Article

Travel Behavior of Elderly in George Town and Malacca, Malaysia

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Abstract: We investigated the travel behavior of the elderly in two United Nations Educational, Scientific and Cultural Organization UNESCO Heritage Cities in Malaysia, George Town and Malacca, to assess the commonalities and differences in the mobility of the elderly and to analyze the factors influencing the mobility of the elderly. We relied upon a one-day travel diary where the elderly recorded their trip information including trip category, mode of travel, and distance travelled. A total of 455 travel diaries were completed and analyzed using descriptive analysis and Poisson estimation with the number of trips as the dependent variable. We found that the elderly in both cities recorded no more than five trips per day, travelled mostly within a distance of five kilometers, and chose private transportation as their preferred mode of transportation. Factors statistically significantly influencing the elderly's trip frequency included location (city), education level, private vehicle ownership, health condition, and engagement in exercise. Findings from this study suggest that authorities need to strategize transportation planning to encourage mobility among the elderly without compromising the heritage status of both cities.

Keywords: elderly; travel behavior; trip frequency; individual attributes; household attributes health attributes

1. Introduction

Like many other countries, Malaysia is experiencing a demographic shift in the population, with those aged 65 years and above increasing rapidly and projected to increase to 14.5% of the population in 2040 from 5% in 2010 [1]. As of 2019, the estimated percentage of elderly population aged 65 years and above is 6.7% [2]. Of the 13 states in Malaysia in year 2018, Perak recorded the highest percentage of elderly population with 15%, followed by Penang with 13% and Malacca 12% [3]. To ensure the elderly remain active and productive so they may live independently throughout their retirement years, as outlined in the 2011 National Policy for Older Persons, the quality of life of the elderly must be enhanced. Among others, social activities and mobility are important aspects of quality of life for the elderly [4–6]. EuroQol five-dimensional questionnaire (EQ-5D) incorporates mobility as one of its five determinants of quality of life [7]. To encourage elderly mobility, environment and social support, such as reliable public transport, ensuring age-friendly outdoor spaces, and building and engaging in community support for the elderly's needs, are essential. As such, information about elderly mobility is a necessary tool for policies aimed at the aged [4] to encourage the elderly to leave the home and be physically active [6].

To plan future transportation needs for social activities of the ageing population, we need to understand the nature of elderly social activities and the travel involved in these activities [8]. Travel behavior analysis is the basis of transportation planning and management [9]. A hasty generalization

is that the elderly have more leisure time compared to the young and potentially spend more time on social activities. However, due to age factor and decreasing mobility, the elderly are found to travel less than the young in terms of trips per day and distance travelled [10]. This is not the case for all trip purposes [11]. Banister and Bowling [5] proved that travel has substantially increased for elderly and the elderly constituted the fastest growing segment of the driving population. Hence, travel patterns of the elderly lack sustainability due to their dependence on private transportation (private car) and less on public transportation [12]. Whereas elderly mobility is important for social participation and quality of life, concerns exist about the impact of the induced automobile society with regard to emissions, environmental pollution, and congestion [5,13]. However, elderly travel behavior patterns are different due to the different levels of economic development in different counties and regions, and governments adopting policies and measures according to local conditions [12,14]. van Hoof et al. [15] noted that cities could provide the best possible environment for the elderly but elderly mobility needs to be addressed. Hence, studies on traveling and quality of life are important especially in the context of elderly mobility so that responses and policies can be appropriately addressed.

Malacca City and George Town in Malaysia have implemented measures to address sustainability issues not only for World Heritage Sites status but also to improve the quality of life of its people. Being the capital cities of Malacca and Penang, respectively, Malacca City and George Town benefit from high per capita income that is higher than the national average. The 2017 per capita income for Malacca and Penang were MYR 46,015 and MYR 49,873, respectively, higher than the national average of MYR 42,228 [16]. With the cities' statuses as World Heritage Sites awarded by UNESCO in 2008, both cities depend considerably on the services sector as important contributors to the high per capita income. In 2018, Penang reported a 28.4% increase in tourists [17] while Malacca reported a 32% increase [18]. Both cities currently face challenges related to urbanization and adhering to the requirements of a World Heritage Site in protecting the cities outstanding universal value (OUV), created by the exceptional qualities of the cities' cultural and natural heritage [19]. As indicated by the UNESCO World Heritage Centre [20], UNESCO supports activities at World Heritage Sites that are ecologically and culturally sustainable, not impacting the sites' OUV, and contributing to the quality of life the communities concerned. Through the George Town Special Area Master Plan, Penang transportation improved sustainable transport using a quality bus transit service, pedestrian improvements, and a bike share program [21]. Malacca had also progressed toward becoming a low carbon state, initiated through Green City Action Plan [22], and the city landscape had changed to less car usage and higher foot traffic [23].

With all the initiatives toward creating sustainable cities, the extendibility of cities as age-friendly cities has rarely been evaluated. As heritage cities, the cities not only need to maintain their unique architecture but also must be livable cities with a conducive environment for all, and particularly for special needs groups such as the elderly. As such, for researchers to deduce and recommend suitable policies to cater to the travel needs of an ageing society, we must first investigate and understand the travel behavior and preferences of the elderly. With all the sustainable initiatives that have been implemented by the two states, evaluating the extent of their impacts on the elderly is necessary. This study was conducted to answer two research questions (RQ): (1) What are the similarities and differences in elderly travel in Malacca City and George Town? (2) What are the factors that affect elderly travel in both cities?

2. Literature Review

Traveling and the quality of life of older people are significantly linked [5,24,25]. Cheng et al. [26] and Tacken [4] reported that elderly quality of life is affected if they are unable to travel safely from one place to another. In some studies, the relationship between quality of life and elderly travel is still vague because most were conducted based on circumstantial evidence [4,27]. Banister and Bowling [5] concluded that traveling interruption was among the strongest variable influencing elderly mobility.

In some studies, the relationship between elderly travel and quality of life was indeterminate because other behavioral factors might have stronger effects on elderly travel [5,26–28].

A more general study by Wen et al. [29] evaluated the factors that determine elderly quality of life. Their findings showed that aesthetics value (heritage) perceived and appreciated by the elderly influenced the elderly's decision to travel to a particular place. Similar studies [29–33] explored the importance of heritage sites in attracting inbound tourists (including the elderly).

Many factors influence the travel behavior of individuals. Due to age-related reasons, the elderly are sometimes regraded as less frequent travelers compared to the younger generations. The elderly were found to make fewer and shorter trips [34]. The trips made were influenced by individual characteristics, attitudes, and beliefs, and social and built environments, to some extent, shape the individual's travel decisions [35]. The individual characteristics that have been investigated include age, education level, marital status, ethnicity, income level, household structure, and sex. Although all these factors remain relevant in influencing elderly travel behavior, their relationships may differ due to the specific needs and health capability of the elderly. Kim and Kim [36] found that sociodemographic features play a significant role in explaining the variance in lifestyles and travel motivations of the elderly.

Age has negative relationship with elderly travel [37,38]. Distinguishing the travel pattern with age group, as implied by Alsnih and Henscher [39], is also important because elderly mobility may be restricted due to age-related factors. Although health condition is known to influence the elderly's ability to travel, few studies have investigated the effects of health on elderly mobility. Böcker et al. [28] investigated elderly obesity and disability on elderly trips and found that obesity had no significant effect on elderly trips whereas disability reduced elderly trips. Medical conditions often limit the travel decisions of the elderly [34].

