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Are New Campus Mobility Trends Causing Health Concerns?

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Abstract: An influx of new mobility trends such as fare-free bus transportation, ride hail, and e-scooter services to improve access and affordability of transportation on campus may be shifting the travel behavior of campus patrons such that it affects their long-term health outcomes. The main research questions explored in this study are as follows: (1) why university patrons choose new modes of travel?; (2) what existing mode did the new modes of travel replace for the riders?; and (3) is the average body mass index (BMI) of users primarily using non-motorized transit options lower than those using motorized or both (referred to as hybrid) for on-campus travel needs? An online survey was administered to a campus community (n = 3309) including students (48%), faculty (15%), and staff (37%) in fall of 2018 when fare-free bus transportation and e-scooters became available on campus, and a gradual increase in ridership of ride-hail services was simultaneously observed. This study found that campus patrons were more inclined to replace active modes of travel with affordable and accessible modes of transportation, thereby substituting their walking or biking routine with app-based transportation services. The mean BMI among travelers who chose motorized transportation modes was more than active travelers, and the BMI was statistically significantly associated with age, gender, race, class standing (undergraduate/graduate), and residence on/off campus. This study concludes with suggestions to prevent substitution of active with non-active transport choices and provides policy guidelines to increase awareness on achieving physical activity levels through active modes of travel for university patrons.

Keywords: non-motorized transport; motorized transport; BMI; campus mobility; physical activity

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1. Introduction

Universities tend to promote active mobility on campus that leads to safer access and convenience and promotes health for its patrons. However, travel time and affordability have also been researched to promote sustainable transit behavior on campus [1,2]. Transit policies of providing fare-free bus routes, also known as "unlimited access", provide an alternative mode of travel to transit non-users while adding no cost to its current patrons [2,3]. While providing better transit infrastructure, university environments shape the mobility behavior for young adults studying and residing on campus [4]. The university discussed in this paper is a higher education institution located in the mid-western region of the United States and is referred to as 'university' or 'campus' henceforth.

The university introduced 'unlimited access' to its campus patrons on the transit bus service on six routes plying in and around the campus. This was initiated in the fall of 2018 and aimed to improve campus mobility by making it more efficient, safe, and convenient for campus patrons [5]. Simultaneously, the campus was also inundated with single-rider e-scooters from Bird and Lime companies, which promote micromobility and last-mile connectivity for its users [6]. Lastly, ride-hail ridership has been gradually increasing since 2014 in this university city [7]. With all these shifts in transit availability on campus, the research on campus patrons' travel behavior and preferences became warranted.

1.1. Travel Behavior for the Campus Community

Campus mobility has an important role to frame travel behaviors and health outcomes for young adults [2,8,9] especially considering that students' travel behaviors have gradually shifted based on their needs to travel and available transportation expenditure. Eboli and colleagues [10] discussed that both 'patience' and 'laziness' can contribute to waiting for public transportation rather than walking. Socioeconomic factors related to travel by a personal vehicle suggest that males, those over 55 years of age, and university staff are more likely to have higher VMTs compared with females, younger university patrons, and students [11]. However, low preference for bus transportation is due to low frequency and longer wait times [12,13], which provides preference for ride hail and electric mobiles for travel [14]. Along the same line of thought, Hamad et al. [15] found that weather played a significant role in avoiding public transit as a mode to travel to the campus by university patrons. Moreover, Allen and Farber [16] studied student mobility across six postsecondary institutes in Canada and found that students who use a personal vehicle commute less often than those who walk and students with a transit pass commute more often supporting the evidence that 'unlimited access' improves student commute corroborating the research by several researchers who look not only at student travel but also at other patrons' travel behavior such as staff and faculty [3,17,18]. Research by Shannon et al. [18] also stressed on the premise that promoting active travel would be effective to not only students but also staff as they found that 30% of the students and staff at a university in Australia were open to switching to active modes of travel. A Shared Micromobility in the US:2018 report states that e-scooters provide the element of fun for young adults and for them to get around faster and is, therefore, increasing in ridership [19]. Even though e-scooters are associated with public safety issues [20], they address the convenience [21], rider enjoyment [22], and affordability [23] criteria in some students' mobility decisions. They have also been researched to find better gender parity and also provide better patronage among women and low-income populations [24].

