

Article

Travel Satisfaction vs. Life Satisfaction: A Weighted Decision-Making Approach

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Abstract: Numerous studies have found that travel mode choice is related to mode-specific attitudes as well as travel-related satisfaction. While choosing a travel mode that is congruent with attitudes towards that mode (i.e., consonance) brings about travel satisfaction, travel-related satisfaction can result in the choice of a travel mode which is not necessarily consistent with (all) attitudes (i.e., dissonance). However, few studies have analyzed the extent to which consonance and dissonance affect or are affected by the overall travel-related satisfaction. This paper aims at understanding whether respondents with a positive attitude towards a certain mode will actually use the mode, and whether consonant travelers are more satisfied with their trips and travel-related situations compared to their dissonant counterparts. Additionally, research in this area is dominated by the use of quantitative methods, leading to a lack of understanding of the complexity of subjective factors such as attitudes and values. In this study, with a retrospective mixed method approach, 1977 (in the quantitative section) and 19 (in the qualitative section) employees who have experienced an involuntary relocation of their workplace have been examined vis-à-vis their travel-related values and attitudes, corresponding choices, and satisfaction. Results from our quantitative analyses indicate that first, the relocation of the workplace was associated with increased public transit use and travel satisfaction; and second, surprisingly, the share of dissonant active mode users was relatively high compared to other modes (except bus). Our qualitative analyses revealed that individuals do not necessarily use the most positively valued travel mode due to lack of accessibility and competences, but also due to having preferences for other travel-related elements such as travel route. Furthermore, travel mode consonance (or dissonance) and travel satisfaction (or dissatisfaction) are not necessarily positively related because (i) individuals attribute different weights to their travel-related attitudes and values, and (ii) satisfaction in other life domains can make a travel dissatisfaction bearable or even favorable.

Keywords: travel behavior; workplace relocation; attitudes; values; travel satisfaction; life satisfaction; quantitative and qualitative; weighted decision-making; Montreal

1. Introduction

Improving the quality of life of individuals and increasing sustainable mobility are two of the principle targets of scholars and policy makers across various disciplines including transportation, geography, economy, sociology, and psychology [1,2]. From a multi-disciplinary point of view, the overall life satisfaction, i.e., a general evaluation of one's life, both affects and is affected by satisfaction in each life domain (e.g., financial, marriage, health, travel, etc.) [2–5]. Recently, a growing awareness

of the complex and mutual relationship between mobility satisfaction and life satisfaction has opened the debate on how individuals manage their daily travel-related choices and the extent to which these choices are congruent with sustainable transport policies. In order to take adequate policy measures to increase life satisfaction while encouraging individuals to adopt non-car transport habits, a deeper understanding of their decision-making process is necessary. Some studies have examined this process through the mobility biographies approach—i.e., travel habits are more likely to be changed during life-changing events, thereby low-carbon transport policies are more effective [6–8]. In this context, the important key event of residential relocation has gained much attention in transport research [9–11], while few studies have been devoted to the mobility impacts of workplace relocation, especially one that is involuntary (as in organizational mergers), as is the focus of this paper.

Travel behavior literature shows that modal choice for commuting often results from a compound decision-making process that is influenced by three main categories of factors: (1) accessibility—i.e., the range of mobility alternatives which may vary according to spatial characteristics (e.g., density, diversity, design, etc.) and journey characteristics (e.g., travel time, cost, weather condition, etc.), and that relates to the socio-demographic characteristics of the decision-maker and that of their household members; (2) competence—i.e., skills and abilities of the decision-maker individual with which they make use of access (e.g., driving license, knowledge relating to the regulations of the movement, etc.); (3) socio-psychological evaluation of the access and competences by the decision-maker, which is shaped by needs and preferences, and relates to attitudes, values and habits [1,12,13]. In order to explain the variety of mode choice behaviors among individuals, especially when their access and skills are identical, we need to delve into the way people interpret and act upon their options and conditions. Understanding this process will help in addressing the inconsistency between travel attitudes and/or preferences and behaviors that can influence travel satisfaction [14,15]. It can also explain the “irrationality” of travel behaviors when decisions are made based on personal preferences or habits rather than utility maximization that can be attained by minimizing travel time and costs [16].

The discrepancy between mode choice and attitudes towards that mode, known as travel mode dissonance, has garnered attention in recent years [14,17]. It is suggested that a positive attitude towards a certain travel mode increases the probability of preference for this mode, hence, choosing it for a particular trip. However, a mismatch between attitudes and behavior can result in feelings of dissatisfaction as the decision-maker had to choose their non-preferred alternative [17–20]. In the present study, we argue that travel mode consonance/dissonance is only one part of the greater travel-related choice (Travel-related choices involve any personal, familial, and professional choice that can influence daily travels. These choices include but are not limited to travel mode, distance, cost, time as well as mobility tool ownership (purchasing or disposing of a car, bike, or public transit ticket), residential location, work and non-work activity locations, marriage, divorce, having a child, and acquiring/disposing of a driver’s license.) consonance/dissonance, which depends upon not only attitudes but also values that are the underpinning of attitudes [21–23] and to which key decisions in life are more or less related (e.g., residence, car, family, education). In this sense, satisfaction in other travel-related domains possibly decreases the weight of travel mode dissonance and dissatisfaction in determining the overall life satisfaction. In fact, as people have more than one travel-related attitude/value, it is not always feasible to behave in conformity to all of them for various reasons such as budgetary constraints or varying preferences within households. Instead, people are more likely to order attitudes/values by their relative importance and act upon the one which has the strongest weight among the others if their accessibility and competences allow them to—for example, a person who has pro-ecological attitude but chooses to drive a car for daily commute because they give higher importance to versatility. It is also important to examine mode-specific attitudes in relation to the wider range of (travel-related) attitudes to which they belong. For instance, while bicycling for commute can be an outcome of a pro-ecological attitude towards cycling (which is a mode-specific attitude), it can be primarily the result of a more leading and influential attitude towards home–work distance (which

is a travel-related attitude), resulting in locating residential property within the cycling distance of a workplace [24–26]. This consideration also helps to control for residential self-selection.

Taken together, the present study targets the travel behavior of more than 10,000 employees of the New McGill University Health Center (MUHC) in Montreal, Canada, who have experienced an involuntary change in their workplace from four different locations within downtown to one peri-central location named the Glen site in 2015. Involuntary workplace relocation can take place when one or multiple job organization(s), at one or multiple location(s), move or merge in(to) another location [12]. From the standpoint of the employees, who have very little part in initiating or controlling the move, this relocation is an exogenous life event that can influence their commuting behavior as well as their overall daily mobility. As suggested by numerous studies, a context change (such as a workplace relocation) can increase an individual's consciousness and deliberation in their decision-making [12,27–33]. Not only have travel habits been found to be susceptible to disruption [9], travel-related values and attitudes are also likely to be activated after a behavioral context change [28,34].

This paper generally examines how the probability of changing commute mode is influenced by an involuntary change in workplace, while also accounting for access and competences, i.e., socio-demographics, transport resources and spatial context. The central focus of this study is on the rationales underlying individuals' travel-related decisions based on their attitudes and values while accounting for the relation between travel satisfaction and overall life satisfaction. To explain the reasons underlying the incongruity between travel attitudes/values and behavior and its influences on travel satisfaction, only a limited amount of studies is carried out and most of them have relied on a quantitative approach for their analysis. Although longitudinal quantitative studies make it possible to analyze causality and changes over a longer period of time, many studies have used cross-sectional methods due to their ease and speed of data collection. Additionally, few studies have applied a mixed-method approach in which a qualitative survey complements the findings from the quantitative survey. Qualitative analysis is, therefore, essential to acquire a deeper insight into the complex causal relationships between the subjective (and relative) psychological concepts that cross-sectional quantitative methods are often unable to address thoroughly. The focus of the present study is mainly on a qualitative research, and we also discuss and interact with the retrospective quantitative survey from which our sample for interviews are recruited. This paper begins with a review of existing literature on the concept of weighted decision-making and creates new insights into the links between travel-related attitudes/values, corresponding choices (whether consonant or dissonant), and travel and life satisfaction (Section 2). Section 3 presents the data collection and analytical methods, while the findings are presented in Section 4. Finally, this paper concludes with a discussion of the implications for research and policy (Section 5).

2. Literature Review

In this section, the concept of weighted decision-making will be presented as a different perspective in explaining travel-related decision-making processes where values and attitudes play a central role. Next, the concept of (travel-related) dissonance/consonance will be discussed. Finally, the link between travel satisfaction and life satisfaction will be reviewed.

2.1. Travel-Related Attitudes, Values, and Weighted Decision-making

Recent transportation literature is substantially devoted to the relationship between behavior and key psychological constructs including attitudes and values, which affect preferences for various short-term and long-term travel-related actions [34–37]. From choosing a residential location to a travel route or mode for daily trips, travel-related decisions are influenced by the degree to which the performance of the behavior is positively or negatively valued. The extent to which a valuation leads to an action can be explained through attitude/value–behavior relationships. Values and attitudes are distinguished constructs—both of which can influence behavior. Values are motivational constructs that guide an individual to fulfill a highly abstract goal like security, hedonism, or universalism [38,39].

For instance, protecting the environment and broad-mindedness are two values that fulfill the goal of universalism. Values can influence behavior in three ways: as cognitions that define a situation (e.g., as one in which environmentalism is involved), provoke goals (e.g., universalism), and guide action (e.g., signing a petition in favor of active modes infrastructure) [34]. While values relate to abstract, meaning-producing cognitive structures, attitudes are viewed in terms of evaluations of specific and tangible entities [21]. Attitudes are the result of various elements including an individual's underlying value structure. According to Eagly and Chaiken [40] (p. 1): "Attitude is a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor". The evaluation degree can vary from affective and cognitive evaluations (e.g., I like walking for commute, and walking can contribute to environmental preservation) to behavioral responses (e.g., walking for daily commute or participating in active transport encouraging campaigns) [25]. In fact, Eagly and Chaiken [40] have used the word attitude to describe both tangible and abstract judgments that could be labeled as values. In the present study, we, therefore, use attitude(s)/value(s) when talking about the link between these constructs to travel behavior in general and that of our sample.

