Chapter 9
Examining the Relationship Between Commuting and it's Impact on Overall Life Satisfaction

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Abstract Commuting to work and school can be viewed as an unpleasant and necessary task. However, some people enjoy their commutes and be satisfied with it. Trip satisfaction can have a positive impact on overall life satisfaction of individual. The purpose of this study is to analyze the relationship between individuals' satisfaction with their commuting trips and its impact on overall life satisfaction. This study is based on the results of the 2015/2016 McGill Commuter Survey, a university-wide travel survey in which students, staff and faculty described their commuting experiences to McGill University, located in Montreal, Canada. Using a Factor-Cluster analysis, the study reveals that there is a relationship between trip satisfaction and the impact of commuting on overall life satisfaction. One result of the study shows that cyclists and pedestrians who have the highest overall trip satisfaction, report that their life satisfaction is most impacted by their commute, and have the highest overall life satisfaction. Also, for all mode users, one or two clusters exhibit lower trip satisfaction, report that satisfaction with their commute does not greatly influence their life satisfaction, and claim having access to and using fewer modes relative to other users of the same mode. These results, in addition to the results that active mode users have high life and trip satisfaction, suggest that building well-connected multi-modal networks that incorporate active transportation can improve the travel experience of all commuters and impact their overall life satisfaction.

Keywords Trip satisfaction · Life satisfaction · Cycling · Walking · Public transport · Driving

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9.1 Introduction

Individuals' quality of life (QOL) and subjective well-being (SWB) are influenced by many factors. One of these factors is an individual's commuting experience, which is often perceived as both unpleasant and fatiguing, as well as a mandatory part of life (Mokhtarian et al. 2015; Ory and Mokhtarian 2009). However, not all commuters perceive their daily trips to be negative, and many people enjoy their commutes (Manaugh and El-Geneidy 2013). Furthermore, a positive commuting experience can contribute to overall life satisfaction (De Vos and Witlox 2017; Olsson et al. 2013; Ory and Mokhtarian 2005). In other words, commuting can be a favorable experience that positively contributes to an individual's happiness. In contrast to the work commute, travel can be undirected, meaning that instead of being derived by demand, individuals travel for enjoyment (Mokhtarian and Salomon 2001). One reason that satisfaction can result from commuting is due to the ability to engage in multiple activities while traveling, such as working, reading, listening to music or simply gazing out the window (Ettema et al. 2012). Personality and attitude can also influence the enjoyment derived from travel, and individuals who do not enjoy travel will often try to reduce it, in contrast to an individual who enjoys travel (Ory and Mokhtarian 2009). Therefore, not all individuals seek to minimize their travel (Manaugh and El-Geneidy 2013; Mokhtarian and Salomon 2001).

Research on QOL and travel were first integrated in the 1970s by Stokols et al. who examined the relationship between commuting and stress (Stokols et al. 1978). These researchers found that commuters with longer distances and travel times felt more inconvenienced and annoyed, and were less satisfied with their commute. Later, Diener and Suh (1997) defined and measured QOL based on social and economic components, as well as SWB. These authors also found that QOL is shaped by cultural norms and individuals' preferences and experiences. Furthermore, SWB is defined as a reflection of an individual's evaluation of their life in positive terms, which is understood as life satisfaction (Diener 1984; Diener et al. 1985, 1999). Consequently, satisfaction is one of the components of SWB that influences individuals' overall QOL. Therefore, satisfaction with travel is considered a form of stated SWB, and life satisfaction measures inherently rely on an individual's subjective assessment. The impact of SWB on QOL on both individuals and communities (Diener et al. 2003) has led to the argument that SWB should be a key indicator in evaluating planning and policy (Cao and Zhang 2016; Stanley and Stanley 2007). Because commuting is a daily experience for many individuals, it likely contributes to many people's SWB and QOL. The purpose of this study is to analyze the relationship between individuals' satisfaction with their commuting trips and its reported impact on their overall life satisfaction.

9.2 Literature Review

Travel can influence the SWB and QOL of individuals (Delbosc 2012). More specifically, commuting can have negative impacts on home life and work, including having a bad mood at home and increased work related stress (Novaco et al. 1991; Wener et al. 2005). Commuters can experience stress during travel, influenced by objective and subjective experiences (Novaco et al. 1990). Increased mobility in urban environments has been associated with higher reported QOL in both young adults (Xiong and Zhang 2016) and the elderly (van den Berg et al. 2016). Establishing the impact that transport can have on SWB has led researchers to further examine satisfaction through trip purpose and mode.

Different aspects of travel influence commuters' perceived satisfaction. For example, trip purpose can have a strong influence on satisfaction, and Bergstad et al. investigated the role of routine activities on life satisfaction. These authors found that positive sentiments were often a result of trips that were for sports, exercise and outdoor activities, and that alternatively, work and school activities were associated with more negative sentiments (Bergstad et al. 2012). The negative affect associated with trips to work has been corroborated by other researchers who have similarly found that trips made for work are the most fatiguing and are viewed as less pleasant compared to taking trips for any other purpose (Mokhtarian et al. 2015). Furthermore, work and school trips are associated with more negative moods and are liked less compared to trips that are for socializing, or sports and leisure (Morris and Hirsch 2016; Ory and Mokhtarian 2005). These results could be due to the fact that commuting is perceived as mandatory and unenjoyable travel in which the commuter has little choice in the decision to travel (Ory and Mokhtarian 2009).

Other factors influencing commuters' enjoyment of travel and commute related stress is the predictability and length of a trip (Olsson et al. 2013; Ory et al. 2004). Commuters that experience a lack of control from delays, congestion and unpredictability during the commute show increased stress (Evans et al. 2002; Gatersleben and Uzzell 2007; Gottholmseder et al. 2009). A less positive mood is associated with driving in larger cities during the peak of peak hours (Morris and Hirsch 2016). Long commuting lengths have been associated with decreased trip satisfaction (Olsson et al. 2013; Ory et al. 2004), lower life satisfaction (Choi et al. 2013; Stutzer and Frey 2008), overall mood (Morris and Guerra 2015), and more stress (Legrain et al. 2015). In contrast, many commuters favor moderate commute times rather than short or long times, or eliminating the commute completely (Ory et al. 2004; Redmond and Mokhtarian 2001). This could be because of the time buffer created between work and home (Jain and Lyons 2008) and the ability to multi-task (Ettema and Verschuren 2007). Additionally, subgroups of commuters have been found to enjoy their school or work related travel (Ory and Mokhtarian 2005) and attitudes about the commute to work can contribute to overall life satisfaction, with positive feelings about the commute leading to positive affect towards life satisfaction (Olsson et al. 2013).

The mode used for travel may also impact travel satisfaction. For example, while Legrain et al. (2015) found that the stress of travelling is strongly associated with the mode of the trip, Morris and Guerra (2015) found that the relationship between mood, including stress, and mode is weak. Perhaps this discrepancy is due to the type of survey data used for analysis. The former used data from a Canadian university survey focused on commuting and the latter used survey data that measured how much time Americans spend on different activities. Studies have also found that those who like the mode they use during a trip are more likely to be satisfied with the trip (Choo et al. 2005), and that people who prefer a certain mode will tend to make choices regarding their home location and self-select to accommodate their travel preferences (Bhat and Guo 2007).