Among the variables that have positive relationships with frequent trips are high education; being married [40]; income; access to a car, taxi, or public transportation; household structure; and ethnic background [8]. Sex has a mixed effect on the traveling behavior of the elderly [36,41]. van den Berg et al. [8] found that women make more trips than men, but an earlier study by Stern [40] found that women make less trips than men. Cheng et al. [26] also revealed that male respondents complete more trips than women.

When mode of transportation was investigated, many studies [26,42–44] found that the elderly depend more on private transportation (car) as their main transportation. Dependence on private transportation has long-term effects on the environment as well as elderly wellbeing, as indicated by Li et al. [44], as the use of cars decreases with age. This is attributed to the deteriorating health conditions of the elderly that forbid them to drive as they age. Deteriorating health conditions could also limit the elderly's accessibility to other active transportation such as walking, cycling, or public transportation [45]. Zhang et al. [46] indicated that being older in age is related to less cycle trips, although, 10% of elderly's daily trip were by cycling.

Musa and Sim [47] studied elderly travel in Malaysia. They identified the elderly's main travel motivations as being for tourism purposes and examined destination choices and major travel difficulties. They found that the majority of the elderly travelled for relaxation, with big cities as the most chosen destination, and tour packages as the preferred travel mode. The distance travelled by the elderly were influenced by their preferences and health condition. More recently, Madha et al. [48] focused on individual travel behavior, rather than the elderly per se, and their willingness to travel using trains. They focused on individuals residing in Petaling Jaya, one of the most populated cities in Malaysia. By adopting the theory of planned behavior, they found that a favorable attitude is vital in influencing an individual's decision to travel by train. This study complemented the earlier one by Musa and Sim [47] and extended that of Madha et al. [48], by providing another insight into travelling issues in Malaysia with a focus on elderly daily trips rather than tourism purposes or narrowed to one mode of transportation. Table 1 provides a summary of the literature.

Table 1. Summary of literature on elderly travel. QoL—quality of life.

Author (Year)	Methods	Main Findings
Stern (1993) [40]	Correlated multinomial logit model and a Poisson regression model	<ul style="list-style-type: none"> - Education and being married are positively related with frequent trips - Women make fewer trips than men
Parlett et al. (1995) [32]	Economic impact of tourism assessment approach	<ul style="list-style-type: none"> - Holistic approach to economic development through conservation
Collia et al. (2001) [34]	National Household Travel Survey (NHTS)	<ul style="list-style-type: none"> - Medical conditions often limit the travel decisions of the elderly
Alsnih and Hensher (2003) [39]	Evidence review	<ul style="list-style-type: none"> - Elderly mobility may be restricted due to age-related factors
Banister and Bowling (2004) [5]	National interview survey	<ul style="list-style-type: none"> - Travel is important element in QoL for elderly based on trips made, travel distance, and transport mode
Schmöcker et al. (2005) [38]	Ordinal probit models and log-linear model	<ul style="list-style-type: none"> - Age negatively related with elderly travel
Páez et al. (2006) [37]	Mixed ordered probit analysis and log-linear model	<ul style="list-style-type: none"> - Age negatively related with elderly travel
Musa and Sim (2010) [47]	Household survey	<ul style="list-style-type: none"> - Elderly travelled mostly to big cities - Distance travelled influenced by preference and health condition
van den Berg et al. (2011) [8]	Social activity diary data	<ul style="list-style-type: none"> - Income; access to a car, taxi, or public transportation; household structure; and ethnic background have positive effects on elderly travel - Women make more trip than men
Guell et al. (2012) [35]	Semi-structured interviews and photo-elicitation interviews	<ul style="list-style-type: none"> - Trips made are influenced by individual characteristics, attitudes, and beliefs, and social and built environments
Li et al. (2012) [44]	Content Analysis	<ul style="list-style-type: none"> - Dependence on private transportation has long-term effects on elderly wellbeing - Use of car decreases with age
Doganer and Dupont (2015) [24]	Community-based design survey	<ul style="list-style-type: none"> - Cultural heritage tourism has ample capacity to create prosperity for a community, strengthen the area's viability, and improve QoL for residents.
O'Hern and Oxley (2015) [43]	Victorian Integrated Survey of Travel Activity (VISTA)	<ul style="list-style-type: none"> - Private motorized transport is the predominant mode of transport for older adults, representing approximately 70% of travel
Gitelman et al. (2016) [45]	Elderly survey	<ul style="list-style-type: none"> - Deteriorating health conditions could limit elderly accessibility to other active transportation such as walking, cycling, or public transportation
Madha et al. (2016) [48]	Theory of planned behavior	<ul style="list-style-type: none"> - Favorable attitude was vital in influencing individual's decision to travel by train
Håkonsen and Løyland (2016) [31]	Demand system	<ul style="list-style-type: none"> - Differences exist within the group of cultural services, and these are partly related to different levels of national standardization and regulation among the cultural services
Zhang et al. (2016) [46]	Qualitative analysis	<ul style="list-style-type: none"> - Being older in age is related to fewer cycle trips
Böcker et al. (2017) [28]	Means of zero-inflated negative binomial models and multinomial logit regression models	<ul style="list-style-type: none"> - Differences exist in the magnitude of the estimated coefficients and factors only influencing transport patterns for the elderly
Cui et al. (2017) [42]	Content analysis	<ul style="list-style-type: none"> - Addressing the elderly's mobility needs via the provision of future transport infrastructure and services, implementing legislative and institutional approaches, and building accessible mobility environments
Kim and Kim (2018) [36]	Self-administered questionnaires	<ul style="list-style-type: none"> - Sociodemographic features play a significant role in explaining the variance in lifestyles and travel motivations of the elderly
Wen et al. (2018) [29]	Systematic literature review based on PRISMA	<ul style="list-style-type: none"> - Elderly people seem to have common preferences: landscape features that are natural, aesthetic, comprehensible, and diverse, with accessible and well-maintained infrastructure and facilities
Cheng et al. (2019) [26]	Structural equation model	<ul style="list-style-type: none"> - Sex has a mixed effect on the traveling behavior of the elderly
Cheng et al. (2019) [41]	Zero-inflated ordered probit model and a Cox proportional hazards model	<ul style="list-style-type: none"> - Male respondents make more trips than women
Ebejer (2019) [30]	Content analysis	<ul style="list-style-type: none"> - For destinations with an established form of tourism, the development of cultural tourism faces difficulties despite the presence of a rich urban heritage
Zhuang et al. (2019) [33]	Qualitative Analysis	<ul style="list-style-type: none"> - Tourism development is the major catalyst for change in local residents' moral values

3. Research Design

3.1. Data Collection

The population studied included elderly aged 60 years old and above residing in Malacca and George Town, Malaysia. As data on elderly population in George Town and Malacca city were not available from the Department of Statistics, data for Penang and Malacca states for the year 2017 were used. Based on these data [3], the population of elderly in Malacca was 101,700 and 204,900 in Penang for a total population of 306,600. Sampling size is calculated based on the Yamane's [49] formula:

$$n = \frac{N}{1 + Ne^2} \quad (1)$$

where n is the sample size, N is the population size, and e is the margin of error (5%).