Values differ from attitudes in that they transcend tangible entities and are hierarchically ordered with respect to importance [21]. The two constructs are, therefore, measured differently: "Whereas the core characteristic of an attitude is its variation on an evaluation dimension (favorable-unfavorable), the distinctive aspect of a value is its variation in importance" [34]. For instance, a decision-maker traveler may choose a certain travel mode based on strong health-related values (valuing living healthily and thus cycling to work every day) but does not consider the environmental values of their colleagues negatively. In other words, although this person has a positive attitude towards preserving the environment, it is not as important as keeping a healthy body to become a value. Although values and attitudes are distinct concepts, some attitudes can fulfill a value-expressive function, allowing an individual to express their self-concept [22]. For example, for an individual whose central value is selflessness, this individual may express very positive attitudes towards respecting others' preferences in a household and sacrificing their own convenience in favor of the convenience of others. Although the majority of studies discuss the existence of an order of importance for values (value priority) and not attitudes, some others suggest that people may consider some attitudes to be more important than others [41], and the more important an attitude the more likely it is to be stable over a long period of time.

The majority of studies that discussed the role of attitudes in travel behavior decisions focus only on mode-specific attitudes [14,42] or residential attitudes [24,43] without considering the complex interactions with decisions on other travel-related life domains (e.g., car occupation and family). This inclusivity, however, requires an in-depth examination of an individual's access and competences, life-stage circumstances, and personal preferences shaped by both values and attitudes, which is the focus of the present study.

Values may affect one's decision by defining the desirability of outcomes that are related to those values [44–47]. For instance, a female traveler aged seventy years who makes a choice between 'traveling by car' and 'traveling by bicycle' (value outcome) may decide according to which value she finds more important—i.e., 'maintaining a (relatively) safe trip' vs. 'keeping a healthy body'. In addition, the desirability or attractiveness of a transport mode alternative is defined by the quality of its attributes and their relative importance; and "values may determine the importance of an attribute and, hence, its decision weight" [34] (p. 435). Decision weight plays a crucial role in human decision-making processes [48,49]. For instance, for attributes of transportation modes, one can refer to cost, speed, punctuality, the availability of seats, air-conditioning, flexibility, safety, carbon dioxide emissions, capability of stimulating physical activity and so on. Therefore, travelers who value (give stronger weight to) preserving the natural environment the most are likely to give more importance to carbon dioxide emissions associated with cars (or even buses), and thus choose walking or cycling. The Random Utility Theory, compensatory decision-making, and non-compensatory decision-making are examples of the decision rules that people can follow when deciding between

alternatives (Lucas, Blumenberg, and Weinberger, 2011). The concept of weighted decision-making follows the non-compensatory decision-making strategy in which the score on one travel mode attribute (e.g., long travel time) cannot compensate the score on another (e.g., low price).

For attitudes, the story is more or less similar. Table 1 (matrix) simply illustrates the concept of weighted decision-making (Decision-making for choosing a transport mode is rather an automatic process for which one may not draw a table. This table only provides clarifications to the concept of weighted decision-making.) for a decision-maker who wants to select a transport mode between bus, car, and bicycle, and is concerned about three attributes, namely, environmental friendliness, cost, and reliability. To evaluate each transport option, one would choose a common scale as for example 1 to 3. For instance, with respect to environmental friendliness, car rates 1, bus rates 2, and bike rates 3, indicating that a bike is the most environmentally friendly mode here. For reliability and cost, the rating involves more subjectivity as one may find a car more reliable than a bike, while for another individual (with different access), a bike is more reliable. Next, the decision-maker assigns importance (weight) to all attributes. In our example, environmental friendliness outweighs cost and then reliability. The value of the weighting will then be multiplied by the value of the attribute for each transport option. Finally, a bicycle is the option with the highest value (16) thus the decision to be made.

Table 1. Example of a weighted decision matrix for three travel modes.

Attributes	Weighting According to Attitudes/Values	Bus		Car		Bicycle	
		Rating	Total	Rating	Total	Rating	Total
Environmental friendliness	3	2	6	1	3	3	9
Cost	1	2	2	3	3	1	1
Reliability	2	1	2	2	4	3	6
Total			10		10		16

People can have more than one mobility-related attitude/value, e.g., towards travel time (e.g., people valuing travel time or people finding travel time wasted time), punctuality, safety, equality, commitment, living healthily, consumerism (not using one's car or paying for gas or parking even in the absence of financial restrictions), preserving the natural environment, etc. These constructs will together influence the choice of preferred travel mode and people may rank each attitude/value differently. This concept of weighted decision-making is otherwise ignored in travel behavior studies that tried to compare various mode-specific attitudes towards each transport mode [14,42,50,51].

In a study by Verplanken and Holland [34], embedded attitudes that are functionally related to the self and have motivational properties as well as central values were shown to have the ability to predict behavior. Hunecke, Haustein [52] indicated that mobility-related attitudes have a stronger relation to travel mode choice, whereas values were better predictors of an individual's frequency of mobility, destinations they choose and the distances they cover to reach their destinations. Therefore, it can be hypothesized that values and value-expressive attitudes are more influential in making more 'important' and long-term decisions (e.g., home ownership or marriage), while attitudes are expected to lead short-term decisions such as choosing a travel mode for a particular trip on a particular day.

It is suggested that values have the capacity to drive behavior and acquire a motivational property if they become central, i.e., a part of one's self-concept [34,53]. According to the self-activation hypothesis when values incorporated in the self-concept are invoked as a result of context change, they are more likely to guide behavior. Previous research has demonstrated that in a routine context, there is usually a significant gap between an individual's pro-ecological values and their actual behavior. However, individuals with environmental concerns as part of their self-concepts are more likely to make (intentional) pro-environmental value-consistent decisions after their routine travel context is

changed. In the present study, we will indicate that a change in work location can be associated with the activation of various travel-related attitudes/values and behaviors.

2.2. Dissonance in Travel-Related Choices

Whether it is as favorable to be an attitude or as important to be a value, there are situations where people neither think about their values nor act upon their attitudes while making decisions. This discrepancy between one's action and one's attitudes/values towards that action, often referred to as a value–action gap or dissonance, is otherwise explained by earlier research [14,23,54,55]. In travel behavior studies, dissonance can be viewed both in terms of residential dissonance and travel mode dissonance. While residential dissonance (i.e., residing in a neighborhood that does not match with one's travel attitudes and residential preferences) has garnered considerable attention in the relevant literature, possible dissonance between the choice of a travel mode and attitudes towards that mode has not yet been analyzed thoroughly. The presence of constraints in travel-related access [56,57] and a lack of certain skills and competences are found to be significant [58]. For instance, an individual with strong positive attitudes towards the environment but insufficient bike riding skill might be forced to use motorized travel modes. Inaccessibility to efficient public transport in a suburban area is also a reason for choosing car over low-carbon transport modes. The presence of perceived behavioral control and perceived social norm [59] is also found to be a cause of incongruity between attitude/value and behavior.

Nordlund and Garvill [60] examine why many people who perceive themselves as “environmentalists” do not translate their attitudes into pro-environmental behavior. The authors suggest that these people are likely to give preference to their immediate interest rather than a long-term collective interest. For instance, it is plausible that a traveler does not sacrifice the comfort, speed and flexibility of a car at the expense of future positive environmental consequences. Moreover, presuming that a pro-environmental action of one person may have insignificant environmental consequences and the negative effects of acting otherwise are uncertain, these individuals are less likely to act upon their pro-environmental attitudes. However, even though walking to work by oneself on a particular morning may contribute only minimally to the reduction of carbon dioxide emissions, such a small action can exert notable, cumulative impact when performed habitually and co-operatively [61]. According to social dilemma research, a willingness to make personal sacrifices for common good is positively related to having a cooperative value orientation [62]. It is, however, important to note that even if a behavior has a positive impact on the environment, it might be performed for other reasons than to preserve the environment—for instance, riding a bike instead of driving a car to stay healthy. In fact, as discussed earlier, individuals not only differ in how they rank the importance of specific values but also in how they may give different weights to their own values [34]. For instance, a person who values preserving the environment might use their car for everyday home–work travel. There might be many reasons for this discrepancy. Environmentalism might not be an adequately central value for this person, s/he might not consider a commute trip as one in which environmentalism applies as a value, s/he might enact a competing value (versatility), or s/he could consider behaving as a pro-environmental person in recycling or composting [53] because such behaviors demand lower cost, time, or effort compared to choosing other travel modes [63].

Dissonance between behavior and attitude/value not only concerns travel mode choices, which is increasingly studied [14,15,43], but also pertains to longer-term travel-related decisions such as residential location choice [64]. For instance, a mismatch between one's actual neighborhood type and their preferences regarding physical attributes of a residential neighborhood can result in residential dissonance [55]. This means that there are possibly values such as ‘freedom’ or ‘preserving one's public image’ and/or attitudes such as ‘pro-community-oriented’ or ‘pro-high density’ that are not reflected in the choice possibly due to financial constraints, varying preferences among household members, or exogenous interventions in the neighborhood. Another example of a longer-term travel-related choice is the decision to (or not to) have a child. A person who values family (expansion) might have a

positive attitude towards (having) a child. If this person plans to have a child and this desire comes true, the individual is consonant in their (travel-related) choice. During the pregnancy and after the birth, the person may switch from cycling or bus use to walking or decide to purchase a car even if driving is against their pro-environmental values and attitudes. In this context, since the person is consonant with their choice/value of having a child, the unfavorability and dissonance of daily travel is deemed less important. In this regard, the extent to which dissonance in travel domains (e.g., residence, family) or subdomains (e.g., mode) influences one's overall satisfaction and vice versa is arguable. More explanations are provided in the following section.