In assessments of mode on travel satisfaction, walking and cycling have been found to elicit more positive emotion than motorized travel (Duarte et al. 2010; Legrain et al. 2015; Mokhtarian et al. 2015; Mokhtarian and Salomon 2001; Olsson et al. 2013). This could be attributed to these active forms of transportation being both relaxing and exciting, as well as a source of physical exercise (Duarte et al. 2010; Gatersleben and Uzzell 2007). The high satisfaction of cyclists has been explored and explained through the convenience of the mode and seasonal variation (Willis et al. 2013). Previous research indicates that bus users are the most unsatisfied mode users (St-Louis et al. 2014). Those who travel by bus may experience low trip satisfaction and a negative impact on mood associated with concerns about safety, crowding, delays, and convenience (Gatersleben and Uzzell 2007; Ory et al. 2004; Stradling et al. 2007). However, taking the bus has the most positive impact on mood when the conditions include short travel times and high access to bus stops (Ettema et al. 2011). Happiness has been found to have a U-shaped or parabolic relationship with access to public transportation. Those with good access and bad access are happy, suggesting that those with poor access are dependent on automobiles (Guo et al. 2016). In terms of automobile use, those that enjoy their automobile trip do so because of a sense of freedom, control, and reliability (Gardner and Abraham 2007; Mann and Abraham 2006), while those who do not enjoy their automobile trip feel that driving is mentally tiring, unpleasant, and stressful (Gatersleben and Uzzell 2007; Legrain et al. 2015; Mokhtarian et al. 2015). It has been suggested, through an analysis of budgeted travel time, that automobile drivers experience more unreliability than pedestrians, cyclists and transit users (Loong and El-Geneidy 2016). Multi-modal trips are more often seen as unpleasant, and mentally and physically tiring, with multi-modal trips involving public transportation being the most fatiguing (Mokhtarian et al. 2015). Though, those who have used multiple modal options feel less stressed (Legrain et al. 2015).

The methods used to measure the relationships between satisfaction and travel include structural equation models (Ory and Mokhtarian 2009), linear regression (Bergstad et al. 2011; Ory and Mokhtarian 2005), satisfaction with life scales (Cao 2016; Diener et al. 1985; Ettema and Schekkerman 2016), as well as through sentiment analysis of social media posts (Guo et al. 2016). Pertinent to the current study, clustering techniques have been used to assess the trip satisfaction of pedestrians (Willis et al. 2013). There are examples of both objective measures (Stanley

et al. 2011) and subjective measures (Bergstad et al. 2011) of mobility being used in the study of well-being and transportation. The advantages and disadvantages of using subjective and objective measures of satisfaction in transportation research is discussed by Delbosc, who reminds us that satisfaction can mean different things to different people (Delbosc 2012). Mokhtarian and Salomon also warn of the complexity of measuring affect in transportation studies and state that respondents of self-reported studies often confuse feelings about activities performed at the destination or during travel when reporting their affect for travel (Mokhtarian and Salomon 2001).

Another challenge associated with studying commuting and life satisfaction is the causal direction. Several studies have analyzed how satisfaction with travel influences SWB or QOL. Olsson et al. and Bergstad et al. operate under the assumption that causal direction is from commute satisfaction to overall happiness (Bergstad et al. 2012; Olsson et al. 2013). This assumption is present in other studies that focus on the impact of mobility on perceptions of QOL for the elderly (Banister and Bowling 2004) and study the effect of satisfaction with travel on affective and cognitive SWB (Bergstad et al. 2011). Olsson et al. do acknowledge that the causal direction could go the other way (Olsson et al. 2013) and overall happiness could influence the perception of trip satisfaction. However, Bergstad et al. (2012) assume that the causal direction is from commute satisfaction to overall happiness. They base their assumption on the results of a study by Schimmack (2008) that found a stronger association between the influence of domain satisfaction and life satisfaction compared to the influence of life satisfaction on domain satisfaction. Accordingly, the present study operates under the first assumption that travel impacts SWB and QOL, similarly to the studies by Olsson et al. (2013), Bergstad et al. (2012), and Banister and Bowling (2004). Furthermore, this study adds to the literature that discusses the impact of commuting on overall life satisfaction by exploring the relationship and identifying patterns based on mode used through a factor-cluster analysis. It is not the intention to confirm this causality, but rather to explore the relationship.

9.3 Data

McGill University is located in Montreal, Canada, with approximately 40,000 students and 1600 faculty members and staff. The university has two campuses; one is centrally located in downtown Montreal and the other is a much smaller suburban campus. The data for the study are derived from 2015 to 2016 the McGill Commuter Survey, which is an online travel behavior survey that was distributed throughout the 2015/2016 school year to faculty, staff and students. In the fall of 2015 and the winter of 2016, a total of 8383 and 8654 emails were sent to all McGill faculty members and staff, and to one third of the student population. This resulted in a response rate of 35.6%, in which 5094 surveys were fully completed and 974 were partially completed.

The survey captured the commuting habits of faculty, staff and students of McGill, and is therefore focused on utilitarian travel. Respondents were asked questions related to their personal characteristics, including their gender, age, income, home

location, and household composition. They were also asked, on a scale of 1–10, to take all things into account and rate their life satisfaction. Other questions were focused on their general commuting habits, including how many years they have been commuting to McGill, how many times a week they commute, how many modes they have access to and which modes they consider reasonable for getting from their home location to McGill. Furthermore, on a five point Likert scale ranging from 'very unsatisfied' to 'very satisfied' respondents were asked, how satisfied they were with their most recent trip overall, and whether their commuting experience has an impact on their life satisfaction. This question operates under the assumption that trip satisfaction influences overall life satisfaction (Banister and Bowling 2004; Bergstad et al. 2011, 2012; Olsson et al. 2013). Several questions about the most recent commute to McGill examined trip characteristics, including length, time of day, and the modes used. Respondents were then asked a series of questions about their main mode. This series of questions targeted both the satisfaction with and the importance of certain components of the trip, including infrastructure, safety, efficiency, service quality, parking facilities and comfort.

In this study, we include only trips to McGill's downtown campus. Responses that did not include the respondents' gender and age were eliminated, as were responses from those under the age of 18 years old. Furthermore, visitors and exchange students were also eliminated because the survey does not indicate the how long these students and visitors were at McGill and their travel behavior may not be indicative of the McGill population as whole. Trips longer than 2 h in length were also eliminated in an attempt to remove commuters living outside of the Greater Montreal Area. Finally, due to small sample sizes, any trips made with the McGill intra-campus shuttle, a motorcycle or scooter, taxi, carpool as a passenger, or "other" were eliminated. This resulted in 3747 trips in which the main modes of transportation were walking, cycling, bus, metro, commuter train or automobile as a driver. The distribution was 841 pedestrians, 293 cyclists, 753 bus users, 1033 metro users, 373 train users and 454 automobile drivers. Although public transit is often looked at as one group, a decision was made to keep bus, metro and commuter train users separate in the hope of creating a more nuanced analysis (St-Louis et al. 2014).

9.4 Methodology and Results

9.4.1 Factor Analysis

A factor analysis was conducted for each mode to group similar variables together and identify how variables from the survey questions relate to one another. Using the rotated component matrix, several factors were identified for each mode. Variables for each factor were selected based on a factor loading threshold of .5 or above or −.5 or below. These factors, a description of the variables within each factor, and the factor loadings are shown in Tables 9.1, 9.2, and 9.3.

