the study sample bearing similar characteristics and opinions. First, a principal component factor analysis was used to identify sets of highly correlated variables, which were then grouped as factors. Varimax rotation was applied to the output for better interpretation of the factor loadings. Stand-alone variables that did not group with other variables were eliminated, as were variables that were grouped with others of dissimilar qualities. Only meaningful factors with a minimum eigenvalue of 1.00 were retained for further analysis. The resulting set of factors represents overarching themes from the underlying variables to be treated as uncorrelated variables in the subsequent analysis.

Second, a cluster analysis was conducted to group respondents into clusters, by maximizing the mean difference between clusters and minimizing the mean difference within clusters. Analysis of variance and the Tukey–Kramer method were used to detect statistically significant differences between the resulting clusters. This two-step approach, known as factor-cluster analysis, has been used by other researchers to create cyclist typologies (20, 21), perform public transit market segmentation (22), and profile different groups of people with distinct travel motivations and preferences (23).

In this study, the principal component factor analysis generated eight factors from 27 variables, which are presented in Table 1. Together, the factors account for 63% of the variance of the original variables. The first factor, support for public and active transportation investment, groups variables that inquired about respondents' opinions toward using taxes to improve and expand public transportation, pedestrian areas, sidewalks, and the bicycle network. The second factor, preference for public and active transportation, indicates whether respondents intend to cycle, walk, or use transit more than they currently do. The third factor, preference for driving, is a group of variables related to dependence on and enjoyment of driving. The fourth factor, unpleasant commuting experience, captures a commute's potential negative effects. The fifth factor, commuting

TABLE 1 Factors, Variables, and Loadings

Factor	Variables	Loading
Support for public and active transportation investment	We need to use taxes to improve and expand public transportation.	0.772
	We need to use taxes to improve and expand pedestrian areas and sidewalks.	0.763
	We need to use taxes to improve and expand the bicycle network.	0.704
Preference for public and active transportation	I would like to cycle more than I currently do.	0.699
	I would like to walk more than I currently do.	0.699
	I would like to use transit more than I currently do.	0.606
Preference for driving	We need to use taxes to improve and expand the highway network.	0.761
	I need a car to do many of the things I like to do.	0.691
	I would like to drive more than I currently do.	0.666
Unpleasant commuting experience	I feel stressed during my trips to McGill.	0.847
	My commute to McGill negatively impacts my punctuality, attendance, or working hours.	0.837
	I feel energized when I arrive at McGill.	−0.708
Commuting frequency	How often are you on campus?	0.803
	Are you at McGill full time?	0.798
	I'm on campus during regular workday hours from approximately 9 a.m.–5 p.m.	0.662
Residential selection criteria	When you moved into your current residence, how important were the following factors in your decisions?	
	Cost of commuting (excluding the cost of parking)	0.773
	Proximity to public transportation	0.761
	Being in a location where I wouldn't have to drive	0.696
	Proximity to McGill	0.635
Household characteristics	How many licensed drivers are in your household, including yourself?	0.893
	How many people are in your household, including yourself?	0.858
	How many automobiles are owned by your household?	0.687
Personal characteristics	What is your age?	0.911
	Are you part of faculty or staff at McGill?	0.820
	For how many years have you been regularly commuting to McGill?	0.804
	What is your yearly personal income?	0.742
	For how many years have you been living at your current residence?	0.662

frequency, is composed of variables that affect travel frequency. The sixth factor, residential selection criteria, groups the importance of several considerations when determining home location. The seventh factor, household characteristics, includes the number of licensed drivers, individuals, and owned automobiles per household. Finally, the eighth factor, personal characteristics, includes age, income, occupation, duration at current residence, and the number of years commuting to McGill University.

Next, a nonhierarchical (k-means) clustering analysis was conducted with the eight factors developed from the principal component factor analysis. Reiterations of the cluster analysis were performed to produce results ranging from two to 10 clusters. The best segmentation of the study sample was obtained through five clusters. Separating the respondents into five clusters allowed discernible distinction of opinions, travel patterns, travel experiences, and characteristics between the clusters. The next section describes each cluster in detail.