Hence, the sampling for the study is $n = \frac{306,600}{1 + 306,600(0.05^2)} = 399.48$, rounded to be 400. Based on the percentage of elderly in the populations in Malacca (33%) and Penang (67%), we selected 132 and 268 respondents, respectively. We adopted quota sampling for each city, in which we selected the desired number of respondents with the required characteristics proportionate to the population under study. The characteristics included age groups and sex. Bai et al. [50] and van den Berg et al. [8] emphasized that when studying the travel behavior of elderly, they should not be treated as homogenous groups as the mobility of elderly is highly influenced by age. We followed Alsnih and Hensher [39] to categorize the elderly into three categories: Young-Old (Y-O; 60–64 years old), Middle-Old (M-O; 65–75 years old), and Old-Old (O-O; above 75 years old). The details of the quota sampling are shown in Table 2.

Table 2. Quota sampling details.

Age Group			Respondent Quota	Sex	Respondent Quota	
Malacca City	Young-Old (Y-O)	33%	44	Female	51%	22
				Male	49%	22
	Middle-Old (M-O)	44%	58	Female	53%	30
				Male	47%	28
	Old-Old (O-O)	23%	30	Female	53%	12
				Male	47%	11
George Town	Young-Old	34%	91	Female	51%	46
				Male	49%	45
	Middle-Old	44%	118	Female	52%	61
				Male	48%	57
	Old-Old	22%	59	Female	54%	32
				Male	46%	27

We interviewed 455 elderly in George Town (300) and Malacca (155), slightly over the estimated sample number. Prior to conducting the full-scale study, a pilot study was conducted in Malacca on 20–24 July 2018. During this time, a briefing session was conducted by the researchers (three researchers went to Malacca) with two enumerators in Malacca. The survey was administered electronically using the Survey Gizmo portal (SurveyGizmo, Boulder, USA) in which each enumerator was provided with a tablet (2 tablets provided by the research team). The pilot study on 50 elderly respondents was completed within a week. The reliability test conducted on all Likert scale questions indicated that all questions passed the test.

The full scale survey started in Malacca on 27 July 2018. One researcher and two research officers travelled to Malacca to brief all enumerators involved and to follow the enumerators to ensure that the e-survey was completed accurately. On 31 August 2018, the lead researcher travelled to Malacca to discuss the survey with enumerators and collect the tablets that had been provided. Briefing and training sessions for enumerators in George Town Penang were conducted on 24 September 2019. Similar to Malacca, the survey was administered electronically. Each enumerator used their own personal tablet or smart phone to conduct the survey that began 25 September 2019. Two researchers and one research officer followed the enumerators on the first two days to ensure that the e-survey was completed correctly. Researchers constantly monitored the progress of the enumerators during the survey administration. The survey was completed on 11 October 2018.

3.2. Data

We drew data from a structured travel diary used to record one-day travel for the prior one week and health. The travel diary was used to record travel details such as trip category (work, shopping, personal, business, recreation, medical), mode of travel (private vehicle, public transportation, active transportation), and distance for each trip. Data on travel details were complemented with sociodemographic information (age, sex, household size), socioeconomic information (education, income, vehicle information), and health condition and health behavior (health condition, exercise performed).

Final data gathered showed slightly higher percentages of M-O and Y-O with the O-O group underrepresented. During the fieldwork, it was challenging to engage the elderly from the O-O group in the survey. Male and female respondents were fairly represented with higher percentages of women than men. Other categories of socioeconomic and sociodemographic factors (Table 1) were also fairly distributed. More elderly respondents were within the primary education group, low individual income, and the majority owned at least one type of private vehicle.

For health condition, respondents were asked about their health status and whether they had been diagnosed with any chronic illnesses for the past 12 months. The chronic illnesses listed were diabetes, hypertension, hypercholesterolemia, kidney failure, minor stroke, and heart problems. Respondents were asked to rate their involvement in exercise on a 5-point Likert scale (1 = never, 2 = sometimes, 3 = often, 4 = and 5 = routine). Five questions altogether asked about exercise for 20 minutes or more at least three times a week, exercise as a part of daily activity, such as using stairs instead of elevators, involvement in light to moderate physical activity such as walking for 30–40 minutes at least five times a week, engagement in stretching exercises at least 3 times per week, and involvement in leisure-time (recreational) physical activities such as swimming, dancing, or cycling.

3.3. Method

A multivariate analysis with elderly trip frequencies as the dependent variable was conducted. As the trip frequencies are count data of the number of trips (trip frequency) the elderly made per day, we used standard Poisson regression. Prior to running a Poisson estimation, we checked if the assumption that mean of the dependent variable equals its variance was fulfilled. As shown in Table 3, a standard Poisson model could be estimated since the variance in trip frequency was almost similar to its mean value.

Table 3. Summary of data on elderly respondents.

Variable Description	% per category										
	Min	Max	Mean	SD	Variance	1	2	3	4	5	6
Cities (1 = George Town, 2 = Malacca City)						65.93	34.07				
Individual attributes											
Age	60	94	68.40	6.90	47.52						
Age group (1 = 60–64 years old, 2 = 65–74 years old, 3 = ≥75 years old)						35.82	45.93	18.24			
Sex (1 = female, 2 = male)						51.32	48.68				
Education (1 = Informal education no education, 2 = Primary education, 3 = Secondary education, 4 = Tertiary education)						15.61	44.93	33.04	6.39		
Monthly individual income (1 = No income sources, 2 = ≤RM 1000, 3 = RM 1000–4000, 4 = >RM 4000)						22.91	37.44	5.51	34.14		
Household attributes											
Vehicle information (1 = no private vehicle, 2 = own private vehicle, 3 = have but do not own private vehicle, 4 = others)						29.08	41.16	22.82	6.94		
Household income (1 = No income sources, 2 = <RM 1000, 3 = RM 1000–4000, 4 = >RM 4000)						2.64	29.96	50.66	16.74		
Household size	1	10	3.46	1.83	3.34						
Trip attributes											
Trip count (number of trips made per day for the past week)	0	5	1.13	1.07	1.15						
Trip distance (1 = <1 km, 2 = 1–5 km, 3 = 6–10 km, 4 = >10 km)						18.30	48.26	19.87	13.56		
Mode of transportation (1 = own driver, 2 = passenger, 3 = public transportation, 4 = bicycle, 5 = pedestrian, 6 = others)						29.02	33.44	15.14	1.89	18.61	1.89
Health attributes											
Involvement in exercises (1 = never, 2 = sometimes, 3 = often)						67.40	23.35	9.25			
Health condition (1 = no chronic illness, 1 = reported at least one type of chronic illnesses such as diabetes, hypertension, kidney failure, stroke, etc.)						39.78	60.22				

Note: Trip attributes are based on the first trip made for elderly in both cities (George Town and Malacca City).