Micromobility and ride-hail services have become ubiquitous on campus due to improved connectivity, perception of better transport solutions for the environment, and less burden of car ownership [14,25,26]. The new modes can lead to healthier benefits such as a smaller number of vehicles and miles travelled leading to less congestion and air pollution, creating a need for more open spaces, which otherwise would be covered with traffic and parking lots [27,28]. Micromobility and ride hail are emerging among young adults whose travel behavior is dependent on fast and cheap travel modes [23,29,30]. However, these new trends have also been dubbed 'disruptive' by researchers and planning and policy experts due to transforming mobility behavior, economic and policy impacts on the existing modes, and impacts on health determinants related to transport [23,27].

1.2. Travel Patterns on Campus

Research on students' travel patterns shows that instead of them being concentrated around a few peak hours of traffic, students and faculty mobility patterns are spread largely according to weekday class schedules and are inter-dependent on complementary transit routes, proximity to transit hubs, environmental conditions, and personal barriers [31,32]. Students living on campus have less distance to travel and traditionally have relied on walking, biking, skateboarding, or campus shuttles to access different parts of the campus. In contrast, students living off campus and those not living within walking distance depend on biking, bus transport, or personal vehicles [2,12].

1.3. Using a Health Indicator: Body Mass Index with Travel Preferences

Active and public transportation is significantly associated with lower BMI among both men and women when compared with private transport modes [33,34]. Non-motorized transport (NMT) such as walking, cycling, and skateboarding improves physical activity levels [35,36] and is associated with lower body mass index (BMI) in comparison with car, taxi, or motorcycle riders [33,37], and bicycle users have overall better fitness results in comparison with pedestrians and other transport modes in different environments [38,39]. Therefore, the thrust of enhancing mobility on university campuses has been shown to take the form of overall improvement in active mobility infrastructure and bike-share programs, reducing travel times and promoting mass-transit modes [2,8,40–42]. Crist et al. [37] discussed that transit commuters accomplish more physical activity than drivers and, therefore, should be considered as an active form of travel, while Tribby, Graubard, & Berrigan [43] found no association between ridesharing and changes in travel-related walking in a national and a metropolitan area survey using the National Household Travel Survey of 2009 and 2017.

Along with the research supporting the use of the BMI as a health indicator, there has also been research stating some limitations of using the BMI as a health indicator, and specifically for using it for certain conditions and illnesses. Rothman [44] stressed on the facts that BMI metrics to assess health are flawed as they do not take into consideration "age, sex, bone structure, fat distribution or muscle mass" (p. S56). They suggest using objective measures to obtain the total body fat content, densitometry, and body fat percentages. Shields et al. [45] specified additional measures such as abdominal obesity to assess obesity as a risk factor for cardiovascular disease risk. Similarly, Hartanto & Yong [46] showed that the waist-to-height ratio (WHR) was a superior measure of the adverse impacts of obesity on memory and executive functions compared with the regular BMI calculation. Charbonneau-Roberts et al. [47] stressed on revisions to using the standing BMI as an indicator of health risk, especially when it comes to Inuit and Far East Asian populations, and thus suggested the use of sitting BMI calculations.

There is limited research for a university campus evaluation of a newly implemented transit policy in comparison with new private modalities of travel such as e-scooters and ride-hail services. This research highlights the needs for evaluating transit policies in light of shifting travel behavior for young adults and discusses policy recommendations to avoid substitution of active mobility such that transit on campus promotes an active lifestyle and a healthy behavior for young adults to pursue after graduation.