2.3. Satisfaction as a Relative Concept

In recent years, subjective well-being (SWB) has been one of the focuses of various disciplines including travel behavior. SWB is related to both short-term affective reflections and long-term overall satisfaction with life, which is a cognitive evaluation [5]. The affective component mainly refers to the feeling of happiness/unhappiness—that is positive/negative moods or states that occur during an interval or activity episode [5,65–67]. According to Veenhoven (2012), happiness can also be derived from a specific life domain such as a good job with high salary. (Life domains are the specific, connected, and integrated areas in which people live and interact and which are customized to everyone's unique life. Examples of life domains include residence, neighborhood, health, education, work, family life, leisure and recreation, finance, and travel behavior) (Zhang, 2017).) Although the effects of monetary choices on happiness are undeniable, these choices are made for managing various other life choices, such as marriage, health, housing, mobility tool ownership, daily travel and activities [68]. In addition, individuals evaluate different aspects of life more importantly than others and so it is important to recognize the extent to which each life domain contributes to life satisfaction. This argument depends upon the value an individual associates with different experiences or domains in life [69]. In this sense, the overall life satisfaction is the sum of satisfaction in all life domains and sub-domains and, hence, it should be evaluated in an integrated manner. It is, however, suggested that it is not only satisfaction in various domains that can influence life satisfaction [70], but life satisfaction can also result in a positive evaluation of life domains [3,4]. In other words, domain satisfaction and life satisfaction have bidirectional effects (Figure 1).

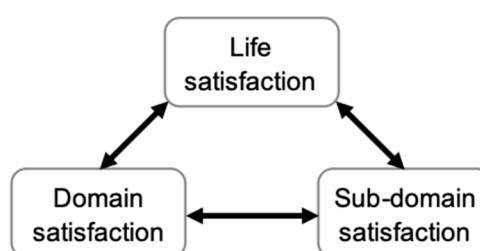


Figure 1. Interconnection between sub-domain satisfaction, domain satisfaction, and life satisfaction.

Being deeply ingrained in an individual's everyday life, mobility domain (especially daily commute) and its subdomains relate to both short- and long-term life satisfaction. They not only affect the overall life satisfaction but are also affected by satisfaction in other travel-related or non-travel-related domains of life [2]. An individual who is satisfied with their marriage, health, occupation, housing and access to amenities is more likely to be generally happy in life and so does not complain about the inconvenience of their daily commute (e.g., inadequacy of public transit service, cost of gas or parking, traffic congestion, etc.). In addition, one may give more importance to other life domains than mobility for different reasons including socio-demographic conditions, life stages/circumstances, and personal preferences. For instance, a 30-year-old single man who is seriously searching for his first job and is physically and financially capable of traveling with all modes of transportation and who is inherently easy-going with issues like traffic or crowded public transit during rush hours is likely to give lower

weight to (the convenience of) daily commute as this valuation might deviate him from moving toward his central goals. Conversely, a 70-year-old female who is highly sociable (likes to participate in activities that are mainly situated around the downtown core) but has no driving and cycling skills may value the ease of accessibility to public transportation over other characteristics of a neighborhood (and even a living space) when searching for a residential property. Therefore, there are central goals and values in life that people invest most of their time and money on achieving and, once these are achieved, the satisfaction that is derived possibly makes other life inadequacies more bearable or even favorable. It is in such situations that behaviors can also affect attitudes—additionally, the reverse causation is generally true [42,51]. Attitudes/values towards a non-preferred travel-related choice that is frequently made might improve to match performed behavior, possibly to reduce discomfort [18].

It should be noted that defining and measuring satisfaction is difficult as it is beyond people's objective circumstances such as distance to metro station or ownership of a private vehicle. Although quantitative studies widely accept that life (or travel) satisfaction can be measured saying, "Overall, how satisfied are you with your life (or daily travel) these days?", qualitative approaches enable a more complex evaluation of this relative concept. Satisfaction is, indeed, a subjective experience that depends upon one's perceptions and feelings and includes both cognitive judgments and affective reactions [5]. To the authors' knowledge, there is no mixed-method study to date on how travel-related domains interrelate, and to which extent each one of them contributes to overall life satisfaction for different individuals.

3. Methodology

3.1. Context of the Project

The relocation of the MUHC (Montreal, Canada) took place between March and June 2015. More than 10,000 employees were progressively relocated from four hospitals in the downtown core to the new site located southwest of the downtown a few miles from the old sites (Figure 2). The new complex is situated next to a bus terminus, a subway and a suburban train station and not far from a motorway interchange serving two highways structured at the national level. Therefore, the site is quite accessible by both private and public transport; however, the existing road network bears variable traffic conditions especially during peak hours [71,72]. The MUHC complex includes multi-level parking with electric vehicle charging facilities for the employees and ample underground paid parking for patients and visitors.

3.2. Participants

This study applies a mixed-method (quantitative and qualitative) approach to collect and analyze data on travel-related decisions before and after the move made by the MUHC employees and their households. As the employees of the MUHC had no control over the decision to relocate their workplace, the self-selection processes are unlikely to influence the link between commute behavior and the new built environment [73]. In other words, the employees had to accept the new home-work distance as well as access to the transportation opportunities. Nevertheless, it should be noted that some employees may have decided to leave the MUHC rather than relocating to its new location because the change meant that the commuting mode, time, or cost became unacceptable. On the other hand, some employees joined the MUHC after its relocation to the Glen site. Although these individuals experienced a change in workplace, we could not include them in our analysis because the relocation of the MUHC did not have a role in the change (or not) of their commute. Therefore, we limited our analysis to the impacts of the relocation of the MUHC on those who worked for it both before and after its move.

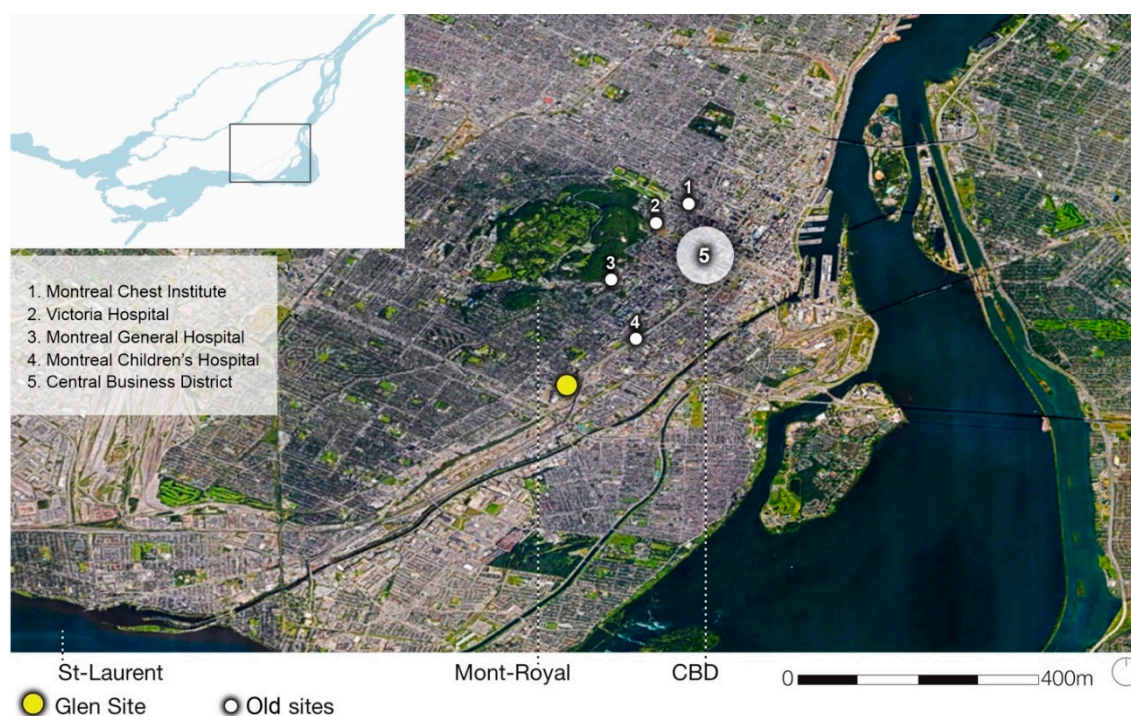


Figure 2. The location of the old and new hospitals of the New McGill University Health Center (MUHC), Montreal, QC, Canada.

Online Questionnaire

The study was conducted in two steps: (1) online questionnaire; (2) face-to-face interview. The self-completion retrospective questionnaire was designed as a web form with LimeSurvey (Montreal, Canada) and published online in both the English and French languages. In order to encourage the employees to participate, the survey was announced through digital ads illustrated on screens inside the complex as well as the internal website of the MUHC. One week prior to the launch of the online survey, the employees received an email regarding an upcoming email about the survey, in which the aim and scope of the corresponding research was explained. The employees were asked to check their inbox on the determined date. On 14 May 2018, (approximately 10,000) employees of the MUHC were invited via email to participate in the online survey questionnaire. The email included a link that directed them to a web-based questionnaire, which typically took approximately 30 min to complete. The project was announced as a study on “understanding the consequences of relocation of the MUHC to the Glen site”. For this survey, ethical approval was granted by the Multi-Faculty Research Ethic Committee at University of Montreal.