A random variable Y is said to have a Poisson distribution with parameter μ if it takes integer values $y = 0, 1, 2, \dots$ (number of daily trips made by elderly) with probability (number of daily trips made by the elderly) using the following formula:

$$Pr(Y = y|\mu) = \frac{e^{-\mu} \mu^y}{y!} \quad (y = 0, 1, 2, \dots) \quad (2)$$

where μ specifies the Poisson distribution with a single parameter for the mean incidence rate of event per unit of exposure for individual i . The probability of observing a specific count y events is computed as:

$$Pr(Y = y|\mu_i) = \frac{e^{-\mu_i} \mu_i^y}{y!}, \quad y = 0, 1, 2, \dots, \quad (3)$$

where $\mu_i = \mu(x_i\beta)$ and x_i is the set of regressor variables and β is the unknown parameter. Poisson distribution has equal means and variances. Wooldridge [51] provided a detail explanation of Poisson estimation.

Figure 1 shows that the variables influencing trip frequency are divided into three main categories: personal attributes, household attributes, and health conditions. Table 4 shows the expected signs of the independent variables.

Figure 1. Conceptual framework of this study.

Table 4. Expected signs of independent variables.

Variable	Expected Sign
Age	-
Sex	+/-
Education	+/-
Household size	-
Household income	+
Vehicle information	+/-
Chronic illnesses	-
Exercises	+

4. Results and Discussion

4.1. Descriptive Analysis of Travel Behavior

4.1.1. Trips Taken Per Day

In general, Figure 2 exhibit the average trip frequency decreases as people age [11]. Overall, in both cities, the average trips per person decreases with age; O-O recorded 0.99 trips compared to 1.05 trips for M-O elderly and 1.29 trips for Y-O elderly. A slightly different trend was observed for George Town. O-O elderly reported a slightly higher average trip frequency of 1.22 trips as opposed to 1.17 trips by M-O elderly.

Figure 2. Average trips per elderly by age group. Note: Y-O is 60–64 years old, M-O is 65–75 years old, O-O is >75 years old.

4.1.2. Travel Distance

With regard to travel distance, the majority of the elderly (48.26%) travelled 1–5 km per day. As shown in Figure 3, as people age, the distance travelled decreases. Of Y-O elderly, 19% travelled more than 10 km per day, but this percentage decrease to 10.56% and 8.51% for M-O and O-O elderly, respectively. A similar trend was observed for both cities.

Figure 3. Travel distance per day.

4.1.3. Trip Purpose

As shown in Figures 4–6, the majority of elderly travelled for personal reasons for their first (27.67%) and second trips (24.19%) and recreational reasons for their third trips (40.82%). A similar trend was observed for Y-O. M-O elderly reported personal reasons (28.67%) for first trips but shopping (25%) for second trips and recreational (40.91%) for third trips. O-O reported personal reasons (23.40%), shopping (25%) for second trips and combination of shopping (21.05%), recreational (21.05%) and other purposes (21.05%) for third trips. When analyzed by city, Y-O and M-O elderly travelled for personal purposes for their first trips, shopping purposes for second trips, with the exception being O-O elderly who travelled for medical purposes for their first trips and other purposes for their second trips. All elderly in Malacca travelled for shopping purposes for their third trip. Trip category for elderly in George Town followed the average behavior of trip category for both cities.

Figure 4. First trip category of elderly.

Figure 5. Second trip category of elderly.

Figure 6. Third trip category of elderly.

4.1.4. Mode of Transportation

A majority of elderly in both cities (62.46%) travelled by private transportation for their first trip either on their own (29.02%) or as passengers (33.4%). A similar trend was observed for second and third trips. O-O elderly also reported walking to their destinations (mainly for trips less than one kilometer) and taking public transportations compared with the other age groups. A higher percentage of elderly in George Town (20.47%) travelled using public transportation compared with elderly in Malacca (3.92%). The elderly in Malacca preferred to travel using private transportation, related to a more established public transportation system in George Town compared to Malacca. Moreover, there was an established perception that public transportation is unable to provide a reliable and accessible mode of transport (Figure 7) [52].

Figure 7. Mode of transportation of the elderly.

4.1.5. Similarities and Differences in Travel Pattern Amongst Elderly

The elderly in George Town travelled more compared to those in Malacca City. The average FREQUENCY trips of the elderly in George Town (for all age groups), was 1.27 trips, slightly higher than the average trips of the elderly in both cities of 1.13. Average trips per day of the elderly in Malacca City was 0.85, which was less than one. The elderly in George Town are more active, participating in various activities compared to those in Malacca.

Although we observed that most elderly in both cities travelled between one and five kilometers (for their first trip), some differences were found when analysis was segregated by city. More Y-O elderly in Malacca City who travelled between 6 and 10 km, whereas more Y-O elderly in George Town travelled between one and five kilometers. The distance travelled by the M-O elderly in Malacca and George Town showed a similar pattern, with the majority travelling between one and five kilometers. More O-O elderly in George Town travelled between one and five kilometers. The percentages of O-O elderly in Malacca City who travelled between one and five kilometers and less than one kilometer were the same. The percentages of O-O elderly in Malacca City travelling between 6 and 10 km were more than the O-O elderly in George Town. Although the elderly in Malacca City made fewer trips than the elderly in George Town, those in Malacca City tended to travel further.

The first trip purposes did not much differ between M-O and Y-O elderly in both cities. We observed that more Y-O and M-O elderly in George Town travelled for recreational purposes. The O-O elderly in Malacca City mostly travelled for medical purposes compared to those in George Town who reported to travel mostly for personal reasons. For their second trip, the majority of elderly in Malacca City travelled for shopping and work purposes, whereas the majority of elderly in George Town travelled for personal and shopping purposes. The percentages of elderly in George Town travelling for other reasons for their second trip were similar across all age groups. In Malacca City, all Y-O elderly and the majority of M-O elderly travelled for other purposes. For the third trip, there was no differences in trip purposes were reported by the elderly in Malacca City, as all travelled for shopping purposes. In George Town, the majority of O-O elderly travelled for other purposes, whereas the majority of M-O and Y-O elderly travelled for recreational purposes.

We found that all groups of elderly in Malacca City reported to prefer being chauffeured (as passengers) in private transportation. The elderly in George Town preferred driving private transportation. Bicycles were not preferred given the small percentages of elderly using them for travel. None of the O-O elderly in Malacca used a bicycle as a mode of transportation. The O-O groups in both cities reported higher walking percentages compared with the other age groups.

4.2. Factors Influencing Trip Frequency

Table 5 shows the Poisson estimation results for the factors influencing trip frequency of the elderly. We concluded that the model fits well because the goodness of fit Chi-squared tests were not statistically significant. The p -value of the deviance of goodness-of-fit was 0.8615; the p -value of the Pearson goodness-of-fit was 0.9999. Discussion on the predicted trips frequency is based on margins analysis, as indicated in Table 6.

Table 5. Poisson estimation ($N = 447$). Ref denotes reference.

Variable	Coefficient
Intercept	−0.298 (0.312)
Cities	
Malacca (ref = George Town)	−0.247 ** (0.0998)
Personal Attributes	
Age group (ref = 60–64 years old)	
65–75 years old	−0.0944 (0.0889)
>75 years old	0.0724 (0.130)
Sex (ref = male)	
Female	−0.0558 (0.0937)
Education level (ref = informal education)	
Primary education	0.236 * (0.137)
Secondary education	0.343 ** (0.143)
Tertiary education	0.536 *** (0.188)
Household Attributes	
Household income (ref = no source of income)	
< RM 1000	0.160 (0.290)
RM 1000–4000	−0.0358 (0.290)
>RM 4000	−0.305 (0.307)
Household size	−0.0143 (0.0231)
Vehicle information (ref = no private vehicle)	
Own private vehicle	0.587 *** (0.131)
Have but do not own private vehicle	0.313 ** (0.142)
Other type of vehicle ownership	0.449 ** (0.194)
Health	
Health condition (ref = no chronic illnesses)	
Reported at least one type of chronic illnesses	−0.194 ** (0.0799)
Engagement in exercise (ref = never)	
Sometimes	0.355 *** (0.106)
Often	0.481 *** (0.118)

Note: * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

Table 6. Margins analysis (by cities and age group).