2. Methods

The main research questions explored in this study are as follows: (1) why university patrons choose new modes of travel?; (2) what existing mode did the new modes of travel replace for the riders?; and (3) what is the average body mass index of users using primarily non-motorized transit options compared with those using motorized or both (referred to as hybrid) for on-campus travel needs?

2.1. Study Framework

The aim is to understand if campus mobility has a relationship with health outcomes for university patrons and what factors can influence their travel behavior using three research questions. The first question investigates whether respondents select new modes of travel on and to campus, and the reason for it. The second question asks for substituted modes of travel if the new modes were not available. The third question asks about the BMI of users travelling on campus (a) for different frequency of unlimited access to bus transportation and (b) based on the three different categories of travel: active (non-motorized), motorized, and hybrid (chose one of each)? The respondents reported their own weight and height, and the BMI was calculated using the standard formula. Two BMI categories were created: (a) underweight and normal (mean BMI < 25 lbs/inches^2) and (b) overweight and obese (mean BMI $\geq$ 25 lbs/inches^2); and the categorical variable was used in the analysis. The BMI was used as an indicator of health in this study as other alternatives to inactivity and obesity would have been more of an invasion of privacy and would have prompted more respondents to not answer those questions at all. Asking about height and weight provided the least invasion into their privacy and was, therefore, chosen as the assessment metric. Even though this paper included transit modal options of e-scooters and ride hail, there are fourteen choices provided that were categorized based on physical activity levels and travel modes. 'Walking', 'biking', and 'skateboarding' were categorized as non-motorized transportation (NMT) modes due to a relatively higher level of physical activity involved in commuting. Wheelchair was also provided as an option, but no responses were recorded from the participants. 'CATA', 'driving alone', 'carpooling', 'motorcycle, motorized bike or moped', 'uber or lyft', 'taxi', 'zipcar', 'electric scooter', and 'special transit' were categorized under motorized transportation (MT). Respondents who chose 'other' were recategorized under the NMT or MT categories based on their responses. As the question allowed for multiple selections, respondents who selected at least one NMT and one MT option were categorized as a hybrid category. The last question was further analyzed if there was any statistical difference in the BMI with the mode of travel reported by the users.

2.2. Data Collection

This study was approved by the University Institutional Review Board (IRB) as exempt: STUDY00002374. The cross-sectional study was pilot-tested with a few students. After reviewing the pilot-test responses, the survey was administered online using Qualtrics to collect data during the month of March 2019. The participants were recruited through the online listserv for the campus community, which included students, faculty, and staff. A total of 3309 survey responses were collected.

2.3. Data Analysis

The preliminary examination of sociodemographic variables illustrates the preferences of travel modes of the respondents for this study. Thereafter, the results of the three research questions are presented. Logistic regression is conducted for the last research question as the dependent variable, and four of the six independent variables are categorical [48,49] to test if the mean BMI is significantly associated with travel patterns, as well as age, undergrad/graduate, gender, race, and living residence variables ($p < 0.05$).

3. Findings

3.1. Preliminary Results

Table 1 shows the travel to and on campus for various university patron categories. This table breaks down travel modes used into three categories: non-motorized (NMT), motorized (MT), and hybrid (HYB). While the NMT and MT modes are intuitive, the HYB mode involves a combination of an NMT and an MT mode for travel. Overall, a majority of the campus population uses MT modes to get to the campus and a combination of NMT and HYB modes for their on-campus travel needs. The only exceptions to the majority who use MT modes to get to the campus are those who live on campus (as this variable would not be calculated for them) and those without access to a car, a majority of which use NMT modes to get to the campus. These patrons probably live closer to the campus since they do not have access to a car and can probably just walk/bike/skateboard to the campus. For the modes used on campus, a majority of males used NMT modes while females used HYB, undergraduates were more likely to use HYB modes while graduate students used NMT, those living on campus were more likely to use HYB modes while those living off campus were more likely to use NMT modes for their on-campus travel, and those without access to a car used NMT more compared with those with access to at least one car as they were more likely to use HYB modes for their on-campus travel needs. There were no differences in the majority of different races and those with or without disabilities as they were more likely to use HYB modes for their on-campus travel needs. A brief explanation on the disability variable shown in multiple analyses throughout is in order. This variable is made up of about six types of disabilities (namely hearing, vision, cognitive, ambulatory, self-care, and independent living). Most of the respondents in this study (over 52%) said they do not have any disability, while less than 2% (the next highest chosen option) mentioned they had difficulty with hearing or vision.