Participants completed the extensive questionnaire, detailing sociodemographic information regarding themselves and their co-residents (age, gender, education, income, number of household members, and car ownership before and after the move); their occupation, old place of work and old and new work schedules; their place of residence (old and new if changed since 2002 when the MUHC officially announced the relocation); their home–work journey characteristics before and after the relocation (modes, time, frequency, cost, and parking at work); their trip chain and activity spaces (kid’s pick up/drop off, shopping, leisure activity, etc.); their level of overall life satisfaction as well as travel-related satisfaction including accessibility and distance to home, public transport and amenities; their perception about each mode of transportation; reasons for choosing their current home and others. Since the focus of the present study is on travel-related attitudes, dissonance, and satisfaction, only corresponding questions from the online survey are analyzed and discussed here.

4. Findings

4.1. Quantitative Results

From the employees who received the email, a response rate of approximately 20% ($n = 1977$) was observed. Of these, 1005 responded to the whole questionnaire, especially questions regarding travel-related attitudes, satisfaction and overall life satisfaction. Based on different quantitative surveys [14,74–76], 42 variables of transport mode attitudes are built on a five-tier semantic differential scale and down to seven attitudes: speed, cost, ecology, comfort, safety, relaxation, and reliability, which are examined for six modes: bus, metro, train, car, bicycle and walk. This question provides a general overview of preferences and compares the employee's attitudes towards different transport modes, whether or not the person uses the mode (Figure 3). For each seven attitudes, a numerical ordinal score between 1 to 5 is assigned [26]—the sum of which gives a total score between 7 to 35, a measure for mode-specific attitudes [42]. According to the observed results, the overall attitudes towards walking present the highest (positive) score with 24.99, followed by attitudes towards metro (24.17) and train (23.95) while the other modes ranked lower with cycling (22.55), car (21.28), and finally bus (21.07). Generally, attitudes towards active modes present the highest score in other studies, but the score coming from attitudes towards metro and train coming before cycling is not usual (De Vos, 2018). (The fact that the number of bike riders—who answered this question—is relatively small is also an important factor that should be taken into account in the interpretation of the results.) This finding can be, at least partially, accredited to: (1) the accessibility of metro and train services at the Glen site compared to the four older MUHC sites; (2) the relatively insufficient accessibility for bike riders due to road closures and constructions, congestion, and the existence of the highways surrounding the Glen site. This argument suggests that behaviors and travel experiences can also affect attitudes—additionally, the reverse causation is generally true.

(Name of the Transport Mode: Car, Bus, Metro, Train, Bicycle, Walk)					
	Strongly Agree	Agree	Neutral	Agree	Strongly Agree
Fast					Slow
Expensive					Cheap
Ecological					Polluting
Uncomfortable					Comfortable
Dangerous					Secure
Tiring					Relaxing
Reliable					Unreliable

Figure 3. Measuring participants' attitudes towards six transport modes (six separate tables).

"Q: What do you think of each transport mode even if you do not use it? (For each transport mode, opposing qualifications (good or bad attributes) are provided. For each pair of qualifiers, check the box that best matches your opinion.)".

As expected, people using the train and metro have a significantly higher score (based on Chi square tests and analysis of variance and Fisher test also called the 'Anova F-test') regarding attitudes towards these modes compared to those using other modes (Table 2). For instance, train commuters score 27.02 for train-related attitudes. The F-test is significantly different (with the p -value $p < 0.001$) from the other groups of transport mode choices: ($F(5, 1066) = 36.226, p < 0.001$), where 5 and 1066 represent the degrees of freedom regarding the five other groups of transport modes and the number of people involved in the other groups respectively, and 36.226 is the ratio between the mean squares resulting from the variance between groups and the variance within groups. For car users, the car-related attitude was 23.09, which is significantly different compared to that of the entire surveyed people with 21.28 ($F(5, 1064) = 29.319, p < 0.001$). This significant difference in the total average was observed for all transport modes.

Table 2. Summary of overall transport mode attitudes by groups of transport mode commuters.

		Bus Attitudes	Metro Attitudes	Train Attitudes	Car Attitudes	Bike Attitudes	Walk Attitudes
Car	Average	20,414	23,097	23,243	23,109	21,605	23,746
	N	343	341	341	340	339	339
	St. Deviation	3633	3588	3182	3640	3502	4106
	Median	20	23	23	23	21	23
Bus	Average	22,891	24,324	23,190	21,431	22,052	24,652
	N	211	210	211	211	210	210
	St. Deviation	3597	3816	3088	3634	3780	4545
	Median	23	24	22	21	21	24
Metro	Average	21,201	25,328	23,291	20,494	22,822	25,388
	N	259	259	258	259	258	258
	St. Deviation	3939	4137	3429	3702	4010	4235
	Median	21	25	22	21	22	25
Train	Average	19,442	23,814	26,948	19,741	21,818	25,265
	N	172	172	172	170	170	170
	St. Deviation	3688	3682	3313	4015	3663	4275
	Median	20	24	27	20	21	25
Bike	Average	22,294	25,314	24,020	18,667	28,882	22,294
	N	51	51	51	51	51	51
	St. Deviation	4346	3927	3850	4546	3609	4346
	Median	22	25	23	19	29	27
Walking	Average	21,342	24,158	23,289	21,395	24,553	29,053
	N	38	38	38	38	38	38
	St. Deviation	3130	3530	3479	2871	3391	4172
	Median	22	24	22	21	25	30
Total	Average	21,057	24,135	23,878	21,336	22,475	24,912
	N	1074	1071	1071	1069	1066	1066
	St. Deviation	3892	3893	3551	3980	4026	4410
	Median	21	24	23	21	22	25

In order to estimate whether an employee could be dissonant or consonant about its commuting transport mode, we have considered several types of thresholds based on the transport mode used and the (normal) distribution we obtained for each overall transport mode attitude. One of the simplest thresholds can be derived from data classification related to a normal distribution, which is the difference between the average and the standard deviation:

$$T_{TM} = \hat{x}_{TM} + 0.5\delta \quad (1)$$

where TM is an index for the transport mode and T_{TM} is the threshold. For example, for car users, this gives a threshold of $(23.109 + 0.5 \times 3.640) = 24.93$, meaning that car commuters with an attitude score of 24.93 or more are considered as more or less dissonant. Table 3 summarizes this element for all modes.

In total, we observed that nearly 80% of the respondents are consonant. Among all, bus users are found to have the most dissonant commuters (27%) as opposed to metro users with only 17% dissonant commuters.

Table 3. Dissonant and consonant participants with respect to commute mode choice.

	Car Users	Bus Users	Metro Users	Train Users	Bicyclists	Pedestrians	Total
Consonant	81.9	72.7	82.8	76.8	70.6	90	79.1
Dissonant	18.1	27.3	17.2	23.2	29.4	10	20.9
Total	100	100	100	100	100	100	100

The Chi-square between commute satisfaction and the dissonance variable is highly significant ($p < 0.001$, Cramer Phi = 0.160). The variables linked to travel satisfaction are based on a two-part question capturing satisfaction and its comparison between a situation before and after workplace relocation: ‘Overall, how satisfied are you with your typical daily commute—before the relocation to the Glen site/after the relocation to the Glen site?’ The question was presented as a 5-point Likert scale, from ‘very satisfied’ to ‘very unsatisfied’. Commuting satisfaction has increased between the two considered periods. Nearly 70% of the respondents are currently satisfied or very satisfied with their commute to work compared to 59.3% before the relocation, testifying to a general improvement of the travel conditions, or at least of its perception. No significant association was found between commuter satisfaction and sociodemographic characteristics, such as age groups, gender, type of employment or group of salaries.

Regarding the overall life satisfaction, respondents were questioned: “Taking all things into account, how satisfied are you with your life these days?” The question was presented as a 5-point Likert scale, from ‘very satisfied’ to ‘very unsatisfied’. More significant associations were found between life satisfaction and age group (Chi-Square = 0.026, $p < 0.05$, Cramer Phi = 0.093), as well as types of employment (Chi-Square = 0.004, $p < 0.01$, Cramer Phi = 0.118). One of the most explanatory variables relies on travel satisfaction after workplace relocation (Chi-Square = 0.000, $p < 0.001$, Cramer Phi = 0.160), with an expected outcome: the more satisfying the commute, the greater the life satisfaction, and vice versa. This result corroborates to the general idea that life satisfaction and domain satisfaction are mutually correlated. However, the meaning behind this relationship has to be explored in detail with qualitative data.

In-Depth Interviews, Data Collection and Analysis

Although quantitative data in general potentially allows for examining causality, online questionnaires, even those with retrospective questions, as in the present study, are less capable of understanding changes and processes over time compared to longitudinal data. One reason is that lengthy questionnaires that contain detailed questions regarding various aspects of causality are time-consuming and can cause participant frustration and drop out. In the present study, the online questionnaire was relatively extensive since it concerned the situations of the respondents both before and after the move. Discovering the complex relationships and interactions between travel-related attitudes/values, mode choice, and satisfaction that are shaped throughout the time requires the use of qualitative methods as a complementary approach that allows for the in-depth evaluation of such subjective and relative concepts [29,70,77,78]. In the present study, the preliminary framework and the closed questions of the online questionnaire did not present sufficiently structured concepts concerning the underlying rationales for travel-related and commute mode choice. For instance, we found that 80% of the respondents are consonant, whereas 70% of the respondents are satisfied commute-wise, showing that there still exist consonant commuters who are unsatisfied with their commute (we also found dissonant but satisfied commuters). Thus, the second stage of the study required a qualitative approach, in the form of detailed semi-structured interviews. Findings from this section can indeed be used for exploring and developing new hypotheses to be examined in quantitative analyses.