Variable	Margins	George Town	Malacca	60–64 years old	65–75 years old	>75 years old
Intercept						
Cities						
George Town	1.224 (0.062)			1.263 (0.093)	1.149 (0.075)	1.357 (0.154)
Malacca	0.956 (0.072)			0.987 (0.083)	0.898 (0.082)	1.061 (0.137)
Personal Attributes						
60–64 years old	1.177 (0.073)	1.263 (0.093)	0.987 (0.083)			
65–75 years old	1.071 (0.063)	1.149 (0.075)	0.898 (0.082)			
>75 years old	1.265 (0.138)	1.357 (0.154)	1.061 (0.137)			
Sex						
Male	1.243 (0.187)	1.334 (0.203)	1.042 (0.174)	1.283 (0.197)	1.167 (0.181)	1.379 (0.270)
Female	1.176 (0.075)	1.262 (0.902)	0.986 (0.092)	1.213 (0.094)	1.104 (0.085)	1.304 (0.167)
Education level						
Informal education	0.866 (0.103)	0.929 (0.116)	0.726 (0.097)	0.893 (0.125)	0.812 (0.103)	0.960 (0.129)
Primary education	1.096 (0.067)	1.17 (0.080)	0.919 (0.085)	1.130 (0.089)	1.029 (0.077)	1.215 (0.146)
Secondary education	1.220 (0.082)	1.310 (0.098)	1.023 (0.096)	1.258 (0.107)	1.145 (0.087)	1.353 (0.171)
Tertiary education	1.479 (0.203)	1.588 (0.233)	1.241 (0.173)	1.526 (0.203)	1.388 (0.213)	1.640 (0.287)
Household Attributes						
Household income						
No source of income	1.182 (0.334)	1.266 (0.359)	0.989 (0.290)	1.219 (0.345)	1.109 (0.324)	1.311 (0.386)
<RM 1000	1.387 (0.121)	1.485 (0.145)	1.160 (0.113)	1.430 (0.151)	1.301 (0.125)	1.537 (0.195)
RM 1000–4000	1.141 (0.061)	1.222 (0.076)	0.954 (0.082)	1.176 (0.081)	1.070 (0.076)	1.264 (0.152)
>RM 4000	0.871 (0.084)	0.933 (0.091)	0.729 (0.093)	0.898 (0.096)	0.817 (0.088)	0.966 (0.138)
Household size (mean value)	1.139 (0.044)	1.222 (0.062)	0.955 (0.072)	1.175 (0.073)	1.069 (0.063)	1.264 (0.138)
Vehicle information						
No private vehicle	0.776 (0.815)	0.833 (0.089)	0.651 (0.084)	0.800 (0.092)	0.728 (0.082)	0.860 (0.129)
Own private vehicle	1.396 (0.850)	1.499 (0.103)	1.171 (0.106)	1.438 (0.109)	1.309 (0.099)	1.546 (0.186)
Have but do not own private vehicle	1.061 (0.102)	1.139 (0.121)	0.891 (0.093)	1.094 (0.122)	0.995 (0.107)	1.176 (0.155)
Other type of vehicle ownership	1.216 (0.197)	1.305 (0.219)	1.020 (0.173)	1.253 (0.222)	1.140 (0.185)	1.347 (0.251)
Health						
Health condition						
No chronic illnesses	1.268 (0.072)	1.361 (0.090)	1.063 (0.092)	1.308 (0.096)	1.190 (0.086)	1.406 (0.168)
Reported at least one type of chronic illnesses	1.044 (0.568)	1.120 (0.072)	0.875 (0.073)	1.077 (0.812)	0.980 (0.069)	1.157 (0.131)
Engagement in exercise						
Never	0.969 (0.055)	1.050 (0.080)	0.821 (0.054)	0.999 (0.078)	0.909 (0.064)	1.074 (0.124)
Sometimes	1.382 (0.111)	1.498 (0.115)	1.170 (0.142)	1.425 (0.131)	1.297 (0.118)	1.532 (0.207)
Often	1.567 (0.148)	1.699 (0.154)	1.327 (0.175)	1.617 (0.166)	1.471 (0.161)	1.738 (0.234)

Note: all variables are statistically significant at 99% significance level.

City was found to be significant in influencing elderly trips, with less trips reported amongst the elderly residing in Malacca. The predicted trip frequency of the elderly living in George Town was 1.224, higher than the 0.956 in Malacca. Figure 7 shows that majority of elderly in Malacca depended considerably on others for travelling, of which 49% were passengers. The elderly in George Town were more independent, with only 26% being passengers. Elderly in George Town mostly drove on their own (30%) or used public transportation (20%). Only 4% of elderly in Malacca used public transportation for their daily travel.

Variables that were found to be statistically insignificant in influencing trip frequency of the elderly were age group, sex, household income, and household size. Although other studies [11,37,38] found a statistically negative relationship between age and elderly travel frequency, we found a contradicting result similar to that of Böcker et al. [28]. A negative relationship was observed for elderly aged 65–75 years. The insignificance of age in influencing trip frequency is related to the majority of elderly who travelled depending on others to travel (Figure 7) as the elderly were mainly passengers in private vehicles. Predicted trip frequency of elderly was higher among elderly aged 75 years with a value of 1.265, and highest among elderly in George Town, with a value of 1.357.

The effect of sex on trip frequency was also inconclusive, similar to the findings reported by Böcker et al. [28] although past studies [8,11] found a statistically significant relationship. Similar to earlier studies by Stern (1993), we found that elderly women made less frequent trips than elderly men, but this finding was inconclusive due to its statistically insignificant results. When predicted count was analyzed, elderly men reported higher predicted trip frequency of 1.243 compared to elderly women with 1.176. Similar to age groups differences, elderly men aged more than 75 years old reported higher predicted trip frequency of 1.379 compared to elderly women, with 1.304.

Education level was found to significantly influence the travel behavior of the elderly with elderly with higher education reporting making more frequent trips compared with those with lower education. This finding is similar to that of Schwanen et al. [53] but contrasted that of Böcker et al. [28]. Predicted count indicates that elderly with tertiary education reported a higher predicted trip frequency of 1.479. Predicted trip frequency values of 1.588 and 1.640 were also reported for the elderly with tertiary education living in George Town and elderly more than 75 years old, respectively.