Table 9.1 Factor analysis for walking and cycling

Factor	Variable from survey	Walking	Cycling
Satisfaction with safety and quality	Satisfaction with the presence of other pedestrians	0.53	
	Satisfaction with the quality of sidewalks	0.60	
	Satisfaction with the safety at intersections	0.78	
	Satisfaction with the reduced speed of cars	0.79	
	Satisfaction with the clarity of crosswalks	0.80	
	Satisfaction with the lighting of sidewalks	0.83	
Satisfaction with safety and infrastructure	Satisfaction with the quality of bicycle paths		0.75
	Satisfaction with the signage for bicycles		0.78
	Satisfaction with the reduced speed of cars		0.71
	Satisfaction with the lighting of bicycling paths		0.67
Importance of safety and quality	Importance of the presence of other pedestrians	0.60	
	Importance of the quality of sidewalks	0.65	
	Importance of the safety at intersections	0.79	
	Importance of the reduced speed of cars	0.73	
	Importance of the clarity of crosswalks	0.79	
	Importance of the lighting of sidewalks	0.65	
Importance of efficiency	Importance of the length of time spent commuting	0.81	0.71
	Importance of the predictability of time spent commuting	0.77	0.78
	Importance of the directness of route	0.57	0.56
Importance of safety and infrastructure	Importance of the quality of bicycle paths		0.70
	Importance of the signage for bicycles		0.76
	Importance of the reduced speed of cars		0.73
	Importance of the lighting of bicycling paths		0.74
Satisfaction with parking	Satisfaction with the availability of bicycle parking at destination		0.89
	Satisfaction with the quality of bicycle parking at destination		0.89
Importance of parking	Importance of the availability of bicycle parking at destination		0.87
	Importance of the quality of bicycle parking at destination		0.88
Need shower facilities	Importance of the availability of showers and changing facilities at destination		0.60
	Willingness to pay for shower facilities (binomial)		0.82
	Satisfaction with the availability of showers and changing facilities at destination		−0.61

(continued)

Table 9.1 (continued)

Factor	Variable from survey	Walking	Cycling
Seniority at McGill	Status as a member of faculty at McGill (binomial)	0.76	0.65
	Number of years at their current position at McGill (continuous)	0.82	0.80
	Age (continuous)	0.87	0.87
Self-selected not to drive	Importance of the cost of parking when moving to your current residence	−0.72	−0.56
	Importance of being in a location where I wouldn't have to drive when moving to your home	0.84	0.77
	Importance of being in proximity to public transportation when moving to your home	0.81	0.81
Other modes viable	Driving is a viable option to get to McGill (binomial)	0.62	
	McGill is within reasonable cycling distance to McGill (binomial)	0.67	
	Transit is a viable option to get to McGill (binomial)	0.69	
Short trip and chose to be close to McGill	Importance of being in close proximity to McGill when moving to your home	0.78	
	Trip length in minutes (continuous)	−0.68	
Short trip where walking is viable and chose to be close to McGill	Trip length in minutes (continuous)		−0.75
	McGill is within reasonable walking distance to McGill (binomial)		0.75
	Importance of being in close proximity to McGill when moving to your home		0.57
Multi-modal measure	Number of modes used in the most recent trip (continuous)	0.72	0.85
	Number of modes respondent has access to (continuous)	0.71	
Frequency of trip	Number of commutes per week (continuous)	0.69	0.79
	Full-time status at McGill (binomial)	0.75	0.78
Variance		61%	67%

In order to acknowledge heterogeneity in travel behavior between and within modes, a factor analysis was conducted independently for each mode. Therefore, because survey respondents were asked different questions based on their main mode of transportation for the trip, several mode specific factors resulted from the analysis. For some modes, the analysis revealed similar factors. For example, bus users, metro users and train users all revealed an 'Importance with Comfort' and 'Satisfaction with Comfort' factor. Furthermore, a factor called the 'Multi-Modal Measure' was created. With the exception of cyclists, this measure included the number of modes the respondent has access to and the number of modes used to

Table 9.2 Factor analysis for bus, metro and train

Factor	Variable from survey	Bus	Metro	Train
Satisfaction with service	Satisfaction with the length of time spent on bus/metro	0.61	0.77	
	Satisfaction with the service reliability	0.86	0.79	
	Satisfaction with the consistency (predictability) of time spend on the bus/metro	0.79	0.81	
	Satisfaction with the waiting time for the bus/metro	0.81	0.80	
	Satisfaction with the length of time spent to reach the bus/metro	0.52	0.68	
	Satisfaction with the frequency of service	0.81		
Satisfaction with wait time and reliability	Satisfaction with the service reliability			0.80
	Satisfaction with the waiting time for the commuter train			0.78
Importance of service	Importance of the length of time spent on bus/metro/train	0.69	0.81	0.80
	Importance of the service reliability	0.84	0.70	0.66
	Importance of the consistency (predictability) of time spend on the bus/metro/train	0.78	0.85	0.82
	Importance of the length of time spent to reach the bus	0.63	0.73	0.69
	Importance of the waiting time for bus	0.78	0.71	0.73
	Importance of the frequency of service	0.79		
Satisfaction with comfort	Satisfaction with the comfort of seating	0.76	0.79	0.86
	Satisfaction with the comfort of standing space	0.85	0.80	0.86
	Satisfaction with the comfort of being in proximity to others	0.84	0.75	0.89
Importance of comfort	Importance of the comfort of seating on the bus	0.79	0.82	0.67
	Importance of the comfort of standing space on the bus	0.88	0.81	0.76
	Importance of the comfort of being in proximity to others on the bus	0.84	0.64	0.73
Satisfaction and importance of parking at station	Satisfaction with the availability of parking close to commuter train station of origin			0.52
	Satisfaction with the cost of parking close to commuter train station of origin			0.65

(continued)

Table 9.2 (continued)

Factor	Variable from survey	Bus	Metro	Train
	Importance of the availability of parking close to commuter train station of origin			0.79
	Importance of the cost of parking close to commuter train station of origin			0.78
Seniority at McGill	Status as a member of faculty at McGill (binomial)	0.70	0.64	0.59
	Number of years at their current position at McGill (continuous)	0.84	0.84	0.83
	Age (continuous)	0.86	0.85	0.81
Self-selected not to drive	Importance of the cost of parking when moving to your current residence	−0.72	−0.75	
	Importance of being in a location where I wouldn't have to drive when moving to your home	0.67	0.72	
	Importance of being in proximity to public transportation when moving to your home	0.86	0.85	
Self-selected to be close to McGill and with transit access	Importance of being in proximity to public transportation when moving to your current residence			0.77
	Importance of being in close proximity to McGill when moving to your home			0.77
Short trip where walking and cycling are viable and chose to be close to McGill	Trip length in minutes (continuous)	−0.82	−0.68	
	McGill is within reasonable walking distance to McGill (binomial)	0.70	0.63	
	McGill is within reasonable cycling distance to McGill (binomial)	0.76	0.67	
	Importance of being in close proximity to McGill when moving to your home	0.55	0.58	
Short trip where walking and cycling are viable	Trip length in minutes (continuous)			−0.49
	McGill is within reasonable walking distance to McGill (binomial)			0.72
	McGill is within reasonable cycling distance to McGill (binomial)			0.47
Multi-modal measure	Number of modes used in the most recent trip (continuous)	0.74	0.74	0.54
	Number of modes respondent has access to (continuous)	0.74	0.73	0.77
Frequency of trip	Number of commutes per week (continuous)	0.79	0.78	0.77
	Full-time status at McGill (binomial)	0.80	0.80	0.75
Variance		66%	63%	67%

Table 9.3 Factor analysis for driving

Factor	Variable from survey	Drive
Satisfaction with parking at destination	Satisfaction with the cost of parking close to destination	0.67
	Satisfaction with the availability of parking close to destination	0.89
	Satisfaction with the length of time spent looking for parking	0.91
	Satisfaction with the consistency (predictability) of time spent looking for parking	0.91
Importance of parking at destination	Importance of the cost of parking close to destination	0.79
	Importance of the availability of parking close to destination	0.89
	Importance of the consistency (predictability) of time spent looking for parking	0.82
Seniority at McGill	Status as a member of faculty at McGill (binomial)	0.66
	Number of years at their current position at McGill (continuous)	0.80
	Age (continuous)	0.86
Self-celected to be close to McGill and with access to transit and parking	Importance of being in close proximity to McGill when moving to your home	0.58
	Importance of being in proximity to public transportation when moving to your home	0.75
	Importance of the cost of parking when moving to your home	0.79
Short trip and satisfaction with trip length and predictability	Trip length in minutes (continuous)	−0.67
	Satisfaction with the predictability of time spent travelling in the vehicle	0.88
	Satisfaction with the length of time spent travelling in the vehicle	0.90
Have access to other modes and walking and cycling are viable	Number of modes respondent has access to (continuous)	0.65
	McGill is within reasonable walking distance to McGill (binomial)	0.64
	McGill is within reasonable cycling distance to McGill (binomial)	0.70
Frequency of trip	Number of commutes per week (continuous)	0.83
	Full-time status at McGill (binomial)	0.87
Variance		69%

make their most recent trip. For cyclists, this measure only included the number of modes used in the most recent trip. For drivers, the number of modes the respondent had access to factored with other modes being reasonable options (see Tables 9.1, 9.2, and 9.3 for details).