RESULTS

The five clusters identified from the factor-cluster analysis are strong advocates, highway or transit funders, cycling advocates, infrequent commuters, and funding opponents (Figure 1). The assigned labels were given after careful examination of the cluster analysis results and summary statistics (Table 2), and signify the key characteristics of each cluster.

Strong Advocates

Strong advocates (25% of the sample) support investing in public and active transportation. They show statistically higher levels of agree-

ment for using taxes to improve and expand public transportation (mean of 4.40 of 5), pedestrian areas and sidewalks (mean of 3.76), and the bicycle network (mean of 3.77) than the average individual in the study. Although all the other clusters, except funding opponents, also demonstrated high levels of support toward improving and expanding public transportation, strong advocates were unique in that they displayed statistically higher levels of agreement toward all three public and active transportation investments. Moreover, strong advocates typically wished to increase their use of active transportation, tended to enjoy walking (mean of 3.55) more than the study's average individual, and revealed low intentions to increase driving (mean of 1.56).

Among the different clusters, strong advocates also seemed to experience the most pleasant commute. As a group, they had the least commuting stress (mean of 2.40) and generally did not perceive that their commutes interfered with their punctuality (mean of 2.22). They were also statistically above average in feeling energized when arriving at McGill University (mean of 3.14). Relative to individuals in the other clusters, strong advocates tended to be older (mean age of 50 years) and have higher incomes (median income of $60,000 to $79,999). Of the strong advocates, 99% were full-time McGill University faculty or staff. Individuals in this group were inclined to select their home location strategically to be near public transit (mean of 4.29) and where they would not have to drive (mean of 3.80).

Highway or Transit Funders

Highway or transit funders (24% of the sample) were highly supportive of investing in public transportation (mean of 4.50 of 5). Unlike strong advocates, however, highway or transit funders did not seem to desire an increase in their use of active transportation.
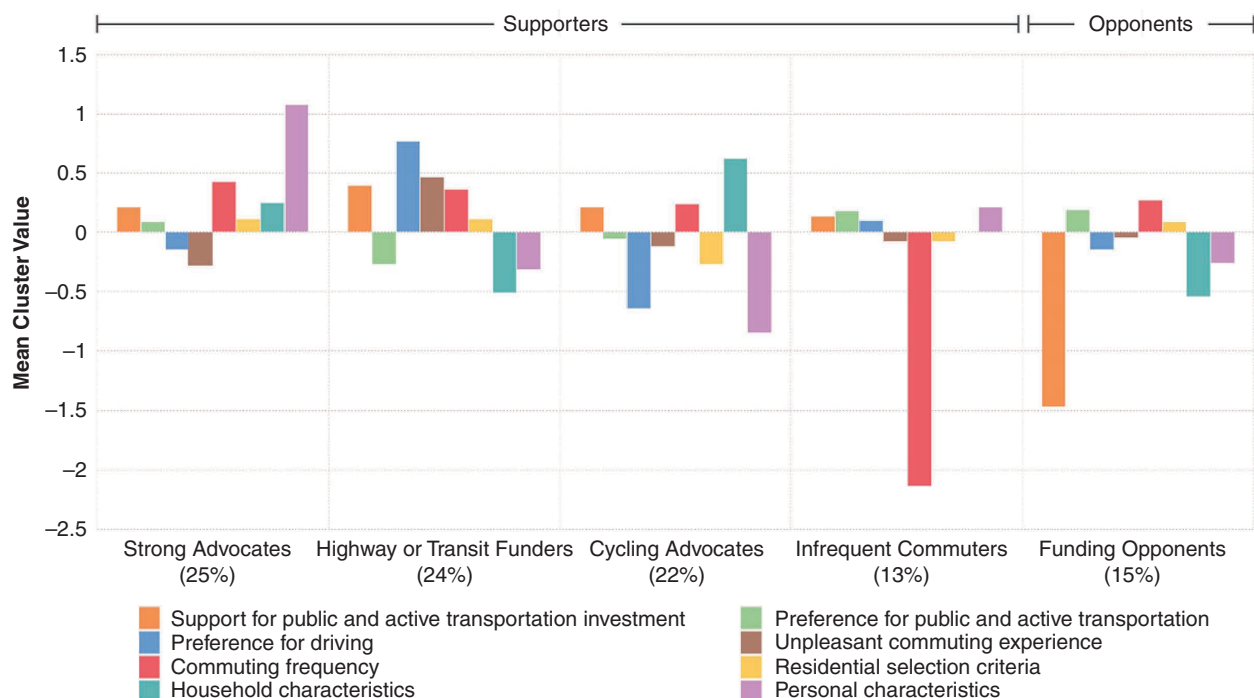

