Identifying the Determinants of Walkability and Use of Non-Motorized Transport in a Medium-Sized City: The Case of Iloilo City, Philippines

Jerilee PACHOCO CAMEÑA
Graduate Student
School of Urban and Regional Planning
University of the Philippines
Diliman, Quezon City 1101
E-mail: jc.pachoco@gmail.com

Jun T. CASTRO
Professor
School of Urban and Regional Planning
University of the Philippines
Diliman, Quezon City 1101
E-mail: nujortsac@gmail.com

Abstract: This study identified the factors that promote walkability and use of non-motorized transport in Iloilo City, Philippines, a medium-sized city of less than 500,000 inhabitants. Data surveyed from 400 respondents using a 23-item questionnaire were analyzed using independent sample T-tests and Pearson's *r* test of correlation. Results showed significant relationships between attitudinal beliefs towards walking and use of NMT and likelihood to use these modes. Socio-economic attributes (gender, age, income, educational level and employment status) also showed significant relationship. Males tend to use more NMTs while females tend to walk more, which might be due to them being "captive walkers".

Multiple linear regression resulted in models showing three (3) main predictors to walking: the individual's intrinsic preference for walking, attitudinal beliefs on walking as facilitative of physical fitness, and perception that walking is the most flexible mode of transport. Two (2) predictors for NMT use emerged: cycling is the most convenient mode of transport, and the strong personal preference for NMT over public transport. Identified deterrents to walking and use of NMT are weather, peace and order, and pollution. Unique responses also identified stray dogs as one of the deterrents. Practical recommendations to increase modal share of walking and use of NMT are also included.

***Key words*:** walkability, non-motorized transport, deterrents to NMT use and walking

1. BACKGROUND and STUDY SITE

Mobility is a universal human right (United Nations Human Settlements Programme, 2013) that numerous innovations have been carried out to enhance it—make it better and faster. This desire for improved mobility has been one of the reasons for increasing motorization, which, along with other factors of urbanization contributed to the continued decline in walking and use of non-motorized transportation (NMT) modes. Use of sustainable modes of transport is being encouraged in transport policies, through drafting of Nationally Environmentally Sustainable Transport Strategies (NESTS) (United Nations Centre for Regional Development, 2011), to address the negative effects of motorization. However, high modal share for walking and use of NMTs remain elusive in the country. Studies have found that in Metro Manila, nearly 35% of destinations are within a 15-minute walk or bicycle trip, but majority of short trips are made by jeepneys, tricycles and even cars (Leather, et al., 2011). Yet, given the seemingly undesirable direct and indirect effects of owning and using a car, people remain attracted to it.

Modal shift from motorized to non-motorized modes could begin if factors that enable for the shift to take place are provided – if people are made capable to perform that shift. Sen's Capability Approach Theory (Robeyns, 2003) detailed on the relationship between an individual's functioning and his capacity to perform that function. The person's proper functioning as a mobile individual is only achieved if s/he is afforded with the capacity (i.e., through provision of pedestrian infrastructure) to perform it. Troped et al. (2003) found that neighborhood physical environmental factors (i.e., presence of sidewalks) are correlated with transformational activity, therefore modal shift at the neighborhood level can happen if

individuals are provided with facilities that enhance their capacity as pedestrians and bicycle users. In addition, modal shift mainly involves personal decisions. It is therefore imperative that in in planning for shift towards use of sustainable transport modes, individual decisions are also taken into account. According to the Theory of Planned Behavior (Ajzen, et al., 1991), an individual's behavior is largely based on the intention to perform it. Individual beliefs and attitude, the prevailing social norms and the control factors are just a few of those that influence an individual's decision to act on the said intention. These factors, along with the desire to perform the intention, manifest as behavior. The more positive the beliefs, the higher the intention becomes, and the more likely to result in performance.