It is important to note that the respondents were asked mode specific questions based on their main mode. For example, pedestrians were asked about their satisfaction with the quality of sidewalks and cyclists were asked about their satisfaction with the quality of cycle paths. The factors analysis was used because it revealed which components of the trip were important to the different mode users. Therefore, we are not comparing the individual questions. Rather, we are comparing the factors, which contain important trip components for the different mode users.

9.4.2 Cluster Analysis

The results of the factor analysis for each mode were used to develop a k-means cluster analysis. The purpose of the cluster analysis is to identify heterogeneity within users of the same mode by clustering similar users together. Clustering was tried using three to five groups for each mode. The best number of groupings for each mode was determined based on the characteristics of the factors in each cluster, previous research on mode user typology, and the authors' judgment. The best segmentation was found through four unique clusters for pedestrians, cyclists, bus users, metro users, and drivers, and three for commuter train users, resulting in 23 clusters total. The results of the cluster analysis are presented in Figs. 9.1 and 9.2. In these figures, each cluster is given a name based on mode. For example, the cyclist clusters are C1, C2, C3 and C4. The number of respondents in each cluster is shown under each name in Figs. 9.1 and 9.2. Summary statistics for the clusters are presented in Table 9.4.

Each cluster corresponds to a similar group of users of the same mode, represented by similar commuting habits, such as travelling frequently, or commuting preferences, such as the satisfaction with service. The following is a description of each cluster that highlights some of the main characteristics.

9.4.2.1 Walking

W1: This cluster is satisfied and concerned with safety and quality. Furthermore, they chose to be close to McGill when choosing their home.

W2: This group has a long trip length and did not consider being close to McGill as important when choosing their home location.

W3: This cluster of pedestrians is unsatisfied and unconcerned with safety and quality, but efficiency is important. Other modes are reasonable options but they do not use or have access to modes.

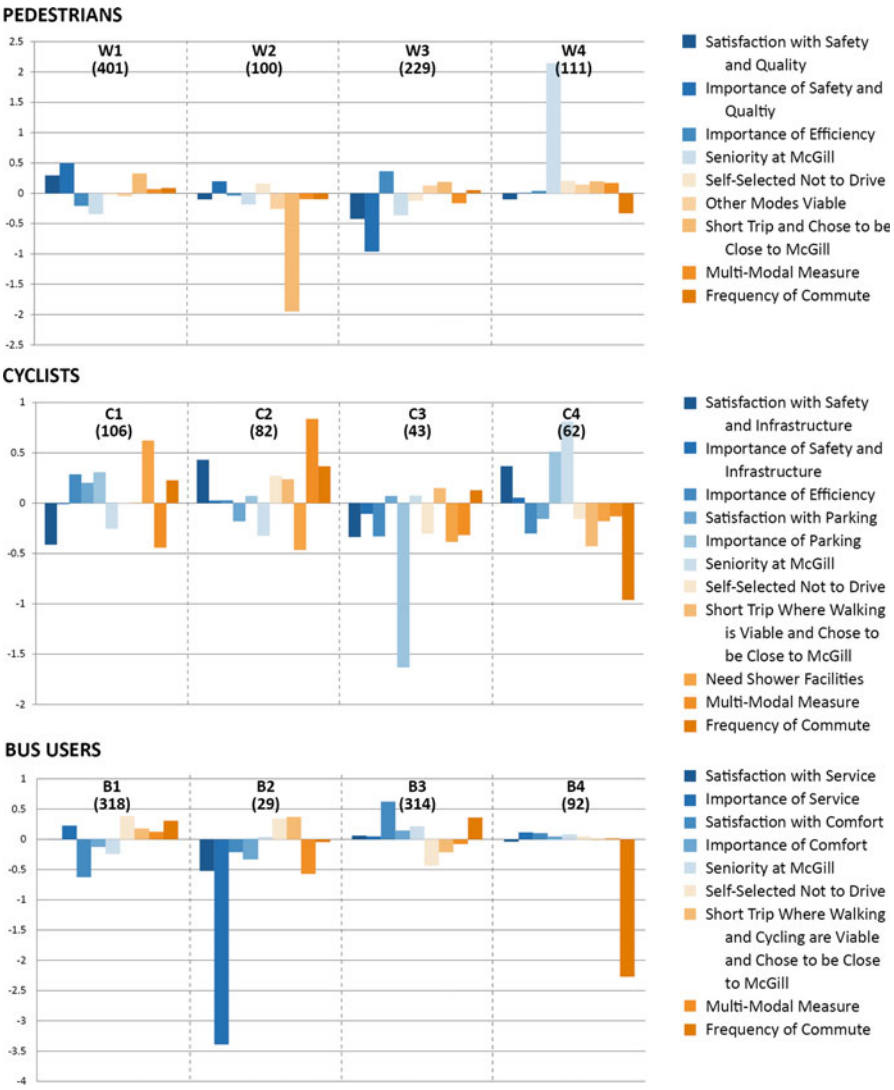

Fig. 9.1 Clusters for pedestrians, cyclists and bus users

W4: These commuters are characterized by seniority at McGill and commute infrequently.

9.4.2.2 Cycling

C1: These cyclists are concerned about shower facilities and parking and do not use many modes.

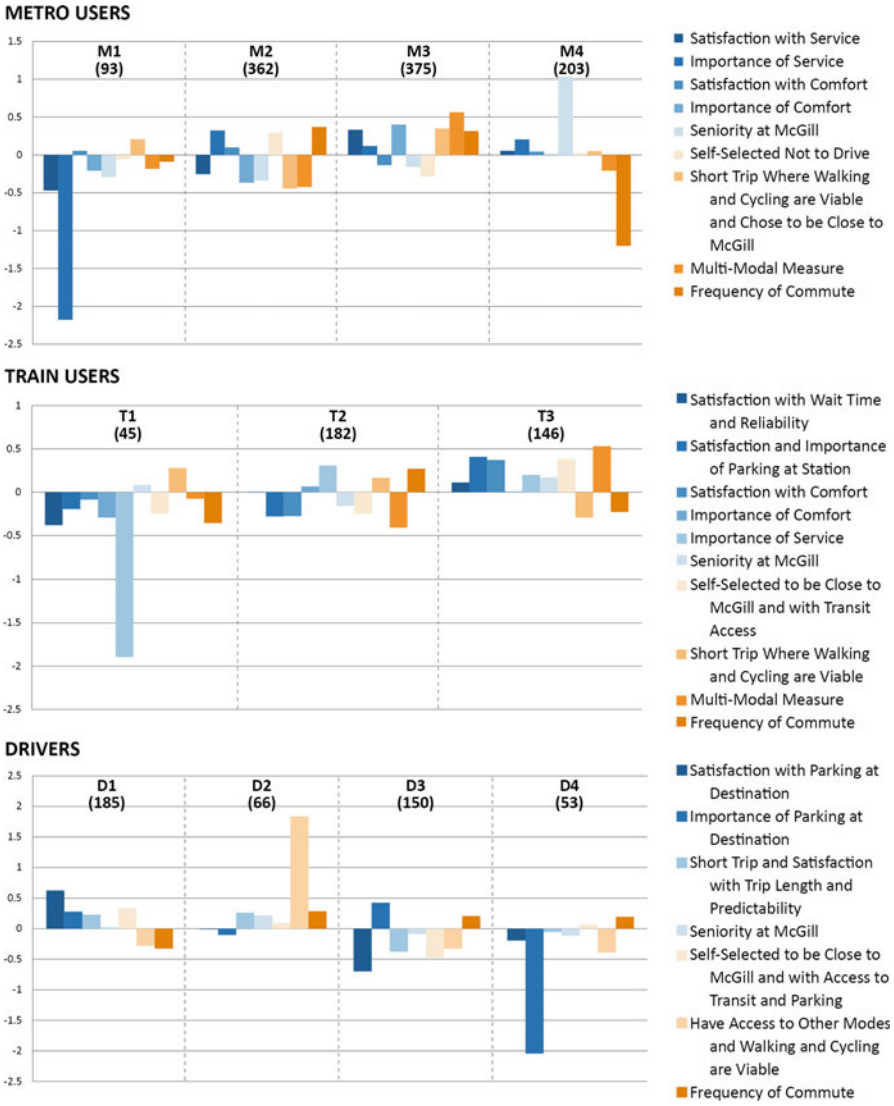

Fig. 9.2 Clusters for metro users, commuter train users and drivers

C2: Cyclists in this cluster are satisfied with safety and infrastructure, use many modes on the trip and report that walking is a reasonable option.