FIGURE 1   *K*-means cluster analysis.

TABLE 2   Summary Statistics: Means of the Variables

	All	Strong Advocates	Highway or Transit Funders	Cycling Advocates	Infrequent Commuters	Funding Opponents
Sample Size	2,319	589	561	521	309	339
Support for Public and Active Transportation Investment						
We need to use taxes to improve and expand						
Public transportation (1–5)	4.12	4.40[a]	4.50[a]	4.20[a]	4.23[a]	2.82[a]
Pedestrian areas and sidewalks (1–5)	3.48	3.76[a]	3.73[a]	3.55	3.62[a]	2.32[a]
The bicycle network (1–5)	3.60	3.77[a]	3.56	4.10[a]	3.66	2.53[a]
Preference for Public and Active Transportation						
I would like to . . . more than I currently do:						
Cycle (1–5)	3.24	3.21	2.85[a]	3.69[a]	3.22	3.23
Walk (1–5)	3.23	3.55[a]	2.98[a]	2.93[a]	3.46[a]	3.31
Transit (1–5)	2.12	2.14	2.10	1.99[a]	2.39[a]	2.06
Preference for Driving						
We need to use taxes to improve and expand the highway network. (1–5)	3.04	2.96	3.84[a]	2.40[a]	3.22[a]	2.65[a]
I need a car to do many of the things I like to do. (1–5)	2.79	3.04[a]	3.22[a]	1.93[a]	3.11[a]	2.65
I would like to drive more than I currently do. (1–5)	1.92	1.56[a]	2.50[a]	1.52[a]	2.00	2.10[a]
Unpleasant Commuting Experience						
I feel stressed during my trips to McGill. (1–5)	2.74	2.40[a]	3.31[a]	2.56[a]	2.66	2.72
My commute to McGill negatively impacts my punctuality. (1–5)	2.70	2.22[a]	3.32[a]	2.70	2.54[a]	2.65
I feel energized when I arrive at McGill. (1–5)	2.87	3.14[a]	2.45[a]	2.95	2.97	2.85
Commuting Frequency						
Frequency on campus (days per month)	18.18	19.39[a]	19.86[a]	20.31[a]	7.20[a]	20.00[a]
Full-time status	0.87	0.98[a]	0.98[a]	0.98[a]	0.17[a]	0.97[a]
Regular work hours	0.76	0.91[a]	0.84[a]	0.76	0.30[a]	0.77
Residential Selection Criteria						
Importance of following factors in selecting current home:						
Cost of commuting (1–5)	3.31	3.32	3.61[a]	2.92[a]	3.27	3.46[a]
Proximity to public transportation (1–5)	4.10	4.29[a]	4.23[a]	3.82[a]	4.03	4.02
Being in a location where I wouldn't have to drive (1–5)	3.75	3.80	3.62[a]	3.89[a]	3.63	3.78
Proximity to McGill (1–5)	3.47	3.44	3.56	3.45	2.95[a]	3.87[a]
Household Characteristics						
Number of licensed drivers per household	1.90	2.03[a]	1.45[a]	2.31[a]	1.80[a]	1.42[a]
Number of individuals per household	2.70	2.99[a]	2.21[a]	3.21[a]	2.61	2.15[a]
Number of automobiles per household	1.00	1.35[a]	0.79[a]	1.00	1.14[a]	0.63[a]
Personal Characteristics						
Age	36.90	50.75[a]	32.93[a]	25.35[a]	42.47[a]	32.09[a]
Faculty or staff	0.53	0.99[a]	0.48[a]	0.12[a]	0.54	0.40[a]
Years at McGill	8.07	16.20[a]	5.32[a]	2.75[a]	8.62	6.19[a]
Income (0–10)	2.03	4.10[a]	1.35[a]	0.46[a]	2.82[a]	1.26[a]
Years at current residence	6.94	12.42[a]	4.36[a]	4.02[a]	8.61[a]	4.67[a]
Current Mode Share						
Cycle	0.07	0.08	0.03[a]	0.13[a]	0.06	0.05
Drive	0.13	0.21[a]	0.09[a]	0.01[a]	0.30[a]	0.10[a]
Transit	0.55	0.59	0.64[a]	0.53	0.47[a]	0.43[a]
Walk	0.25	0.12[a]	0.24	0.33[a]	0.17[a]	0.42[a]