On the last page of the online questionnaire, respondents were asked to provide their email address and/or telephone number if they are interested in being contacted for a face-to-face interview. A total of 101 respondents provided their contact information—of which, only 19 consented to participating

in a one-hour long interview. The interviews were conducted between September and December 2018 with 19 employees at the Glen site. The sample, composed of four men and fifteen women, reflects a range of ages between 27 and 80, household structures, income level and profession category (Table 4). The interviews were based on open-ended questions enabling the respondents to speak freely about their daily (old and new) work and non-work trips and those of their household members, the relevant experiences and challenges, other travel-related events during the last couple of years (e.g., residential mobility, car ownership, etc.), reasons underlying any change (or not) around the relocation, travel-related values and attitudes and level of travel and life satisfaction before and after the move of their workplace. Regarding the data analysis, first, the audio-recorded interviews were transliterated, and the sociodemographic characteristics of the respondents were presented in Table 4. Next, all the interview manuscripts were recoded based on the study objectives and the key variables to be examined. Coding was carried out with the help of the QDA Miner, a specialized software for analyzing qualitative data. The participants were given pseudonyms.

Table 4. Socio-demographic characteristics of the respondents.

Characteristics		Cases
Gender	Male	4
	Female	15
Age (years)	25–34	4
	35–44	4
	45–54	7
	55–64	1
	65 and more	3
Education	Secondary level and below	3
	Diploma/College	3
	Undergraduate degree	8
	Master’s degree	1
	PhD degree	4
Number of children in household	0	7
	1	2
	2 or more	10
Household type	Single	1
	Couple without children	6
	Couple with children	12
Employment status	Full-time	15
	Part-time	3
	Night shifts only	1
Total Σ		19

4.2. Qualitative Exploration of Consonance and Satisfaction

This section presents an analysis of the data from the interviews centered upon the key elements of utility maximization and weighted decision-making set out in the theoretical background section. Based on the travel-related priorities of the interviewees and the attitudes/values underlying their corresponding decisions, five categories of decision-makers are distinguished and analyzed in detail. Elements of dissonance/consonance and satisfaction are also discussed accordingly (Table 5).

Table 5. Profiles of participants and different categorizations according to decision weights, consonance and satisfaction level.

Participant	Characteristics		Commute Mode		First Ranked Attitude/Value	Residential Satisfaction	Commute Disso./Conso.	Commute Satisfaction
	Age	HH Composition	Before *	After				
1. Olivia	28	Couple, no child	Car	Car	Home ownership	Satisfied	Somewhat dissonant	Satisfied
2. Isabelle	51	Couple with four children	PT	PT	Living space and neighborhood	Satisfied	Dissonant	Dissatisfied
3. Ava	27	Couple, no children	PT	PT	Pro-environmental	Satisfied	Consonant	Satisfied
4. Emma	33	Couple with one child and one expecting	PT	PT/car during pregnancy	Pro-environmental	Satisfied	Dissonant	Somewhat dissatisfied
5. Camila	38	Couple with two children	PT	PT/walk	Pro-environmental	Satisfied	Consonant	Satisfied
6. Elizabeth	51	Couple with two children	PT/Bike	PT/Bike/walk	Pro-environmental	Satisfied	Consonant	Satisfied
7. Sophia	68	Couple, no children	PT	PT	Pro-environmental	Satisfied	Consonant	Satisfied
8. Mila	41	Single	PT	Car/PT	Minimizing costs	Satisfied	Consonant	Somewhat dissatisfied
9. Jane	45	Couple with two children	PT	PT	Minimizing costs	Satisfied	Consonant	Somewhat dissatisfied
10. Zoe	52	Couple with two children	Car/PT	PT	Minimizing costs	Somewhat dissatisfied	Dissonant	Somewhat dissatisfied
11. Rachel	61	Couple with one child	Car	PT/Bike	Minimizing costs	Somewhat dissatisfied	Somewhat dissonant	Somewhat dissatisfied
12. Abigail	35	Couple with two children	PT	Multimodal	Spouse's and children's satisfaction	Satisfied	Somewhat dissonant	Satisfied
13. John	48	Couple with four children	Car	Bike/PT	Spouse's and children's satisfaction	Somewhat dissatisfied	Somewhat dissonant	Somewhat satisfied
14. Linda	27	Couple, no children	PT	PT	Convenience and speed	Satisfied	Consonant	Satisfied
15. Mia	36	Couple with two children	PT	Car	Convenience and speed	Satisfied	Consonant	Somewhat dissatisfied
16. Hannah	48	Couple with two children	PT/Being driven	PT/Being driven	Convenience and speed	Satisfied	Somewhat dissonant	Somewhat satisfied
17. Benjamin	53	Couple with two children	PT	PT/Bike	Convenience and speed	Satisfied	Consonant	Satisfied
18. George	69	Couple, no children	PT/Bike	Car	Convenience and speed	Satisfied	Dissonant	Somewhat satisfied
19. William	80	Couple, no children	Walk	Car/PT	Convenience and speed	Somewhat satisfied	Somewhat dissonant	Somewhat satisfied

HH Composition = Household Composition – PT = Public Transport (Train, Metro, Bus)—* Before and after the relocation of the MUHC.

4.2.1. Home Ownership/Location is More Important Than Any Travel Disutility

The first group belongs to two participants, Olivia and Isabelle, for whom home ownership/location outweighed any possible travel disutility.

Q: *“So, why did you choose this location for your current home?”*

A: *“It was the low mortgage cost versus everything else . . . I can’t get anything in the city with a bit of land for under one hundred fifty thousand dollars.” (Olivia, Age 27)*

Olivia is a nurse who only works night shifts and drives a car four days a week for a home–work distance of ninety-five kilometers; a three-hour round-trip commute that costs her four hundred dollars of gas and one hundred dollars of parking per month not to mention the costs of maintenance and insurance.

Prior to moving to her current home, Olivia experienced commuting to the Glen site from three other locations (North, West, and South) within the Greater Montreal (Greater Montreal is referred to as the Montreal Island (the inner and densely populated area) and its surrounding lower-density municipalities which are located on the fringe of Metropolitan Montreal.) and, from each home, she chose driving over other transport modes, even when she had the opportunity to have a twenty-minute train commute. In fact, neither the residential nor the workplace relocations (as major life events) stimulated a change in behavior nor weakened her strong habit of car use [9]. In addition, working nights and also having a car, Olivia preferred driving to ensure having a seat (compared to jam-packed rush-hour public transit) in a morning when she could not have enough sleep the night before. Olivia also admitted that she is not a day person, thus daytime commute is not an option for her, which is why she opted for a nighttime job in the first place. Olivia also highlighted that her job is stable, whereas her partner’s is more flexible. This provided them with less constraints in finding viable neighborhoods in which to search for a new property. With his skills and competences, Olivia’s partner can choose different careers at different locations or even stay at home with their future children if necessary.

Olivia perceived the MUHC “super-hospital” as a prestigious organization where being an employee is a value that fulfills her feelings of self-esteem, pride, and satisfaction. She believed that working at this well-known hospital is worth the long commute and the costs. Olivia referred to her commute time as her “alone time”, “girl time”, or the time in which she can have her own space to think about herself.

“I always wanted to be part of the ‘big’ hospital. I always wanted to be part of advancing research . . . I feel like a sense of pride when I tell people that I work at the super-hospital. Everybody knows the super-hospital. You know, so, I tell them I work for the Children’s or I work at the Glen and they’ll say ‘Oh, the super hospital!’.” (Olivia, Age 27)

For Olivia, travel environmental concerns had a lower value weight compared to home ownership and the reputation of working for the MUHC, her two central values. Surprisingly, the price of her car was almost the same as her house, confirming the fact that one may pay any expenses to achieve a central goal. Recycling, composting, and implementing solar panels in her backyard were examples of actions that Olivia performed in order to enact her environmental concerns.

For Isabelle, the story is in some respect different. Aged fifty-one, Isabelle lives with her spouse and four children in a large detached house, in a small island near Montreal, thirty kilometers west of the MUHC. Isabelle is a full-time administrative technician who relies tremendously on public transit for morning and afternoon commutes. Two buses and a metro take her to and from the Glen in almost four hours per day—i.e., one-third of the time she spends out of home. Isabelle enumerated various dissatisfactory elements associated with bus use and admitted that these challenges can be sufficient for some people to move their home closer to their workplace.

Six years before the relocation of the MUHC, when Isabelle and her husband bought their current house, they knew about the future location of the Glen and could afford to rent or buy in closer proximity

to the workplace of all household members. However, giving prominence to certain characteristics of a residential neighborhood decreased the importance of home–work travels.

Q: *“Do you ever plan to relocate your home because of all these situations?”*

A: *“No. We like where we are. We’re still part of the Montreal. But we feel like we’re a little separate because it’s an island. We have a little bridge. I think that If I was a single elderly woman, I wouldn’t stay there. But because we’re family we’re all out there. I really like it there. Buying a house in Montreal? There’s no way I can afford anything around here. We went where the prices were reasonable, where you know things were more convenient.” (Isabelle, Age 51)*

Despite her positive stance towards environmental protection, Isabelle’s travel-related decision did not reflect her attitudes. She acknowledged that the ownership of only one vehicle which is chiefly used by her spouse—whose workplace was situated seventy kilometers to the south—has forced Isabelle to use public transit. Once she can afford a car, she would either drive to work or to the train station to save time.