C3: This group is concerned with safety, infrastructure and efficiency and have a short trip in which they could walk.

C4: The cyclists in this cluster commute infrequently, have seniority at McGill and have a long trip in which they use few modes.

Table 9.4 Cluster summary statistics

Personal characteristics							Satisfaction			Commute characteristics				Trip characteristics		
Cluster	Age	Gender (% male)	Income (1–10)	Faculty (%)	Staff (%)	Student (%)	Life satisfaction (1–10)	Trip satisfaction (1–5)	Commute impacts my life satisfaction (1–5)	Number of years at McGill	Commutes per week	Full time (%)	Number of modes they have access to	Trip length (minutes)	Left during AM peak (%)	Number of modes used
W1	25.4	41.1	1.5	0.5	9.7	89.8	7.5	4.1	4.2	2.4	5.4	95.5	1.9	16.1	40.4	1.8
W2	32.6	40.0	2.1	3.0	29.0	68.0	7.3	3.9	4.1	4.3	4.5	93.0	1.6	37.3	47.0	1.9
W3	24.6	41.5	1.6	0.9	10.5	88.6	7.3	3.9	4.0	2.5	5.1	98.3	1.8	17.7	37.1	1.6
W4	50.5	52.3	5.8	80.2	19.8	0.0	8.1	4.3	4.6	14.1	4.3	83.8	2.2	29.0	71.2	1.6
C1	34.8	53.8	2.7	17.9	23.6	58.5	7.7	4.1	4.6	3.8	5.0	98.1	2.4	24.1	0.7	1.5
C2	31.6	56.1	2.6	11.0	28.0	61.0	7.7	4.1	4.3	3.9	5.1	98.8	2.4	23.5	0.5	2.9
C3	33.3	65.1	2.9	25.6	16.3	58.1	8.0	4.4	4.5	6.4	4.8	100.0	2.4	22.3	0.5	1.6
C4	44.4	66.1	4.6	53.2	30.6	16.1	8.1	4.0	4.6	9.6	3.5	67.7	2.6	32.6	0.6	1.6
B1	32.6	30.5	2.4	8.5	33.3	58.2	7.4	3.5	4.2	5.0	4.8	100.0	1.9	45.0	62.6	2.7
B2	38.1	58.6	2.5	13.8	34.5	51.7	7.1	2.7	3.6	7.3	4.5	89.7	1.5	44.0	55.2	2.2
B3	40.6	36.0	3.0	16.9	44.9	38.2	7.6	3.6	4.2	9.5	4.8	99.7	1.7	52.4	59.9	2.4
B4	40.1	31.5	2.9	22.8	21.7	55.4	7.5	3.7	4.3	6.2	1.8	38.0	2.1	45.6	39.1	2.5
M1	31.9	45.2	2.1	3.2	24.7	72.0	7.3	3.3	3.7	3.2	4.1	87.1	1.6	44.1	59.1	2.4
M2	31.3	33.4	2.1	0.8	35.6	63.5	7.4	3.5	4.1	3.8	4.8	99.4	1.3	50.1	60.8	2.4
M3	34.3	36.3	2.7	5.6	47.5	46.9	7.5	3.9	4.3	4.8	4.8	98.4	2.2	37.7	70.4	3.0
M4	46.8	38.9	3.9	40.4	31.0	28.6	7.4	3.7	4.2	11.7	2.9	55.7	1.7	43.5	59.1	2.2
T1	47.6	55.6	3.7	13.3	71.1	15.6	7.8	3.6	3.8	12.0	4.4	80.0	1.8	69.6	57.8	2.4
T2	43.4	37.9	3.3	4.4	72.5	23.1	7.5	3.7	4.4	8.6	4.7	97.8	1.5	68.0	59.9	2.4
T3	42.8	41.8	3.9	26.0	50.0	24.0	7.9	3.8	4.4	10.5	4.2	85.6	2.1	70.8	66.4	3.1
D1	46.5	36.8	4.5	36.2	43.2	20.5	7.8	3.7	4.2	11.6	3.5	63.8	1.8	40.4	52.4	1.6
D2	44.6	63.6	5.4	65.2	16.7	18.2	7.6	3.5	4.2	12.2	4.3	90.9	2.5	30.2	71.2	1.9
D3	43.6	39.3	4.0	18.0	48.0	34.0	7.4	3.2	4.0	9.7	3.9	81.3	1.7	50.9	52.0	1.7
D4	47.3	39.6	4.4	24.5	58.5	17.0	7.6	3.1	3.9	10.9	4.4	81.1	1.6	45.9	62.3	1.4
Total	36.5	40.3	2.9	15.6	34.4	50.0	7.5	3.7	4.2	6.7	4.5	89.7	1.9	40.5	56.9	2.2

9.4.2.3 Bus Users

B1: This group is satisfied with service quality, even though it is unimportant to them. They report that walking and cycling are reasonable options and they have access to modes.
B2: These bus users are unsatisfied with service and comfort. Walking and cycling are viable options for them but they do not have access to nor use many modes.
B3: These commuters are satisfied with their trip components, which are important to them. They are limited in their modal options.
B4: This cluster commutes infrequently at less than two times per week, and services are important to them.

9.4.2.4 Metro Users

M1: This cluster is unsatisfied and unconcerned with metro service and walking and cycling are reasonable options. They do not use or have access to many modes.
M2: They are unsatisfied with service, self-selected to not drive, are limited in their modal options and have low access to other modes.
M3: These metro users are satisfied with service and unsatisfied with comfort. Walking and cycling are reasonable options for them and they have access to other modes.
M4: They have seniority status at McGill and commute infrequently.

9.4.2.5 Train Users

T1: These commuters report low satisfaction with several trip components but are unconcerned with service. They have short trips relative to other train users, in which they could walk or cycle and do not have access to many modes.
T2: This cluster did not self-select when choosing their home, have a short trip relative to other train users in which walking and cycling are options, and have low access.
T3: These train users are satisfied with trip components, self-selected to be close to McGill with transit access and a long trip. Walking and cycling are not reasonable options but they do have access to modes.

9.4.2.6 Automobile Drivers

D1: This group of drivers is satisfied with their trip components and self-selected to be close to McGill with access to both transit and parking. Walking and cycling are not viable options and they do not have access to modes.