Table 1. Frequencies for modes used to and on campus.

Variable	Mode to Campus				Mode on Campus			
	n	**NMT**	**MT**	**HYB**	**n**	**NMT**	**MT**	**HYB**
Population	1865	7.40%	78.39%	14.21%	2312	41.83%	12.02%	46.15%
Mean BMI		24.57	27.69	25.32		25.6	28.33	27.06
Gender								
Male	573	10.12%	71.20%	18.67%	708	45.34%	13.98%	40.68%
Female	1069	5.61%	83.16%	11.23%	1337	39.34%	10.47%	50.19%
Student								
Undergrad	401	16.21%	59.85%	23.94%	826	42.98%	7.26%	49.76%
Graduate	248	7.66%	72.98%	19.35%	271	57.93%	5.90%	36.16%
Residence								
On campus	0	-	-	-	443	40.86%	8.35%	50.79%
Off campus	653	12.86%	65.08%	22.05%	650	51.23%	5.85%	42.92%
Car								
No Car	10	50.00%	20.00%	30.00%	10	70.00%	0.00%	30.00%
>1 car	678	4.57%	85.10%	10.32%	677	37.37%	16.10%	46.53%
Race								
White	1353	7.46%	78.79%	13.75%	1663	42.57%	11.06%	46.36%
Non-White	265	6.04%	78.87%	15.09%	336	37.20%	13.10%	49.70%
Disability								
No disability	1360	7.79%	77.57%	14.63%	1696	42.98%	9.55%	47.46%
>1 disability	242	5.37%	83.47%	11.16%	302	35.10%	18.87%	46.03%

3.2. Factors for Choosing Selected Mobility Options

Answering the first research question, Table 2 shows the reasons behind respondents' travel behavior preferences (multiple selection) for choosing newer transit modes such as the bus with unlimited access on campus, ride hail, or e-scooters; it shows that the highest number of respondents selected 'bad weather' (65%) and 'convenience and easy to use' (60%) as their reason to use the bus showing the likelihood of using public transportation due to external factors; while 48% selected to 'save money on gas and parking', 47% 'didn't own or have access to a car', and 41% selected 'faster than alternatives'. Respondents' preferences for choosing ride hail were that they do not own or have access to a car, bad weather, and convenience (over 60% of the respondents chose these reasons), while 51% chose that it is faster than alternative options. For the respondents who chose to take e-scooter trips, 78% and 69% selected them for fun and to get around easier and faster, respectively, and less than 25% selected them to save money over other transportation options and because it is good for the environment. Therefore, based on these results, the travel behavior on campus can be inferred to be influenced by access to a personal vehicle, weather, and convenience for transitioning to newer modes of travel.

3.3. Substitution Effect

Answering the second research question, findings shown in Table 3 indicate that free bus rides and e-scooter rides have replaced travel modes for almost 54% and 38% of active mobility travelers (or NMT travelers), respectively, and ride hail has replaced almost 71% of hybrid travel modes (HYB) (assuming that active mobility will be less preferred as a trip mode). On the other hand, ride hail has been chosen over other motorized modes (23.5%) of travel, and e-scooters have been chosen over hybrid modes of travel, which are both positive trends to reduce the need for parking on campus and improved accessibility. However, the affordability of ride hail, safety concerns and parking for e-scooters, and congestion on campus roads are still problematic at peak times during the day.

Table 2. Top choices for why respondents chose a certain mode.