NOTE: The five-point Likert scale: 1 = strongly disagree or extremely unimportant; 5 = strongly agree or extremely important. Income: 0 = $0–$19,999; 10 = above $200,000.
[a]Significantly different from sample mean at $\alpha = .05$.

Compared with the study's average individual, highway or transit funders revealed significantly lower intentions to cycle more (mean of 2.85) or walk more (mean of 2.98). Yet, they were in favor of investing in pedestrian areas and sidewalks (mean of 3.73). Perhaps it was the lack of pedestrian-friendly infrastructure that deterred them from wanting to walk more.

Nevertheless, what distinguished highway or transit funders from other clusters was their relatively high preference for driving. They tended to be the greatest proponents of using taxes to improve and expand the highway network (mean of 3.84), were inclined to perceive that having a car was a necessity (mean of 3.32), and had a comparatively high desire to increase driving (mean of 2.50). These findings may correspond with the relatively low importance they place on not having to drive when selecting their home location (mean of 3.62). Highway or transit funders tended to be unhappy with their current commutes, and showed the highest levels of commuting stress (mean of 3.31) and tardiness (mean of 3.32), as well as the lowest levels of energy (mean of 2.45). The transit share of this cluster was 64%, which was the highest among all the different clusters. However, given the discussed characteristics of highway or transit funders, the mode share distributions may change.

Cycling Advocates

Cycling advocates (22% of the sample) were generally younger individuals (mean age of 25 years), who showed the greatest support toward using taxes to improve and expand the bicycle network (mean of 4.10 of 5). Among the different clusters, they exhibited the greatest desire to cycle more (mean of 3.69), and had the lowest preference for driving. Cycling advocates tended to oppose investing in highway network improvements (mean of 2.40), had low dependency on cars (mean of 1.93), and did not typically desire to increase their car usage (mean of 1.52).

Cycling advocates placed the highest importance on living at a location where driving is not necessary (mean of 3.89), typically found their commutes enjoyable, and endured significantly lower levels of commuting stress (mean of 2.56) than the average individual in the study did. Of the cycling advocates, 88% were McGill University students, who had a median income less than $20,000. Their living arrangements were significantly different from those of the individuals in other clusters. Cycling advocates reported the highest number of individuals (mean of 3.21 persons) and licensed drivers (mean of 2.31 persons) per household, perhaps suggesting that many lived with roommates. Although not all cycling advocates commuted by cycling, they did boast the highest proportion of cycling commuters among the different clusters.