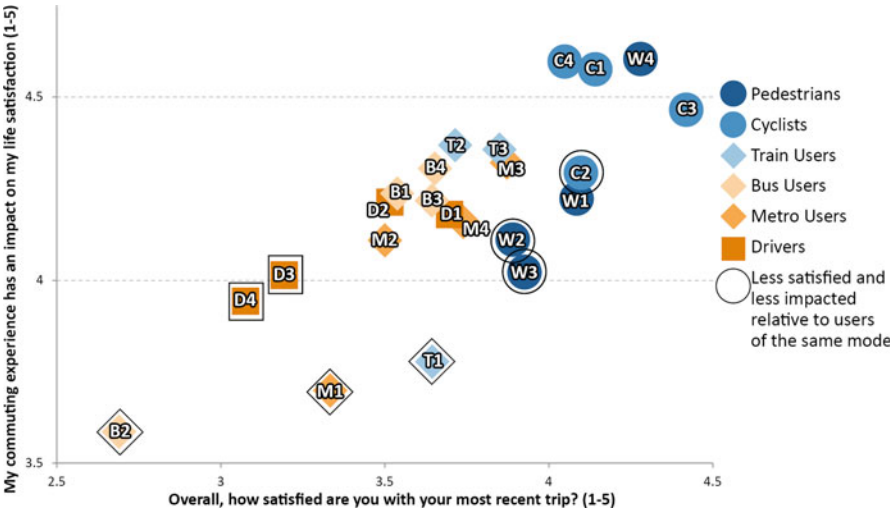

Fig. 9.3 Trip satisfaction and the impact of commute on life satisfaction

D2: Walking and cycling are reasonable options for these drivers and they have access to a high number of modes.

D3: This cluster is unsatisfied and concerned with parking and did not self-select when choosing their home. Walking and cycling are reasonable options and they have access to modes.

D4: Similar to the above cluster, walking and cycling are reasonable options for these drivers and they have access to a high number of modes.

Trip satisfaction and the impact of commuting on life satisfaction were not included in the factor-cluster analysis. This way, the various clusters could be plotted against trip satisfaction and the impact of commuting on life satisfaction. Accordingly, Fig. 9.3 demonstrates the relationship between life satisfaction and the impact of commuting on life satisfaction for each cluster. However, while the following analysis addresses the relationship between these two aspects of satisfaction, it is not our intention to confirm causality. Rather, this study is an exploratory analysis of the relationship between commuting and its impact on life satisfaction.

9.4.3 Trip Satisfaction and the Impact of Commute on Life Satisfaction

Figure 9.3 demonstrates the relationship between the variables measuring overall trip satisfaction and the impact of commuting on overall life satisfaction. Clusters which on average exhibit high trip satisfaction also show that life satisfaction is highly impacted by commuting. Conversely, clusters with lower trip satisfaction show that

commuting does not strongly impact life satisfaction. Furthermore, clusters located in the lower left-hand corner of Fig. 9.3 also exhibit below-average overall life satisfaction on a scale of 1–10 (See Table 9.4). For example, cluster B2 has the lowest reported life satisfaction at 7.1/10, the lowest reported trip satisfaction of 2.7/5, and report their life satisfaction is the least impacted by commuting. On the other end of the spectrum, cluster W4 has the highest life satisfaction, as well as high trip satisfaction, and has a life satisfaction that is one of the most influenced by their commuting experience. This is consistent with previous research that found that happiness with commuting can contribute to overall happiness (Olsson et al. 2013) and suggests that as users' trip satisfaction increases, they may be more likely to report that their life satisfaction is influenced by their commute.

These findings might suggest that commuters who are unsatisfied with their trip could be unaware of the negative impact that commuting has on their overall life satisfaction. Alternatively, the results may be suggesting that those who reported a low trip satisfaction may not want to admit that their commute is impacting their overall life satisfaction. In either case, it appears as though the perceived association between commuting and overall life satisfaction decreases with trip satisfaction. In other words, as trip satisfaction decreases, respondents assign a lower level of association between commuting and life satisfaction. Since personality and attitude can play a role in the enjoyment of travel (Mokhtarian and Salomon 2001; Ory and Mokhtarian 2005), it is possible that personality traits influence the decision to report both low trip satisfaction and low life satisfaction. However, personality traits were not captured in the survey. Therefore, the impact of personality and attitude cannot be examined in this study.

The top right-hand corner of Fig. 9.3 represents high trip satisfaction and high impact of commuting on life satisfaction. This corner is dominated by active transportation clusters, which is consistent with previous findings that report high satisfaction and happiness among cyclists and pedestrians (Duarte et al. 2010; Legrain et al. 2015; Mokhtarian et al. 2015; Mokhtarian and Salomon 2001; Olsson et al. 2013). These clusters have been able to derive the enjoyment from their utilitarian work commute that has previously been identified in undirected travel (Mokhtarian and Salomon 2001). Also similar to previous findings about the dissatisfaction of bus users (St-Louis et al. 2014), the least satisfied cluster is B2.

9.4.4 Relatively Less Satisfied Clusters

Overall, Fig. 9.3 demonstrates that active transport users tend to be both more satisfied with their trips and believe that their overall life satisfaction is strongly influenced by their commute. On the other hand, public transit and automobile users tend to be less satisfied overall and their life satisfaction is less influenced by their trip. However, Fig. 9.3 reveals that although there is a general pattern, there are modal clusters that are less satisfied and less impacted by commuting, compared to users of the same mode. These clusters are W2, W3, C2, B2, M1, T1, D3 and D4.

Commuters in these clusters were identified as being less satisfied with their trip and their life satisfaction is less impacted by commuting relative to other clusters of the same mode. The clusters that are less satisfied and less impacted by commuting are identified by a black outline in Fig. 9.3. This finding suggests that, while mode choice does influence satisfaction (St-Louis et al. 2014), not all users of the same mode are similar. With the exception of C2, a commonality among the less satisfied and less impacted by commuting modal clusters is that the factor measuring access to and use of multiple modes is negative. Therefore, clusters that are less satisfied and less impacted by commuting tend to report having access to and/or using fewer modes than the other clusters using the same mode (Figs. 9.1 and 9.2). Therefore, clusters with both lower trip satisfaction and a lower impact of commuting on life satisfaction are limited in their travel options, relative to clusters of the same mode. Taking into consideration previous findings that commutes are often viewed as mandatory and unenjoyable (Ory and Mokhtarian 2009), these clusters may have low satisfaction because of the lack of control and flexibility in a trip that is viewed as obligatory. This is a significant finding because it emphasizes the importance of giving commuters different modal options that are flexible, reliable and accessible. This finding is similar to previous research concentrating on trip satisfaction and flexibility in choice in Beijing context (Mao et al. 2016).

Commuters in clusters that are less satisfied and less impacted by commuting are not the only respondents with access to fewer modes. There are several clusters with low access even though they are not identified as less satisfied in Fig. 9.3. It is possible that their relatively high satisfaction is explained through self-selection measures, as users in these clusters considered their proximity to McGill or access to transit, when choosing their home location. Through these self-selection strategies, respondents have been able to choose a home that makes their chosen mode a reasonable option. This is likely influencing their trip satisfaction to be relatively high, despite clustering negatively for the factor measuring access to and use of multiple modes. Taking into account previous findings that those who like the mode they are using have higher satisfaction and that people tend to choose home locations where their preferred modes are reasonable options (Bhat and Guo 2007; Choo et al. 2005), the effect of low access appears to be mitigated through self-selection strategies.

9.5 Policy Recommendations

The results of this study reveal that those whose life satisfaction is impacted by their commute are relatively more satisfied with their trip, while those whose life satisfaction is less impacted by their commute are less satisfied with their trip. Accordingly, since the life satisfaction of those who are less impacted is lower than those who are impacted, it can be assumed that increasing trip satisfaction could increase the impact of commuting and result in a higher life satisfaction. This is based on respondents with high trip satisfaction also reporting high overall life satisfaction.

Based on this analysis, increasing an individual's SWB could be done through improving their commute.