The study site is Iloilo City, located in the Visayas group of islands in central Philippines. It is a mid-sized city, with a population of 424,619. Its geographical make-up is suitable for intermodal travel, and the city can easily be reached through sea, land (roll-on roll-off mode) and air. It is comprised of sic (6) districts, with Jaro District as the biggest in terms of population and land area (Iloilo City Planning and Development Office, 2014). The City is typically flat with low level mass making it ideal for walking and cycling.

2. DATA COLLECTION AND ANALYSIS

A total of 400 respondents were interviewed in forty (40) barangays in the City of Iloilo, proportionately distributed among its six (6) districts.

A 23-item questionnaire was used to gather the primary data for this study. It was based on existing questionnaires used in various pedestrian and bicycling surveys, such as the Neighborhood Environment Walkability Scale (NEWS) (Cerin et al., 2009; Cerin, et al., 2006), and the Pedestrian and Bicycle Survey (PABS) (Krizek, et al., 2010). The questions were then modified and organized as per the parameters for assessing determinants on walkability and use of NMT used in this study (see Table 1), and translated into Hiligaynon, the local language of the city. The localized questionnaire was pre-tested for comprehensibility.

The questionnaire has two (2) major parts. Part 1 focused on the getting the socio- economic data of the sample. The questions include the variables being evaluated (gender, age, income, employment, educational level, and ownership of private vehicle). Part 2, was divided into sub-parts. Part 2-A contains questions specific to walking while Part 2-B contains questions on NMT use. These parts included questions on attitudinal beliefs, subjective rating of neighborhood physical conditions and likelihood to walk or use NMT, formulated with Likert-type of questions set on a 5-point scale.

The survey was conducted on April 6-14, 2016, from 8:00 in the morning until 5:00 in the afternoon. It covered at least one weekend to consider respondents who are not at home on weekdays because of work.

Tests for associations and relationships used either independent samples t-tests or the Pearson's *r* test of correlation, depending on the level of measurement of the variables. Once the relationship or association has been established, multiple linear regression was used to come up with models and the list of predictor variables.

Table 1. Parameters for Assessing Determinants of Walkability and NMT Use

	Parameters	Factors included
1	Safety from traffic	a. Vehicle traffic volumes and speeds b. Special hazards to walking and cycling c. Pedestrian road crossing facilities d. Presence segregated bike lanes e. Presence of parked cars adjacent to the traffic lane: (a) obscure your view of vehicles and bicycles entering the roadway from driveways and alleys, and (b) pose a hazard due to persons exiting their vehicles on the left side (traffic side) after parking)
2	Security from criminality	a. Lighting along streets and paths b. Prevalence of theft (bike theft)
3	Convenience	a. Well-connected sidewalks (i.e. connects to public transport stops, areas of destination (shops, park, etc.) b. Well-connected sidewalks in terms of continuity of pavement c. Bicycle parking facilities
4	Comfort	a. Sidewalks evaluated in terms of quality of surface condition b. Cleanliness, litter, and aesthetic conditions c. Climate and weather
5	Attitudinal beliefs on personal capacity/self-efficacy	a. Preference for walking or NMT use as modes b. Health and social pressures c. Skill/capacity to conduct the activity

Source: Modified from Pikora et al. (2003)

3. RESULTS

Table 2 shows the profile of the respondents.

Table 2. Profile of Respondents

Gender		*Income*	
Males	195 (49%)	< PhP 5,000	52 (14.1%)
Females	205 (51%)	PhP5,000-9,999	101 (27.4%)
		PhP10,000 - 19,999	137 (37.1%)
Age in years		PhP 20,000 - 39,999	52 (14.1%)
15-19	15 (4.1%)	PhP 40,000 - 59,999	19 (5.1%)
20-24	43 (11.7%)	PhP 60,000 - 99,999	4 (1.1%)
25-29	43 (11.7%)	PhP 100,000 - 249,000	2 (0.5%)
30-34	35 (9.5%)	> PhP 250,000	2 (0.5%)
35-39	48 (13.1%)		
40-44	38 (10.4%)		
45-49	43 (11.7%)	*Education*	
50-54	30 (8.2%)	< high school level	79 (20.3%)
55-59	26 (7.1%)	> high school graduate	310 (79.7%)
60-64	21 (5.7%)		
> 65	25 (6.8%)		
		Own private vehicle?	145 (36.3%)
Employment		Yes	255 (63.7%)
Employed	248 (63.6%)	No	
Not employed	142 (36.4%)		