Vehicle ownership was found to positively influence trip frequency. Those owning a private vehicle reported making more frequent trips compared with those with other types of vehicle ownership. Predicted count analysis also indicates that those owning a private vehicle reported a predicted trip frequency of 1.396 as opposed to 0.776 for elderly without a private vehicle, 1.061 for elderly having but not owning private vehicle, and 1.216 for elderly relying on other types of vehicle ownership. A similar trend was observed among cities and aged groups. One reason for this result is the convenience of traveling in a private vehicle, either as a driver or passenger, in comparison with traveling by public transportation or active transportation. The current environment of many cities is more suitable for vehicle ownership dependency [54] and less on active transportation. Musselwhite [55] confirmed that the elderly preferred private vehicles to walking due to the many obstacles related to walking, such as poor walking infrastructure.

Health status was regarded as an essential element influencing elderly trip frequency. Elderly with at least one type of chronic illness reported a lower frequent trip frequency. Elderly with no chronic illness reported 1.268 predicted trip frequency compared with 1.044 for elderly who had at least one type of chronic illnesses. A higher predicted frequency was reported for elderly with no chronic illness living in George Town and elderly aged more than 75 years old. Elderly who engaged in more frequent exercise reported more frequent trips. Elderly who were often engaged in exercise reported 1.567 predicted trip frequency compared with 1.382 and 0.969 among elderly who sometimes or never engaged in exercises, respectively. A similar pattern was observed between cities and among different-aged groups.

As the analysis was number of trips per day, trip specific information such as trip purpose, trip distance, and mode of transportation could not be included in the estimation.

5. Conclusions

We used descriptive analysis to answer the first research question, “what are the similarities or differences of elderly travelling in Malacca City and George Town?” We found substantial differences between elderly travel in the two heritage cities. The elderly in George Town were more active compared with the elderly in Malacca City as observed through their high average trips per day. The elderly in Malacca City chose to travel longer, even among the O-O age group who travelled more than five kilometers per day. Whereas we observed some similarities in the trip purposes of the elderly in both cities, apparent differences existed in the trip purposes for the O-O elderly. O-O elderly in Malacca City mostly travelled for medical purposes for their first trip, other purposes for their second trip, and shopping purposes for their third trip. With private transportation being the first choice for transportation, elderly in Malacca City were more often passengers and elderly in George Town were more often their own drivers. However, the O-O elderly in both cities preferred to walk than any other mode of transportation.

Understanding the similarities and differences in elderly travel in both cities provides further insight into the current state of transportation in both cities. The less than 4% of elderly using public transportation to travel in Malacca suggests that the public transportation in Malacca needs to be enhanced to increase the participation of elderly in daily travel. Graham et al. [25], in their study on elderly travel in rural area of the United Kingdom, indicated that a weak public transport infrastructure most impacts non-car owners, which indirectly affects the quality of life of the elderly. As more than 50% of the elderly in both cities did not own a private vehicle, their lives would be considerably affected without good public transportation. Although we found that trip frequency increased with ownership of a private vehicle and that the elderly in both cities relied on the freedom and capability to travel independently, the ability to drive decreases with age. Hence, investment in public transportation is fundamental to promoting and protecting the quality of life of the elderly in the future.

As heritage cities with the need to retain the UNESCO Heritage Status, George Town and Malacca should be more proactive in promoting and establishing their cities as low-carbon cities. The analyzed data indicated that many elderly (20%) were walking and cycling. Walking and cycling can be regarded as part of a person’s daily exercises. Predicted count analysis indicated that the more often an elderly participates in exercises, the higher their daily trip frequency. This further contributes to a healthier lifestyle and promotes green environment; Nelson et al. [56] and Srichuae et al. [27] concluded that walking and cycling benefit the health of the elderly. It has been noted by Cleland et al. [57] that regular walking is regarded as the best way for a healthy living of the general population, prevents the development of non-communicable diseases such as cardiovascular diseases [58] and weight gain [59], and contribute to positive mental health [60]. Thus, there is a need to revisit both cities’ development plans to include city-friendly transportation that include safe and walkable facilities for pedestrians, especially the elderly.

Local authorities ought to ensure that both cities embrace the characteristics of walkable places that are preferred by locals, visitors and tourists [61]. According to Bartlett [62], walkable trips are often considered as trips that take no longer than five minutes (approximately 400 meters). Patterson, Pegg & Wan Omar [60] recommended the integration of individual, social environment and provision of walking trails in local neighbourhood community to promote walking activity. Walking trail characteristics cover the aspects of accessibility, facilities, maintenance, safety from crime and traffic, trail surfaces attractiveness and historic interest [63–67]. Urban development of cities should take into consideration all these provisions to promote walkability in the cities.

We used Poisson estimation to answer the second research question, “what are the factors that affect elderly travelling in both cities?” The factors that were found to be statistically significant in influencing elderly travel were: city, education, vehicle information, health condition, and engagement in exercise. The Poisson estimation further confirmed our findings from the descriptive analysis, in which location (in this case city), influenced travelling behavior and that elderly in Malacca City travelled less than those in George Town. Education also played a role in influencing elderly travel,

with those with higher education having a higher probability of engaging in more travel. Hence, on education of the younger generation should be emphasized now so that they will more educated elderly in the future. At present, the majority of the elderly interviewed in both cities only had primary and secondary education.

Poisson estimation also indicated that elderly with at least one type of illnesses travelled less than those with no illnesses. As such, we found that elderly who participated actively in exercises travel more and were more active. Hence, good health behavior among the elderly should be emphasized, to not only increase their travelling activities but also to remain active even during old age to enhance their quality of life.

Above all, this study has contributed significant insights into the sustainability of both cities with reference to elderly travel. Despite the many initiatives to promote low-carbon cities, the elderly's dependence on private transportation is still high. Although claims were made that Malacca's and George Town's landscapes cater to active transportation (walking and cycling), the percentages of elderly engaging these modes of transportation were marginal. The challenge in terms of spatial requirement is the introduction of an elderly-friendly transportation system. The UNESCO heritage status of both cities would also mean that careful development planning is required to align the heritage status with an elderly-friendly environment. Understanding the differences in elderly persons' travel patterns in both cities would help local authorities to adopt relevant policies according to the local conditions.

Local authorities ought to ensure that both cities embrace the characteristics of walkable places that are preferred by locals, visitors and tourists (Ram & Hall, 2018). According to Bartlett (2003), walkable trips are often considered as trips that take no longer than five minutes (approximately 400 meters). Patterson, Pegg & Wan Omar (2018) recommended the integration of individual, social environment and provision of walking trails in local neighbourhood community to promote walking activity. Walking trail characteristics cover the aspects of accessibility, facilities, maintenance, safety from crime and traffic, trail surfaces attractiveness and historic interest (Southworth 2005; Lo 2009; Ujang & Muslim 2014 Vale et al. 2016; Ujang & Muslim 2016b). Urban development of cities should take into consideration all these provisions to promote walkability in the cities.

Limitations and Future Research

Although the findings of this study provide some insights into the current status of the sustainability of these World Heritage Cities, the focus was limited to elderly residing in both cities. To further understand the challenges with elderly mobility in both cities, the study could be expanded to include elderly tourists. A comparative analysis with the non-elderly would provide deeper understanding of other travel patterns to better guide policy formulation.

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References

1. Department of Statistics Malaysia. *Unjuran Penduduk Malaysia (Semakan Semula) 2010–2040*; Department of Statistics Malaysia: Kota Kinabalu, Malaysia, 2016; p. 215.
2. Department of Statistics. Full report AP 2019_f_19.7.2019_opt.pdf. Putrajaya, 2019. Available online: <https://www.dosm.gov.my/v1/> (accessed on 19 July 2019).