Mode	% of Responses
Bus	
Bad weather	65%
Convenience	60%
Saves money	48%
No access to a vehicle	47%
Faster than alternative modes	41%
Ride Hail	
No access to a vehicle	69%
Bad weather	63%
Convenience	60%
Faster than alternative modes	51%
Difficult to find parking	17%
E-scooter	
It is fun	78%
Get around easily and faster	69%
Saves money	21%
Good for the environment	21%

Table 3. Substitution Effect and Comparative BMIs.

Variable		n	Mean BMI
BUS		342	
	NMT	54.10%	24.18
	MT	14.00%	25.83
	HYB	31.90%	25.14
HAIL		34	
	NMT	5.90%	25.81
	MT	23.50%	26.99
	HYB	70.60%	22.73
ESCOOT		239	
	NMT	38.00%	25.39
	MT	13.00%	22.94
	HYB	49.00%	25.19

The trend for choosing ride hail for campus patrons is due to the inaccessibility of personal vehicles, and it is faster than alternative routes such as public transportation [23]. E-scooter riders chose to use this mode for fun and to get around faster. This trend is more prevalent in younger adults and gradually increasing as seen from a report on Shared Micromobility in the US: 2018 [19]. However, the number of accidents and major injuries reported with e-scooter riders should caution young and mature adults to follow the road safety rules and riding responsibly and for planners to enforce traffic rules that safeguard other riders.

3.4. Association with BMI

Before answering the third research question, the mean BMI was calculated for respondents with various sociodemographic characteristics. Table 4 provides an overview of the BMI for various respondent sub-groups.

Table 4. Demographic frequencies and comparative mean BMIs.

Variables	Options	%	Mean BMI (lbs/in^2)
Age (in years) (n = 2143)	Up to 24	38.64	24.57
	25–34	18.53	26.87
	35 to 64	39.66	28.50
	65 and up	3.17	26.90
Gender (n = 2081)	Male	34.69	26.88
	Female	65.31	26.41

Table 4. *Cont.*

Variables	Options	%	Mean BMI (lbs/in^2)
Type of respondent	Student	48.04	24.99
(n = 3227)	Non-students	51.96	28.14
Grad-Undergrad	Undergraduate	75.21	24.58
(n = 1147)	Graduate	24.79	26.24
Residence	On campus	40.27	24.4
(n = 1140)	Off campus	59.73	25.45
Car	No car	26.50	30.08
(n = 1000)	At least one car	73.50	27.5
Race	White	80.40	26.73
(n = 2097)	Non-White *	19.60	25.8
Disability	No disability	86.31	26.28
(n = 2030)	At least one or more disability	13.69	27.85
BMI lbs/inches^2 n = 1954	Underweight (<18. lbs/inches^2)	2.45	
	Normal (18.5–24.9 lbs/inches^2)	47.28	
	Overweight (25–29.9 lbs/inches^2)	27.68	
	Obese (30+ lbs/inches^2)	22.59	

* Non-White category includes African American, Asian, American Indian and Alaskan Native, Native Hawaiian and other Pacific Islander, and others.

3.4.1. BMI for Different Modalities Used on Campus

Table 5 shows the mean BMIs by selected modes of travel for various frequencies of travel. Respondents who used the bus less than once per week had the highest mean BMI of 27.18 lbs/inches^2, which is considered overweight in comparison with those who used it more frequently. This trend is evident for the ride-hail and e-scooter modes as well. The number of respondents for ride-hail frequencies is few, so those results should be read with caution. However, those responding frequencies for the bus system and e-scooters indicate that these modes require some form of active travel, and, therefore, the less the people use them, the more likely they are to be overweight.

Table 5. Mean BMI for various mode frequencies.