The above analysis revealed that there is variation among clusters in terms of trip satisfaction, the impact of commuting on life satisfaction and having access to and using different modes. To increase satisfaction among those who are relatively less satisfied, planners and policy makers should develop strategies that provide increase the number of options from a single mode and/or increase access to multi-modal trips that are more reasonable, flexible, and reliable. Additionally, these strategies should encourage multi-modal trips that include more walking and cycling. Strategies for improving multi-modality include developing integrated payment systems for public services such as transit and bicycle-share systems, as well as by integrating bicycle and car parking at transit hubs, and by better integrating pedestrian areas. Other strategies include investing in cycling, pedestrian and transit infrastructure, prioritizing transit connectivity, and creating route findings systems that incorporate multiple modes (Henao et al. 2015; Mishra et al. 2012; Terveen 2013). These approaches have been shown to increase mode share for walking and cycling and allow users to express their modal preference. Since those who walk and cycle to work tend to be the most satisfied, with both their trip and their life, increasing the mode share of walking and cycling could have a positive impact on life satisfaction. Additionally, since those who like the mode they use during a trip are more likely to be satisfied with the trip (Choo et al. 2005), a well-connected multi-modal network would allow commuters to use their preferred mode. Multi-modal trips are sometimes viewed as unpleasant (Mokhtarian et al. 2015), however, strategies to improve the multi-modal experience could encourage the modes that result in high trip satisfaction.

9.6 Limitations

Similarly to previous research, this study has shown that commuting can influence life satisfaction (Banister and Bowling 2004; Bergstad et al. 2011, 2012; Olsson et al. 2013) and adds to the literature by exploring this relationship through a factor-cluster analysis based on mode. However, commuting is only one of many components that impact a person's SWB. Many other social and economic factors impact life satisfaction and SWB, including income, unemployment, education and quality personal relationships (Clark and Oswald 1996; Delbosc and Currie 2011; Diener et al. 1999; Ferrer-i-Carbonell 2005; Helliwell 2003; Myers 2000). However, due to data limitations, these factors could not be included in this study. Additionally, personal factors, including personality and attitude can influence SWB (Ory and Mokhtarian 2009). Based on the results of the literature review, as well the findings from the present study, conclusions cannot be drawn that all types of people would benefit from a mode change.

Question and sample bias are potential limitations of this study. Diener et al. (2013). present a review of the reliability of satisfaction with life scales and find that

the results of the scales can be representative of an individual's actual QOL. However, results can be effected by factors such as current mood, question order and method of presentation. Therefore, it is important to note the potential sample bias in the self-reported trip satisfaction and life satisfaction, as self-reported satisfaction and subjective measures rely on the respondents' subjective meaning of satisfaction and trip satisfaction may be biased by the destination itself (Delbosc 2012; Mokhtarian and Salomon 2001). Additionally, the sample is comprised of faculty, staff and students of a university, meaning the sample is both educated and employed. As noted above, education and employment have a positive impact on satisfaction (Clark and Oswald 1996; Delbosc and Currie 2011; Helliwell 2003), and it should therefore be expected that the sample would report a higher life satisfaction compared to the general population. Finally, the survey question that asked the respondents to agree or disagree, on a scale of one to five, with the statement about commuting impacting life satisfaction was asked immediately after the respondent was asked to rate their trip satisfaction. The close proximity of these two questions in the survey could have induced further response bias.

9.7 Conclusion

To conclude, previous research has shown that transportation and commuting can have an impact on overall life satisfaction (Banister and Bowling 2004; Bergstad et al. 2011, 2012; Olsson et al. 2013). Furthermore, results of this study have revealed that commuters with high trip satisfaction also tend to report that commuting has an impact on their life satisfaction. While the results of this study have revealed relationships between variables, based on the current findings, causality cannot be confirmed. Therefore, in the future, researchers should focus on developing methods to more comprehensively study the impact that commutes have on life satisfaction and focus on assessing causality. While the present study assessed the impact of commuting on life satisfaction, further research could focus on analyzing whether overall QOL and SWB impact the satisfaction with commuting. In addition, researchers studying life satisfaction in different fields should be collaborating with the goal of painting a better overall picture of the factors influencing overall satisfaction and QOL.

The findings of the study reveal that there is a relationship between individuals' overall life satisfaction, their reported trip satisfaction, and the perception that trip satisfaction impacts their life satisfaction. Findings suggest that commuters who are satisfied with their trip also report that their commute impacts their life satisfaction. In contrast, less satisfied commuters report a lower association between trip satisfaction and life satisfaction. This suggests that as users' trip satisfaction increases, they may be more likely to report that their life satisfaction is influenced by their commute.

This study has added to the literature by exploring the relationship between commuting and overall life satisfaction through modal clusters. Exploring the

relationship between trip satisfaction and the impact of commuting on life satisfaction has resulted in policy recommendations that advocate for the building of a well-connected multi-modal transportation network that incorporates active transportation. This would allow commuters to use their preferred mode and diminish the negative impact of being constrained in their modal options.

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References

Banister, D., & Bowling, A. (2004). Quality of life for the elderly: The transport dimension. *Transport Policy, 11*(2), 105–115.

Bergstad, C., Gamble, A., Gärling, T., Hagman, O., Polk, M., Ettema, D., et al. (2011). Subjective well-being related to satisfaction with daily travel. *Transportation, 38*(1), 1–15.

Bergstad, C., Gamble, A., Hagman, O., Polk, M., Gärling, T., Ettema, D., et al. (2012). Influences of affect associated with routine out-of-home activities on subjective well-being. *Applied Research in Quality of Life, 7*(1), 49–62.

Bhat, C., & Guo, J. (2007). A comprehensive analysis of built environment characteristics on household residential choice and auto ownership levels. *Transportation Research Part B: Methodological, 41*(5), 506–526.

Cao, X. (2016). How does neighborhood design affect life satisfaction? Evidence from Twin Cities. *Travel Behaviour and Society, 5*, 68–76.

Cao, J., & Zhang, J. (2016). Built environment, mobility, and quality of life. *Travel Behaviour and Society, 5*, 1–4.

Choi, J., Coughlin, J., & D'Ambrosio, L. (2013). Travel time and subjective well-being. *Transportation Research Record: Journal of the Transportation Research Board, 2357*, 100–108.

Choo, S., Collantes, G., & Mokhtarian, P. (2005). Wanting to travel, more or less: Exploring the determinants of the deficit and surfeit of personal travel. *Transportation, 32*(2), 135–164.

Clark, A., & Oswald, A. (1996). Satisfaction and comparison income. *Journal of Public Economics, 61*(3), 359–381.

De Vos, J., & Witlox, F. (2017). Travel satisfaction revisited: On the pivotal role of travel satisfaction in conceptualising a travel behaviour process. *Transportation Research Part A: Policy and Practice, 106*, 364–373.

Delbosc, A. (2012). The role of well-being in transport policy. *Transport Policy, 23*, 25–33.

Delbosc, A., & Currie, G. (2011). Exploring the relative influences of transport disadvantage and social exclusion on well-being. *Transport Policy, 18*(4), 555–562.

Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95*, 276–302.

Diener, E., & Suh, E. (1997). Measuring quality of life: Economic, social and subjective indicators. *Social Indicators Research, 40*, 189–216.

Diener, E., Emmons, R., Larsen, R., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*, 71–75.

Diener, E., Suh, R., & Smith, H. (1999). Subjective well-being: Three decades of progress. *Psychological Bulletin, 125*, 276–302.

Diener, E., Oishi, S., & Lucas, R. (2003). Personality, culture, and subjective well-being: Emotional and cognitive evaluations of life. *Annual Review of Psychology, 54*(1), 403–425.

Diener, E., Inglehart, R., & Tay, L. (2013). Theory and validity of life satisfaction scales. *Social Indicators Research, 112*(3), 497–527.

Duarte, A., Garcia, C., Giannarakis, G., Limão, S., Polydoropoulou, A., & Litinas, N. (2010). New approaches in transportation planning: Happiness and transport economics. *NETNOMICS: Economic Research and Electronic Networking, 11*(1), 5–32.

Ettema, D., & Schekkerman, M. (2016). How do spatial characteristics influence well-being and mental health? Comparing the effect of objective and subjective characteristics at different spatial scales. *Travel Behaviour and Society, 5*, 56–67.

Ettema, D., & Verschuren, L. (2007). Multitasking and value of travel time savings. *Transportation Research Record: Journal of the Transportation Research Board, 2010*, 19–25.