3. Department of Statistics. *Current Population Estimates*; Department of Statistics: Putrajaya, Malaysia, 2018.
4. Tacken, M. Mobility of the elderly in time and space in the Netherlands: An analysis of the Dutch National Travel Survey. *Transportation* **1998**, *25*, 379–393.
5. Banister, D.; Bowling, A. Quality of life for the elderly: The transport dimension. *Transp. Policy* **2004**, *11*, 105–115. [[CrossRef](#)]
6. Winters, M.; Voss, C.; Ashe, M.C.; Gutteridge, K.; McKay, H.; Sims-Gould, J. Where do they go and how do they get there? Older adults' travel behaviour in a highly walkable environment. *Soc. Sci. Med.* **2015**, *133*, 304–312. [[CrossRef](#)]
7. Devlin, N.J.; Brooks, R. EQ-5D and the EuroQol Group: Past, Present and Future. *Appl. Health Econ. Health Policy* **2017**, *15*, 127–137. [[CrossRef](#)] [[PubMed](#)]
8. Berg, P.V.D.; Arentze, T.; Timmermans, H. Estimating social travel demand of senior citizens in the Netherlands. *J. Transp. Geogr.* **2011**, *19*, 323–331.
9. Habib, K.M.N.; Morency, C.; Trepanier, M. Integrating parking behaviour in activity-based travel demand modelling: Investigation of the relationship between parking type choice and activity scheduling process. *Transp. Res. Part A Policy Pract.* **2012**, *46*, 154–166.
10. Silvis, J.; Niemeier, D. Social Network and Dwelling Characteristics that Influence Ridesharing Behavior of Seniors. *Transp. Res. Rec. J. Transp. Res. Board* **2009**, *2118*, 47–54.
11. Pettersson, P.; Schmöcker, J.D. Active ageing in developing countries?—trip generation and tour complexity of older people in Metro Manila. *J. Transp. Geogr.* **2010**, *18*, 613–623. [[CrossRef](#)]
12. Liu, W.; Lu, H.; Sun, Z.; Liu, J. Elderly's Travel Patterns and Trends: The Empirical Analysis of Beijing. *Sustainability* **2017**, *9*, 981.
13. Rosenbloom, S. Sustainability and automobility among the elderly: An international assessment. *Transportation* **2001**, *28*, 375–408.
14. Liu, Y.; Feng, Y. Simulating the Impact of Economic and Environmental Strategies on Future Urban Growth Scenarios in Ningbo, China. *Sustainability* **2016**, *8*, 1045.
15. Van Hoof, J.; Kazak, J.K.; Perek-Białas, J.M.; Peek, S.T.M. The Challenges of Urban Ageing: Making Cities Age-Friendly in Europe. *Int. J. Environ. Res. Public Health* **2018**, *15*, 2473. [[CrossRef](#)] [[PubMed](#)]
16. Department of Statistics. Press Release State Socioeconomic Report 2017. Putrajaya, 2018. Available online: <https://www.dosm.gov.my/v1/index.php?r=column/pdfPrev&id=OE5UdnNRL1VZbjJcU1STVdIdFIUdz09> (accessed on 23 August 2019).
17. Department of Statistics. *Laporan Sosioekonomi Negeri Pulau Pinang 2018*; Department of Statistics: Putrajaya, Malaysia, 2018.
18. Department of Statistics. *Laporan Sosioekonomi Negeri Melaka 2018*; Department of Statistics: Putrajaya, Malaysia, 2018.
19. Liu, O.P. Community Involvement for Sustainable World Heritage Sites: The Melaka Case. *Kaji. Malays.* **2017**, *35*, 59–76.
20. UNESCO World Heritage Centre. *Convention Concerning the Protection of the World Cultural and Natural Heritage*; UNESCO World Heritage Centre: Bonn, Germany, 2015.
21. George Town Could Become a Malaysian Best Practice in Transport. Transport Matters. Available online: <https://www.itdp.org/2019/03/04/george-town-cycling-walking-transport/> (accessed on 25 March 2019).
22. Asian Development Bank. Green City Action Plan: A framework for GrEEEn Actions Melaka, Malaysia. Available online: <https://www.adb.org/sites/default/files/related/41571/imt-gt-green-city-action-plan-melaka-april-2014.pdf> (accessed on 23 April 2018).
23. Subramaniam, R. Melaka, A Green City Example. *New Straits Times*. Available online: <https://www.nst.com.my/opinion/letters/2018/09/416341/melaka-green-city-example> (accessed on 19 September 2018).
24. Brebbia, C.; Doganer, S.; Dupont, W. Accelerating cultural heritage tourism in San Antonio: A community-based tourism development proposal for the missions historic district. *Int. J. Sustain. Dev. Plan.* **2015**, *10*, 1–19.
25. Graham, H.; De Bell, S.; Flemming, K.; Sowden, A.; White, P.; Wright, K. The experiences of everyday travel for older people in rural areas: A systematic review of UK qualitative studies. *J. Transp. Health* **2018**, *11*, 141–152.
26. Cheng, L.; Chen, X.; Yang, S.; Cao, Z.; De Vos, J.; Witlox, F. Active travel for active ageing in China: The role of built environment. *J. Transp. Geogr.* **2019**, *76*, 142–152. [[CrossRef](#)]