Variable	Options	Number of Respondents	Percentage	Mean BMI
BUS frequency	At least once per day	226.00	51.95%	24.89
n = 435	4–6 times per week	58.00	13.33%	25.54
	1–3 times per week	46.00	10.57%	24.50
	Occasionally, but less than once per week	78.00	17.93%	27.18
RIDE-HAIL frequency	At least once per day	0.00	0.00%	-
n = 26	4–6 times per week	2.00	7.69%	20.28
	1–3 times per week	10.00	38.46%	22.81
	Occasionally, but less than once per week	14.00	53.85%	25.10
ESCOOTER frequency	At least once per day	19.00	8.88%	23.89
n = 214	4–6 times per week	28.00	13.08%	23.40
	1–3 times per week	54.00	25.23%	25.05
	Occasionally, but less than once per week	113.00	52.80%	25.47

3.4.2. BMI Comparisons for Alternative Modalities

This study asked for alternative modes to the bus, ride hail, and e-scooters if these modes were not present. Respondents who would have substituted their travel with non-motorized travel were grouped as NMT, respondents who would have used motorized travel were placed in MT, and those who would have used at least one of each were grouped as hybrid (HYB). Table 6 shows a majority of the respondents who rode the bus said that if the bus was not available, they would have used other non-motorized travel modes (54%). The average BMI for this group of respondents was the lowest at 24.18 when compared with those that said they would have used some motorized mode of travel (14% with a mean BMI of 25.83) and those that would have used a hybrid mode of travel (32% with a mean BMI of 25.14). This result is understandable as on-campus travel is usually by walking/biking for most respondents, and unlimited fare-free access to the bus system would be attractive to this group. It is also noteworthy that the BMI for those that would have used a motorized form of travel if the bus was not available is the highest of the three alternative travel groups. The group of respondents who used ride hail was considerably small at 34 people, so the categorization into the NMT, MT, and hybrid alternative modes must be read with caution. However, a large majority (70%) of respondents said that they would have used a hybrid form of travel if ride hail was not available, and this group has the lowest BMI at 22.73. Again, those who said that they would have used a motorized form of travel if the ride hail was not available had the highest BMI at 26.99 compared with the other two alternative travel modes. Lastly, the majority of the e-scooter users (49%) said that they would use a hybrid form of travel if the e-scooters would not be available. Similar to the other modes, those who would have used a motorized form of travel if the e-scooters would not be available to them had the highest BMI at 25.39 when compared with the other alternative modes.

Table 6. Comparing BMI among Alternative Group Modes.

Variable	n	Mean BMI
Public Transit (Bus)	342	
Non-Motorized Transport	54.10%	24.18
Motorized Transport	14.00%	25.83
Hybrid Mode of Transport	31.90%	25.14
Ride-hail	34	
Non-Motorized Transport	5.90%	25.81
Motorized Transport	23.50%	26.99
Hybrid Mode of Transport	70.60%	22.73
E-Scooter	239	
Non-Motorized Transport	37.70%	25.39
Motorized Transport	13.00%	22.94
Hybrid Mode of Transport	49.00%	25.19

Logistic regressions are conducted as the dependent variable, and eight of the nine independent variables are categorical [48,49]. The likelihood of being overweight or obese is significantly associated with age, undergrad/graduate, gender, race, and residence variables and is statistically significant ($p < 0.05$) (see Table 7). This also indicates that males are 1.5 times and White respondents are 1.3 times more likely to be overweight and/or obese than females and non-White respondents. Undergraduates are 0.6 times and on-campus residents are 0.5 times less likely to be overweight or obese than graduates and off-campus residents. The associations between having a disability, or having access to a vehicle, and BMI were not statistically significant.

Table 7. Logistic Regression with Dependent Variable BMI, Odd's Ratio = exp(B).