Ettema, D., Gärling, T., Eriksson, L., Friman, M., Olsson, L., & Fujii, S. (2011). Satisfaction with travel and subjective well-being: Development and test of a measurement tool. *Transportation Research Part F: Traffic Psychology and Behaviour, 14*(3), 167–175.

Ettema, D., Friman, M., Gärling, T., Olsson, L., & Fujii, S. (2012). How in-vehicle activities affect work commuters' satisfaction with public transport. *Journal of Transport Geography, 24*, 215–222.

Evans, G., Wener, R., & Phillips, D. (2002). The morning rush hour predictability and commuter stress. *Environment and Behavior, 34*(4), 521–530.

Ferrer-i-Carbonell, A. (2005). Income and well-being: An empirical analysis of the comparison income effect. *Journal of Public Economics, 89*(5), 997–1019.

Gardner, B., & Abraham, C. (2007). What drives car use? A grounded theory analysis of commuters' reasons for driving. *Transportation Research Part F: Traffic Psychology and Behaviour, 10*(3), 187–200.

Gatersleben, B., & Uzzell, D. (2007). Affective appraisals of the daily commute comparing perceptions of drivers, cyclists, walkers, and users of public transport. *Environment and Behavior, 39*(3), 416–431.

Gottholmseder, G., Nowotny, K., Pruckner, G., & Theurl, E. (2009). Stress perception and commuting. *Health Economics, 18*(5), 559–576.

Guo, W., Gupta, N., Pogrebna, G., & Jarvis, S. (2016). Understanding happiness in cities using Twitter: Jobs, children and transport. *IEEE International Smart Cities Conference*, Trento, Italy, 12–15 Sep 2016.

Helliwell, J. (2003). How's life? Combining individual and national variables to explain subjective well-being. *Economic Modelling, 20*(2), 331–360.

Henao, A., Piatkowski, D., Luckey, K., Nordback, K., Marshall, W., & Krizek, K. (2015). Sustainable transportation infrastructure investments and mode share changes: A 20-year background of Boulder, Colorado. *Transport Policy, 37*, 64–71.

Jain, J., & Lyons, G. (2008). The gift of travel time. *Journal of Transport Geography, 16*(2), 81–89.

Legrain, A., Eluru, N., & El-Geneidy, A. (2015). Am stressed, must travel: The relationship between mode choice and commuting stress. *Transportation Research Part F: Traffic Psychology and Behaviour, 34*, 141–151.

Loong, C., & El-Geneidy, A. (2016). *It's a matter of time: An assessment of additional time budgeted for commuting across modes.* Paper presented at the Transportation Research Board 95th Annual Meeting.

Manaugh, K., & El-Geneidy, A. (2013). Does distance matter? Exploring the links among values, motivations, home location, and satisfaction in walking trips. *Transportation Research Part A: Policy and Practice, 50*, 198–208. https://doi.org/10.1016/j.tra.2013.01.044.

Mann, E., & Abraham, C. (2006). The role of affect in UK commuters' travel mode choices: An interpretative phenomenological analysis. *British Journal of Psychology, 97*(2), 155–176.

Mao, Z., Ettema, D., & Dijst, M. (2016). Commuting trip satisfaction in Beijing: Exploring the influence of multimodal behavior and modal flexibility. *Transportation Research Part A: Policy and Practice, 94*, 592–603.

Mishra, S., Welch, T., & Jha, M. (2012). Performance indicators for public transit connectivity in multi-modal transportation networks. *Transportation Research Part A: Policy and Practice, 46* (7), 1066–1085.

Mokhtarian, P., & Salomon, I. (2001). How derived is the demand for travel? Some conceptual and measurement considerations. *Transportation Research Part A: Policy and Practice, 35*(8), 695–719.

Mokhtarian, P., Papon, F., Goulard, M., & Diana, M. (2015). What makes travel pleasant and/or tiring? An investigation based on the French National Travel Survey. *Transportation, 42*(6), 1103–1128.

Morris, E., & Guerra, E. (2015). Mood and mode: Does how we travel affect how we feel? *Transportation, 42*(1), 25–43.

Morris, E., & Hirsch, J. (2016). Does rush hour see a rush of emotions? Driver mood in conditions likely to exhibit congestion. *Travel Behaviour and Society, 5*, 5–13.

Myers, D. (2000). The funds, friends, and faith of happy people. *American Psychologist, 55*(1), 56.

Novaco, R., Stokols, D., & Milanesi, L. (1990). Objective and subjective dimensions of travel impedance as determinants of commuting stress. *American Journal of Community Psychology, 18*(2), 231–257.

Novaco, R., Kliewer, W., & Broquet, A. (1991). Home environmental consequences of commute travel impedance. *American Journal of Community Psychology, 19*(6), 881–909.

Olsson, L., Gärling, T., Ettema, D., Friman, M., & Fujii, S. (2013). Happiness and satisfaction with work commute. *Social Indicators Research, 111*(1), 255–263.

Ory, D., & Mokhtarian, P. (2005). When is getting there half the fun? Modeling the liking for travel. *Transportation Research Part A: Policy and Practice, 39*(2), 97–123.

Ory, D., & Mokhtarian, P. (2009). Modeling the structural relationships among short-distance travel amounts, perceptions, affections, and desires. *Transportation Research Part A: Policy and Practice, 43*(1), 26–43.

Ory, D. T., Mokhtarian, P. L., Redmond, L. S., Salomon, I., Collantes, G. O., & Choo, S. (2004). When is commuting desirable to the individual? *Growth and Change, 35*(3), 334–359.

Redmond, L., & Mokhtarian, P. (2001). The positive utility of the commute: Modeling ideal commute time and relative desired commute amount. *Transportation, 28*(2), 179–205.

Schimmack, U. (2008). The structure of subjective well-being. In *The science of subjective well-being* (pp. 97–123). New York: Guilford Press.

Stanley, J., & Stanley, J. (2007). Public transport and social policy goals. *Road & Transport Research: A Journal of Australian and New Zealand Research and Practice, 16*(1), 20.

Stanley, J., Hensher, D., Stanley, J., & Vella-Brodrick, D. (2011). Mobility, social exclusion and well-being: Exploring the links. *Transportation Research Part A: Policy and Practice, 45*(8), 789–801.

St-Louis, E., Manaugh, K., van Lierop, D., & El-Geneidy, A. (2014). The happy commuter: A comparison of commuter satisfaction across modes. *Transportation Research Part F: Traffic Psychology and Behaviour, 26*, 160–170.

Stokols, D., Novaco, R., Stokols, J., & Campbell, J. (1978). Traffic congestion, type A behavior, and stress. *Journal of Applied Psychology, 63*(4), 467.

Stradling, S., Anable, J., & Carreno, M. (2007). Performance, importance and user disgruntlement: A six-step method for measuring satisfaction with travel modes. *Transportation Research Part A: Policy and Practice, 41*(1), 98–106.

Stutzer, A., & Frey, B. (2008). Stress that doesn't pay: The commuting paradox. *The Scandinavian Journal of Economics, 110*(2), 339–366.

Terveen, L. (2013). *Bike, bus, and beyond: Extending cyclopath to enable multi-modal routing*. Minnesota Department of Transprtation: Twin Cities, Minnesota.

van den Berg, P., Kemperman, A., de Kleijn, B., & Borgers, A. (2016). Ageing and loneliness: The role of mobility and the built environment. *Travel Behaviour and Society, 5*, 48–55.

Wener, R., Evans, G., & Boately, P. (2005). Commuting stress: Psychophysiological effects of a trip and spillover into the workplace. *Transportation Research Record: Journal of the Transportation Research Board, 1924*, 112–117.

Willis, D., Manaugh, K., & El-Geneidy, A. (2013). Uniquely satisfied: Exploring cyclist satisfaction. *Transportation Research Part F: Traffic Psychology and Behaviour, 18*, 136–147.

Xiong, Y., & Zhang, J. (2016). Effects of land use and transport on young adults' quality of life. *Travel Behaviour and Society, 5*, 37–47.