3.1 Travel Profile of Respondents

Public transport in the form of jeepneys is the dominant mode in the City of Iloilo. Figure 2 shows the relatively higher percentage of jeepney users in three of four identified trip purposes: work (31.1%), shop (35.2%) and leisure 42.9%). For travels related to exercise or sports, large percentage of respondents walk (71%), followed by use of bicycles (19.3%).

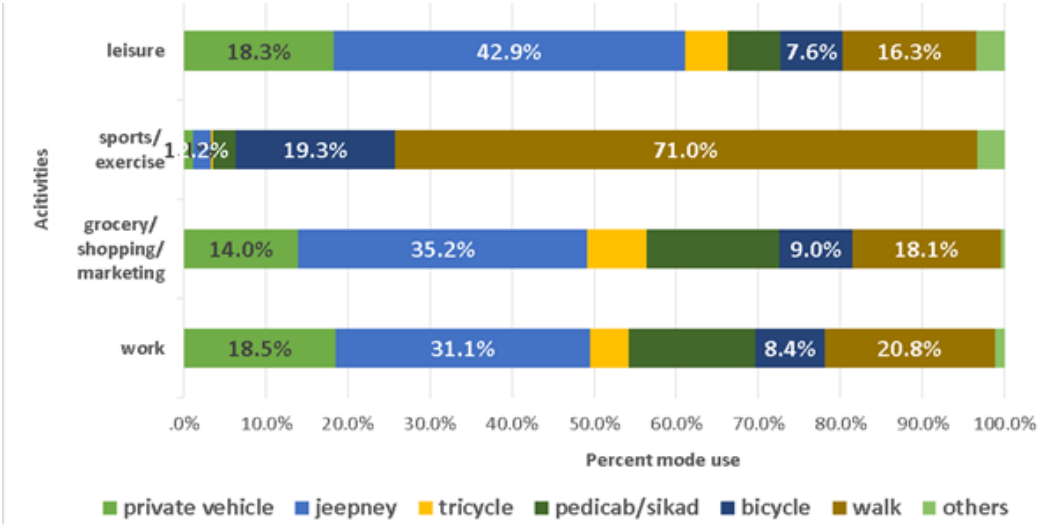

Figure 2. Activities and Corresponding Transport Modes Used

Majority of the respondents do walk for utilitarian purposes (to go to work, school market, etc.). Common destination for utilitarian walks are the jeepney stops, work/school and recreational areas around the neighborhood, including visits made to friends in the neighborhood. Walks to jeepney stops are short distance trips, typically done under five (5) minutes while walks to school and to exercise could last for as long as half an hour. Evidence from previous studies show that recreational walking trips, including trips for exercise, usually takes longer than trips for other purposes (Corpuz, et al., 2005)

3.2. Correlates of Walking

Nine (9) attitudinal beliefs on walking were tested for correlation and association with the socio-economic attributes (gender, age, income, employment, education and private vehicle ownership) and the physical environment factors. The attitudinal beliefs were rated using the 5-point Likert-type scale (1 = strongly disagree – 5 = strongly agree). Results are shown in Table 3.

Gender failed to show any significant variation in any of the nine (9) attitudinal beliefs. However, results show that women tend to agree more on the negative statements (i.e., I am not fit enough to walk) than their male counterpart.

Significant relationship was found between age and three (3) attitudinal beliefs on walking: 1) I would rather walk than ride the jeepney, 2) the distance from my residence to work/school is walkable, and 3) walking is the quickest way to travel for short trips. The perception on individual's capacity to walk showed positive correlation with income, however the relationship is weak. According to Pendakur (1999), as incomes increase, the desire for improved personal mobility increases, thus, people with higher incomes tend to opt for motorized vehicles. This desire for personal motorized vehicles is further encouraged by the lack of adequate and efficient public transport systems, especially in cities in developing countries, like Iloilo City.