In sum, looking at the two above-mentioned cases, one may find various attributes of travel mode such as cost, convenience, and eco-friendliness to be important in making commute-related decisions. However, the utility/satisfaction that Olivia and Isabelle gained from home ownership and residing in their preferred house and neighborhood outweighed the disutility of wasting time, money, and energy during the daily commute. In other words, Olivia’s and Isabelle’s choices and behaviors may not seem rational from an economic or ecological perspective—but rather satisfactory—since the corresponding utility is not maximized. With respect to the questions of ‘commute satisfaction’ and ‘overall life satisfaction’, both participants had selected ‘neutral’ and ‘satisfied’ respectively on a 5-point Likert scale in the online questionnaire. However, the interviews revealed that these responses are highly relative and subjective as Olivia was found distinctively happier regarding her commute as opposed to Isabelle who perceived her home–work trips as ‘horrible’.

4.2.2. Environmentalism Underlies Every Travel-Related Decision

For five of the participants (Emma, Elizabeth, Camila, Sophia, Ava), pro-environmental attitudes/values guide their (travel-related) behavior distinctively compared to others. The interviews revealed that environmental concerns have more or less influenced long-term and short-term travel-related decisions including the choice of home location, vehicle ownership, non-work activity spaces, and daily commute. Among the first priorities in locating a residential neighborhood, these participants referred to walkability and accessibility to public transport and amenities. Elizabeth highlighted that having grown up in the suburbs, her husband and herself had negative experiences from extensive automobile dependency. These experiences together with their strong ecological concerns morally motivated Elizabeth and her spouse to stay downtown to minimize their pollution while taking the advantage of having a short home–work distance. Similarly, Emma acknowledged that having grown up in another city, she finds driving in Montreal to be comparatively “stressful” and “aggressive”. Outweighing the accessibility and possibility of walking to work to home ownership, Emma rented an apartment within one-and-a-half kilometer of the Glen site. In addition, Elizabeth, Emma, Camila, and Ava emphasized that the ownership of only one car, that is fuel efficient, was an intentional choice resulting from their feelings of moral obligation to act pro-environmentally.

“I owned a car before. But when we moved in, we decided to keep only one car because we still need to go to the country house during the weekend. But the choice of disposing one car is that I’m a big environmentalist.” (Ava, Age 27)

Interestingly, all participants of this category were found to be more or less proactive in their home location decisions when anticipating the future of their workplace. (In the late 1990s, scattered news about the building of a new MUHC at a site named “Glen site” emerged. As a result, the majority

of the employees who worked at the MUHC at that time were more or less informed about an eventual relocation of their workplace.) For instance, in her last year of study at university, Ava decided to move in with her partner. Knowing that her chance of finding a job at the MUHC is the highest among other medical centers in Montreal, she sought for residential locations in close proximity to the Glen and within walking distance of a metro station. Camila who also expected a baby started to search for a larger home around the Glen two years in advance in order to avoid “getting confined” by the new travel constraints. Even Elizabeth, who moved to her current home fifteen years before the relocation of the MUHC, prioritized accessibility to her future workplace and limited her search to central neighborhoods.

“The fact that my children, my spouse and I are close to work and in biking distance of work and school is more important than having a big backyard. . . . At that point they did not have a land site chosen but it was very clear that because of the trauma center status and the level of care that we deliver we would be staying within the downtown core.” (Elizabeth, Age 51)

It can be argued that an environmentalist individual who is subconsciously concerned about the future of the planet is more likely to contemplate their own future life situations, too. Anticipating any probable changes and challenges, these people are more prone to take actions proactively to avoid obligations to act against their pro-ecological values and attitudes. Furthermore, an individual who always cares about the common good is more likely to consciously make co-operative choices (based on altruistic values) at any time he/she makes a decision [62]. The common acknowledgement among these participants was that the choice of low-carbon transportation modes, especially for commute, was the outcome of conforming to inherent pro-ecological values.

“Definitely my husband and I we care about the environmental impact that we have. So, this is primarily reason why we try to stick to public transport as opposed to using our vehicle that has gas emissions. So, I mean I wouldn’t say it’s like something that we think about. I think it’s just instinctually what we’re concerned about.” (Camila, Age 38)

Q: Will you be ever interested in green-transportation incentives?

A: “It wouldn’t affect me because I’m going to do it anyway . . . I know what I value.” (Sophia, Age 68)

These findings corroborate the value-belief-norm theory of environmentalism—i.e., feelings of moral obligation to act pro-environmentally are the outcome of values (e.g., altruistic values) and environmental beliefs (i.e., awareness of the behavior’s negative influences on the environment and feeling responsible to act upon that) (Stern et al., 1999; Stern, 2000). According to Kollmuss and Agyeman [23], individuals’ priorities are defined according to their feelings of responsibility, which are shaped by values and attitudes. If people’s pro-ecological values are in alignment with their priorities—i.e., their own well-being and the well-being of their family—the motivation to act upon the priorities increases (e.g., residing in cycling distance of the children’s school). If they contradict each other, the priorities will less likely be followed (e.g., not to purchase a car, even though one could afford to buy one). This argument is comparatively true for the participants of this category for whom pro-environmental values are central to the self and, when activated (by anticipating their workplace relocation), are regulated value-congruent behavior [34].

4.2.3. Maximizing Utility Equals Minimizing Costs

Q: “Why do you use public transport and your husband take the car?”

A: “We did the math. He could go to work in a different way but it’s actually cheaper for him to drive than purchase the train and bus pass. For me, it’s the opposite.” (Jane, Age 45)

For Jane, Mila, Zoe, and Rachel, commuting behavior can be better explained through the utility maximization theory from an economic perspective. As economics theorize, when making a choice from various alternatives, individuals attempt to get the greatest value possible from the expenditure of the least amount of money. This often happens when the individual's income or resources are limited, and they have to select the combination of choices that is most affordable to maximize their utility. For example, the choice of locating a low-rent residential property in an urban fringe and spending more on transportation versus living in an expensive apartment within the city but paying less on transportation by relying on walking and cycling.

"I think our next step will be to purchase a home. And that is a big discussion at home. Do we stay within the city, or do we move out to a more rural area which is a dream of ours? But the cost of accessibility to Montreal core is something to be considered also because we will maintain having one vehicle only." (Jane, Age 45)

Jane is an administrative technician who lives with her husband and two sons (both at the legal driving age). With a relatively low household income, for Jane, minimizing the household expenditure, especially on transportation, is one of the first priorities that she tried to realize primarily through residential self-selection and maintaining the ownership of one vehicle. Jane emphasized the "rationality" of her decisions that helped optimize their income and expenses, a strategy that maximized the entire household's utility and satisfaction—i.e., the choice of residing in a low-rent apartment in a mixed-use, transit-oriented neighborhood and locating job, school, and daily activities of the household members within the close proximity of their residence. Jane also referred to the "time loss in traffic congestion" as "a waste of money" and pointed to her tendency to prevent her children from driving as an indication of her strong economic concerns.

Mila, a forty-one-year-old, single, health and social professional, moved out from her parents' home to shorten her commute after the relocation of the MUHC, a reduction from three hours to thirty minutes per day. Mila works at two sites, (1) the Glen, to which she takes the train, and (2) the MUHC administrative building to which she drives her car. Choosing her current home location was an attempt to maximize her accessibility to one of the least congested highways that goes to her second workplace, a main train station that goes directly to the Glen, and her leisure activities. Mila acknowledged that in spite of the recently added rent to her monthly expenses, she gains more utility in saving travel time and gas for work and non-work trips. She managed to use the extra time for earning money in a sport class where she is a trainer.

Zoe and Rachel (fifty-two and sixty-one-year-old administrative technicians) shifted from a car-based commute at their former workplace to a public and active transport-based commute at the Glen site. For Zoe and Rachel, the choice of car was utilitarian up until the parking fees exceeded the public transit fares. In fact, taking into account the costs of gas, parking and maintenance, they outweighed the monetary benefits of public transport (especially bus) to the flexibility, speed, and reliability of car commuting. Zoe emphasized that the only driving force to take low-carbon transport modes is the household's financial restrictions and environmental concerns play no role whatsoever in this regard.

Q: "Do you have any environmental concerns when you use public transportation?"

A: "I think everybody's gonna say of course I care about environment but come on now it's cheap and I don't want the hassle of accidentally parking somewhere where I can't park and then get a ticket." (Zoe, Age 52)

Rachel also took advantage of riding her bicycle to work for seven months during the non-snow seasons. She underlined that a "simple calculation (of time and cost) can make a big difference". Comparing a one-hour long bike ride (one way) to a forty-five-minute long public transit journey, Rachel preferred the former alternative for two reasons: (1) "for a fifteen-minute extra (commute time),

I can save almost eight hundred dollars per year” and (2) “I’ll save a lot of money on the gym as the bike is already my cardiovascular exercise”.

Although one may argue that minimizing costs to maximize utility is everyone’s desire, the aforementioned cases are highly distinctive from other participants in this respect. For instance, both Jane and Zoe highlighted that the joy of shopping at diverse or special but remote shopping centers is not worth the gas to travel that extra distance. However, they may go to several stores in their vicinity to take advantage of the best deals. Finally, any travel mode consonance is not necessarily associated with travel satisfaction. Although the choice of public transit is the most utilitarian for Zoe, it is still somewhat unsatisfying due to the inadequacies of public transit. In fact, she is a good example of an individual who is choosing between bad and worse for her commute mode.

4.2.4. “My Family is My Priority; I Will Adapt Myself”

John is a forty-eight-year-old nurse who lives with his wife and four children, twenty-seven kilometers south-west of the Glen site. For John, the accessibility and convenience of the household outweighed his own ease of access to work. A three-hour round commute trip by bicycle was John’s biggest challenge after the relocation of the MUHC to the Glen site. Although riding a bicycle was in line with John’s pro-environmental and pro-health attitudes, he complained about a six-kilometer additional commute distance after the move. He also raised many criticisms on the inapproachability of the Glen as a result of road closures, constructions and congestion.