Infrequent Commuters

Infrequent commuters (13% of the sample), by definition, did not travel to McGill University on a regular basis. Compared with the average individual in the study, who commuted to McGill University 18 days per month, infrequent commuters traveled to the university only seven days per month. Nevertheless, infrequent commuters were generally supportive of transportation investments, and did not discriminate between modes, demonstrating levels of support similar to those of strong advocates, highway or transit funders, and cycling advocates for the various transportation infrastructure projects. In other words, individuals identified as infrequent commuters may

hold opinions toward transportation investments that are similar to those of the individuals in the other advocate groups.

Only 17% of infrequent commuters were full-time faculty, staff, or students. Less than one-third were on campus during regular work hours (9:00 a.m. to 5:00 p.m.). Among the various clusters, infrequent commuters seemed to be the least concerned about situating their residence near McGill University (mean of 2.95 of 5). Perhaps due to a combination of these characteristics, 30% of the infrequent commuters commuted by driving, which was the highest proportion among the different clusters.

Funding Opponents

Funding opponents (15% of the sample) were a group of individuals who were against using taxes to fund any transportation infrastructure improvements or network expansions. They showed significantly lower levels of agreement for using taxes to improve and expand public transportation (mean of 2.82 of 5), pedestrian areas and sidewalks (mean of 2.32), and the bicycle network (mean of 2.53) than the average individual in the study. Funding opponents were also opposed to using taxes to improve and expand the highway network (mean of 2.65).

Compared with the average individual in the study, funding opponents placed significantly higher importance on commuting cost (mean of 3.46) and being in proximity to McGill University (mean of 3.87) when selecting their residential location. The high value they placed on commuting cost may be associated with their comparatively low income (median of $20,000 to $39,999). Or it may be important for individuals in this cluster to live near the university, due to their frequent travel to campus (mean of 20 days per month). Funding opponents were also characterized by having the fewest number of individuals (mean of 2.15), licensed drivers (mean of 1.42), and automobiles (mean of 0.63) per household. Considering these attributes, it was not surprising that 42% of the individuals in this cluster commuted by foot.

DISCUSSION

Before discussion of the specifics of the results, it is important to reflect on the situational context of the study. In general, it was found that most people at McGill University support public transit investments, but only a small percentage would like to use it more than they currently do. This discrepancy between transit support and desired increase of transit use among all the clusters is portrayed in Figures 2 and 3. Granted that more than half of McGill University's population commutes regularly by public transit, the lack of desire to increase transit use may be explained by existing frequent use, or by factors relating to service quality and convenience.

There is a general tendency of the McGill University community to limit car use and increase participation in active transportation modes (Figure 3). Interestingly, overall support for investing in pedestrian infrastructure (mean of 3.48 of 5) and expanding the bicycle network (mean of 3.60), although present, is not as strong as the support for public transportation spending (mean of 4.12). Figure 2 illustrates the diverse opinions among the different clusters toward investing in the highway network. In contrast, apart from the constant opposition from funding opponents, opinions about investing in public transportation, pedestrian areas and sidewalks, and the bicycle network are relatively consistent. In general, the opinions of individuals
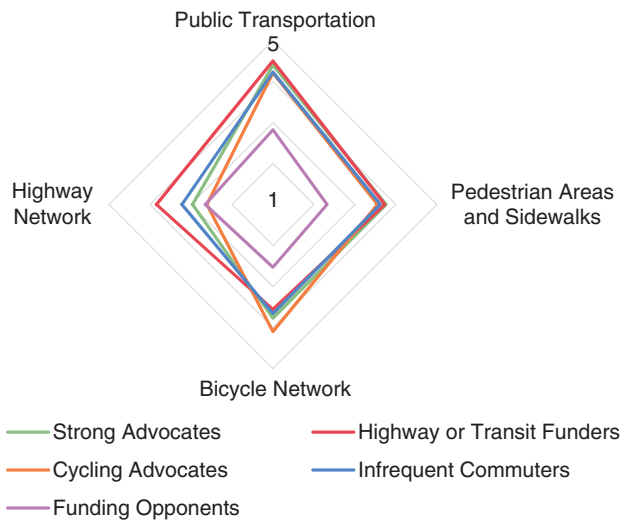
FIGURE 2   Support for transportation investment.

at McGill University about investments in transportation differ greatly from those found in American studies. Hence, the findings of this study highlight that public opinion is context- and culture-specific, and confirm that the results of other studies should not be casually applied to any setting.