27. Srichuae, S.; Nitivattananon, V.; Perera, R. Aging society in Bangkok and the factors affecting mobility of elderly in urban public spaces and transportation facilities. *IATSS Res.* **2016**, *40*, 26–34. [[CrossRef](#)]
28. Böcker, L.; Van Amen, P.; Helbich, M. Elderly travel frequencies and transport mode choices in Greater Rotterdam, the Netherlands. *Transportation* **2017**, *44*, 831–852. [[CrossRef](#)]
29. Wen, C.; Albert, C.; Von Haaren, C. The elderly in green spaces: Exploring requirements and preferences concerning nature-based recreation. *Sustain. Cities Soc.* **2018**, *38*, 582–593.
30. Ebejer, J. Urban Heritage and Cultural Tourism Development: A Case Study of Valletta's Role in Malta's Tourism. *J. Tour. Cult. Chang.* **2019**, *17*, 306–320. [[CrossRef](#)]
31. Håkonsen, L.; Løyland, K. Local government allocation of cultural services. *J. Cult. Econ.* **2016**, *40*, 487–528. [[CrossRef](#)]
32. Parlett, G.; Fletcher, J.; Cooper, C. The impact of tourism on the Old Town of Edinburgh. *Tour. Manag.* **1995**, *16*, 355–360.
33. Zhuang, X.; Yao, Y.; Li, J. Sociocultural Impacts of Tourism on Residents of World Cultural Heritage Sites in China. *Sustainability* **2019**, *11*, 840. [[CrossRef](#)]
34. Collia, D.V.; Sharp, J.; Giesbrecht, L. The 2001 National Household Travel Survey: A look into the travel patterns of older Americans. *J. Saf. Res.* **2003**, *34*, 461–470. [[CrossRef](#)]
35. Guell, C.; Panter, J.; Jones, N.; Ogilvie, D. Towards a differentiated understanding of active travel behaviour: Using social theory to explore everyday commuting. *Soc. Sci. Med.* **2012**, *75*, 233–239. [[PubMed](#)]
36. Kim, M.; Kim, C. Lifestyle and travel motivation of the elderly in South Korea: Baseline characteristics and the relationship between demographic factors. *Int. J. Hosp. Tour. Adm.* **2018**, 1–24. [[CrossRef](#)]
37. Páez, A.; Scott, D.M.; Potoglou, D.; Kanaroglou, P.S.; Newbold, K.B. A Mixed Ordered Probit Analysis of Elderly Trip Generation in the Hamilton CMA. In Proceedings of the 11th International Conference on Travel Behaviour Research, Kyoto, Japan, 16–20 August 2006; pp. 16–20.
38. Schmöcker, J.-D.; Quddus, M.; Noland, R.; Bell, M. Estimating Trip Generation of Elderly and Disabled People: Analysis of London Data. *Transp. Res. Rec. J. Transp. Res. Board* **2005**, *1924*, 9–18.
39. Alsnih, R.; Hensher, D.A. The mobility and accessibility expectations of seniors in an aging population. *Transp. Res. Part A Policy Pract.* **2003**, *37*, 903–916.
40. Stern, S. A disaggregate discrete choice model of transportation demand by elderly and disabled people in rural Virginia. *Transp. Res. Part A Policy Pract.* **1993**, *27*, 315–327.
41. Cheng, G.; Zhao, S.; Li, J. The Effects of Latent Attitudinal Variables and Sociodemographic Differences on Travel Behavior in Two Small, Underdeveloped Cities in China. *Sustainability* **2019**, *11*, 1306. [[CrossRef](#)]
42. Cui, J.; Loo, B.P.; Lin, D. Travel behaviour and mobility needs of older adults in an ageing and car-dependent society. *Int. J. Urban Sci.* **2017**, *21*, 109–128. [[CrossRef](#)]
43. O'hern, S.; Oxley, J. Understanding travel patterns to support safe active transport for older adults. *J. Transp. Health* **2015**, *2*, 79–85.
44. Li, H.; Raeside, R.; Chen, T.; McQuaid, R.W. Population ageing, gender and the transportation system. *Res. Transp. Econ.* **2012**, *34*, 39–47.
45. Gitelman, V.; Pesahov, F.; Carmel, R.; Chen, S. The Use of Mobility Scooters by the Elderly—A Feasibility Study in Israel. *Transp. Res. Procedia* **2016**, *14*, 2324–2333.
46. Zhang, Y.; Li, C.; Ding, C.; Zhao, C.; Huang, J. The Built Environment and the Frequency of Cycling Trips by Urban Elderly: Insights from Zhongshan, China. *J. Asian Arch. Build. Eng.* **2016**, *15*, 511–518.
47. Musa, G.; Sim, O.F. Travel behaviour: A study of older Malaysians. *Curr. Issues Tour.* **2010**, *13*, 177–192. [[CrossRef](#)]
48. Madha, A.; Salman, A.D.; Hussain, H.D.; Borhan, N.; Rahmat, R.A.O. Analysis of travel behaviour in Petaling Jaya, Malaysia: An application of the theory of planned behaviour. *Arch. Transp.* **2016**, *38*, 29–38.
49. Yamane, T. *Statistics, An Introductory Analysis*, 2nd ed.; Harper and Row: New York, NY, USA, 1967.
50. Bai, B.; Smith, W.; Cai, L.A.; O'Leary, J. Senior Sensitive Segments: Looking at Travel Behavior. In *The Practice of Graduate Research in Hospitality and Tourism*; Psychology Press: London, UK, 1999; pp. 75–89.
51. Woolridge, J.M. *Econometric Analysis of Cross Section and Panel Data*; MIT Press: London, UK, 2002.
52. De Koning, J.L.; Stathi, A.; Fox, K.R. Similarities and Differences in the Determinants of Trips Outdoors Performed by UK Urban-and Rural-living Older Adults. *J. Aging Phys. Act.* **2015**, *23*, 613–621.
53. Schwanen, T.; Dijst, M.; Dieleman, F.M. Leisure trips of senior citizens: Determinants of modal choice. *Tijdschr. Voor Econ. Soc. Geogr.* **2001**, *92*, 347–360. [[CrossRef](#)]

54. World Health Organization. *Global Status Report on Non-Communicable Diseases*; World Health Organization: Geneva, Switzerland, 2011.
55. Musselwhite, C.B.A. Further examinations of mobility in later life and improving health and wellbeing. *J. Transp. Health* **2015**, *2*, 99–100.
56. Nelson, M.E.; Castaneda-Sceppa, C.; Rejeski, W.J.; Blair, S.N.; Duncan, P.W.; Judge, J.O.; Macera, C.A. Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association. *Med. Sci. Sports Exerc.* **2007**, *39*, 1435–1445.
57. Cleland, V.J.; Timperio, A.; Crawford, D. Are perceptions of the physical and social environment associated with mothers' walking for leisure and for transport? A longitudinal study. *Prev. Med.* **2008**, *47*, 188–193. [[CrossRef](#)] [[PubMed](#)]
58. Boone-Heinonen, J.; Evenson, K.R.; Taber, D.R.; Gordon-Larsen, P. Walking for prevention of cardiovascular disease in men and women: A systematic review of observational studies. *Obes. Rev.* **2008**, *10*, 204–217. [[CrossRef](#)] [[PubMed](#)]
59. Brown, B.B.; Werner, C.M.; Amburgey, J.W.; Szalay, C. Walkable route perceptions and physical features: Converging evidence for en route walking experiences. *Environ. Behav.* **2007**, *39*, 34–61.
60. Patterson, I.; Pegg, S.; Wan Omar, W.R. Walking to Promote Increased Physical Activity. In *The Routledge International Handbook of Walking*, 1st ed.; Hall, C.M., Ram, Y., Shoval, N., Eds.; Routledge: Oxon, UK, 2018; pp. 274–287.
61. Ram, Y.; Hall Michael, C. Walkable Places for Visitors. In *The Routledge International Handbook of Walking*, 1st ed.; Hall, C.M., Ram, Y., Shoval, N., Eds.; Routledge: Oxon, UK, 2018; pp. 311–329.
62. Bartlett, R. Testing the 'Popsicle Test': Realities of Retail Shopping in New 'Traditional Neighbourhood Developments. *Urban Stud.* **2003**, *40*, 1471–1485.
63. Southworth, M. Designing the walkable city. *J. Urban Plan. Dev.* **2005**, *131*, 246–257. [[CrossRef](#)]
64. Lo, R.H. Walkability: What is it? *J. Urban.* **2009**, *2*, 145–166.
65. Ujang, N.; Muslim, Z. Walkability and attachment to tourism places in the city of Kuala Lumpur, Malaysia. *Athens J. Tour.* **2014**, *2*, 53–65. [[CrossRef](#)]
66. Vale, D.S.; Saraiva, M.; Pereira, M. Active accessibility: A review of operational measures of walking and cycling accessibility. *J. Transp. Land Use* **2016**, *9*, 209–235.
67. Mansouri, M.; Ujang, N. Tourist' expectation and satisfaction towards pedestrian networks in the historical district of Kuala Lumpur, Malaysia. *Asian Geogr.* **2016**, *33*, 35–55. [[CrossRef](#)]

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