Employment has shown significant variability in three (3) attitudinal beliefs (not the type who likes to walk, not fit enough to walk, weather makes it difficult to walk). Meanwhile, education showed variability in belief that walking provides flexibility of time and ability to choose routes. These results could be also attributed to latent characteristics which this group on education has. High school graduates tend to be employed and thus, the idea of distance travelling to work seemed a more important issue to them. On the other hand, people with lower education tend to be unemployed, with much lower income so the idea that walking is able to afford them with capacity to become mobile (despite the fact that they do not have fare money) appears to be a more important point for them.

Table 3. Socio-Economic Correlates of Individual Factors on Walking

	Age	Income	Education	Employment
1. I am not the kind of person who likes to walk				t –value = 2.098 df = 320.561 p = .037***
2. I would rather walk than ride the jeepney	*r* =.103* p= .044 N = 286			
3. The distance from my residence to work/school is walkable	*r* = 156** p = .002 N= 387			
4. Walking is the quickest way to travel for short trips	*r* = .141** p = .006 N = 388			
5. The weather makes it difficult for me to walk				t-value = -2.216 df = 339.875 p = .027*
6. I do not think I am fit enough to walk		*r* = .117* p = (.027) N = 358		t-value =-2.231 df = 287.734 p = .026***
7. Walking provides me with flexibility and freedom to choose routes			t-value = 2.206 df = 126.763 p = .046***	

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)
*** Significance at p-value < 0.05

Table 4 shows the physical environment correlates of walking. Majority of the variables show positive correlation, except for two: the belief that "The distance to work/school is walkable" and the number of pedestrian crossings present (coefficient = - 0.144, p value = 0.005), and the "I am not fit enough to walk" with well-lit sidewalks (coefficient = -.106, p-value = .038), meaning, the less well-lit the sidewalks are the more people rate themselves as not fit enough to walk. This inverse correlation can be attributed to the individual's low sense of security walking in streets that are not well-lit.

Table 4. Physical Environment Correlates of Individual Factors on Walking

Attitudinal beliefs: walking / Physical Environment		Adequate amount of sidewalk	Well-connected sidewalk	Pedestrian crossing present	Shaded side walk	Well-paved side walk	Well-lighted sidewalk
I walk regardless of weather	*r* (p-value) N	.170** (.001) 383	.190** (.000) 382		.180** (.000) 382	.119* (.020) 381	.178** (.001) 378
Walking provides flexibility/freedom to choose routes	*r* (p-value) N	.181** (.000) 388	.103* (.043) 387		.145** (.004) 387	.176** (.001) 386	.285** (.000) 382
The distance to work/ school is walkable	*r* (p-value) N			-.144** (.005) 388	.113* (.026) 388		.178** (.000) 383
I do not like to walk	*r* (p-value) N	.116* (.022) 390	.110* (.030) 389				
I should walk more for physical fitness	*r* (p-value) N					.100* (.048) 389	.174** (.001) 385
Walking is the quickest mode for short trips	*r* (p-value) N					.134** (.008) 388	.204** (.000) 384
I am not fit enough to walk	*r* (p-value) N			.137** (.007) 386			-.106* (.038) 381

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

On the other hand, the negative correlation between number of pedestrian crossings and perception of the walkable distance to school can be attributed to the way pedestrian crossings are installed in the city. Most of them are found only in the main streets where traffic is busier. Places and streets with more pedestrian crossings would tend to be perceived as not within walkable distance as they would mean further from away barangay/neighborhood, also suggesting that respondents find destinations located in busier streets less walkable. It would be interesting to have the objective evaluation of these physical environments and compare them with the subjective evaluation of the individuals.