Considering the context of this study, it was not surprising that among the five clusters generated from the factor-cluster analysis, only one consisted of individuals who opposed the use of taxes to fund transportation investments (funding opponents). However, it is difficult to interpret whether funding opponents were simply against spending, opposed to transportation infrastructure investment in general, or specifically against the use of tax revenue to fund these projects. As was suggested by The Gilmore Research Group (13), opposition to tax-funded transportation projects may be due to the belief that there are too many taxes already. Or funding opponents may perceive that the government should prioritize financing other projects instead. Nevertheless, proper investigation into the reasons

FIGURE 3   Desire to increase use of mode.

behind the funding opponents' lack of support is essential to address issues of public acceptability. Such an investigation may be done through public consultation, as it would enable policy makers to become aware of public opinion and address public concerns directly.

Strong advocates, highway or transit funders, cycling advocates, and infrequent commuters demonstrated support toward investing in public and active transportation, signaling positive public opinion toward public and active transportation investment. However, this does not indicate that they all had identical motivations and desires. Some infrequent commuters seemed to show a discrepancy between transit support and current transit use. This could be a scenario that is similar to the phenomenon that was described by Manville and Cummins (15), where public and active transportation become ideologies rather than a lifestyle. Although this seems to be a possibility for some, this is not to say that it is the case for all infrequent commuters, especially since commuting by car does not necessarily imply that all trips are made, or are preferred to be made, by car.

Encouraging infrequent commuters to travel more by public and active transportation could potentially help improve their opinion toward public and active transportation investment, to a level comparable to that of strong advocates. A previous study comparing the mode satisfaction of regular public transit users and infrequent public transit users revealed that regular public transit users have higher overall satisfaction with public transit than infrequent users do (24). In the same study, Pedersen et al. (24) also demonstrated that habitual car users tended to underestimate their satisfaction with public transit. Hence, with increased traveling frequency, it may be possible for infrequent commuters to develop more positive opinions toward public and active transportation investment.

Highway or transit funders appeared to be driven by a perceived failure of the existing transportation system. They tended to be unhappy with their current commutes and demonstrated a relatively high preference for driving. Given that most highway or transit funders were transit users, their inclination toward driving may suggest a potential mode switch in the future (25). It would be of value, therefore, to understand their source of dissatisfaction. Understanding the public transit system's weaknesses as experienced by current users would allow effective allocation of funds to finance discernible transportation infrastructure improvements (26, 27). It may also increase user satisfaction and limit mode switches from public transit to driving (25).

There appears to be less support for investing in the bicycle network than for public transportation spending. Hence, cycling advocates are crucial in promoting the importance of expanding the bicycle network. In Montreal, cycling advocates currently have the support of influential politicians who are eager to develop Montreal into a better city for cycling (28). Elsewhere, cycling advocates may need to develop partnerships with influential spokespeople to further their cause. For example, in the Canadian province of Ontario, London Cycle Link recently presented proposals to the city council and demonstrated how implementing cycling projects can help the city achieve the council's strategic goals (29).