Prior to the relocation of the MUHC, John used his private car for commute, which exposed him to extensive parking availability and cost challenges, leading him to experience strong feelings of dissatisfaction for commute trips. Therefore, he changed his job twice to adjust his work schedule and commute routines to that of his household members. He believed that in a household of six, the existence of at least one flexible member is essential for “the whole system to work”. John highlighted that the choice of their current residence was mainly determined by the workplace of his spouse and the location of the school and extracurricular activities of their children.

“We moved three times but in the same neighborhood . . . of course, it is relatively less expensive here but, more importantly, the environment was safer to raise a family.” (John, Age 48)

Similar to John, Abigail, a thirty-five-year-old pharmacist, put the preferences of her spouse and two children (“personal life”) before her convenience (“work life”). She acknowledged that having a “selfless” personality, she can easily ignore her travel satisfaction in favor of the household’s sense of “contentment” and “happiness”. Especially, after the birth of her children, the importance of having a short commute was substituted by the ease of access to grandparents. Although Abigail relocated home immediately after the relocation of the MUHC, she enumerated various non-MUHC-related factors (e.g., larger living space, proximity to parks and shopping) to be as key determinants in their decision.

4.2.5. Convenience and Speed Weigh Way More

Undoubtedly, convenience and speed are everyone’s interests when it comes to repetitive work travel. However, the extent to which an individual gives prominence to travel convenience and speed at the expense of other factors (residence, environment, cost, and family) can be argued. In six cases of the sample we analyzed—George, William, Hannah, Benjamin, Mia, and Linda—the significance of convenience and speed for everyday commute played a substantial role in residential location and vehicle ownership decisions.

George and William, two physicians with similar socio-economic characteristics (both above sixty-five years old, live only with their wife, above-average annual household income) switched from active to car-based commuting after the relocation of their workplace. Currently living within walking distance of a major public transit station, George can take the train and William can take the metro to reach the Glen site in approximately forty-five minutes with a reduced fare for the elderly. However, having experienced a longer commute distance and a different route after the relocation of the MUHC,

both participants switched to driving to maintain the speed and convenience of their daily travel within a certain level. For example, although the new cost of commute including parking, gas, and maintenance, has increased six-fold, George acknowledged that he has no choice but to pay for his safety and convenience. Similar to Zoe, he seemed to be caught between a rock and a hard place where his choice of commute mode is only practical rather than satisfactory.

"I did actually take my bike to work at the old site for about six to eight years. I stopped doing that when I came to the Glen because I didn't want to be killed in the highway. So, it was for my personal safety. If I take auxiliary roads, it takes much longer. I am concerned about fossil fuels but, I feel two hours commute per day is just not something that I can handle at this stage." (George, Age 69)

William also works at a private clinic within walking distance of his principle workplace, the Glen site. He explained how the nature of his job necessitates the use of car on certain days of the week. Having to carry some delicate objects like "biopsy specimen" between home, the Glen and his private office, he prefers to drive or be driven by his wife to transport the biopsies safely. On other days, however, positive attributes of a car such as air-conditioning, flexibility, independence, and "access to underground parking next to the elevators" overshadow the low cost and ecological sustainability of public transport.

Mia, a thirty-seven-year-old nurse who lives with her husband and two children, relocated home in anticipation of the relocation of the MUHC. The household's first determinant factor in the residential move was shortening of the commute distance for everyone. For this purpose, the location of the children's schools was also chosen on the route from home to the Glen and Mia's husband's workplace. Therefore, having located all the destinations close to each other and in one direction, the entire household's commute is completed (morning and afternoon) on a single trip with everyone in one car. However, Mia confessed that not only can she and her husband easily use public transit, their children can also use the school bus for commute. Mia who had the least ecological concerns among all was an admirer of driving. She explained that even though public transit is easily accessible and cheaper, it is not comparable with car regarding, speed, reliability, air conditioning and entertainment for the children.

"I'm not going to go out of my way to make a decision for the environment. . . . If you want to convince me to take the public transport, you're going to make the public transport faster and more convenient than if I was taking the car and not much more expensive unless it's a lot more comfortable." (Mia, Age 36)

This distinctive appeal for speed and convenience was not limited to car users. Benjamin, Hannah, and Linda were three public/active transport users who self-selected their commute mode irrespective of its advantages vis-à-vis environment, cost or family.

A couple of years prior to the relocation of the MUHC, Benjamin and his family relocated home for two main reasons: having a larger living space and residing within walking distance of a metro station. When the latter condition was met, Benjamin disposed of his second car as all four members of the household were able to commute using the same metro line. Benjamin acknowledged that even though the cost of four public transit passes is equal to, if not higher than, the gas and parking expenses of car commuting (car-sharing like Mia), they would rather avoid time loss and the stress of getting stuck in traffic. Conveniently, for Benjamin himself, access to the Glen site is straight with no transfer between lines. Benjamin explained that he had also tried driving and cycling to work. Whereas driving is "time-consuming and exhausting", cycling is pleasurable and advantageous for his health, hence, it is his preferred alternative during the summer. However, Benjamin admitted that ecological concerns play a minor role in his decision for his use of low-carbon transport modes.

"Nothing is more important than having a commute time within a certain threshold, the faster the better . . . Car is for when I have to visit multiple sites in one day. That's way more convenient than

other means. ... I'm not taking my car and I take the subway because I want to save the planet? It's there somewhere but it's probably the last one." (Benjamin, Age 53)

Hannah is a forty-eight-year-old administrative technician, who changed her home two years after the relocation of the MUHC. Although the impetus for this home relocation was a non-job-related factor, the choice of the neighborhood was determined merely by the importance of commute convenience and distance for Hannah, as, from their home relocation, the other three household members (husband and two children) did not benefit commute-wise. However, notwithstanding that the new home was within a thirty-minute walking distance of the Glen site, Hannah asked her husband—who was unemployed at that time—to drive her to work for more than one year. Finally, with her husband finding a job, Hannah switched to public and active transport, commuting without any intention for environmental preservation or saving money.

"At that time of day [bus and metro] is like super packed in like sardines. And I hated it. It was awful. So, when my husband stopped working, I was like, "do you mind giving me a ride?" I switched to public transport only because it's more convenient parking wise, time wise, traffic wise." (Hannah, Age 48)

Finally, Linda was the only participant who never considered driving as an option for commute as she never opted for a driving license. Being raised in a transit-oriented neighborhood, Linda has always appreciated the capability of performing her daily activities by walking or bus and metro. Therefore, when deciding to relocate home in 2015, her first priority was maintaining accessibility to public transport and walkability to amenities and services. However, even though Linda and her partner can largely save money and also contribute to environmental preservation by public/active transport use, she admitted that the only driving force to remain a non-car user is the convenience and the dislike of cars that originates from childhood experiences.

"It's more pleasant to sit with the phone or with the book in the Metro than to be in a wheel and trust and not knowing where to go because Turcot is closed, something else is closed. Everything around the Glen is Closed. I just chose to never never get my license." (Linda, Age 27)

For the six cases we analyzed in this group, the convenience and duration of commute trips outweighed other key elements such as cost (George, William, Mia and Linda), environment (Mia, Benjamin, Linda), and family (Hannah). These individuals managed their commute trip to be short, straight and with minimum transfers between lines.

Our analyses indicated that people tend to have both more than one travel attitude (towards mode, route, distance, time, direction) and travel-related attitudes/values including the ones towards preserving the environment, spending/saving money, health (having physical activity through daily transport), home ownership (as an essential investment), residential location (accessibility, density, tranquility, family-oriented), and everyone's satisfaction in a household. However, not only do people differ in how they rank the importance of specific attitudes/values, they are also likely to assign different weights to their own attitudes/values, which eventually influences the way they experience feelings of satisfaction (Figure 4). Commuters such as William who express negative feelings about being stuck in congestion and experiencing stress may feel satisfied overall as they can make efficient use of time by being more multitasking compared to cycling or public transport. In fact, the utility gained in saving time outweighs the disutility of feeling stress. Although Olivia had pro-ecological and pro-health concerns, too, her stronger inclination toward home ownership as an essential investment led her to rank 'preserving the environment' and 'having physical activity' the second and the third, respectively. Therefore, to maximize her feelings of satisfaction, she chose to purchase a house where she could afford it—a very distant neighborhood from the city that was only accessible to work by car. This choice, however, overshadowed her desire to respect the environment or perform some exercise through daily public/active commuting. Additionally, as Figure 4 illustrates, the existence

of barriers and facilitators, i.e., socio-demographic characteristics, spatio-temporal accessibility, and skills and competences, can influence one's capability to act upon their attitudes/values in their order of importance. For instance, for Isabelle, the self-selection of a residential neighborhood (as the first priority) which is inaccessible by adequate public transit facility results in the element of 'travel convenience' to be negatively overshadowed. Emma, who was also pregnant at the time of the survey, highlighted that the occasional reduced mobility has forced her to be driven to work by her spouse. For some participants, the existence of barriers caused them to adopt new attitudes or even values in some cases. For instance, George who has reached a sensitive age for bicycling prioritized the value of security over environmentalism and thus changed his commuting from many years of bicycling to car use after the relocation of his workplace. This finding is in line with the results from De Vos, Ettema [64], who suggest that travel attitudes are likely to change after relocation. Using a quantitative analysis, this study suggests that travel attitudes vary across individuals depending on the spatial characteristics of the current and previous locations. Our qualitative analysis revealed that in addition to spatial characteristics (e.g., passing through a highway for the new home–work route for George), the socio-demographic characteristics, skills/competences, and habits of the individual also play a role in how travel attitudes/values change.