Variable	Wald	S.E.	Exp(B)
Age (Average) (n= 1949, R^2 = 0.09)	121.320	0.003	1.038 ***
Gender (Ref Female; n = 1901, R^2 = 0.01)	16.742	0.096	1.486 ***
Grad/Undergrad (Ref Grad; n = 954, R^2 = 0.01)	10.097	0.152	0.616 **
Race (Ref Non-White; n = 1874, R^2 = 0.003)	3.854	0.128	1.286 *
Disability (Ref No disability; n = 1872, R^2 = 0.002)	3.323	0.135	1.278
Residence (Ref Off Campus; n = 950, R^2 = 0.02)	15.154	0.140	0.576 ***
Cars (Ref No Car; n = 607, R^2 = 0.00)	0.012	0.735	0.923
Mode On Campus (Ref Hybrid; n = 1920, R^2 = 0.01)			
Non-Motorized Transport	5.909	0.097	0.790 *
Motorized Transport	5.118	0.157	1.428 *

Table 7. *Cont.*

Variable	Wald	S.E.	Exp(B)
Mode to Campus (Ref Hybrid; n = 1530, R^2 = 0.03)			
Non-Motorized Transport	0.001	0.233	0.993
Motorized Transport	23.997	0.150	2.088 ***

* $p < 0.05$, ** $p < 0.01$; *** $p < 0.001$ Ref = Reference Category; R^2 = Negelkerke R^2; logistic regression is testing likelihood of being overweight/obese.

4. Discussion

Results to the first research question on why people choose different modes of travel on campus pointed to issues of access to a personal vehicle, weather, and convenience. Results for the second research question on what existing modes did the new modes replace provided some nuances. Non-motorized mode users switched to the bus because of the free bus rides on campus and to e-scooters due to the availability on campus. Hybrid mode users switched to ride hail due to the inaccessibility of a personal vehicle and due to this mode being faster than the alternative modes. Lastly, results to the third research question on the association between socioeconomic characteristics, various modes used, and BMI suggested that males, White, graduates, and those living off campus were more likely to be overweight/obese compared with females, non-White, undergraduates, and those living on campus. Those respondents who would have chosen motorized transport modes if the bus was not available had the highest BMI, while those who would have chosen motorized modes if the e-scooters were not available had the lowest BMI.

4.1. Policy Recommendations: Institutional Transport Policies and Programs

Changing mobility to a less active mode is a by-product of improving accessibility and convenience for travelers. These trends are concerning as this is devaluing the active lifestyle for primarily walkers, cyclists, and skateboarders, and indicating travel time and convenience can lead to less physical activity if they choose to travel by motorized modes. While free and easy access to transportation assists residents, especially those on low incomes, planning needs to consider the health implications of modal choice. This study corroborates research showing that active mobility users have, on average, a lower mean BMI than those using hybrid and motorized modes [22,50]. Accessing public transportation does encounter more physical activity as it requires walking or biking for access and egress purposes. Therefore, a slight trend of normal and marginally overweight BMI among those frequently travelling using public transportation than the higher BMI for those who rarely use bus services (less than once per week) is understandable. Encouraging more use of the bus system on campus by giving free rides is a step in the right direction. Policies coupling this mode with other active and sustainable modes like e-scooters and walking/biking would enhance the overall health of these riders. Students, both graduates and undergraduates, and those residing on campus tend to rely more on hybrid modes of travel on campus, which can be attributed to less travel time to attend classes and convenience factors. Students residing on campus tend to have lesser travel distances [29,51] and are, therefore, negatively influenced by the addition of convenient modes of travel that reduces their active mobility.

A bicycle share program can also benefit campus patrons [52], especially those residing on campus to prevent them from shifting toward motorized transport. University patrons living off campus who drive or use hybrid modes to travel to attend classes can benefit from accessible alternate modes of travel that reduce the need for more parking spaces and noise and air pollution in the area. Even though bus rides for all on campus are free, reduced bus fares or bus passes for students living further away can be provided rather than have them depend on their personal vehicles. However, preference for non-motorized travel behavior requires conducive environmental conditions, safe infrastructural amenities, and efficient travel time that can be benefitted with integrated and real-time management of transit services for accessing alternative modes of travel [21,26].