Individuals classified as strong advocates are the ideal allies to promote investing in public and active transportation. Since many of them are full-time McGill University faculty or staff, they are likely to be in well-placed positions to endorse the necessity and benefits of public and active transportation infrastructure. Strong advocates indicated an intention to increase walking and cycling trips. It would be interesting to observe whether these motives will be realized with the implementation of quality pedestrian and cycling infrastructure, since researchers have previously found that appropriate installation
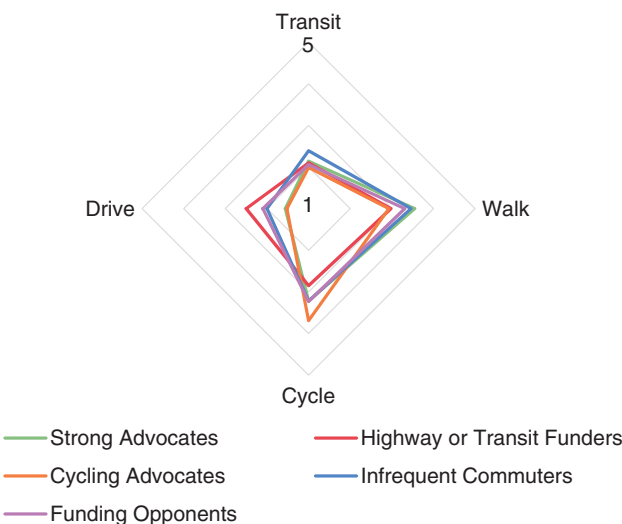
of walking and cycling facilities is associated with increased walking and cycling (*30–32*). However, if the implementation of such facilities does not increase the number of walking or cycling trips for commuting and noncommuting purposes despite the expressed intentions, then it is possible that some individuals answered the survey based on what they assumed was socially acceptable, in lieu of their true sentiments (*33*). Of course, there may be other valid explanations; thus, this is a topic for future research.

Finally, strong advocates, highway or transit funders, cycling advocates, and infrequent commuters possess statistically distinct personal characteristics, such as age and income, when compared with each other. This finding may imply that a person's stage of life partially accounts for that individual's attitudes and preferences (*34*). For instance, cycling advocates, who on average have the lowest income and the lowest average age, are particularly supportive of investing in cycling facilities. Strong advocates, who have the highest incomes and the highest average age, support investing in public transit, cycling, and walking infrastructure. Hence, future research should examine whether current cycling advocates will remain solely enthusiastic about cycling, or whether they will shift toward other clusters, supporting a wider range of transportation infrastructure as they age. The findings from future research may reveal whether the observed phenomenon is a result of life phases or generational trends.

CONCLUSION

In conclusion, this study found that strong advocates are the greatest allies of promoting public and active transportation investments, and cycling advocates are valuable for publicizing the benefits of expanding the bicycle network. Despite the presence of funding opponents, at McGill University, public opinion toward investment in public and active transportation is positive. However, this level of support may be distinct to the university and not representative of the public opinion in Montreal. Hence, care should be taken when one extends the geographic application of this study's findings. In addition, it is possible that survey respondents answered the questions in a manner they thought was socially appropriate and concealed their true opinions (*33*).

It is important to develop a deeper understanding of the reasons behind opinions that oppose transportation investments. Ballots reveal preferences but do not disclose underlying motivations (*15*). Therefore, based on the existing survey questions, it was not possible to interpret whether funding opponents were simply against spending, opposed to transportation infrastructure investment in general, or specifically disagreed with the use of tax revenue to fund these projects. Future research should aim to nurture a better comprehension of issues hindering public acceptance, to address them effectively, and personal interviews would be an effective method.

Discussions with highway or transit funders may uncover current weaknesses in the transportation system, which could guide the allocation of funds to finance discernible transportation infrastructure improvements. Although having a public dialogue is important to gauge public opinion and understand underlying issues, there is no straightforward approach to address the various concerns of the different clusters. Instead, policy makers should carefully weigh the criticisms of each cluster to find the best way to improve public acceptability.

Lastly, it is important to keep in mind that stronger support for transportation infrastructure investment may not automatically translate into increased mode usage (*15*). Therefore, while advocating for public and active transportation investments, transit agencies and cities should also promote increased usage of public transit, walking, and cycling.

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