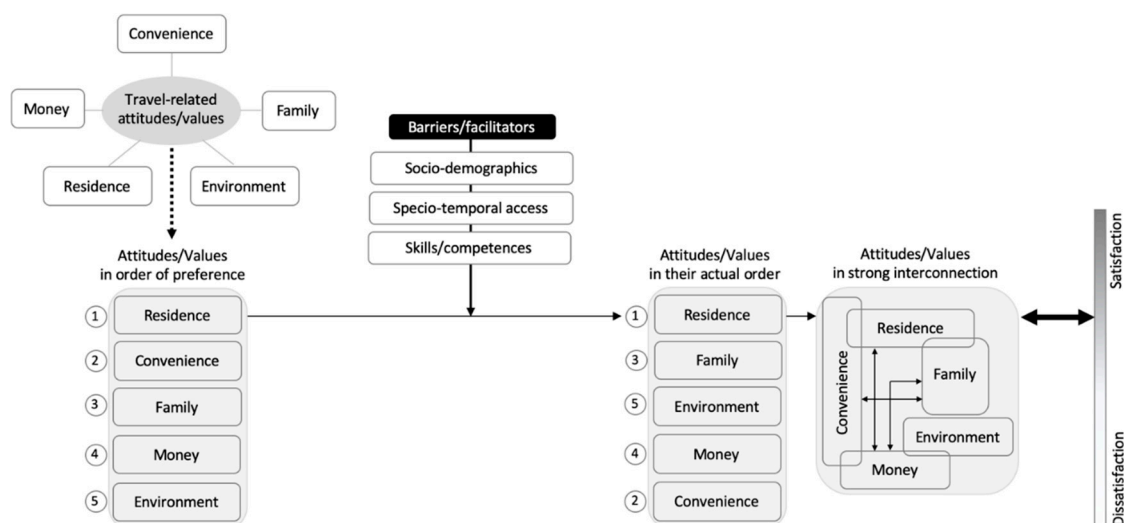


Figure 4. Weighted decision-making and the interconnection between travel-related domains and satisfaction—The example of Isabelle.

Furthermore, our analyses highlighted that travel-related choices and the corresponding attitudes/values are strongly interconnected to one another, i.e., one life choice may not only be the outcome of other life choices but also influence other life choices [2]. For example, although locating her residence in a particular neighborhood is the first priority for Isabelle, meeting the desire of all household members (i.e., the element of family) constructs a salient part of this decision. The choice of active modes for commute may not only result from residential location choice but also lead to reluctance to participate in and travel to sport classes after work (the case of Rachel and Benjamin). Preserving the natural environment cannot only result from recycling and composting (the case of Olivia) but also life choices such as driving an electric vehicle for daily commute, which then provides flexibility in performing more complex trip chains such as pick up/drop offs of the children (the case of Abigail).

5. Discussion and Conclusions

Using quantitative and qualitative data from the commuting behavior of the MUHC employees (Montreal, Canada) we have analyzed how attitudes/values play a role in travel-related decision-making

processes and the extent to which corresponding dissonance/consonance affects or is affected by the overall travel-related satisfaction. Similar to previous studies, the quantitative results indicated that mode-specific attitudes play a substantial role in choosing that mode for commute. Respondents using a certain commute mode have significantly more positive attitudes towards that mode compared to commuters who use other modes. By analyzing mode-specific attitudes for six modes (car, train, metro, bus, bicycle, walk), we found that only 20 percent of the respondents are commuting by travel modes which are not matched to their attitudes. Among these dissonant commuters, bus users constitute the biggest share and metro users the smallest. Surprisingly and contrary to the results from previous studies, the share of dissonant active mode users was relatively high compared to other modes (except bus). The mode-specific attitude score for bicycle was also lower than for the metro and train. These findings can be, at least partially, accredited to: (1) the accessibility of metro and train services at the Glen site compared to the four older MUHC sites; (2) the relatively insufficient accessibility for bike riders due to road closures and constructions, congestion, and the existence of the highways that surround the Glen site. Furthermore, we found that whereas 80% of the respondents are consonant, 70% of the respondents are satisfied commute-wise, showing that there still exist consonant commuters who are unsatisfied with their commute (we also found dissonant but satisfied commuters). This finding is in contradiction with that of De Vos [14], who argues that it is not the chosen mode itself that influences travel satisfaction, but whether the chosen mode is in consonance with attitudes towards that mode. Dissonance-satisfaction suggests that people can have a relative preference for more than one mode or their satisfaction results from non-mode-related domains such as travel route or time or a friend who accompanies them. Consonance-dissatisfaction can be an outcome of a temporary inadequacy related to the mode used (e.g., road closures, temporary out-of-service train facility) or due to dissatisfaction vis-à-vis non-mode travel attributes (e.g., route, direction (towards/against traffic congestion), distance, departure/arrival time).

In conformance with our quantitative findings, results from our qualitative analysis revealed that dissonance between the choice of a travel mode and attitudes towards that mode does not always mean that the mode used is the non-preferred one (Emma, George, William, Zoe, Rachel, John, Hannah). Even though a certain mode might be the most preferred one (in an ideal situation), individuals might choose the “second-best, somewhat less positively valued” transport mode [14] (p. 271). George and Emma are examples of individuals with strong pro-environmental values who are currently driving their private vehicle every day because they are enacting a competing value, maintaining health and security (George is above sixty-five, and Emma is pregnant). In fact, the choice of a car is more utilitarian (rather than actually (highly) satisfying) at this stage of their life. It is in such situations that—besides an effect of attitudes on behavior—travel behavior can also influence attitudes [14,42,79].

From the standpoint of a weighted decision-making process, our study highlighted that as people have more than one travel(-related) attitude/value, it is not always feasible to behave in conformity to all of them. Instead, people are more likely to act upon the attitude/value which has the strongest weight among the others if their access and competences allow them to. Depending on the weight that individuals attach to their attitudes, they may assess different attitudinal aspects of a decision more importantly than others. Therefore, it can be argued that consonance/dissonance and satisfaction are not absolute concepts, but rather relative, and depend on the weight one may attribute to different attitudes/values. These results also provide valuable insights into the relationship between travel-related choices and travel satisfaction. Among the sample of cases we analyzed, Olivia has positive attitudes towards home ownership, environment and health. But the weight of home ownership for Olivia is stronger than for the other two. Therefore, even though her financial resources (access) do not allow her to act upon all three attitudes at the same time (purchasing a house within walking or cycling distance of the MUHC), Olivia feels highly satisfied (and consonant) because her first priority/value is met. Recycling, composting and doing some exercise on the weekends are examples of actions that she performs in order to remain congruent with her other two attitudes. For two of our cyclist participants, Rachel and John, inaccessibility to safe roads during the snow seasons

resulted in different levels of travel dissatisfaction. For John who ranks the ‘household’s satisfaction’ first, the inability to cycle for commute is less dissatisfying compared to Rachel who considers cycling as a means of ‘saving money’, the value she ranks the first. This finding is in line with Zhang [2]’s life-oriented approach, which considers the possible contingencies among individuals and suggests that the effects of similar choices may vary across persons and situations. Therefore, it is essential that policy makers find out what works best for whom, when, and where.

Although this study has provided valuable information regarding the link between mode-specific attitudes, consonant/dissonant commuters’ mode choice, and commute satisfaction, future studies can provide additional insight. As illustrated in Table 1, significant attention should be paid to the construction of measures analyzing (i) travel mode preference; and (ii) travel-related preferences. Both mode-specific attitudes and travel-related attitudes/values should be analyzed using measures that include weight attribution to each travel mode perception and each travel-related attitude/value, respectively. In fact, ranking attitudes in their order of importance makes it possible to clearly represent a preference for a certain mode or a certain travel-related choice. Moreover, this also enables the creation of a more detailed measure of dissonance in both travel mode and travel-related choices, which allows for a better evaluation of travel satisfaction and life satisfaction. While transportation plays a vital role in meeting individuals’ various needs, it is just one part of people’s life choices in a sense that satisfaction in other life domains can make a travel dissatisfaction bearable (or even favorable) (the cases of Isabelle and Zoe). Although the qualitative analysis of travel-related dissonance and corresponding level of satisfaction used in this study provides a straightforward evaluation of the typologies of individuals vis-à-vis factors affecting their satisfaction, future mixed-method studies are required that include a more detailed examination of other travel-related domains (e.g., family formation) while allowing for generalization to large populations. It should also be considered that travel satisfaction is not only a function of mode satisfaction but also travel route, direction, time (departure/arrival) and distance—each of which might have a different level of importance in one’s travel mode selection process. Moreover, using longitudinal data—which is relatively less dominant in travel behavior/satisfaction studies—makes it possible to analyze the importance of life satisfaction as an explanatory variable of domain and subdomain satisfaction. On the other hand, longitudinal data also enables accounting for the interconnection between potential changes in domain satisfaction and life satisfaction over a longer period of time.

Finally, future studies should account for a wider range of travel-related dimensions including spatial, familial and professional factors and examine them by considering the interactions between household members and their needs, abilities and preferences, which can constrain the use of a preferred mode, and thereby affect travel satisfaction. Doing so, insights can be gained on the causes, dimensions and consequences of travel-related choice dissonance and dissatisfaction. In this regard, more qualitative studies that apply in-depth interviews with all household members could also provide valuable information. The evidence from this study offers three important implications for future sustainable planning practice that attempt to encourage less automobile dependency and more public/active transport use. First, policy makers should pay special attention to the accessibility of workplaces to better transit service than is the current practice, especially in cases of relocation as travel-related attitudes/values are more likely to be changed and guide behavior during such life events. Second, interventions should focus on dissonant travelers, as these individuals are more likely to change their behavior. Finally, the entire household situation and interactions should be evaluated rather than individuals exclusively.

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