4.2. Policy Recommendations: Enable Safe Transit Infrastructure

While the trends of new modalities are surging, the number of accidents and major injuries reported in e-scooter accidents should caution young and mature adults to follow the road safety rules and riding responsibly and for planners to enforce traffic rules that safeguard other riders. Moving toward shared micromobility, which includes the use of bikes, e-bikes, e-scooters, and autonomous mobility in the future, university campuses can integrate transport infrastructure to safely promote active mobility and accessibility for all patrons.

Improving campus mobility for all student classes such as undergraduates, those with no access to a vehicle, and students who may be differently abled is vital to promote healthy lifestyles. Transportation for people with disabilities requires nuanced and safe approaches to promote active mobility for them that will reduce their dependency on motorized mechanisms and improve travelers' health [53]. Few infrastructural improvements such as segregated pathways for cyclists, skateboarders, and shared micromobility riders with designated parking stops and cautionary intersections where high pedestrian traffic flows are encountered can ease the movement/traffic flow while preventing accidents from occurring.

4.3. Policy Recommendations: Encourage Non-Motorized Transportation

According to these results, the campus environment, weather conditions, and convenience are primary factors that influence travel behavior for campus patrons, while secondary factors include expenditure on car and parking, access to a vehicle, and parking availability, as also reported in previous studies [29,54]. While unlimited access for campus patrons may have improved mobility and affordability of transit on campus, substitution of walking, biking, or skateboarding may affect the long-term health and behavior for a young individual. Policies that encourage the use of e-scooters and transit focus on the middle ground between motorized and non-motorized modes of travel. There is some aspect of physical activity involved with both modes, and they are far more sustainable than motorized modes of transportation, especially when results show that convenience, weather, and access to a vehicle are the biggest issues affecting the shift to motorized modes.

4.4. Limitations

This study has common limitations seen in qualitative surveys. When it came down to answering questions on height and weight, the responses to those questions dropped considerably showing that people did not want to answer questions of a personal or private nature. There may be response bias while reporting height and weight by respondents, which is used to determine the mean BMI of respondents as the dependent variable. This study is conducted in a region with extreme winter conditions that can prevent users from active travel due to weather conditions and, therefore, limits its generalizability to other US university campuses or similar-sized cities.

Future research can incorporate additional health indicators such as waist circumference, level of physical activity, and travel satisfaction as evidence for assessing health relationships with travel behavior. A better sampling strategy would allow for creation of quotas in order to have representation from each group, students, faculty, and staff. And finally, an activity tracker and a travel diary that participants in this study agree to use for a certain number of weeks would give a more accurate picture of the travel routes and physical activity during a specified time period.

5. Conclusions

Actions within a microcosm, such as a university campus, can often reflect behaviors, opportunities, and outcomes in a small city. While unlimited access for campus patrons may have improved mobility and affordability of transit on campus, substitution of walking, biking, or skateboarding may affect the long-term health and behavior for a young individual. Active mobility is a choice that promotes physical activity for campus patrons, and, therefore, faculty and staff (adults) can be role models to drive healthy lifestyle habits to influence young minds. Incentives to promote the use of active transportation among faculty and staff and discourage single-occupancy vehicle commutes may promote a behavioral shift for students to engage in active commuting as well [37]. The university's sustainable mobility initiatives can prioritize active mobility integrated with public transit opportunities beyond campus boundaries, which limits students' use. Ride share and electric mobility can be enhanced for off-campus riders and make it more accessible for vulnerable students including those with disabilities. From the literature, we see that ride sharing and e-mobility may offer improved air quality, traffic noise reduction, and less traffic congestion and, therefore, can enhance health benefits [27], but land-use planning and transportation planning need to assess infrastructural improvements and active commuting programs for university patrons and safety guidelines for all riders. Active transportation should continue to be promoted through engaging active groups on campus that can spread awareness about substituting their physical activity and combining travel routes with micromobility or autonomous vehicles [55]. After all, travel behaviors and habits cultivated as young adults are likely to shape behaviors as they move into their mature adult lives, and this can affect health outcomes.

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