3.3. Individual Factors and Likelihood to Walk

Table 5 shows the correlates of the five (5) variables for likelihood to walk with the nine (9) attitudinal beliefs on walking. Three (3) attitudinal beliefs were found to be correlated with all the five (5) categories of likelihood to walk. All correlations were positive, however majority tend to be weak, except between the belief that walking provides flexibility and likelihood to walk alone at night, which showed medium strength of relationship with r=0.438.

Three conditions of likelihood to walk (at night, at peak hours and on well-paved sidewalks) were found to be significantly, however negatively, related to the individual's perception of his/her physical fitness/capacity to walk. Still, the relationship is weak with at r=0.299 between "I do not think I am fit enough to walk" and "likelihood to walk alone at night".

Table 5. Correlation: Attitudinal Beliefs on Walking and Likelihood to Walk

Attitudinal beliefs: walking	Likelihood to walk	Alone at night	At peak hours of traffic	If sidewalks are well-paved	On good weather	For further distances
I would rather walk than ride the jeepney	*r*	.125*	.124*	.116*	.211**	.271**
	(p-value)	(.014)	(.015)	(.023)	(.000)	(.000)
	N	382	384	382	385	383
Walking provides flexibility and freedom to choose routes	*r*	.438**	.317**	.319**	.169**	.127*
	(p-value)	(.000)	(.000)	(.000)	(.001)	(.013)
	N	382	384	383	385	383
Walking is the quickest way to travel for short trips	*r*	.346**	.305**	.300**	.150**	.113*
	(p-value)	(.000)	(.000)	(.000)	(.003)	(.026)
	N	384	386	384	387	385
The distance from my residence to work/school is walkable	*r*	.231**	.233**	.141**	.116*	
	(p-value)	(.000)	(.000)	(.006)	(.023)	
	N	383	385	383	386	
I should walk more for physical fitness	*r*	.181**	.183**	.279**	.248**	
	(p-value)	(.000)	(.000)	(.000)	(.000)	
	N	385	387	385	388	
I walk regardless of weather	*r*	.307**	.310**	.238**	.224**	
	(p-value)	(.000)	(.000)	(.000)	(.000)	
	N	377	379	377	380	
I do not think I am fit enough to walk	*r*	-.299**	-.208**	-.162**		
	(p-value)	(.000)	(.000)	(.001)		
	N	381	383	381		

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

3.4. Correlates of NMT use

Table 6 shows the analysis between socio-economic factors and attitudinal beliefs on using NMT. Eight (8) of the nine (9) variables were found to be significant. In particular, there appeared to be significant variance in gender, and on the belief that poor weather is not good for cycling. Females agree more to this statement. In addition, there appears to be significant variances on private vehicle ownership and the perception that the workplace or school is within bikeable distance. The numbers show that those who do not own private vehicles tend to perceive destinations are within bikeable distance.

Table 6. Socio-Economic Correlates of Use of NMT

	Gender	Age	Education	Employment	Vehicle ownership
I am not the type who likes to cycle		r = .137** p-value=.007 N =390			
The distance to my workplace/ school is bikeable	t = 2.135 df =384.643 p-value=.033		t-value = 3.127 df = 133.522 p-value=.002*		t = -2.799 df = 283.675 p-value=.005
I prefer to cycle than use the public transport	t =6.522 df =389.932 p-value=.000				
Cycling can be the quickest way to travel around	t =4.403 df = 380.020 p-value=.000				
I am not fit enough to cycle	t= -4.053 df =382.142 p-value=.000	r =.205** p-value=.000 N=383			
Cycling is dangerous	t =-3.669 df =385.220 p-value=.000				
I prefer to not cycle when it rains	t = -3.246 df = 382.327 p-value=.001			t = 2.002 df= 308.656 p-value=.046*	
I do not cycle when it is too hot	t =--2.775 df = 383.074 p-value=.006				

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)
*** Significance at p-value < 0.05

Correlation results between attitudinal beliefs on use of NMT and physical environment are shown in Table 7. Five (5) attitudinal beliefs were found to be significantly and positively correlated with two (2) physical environment variables: bike lane and alternative route. Meaning, the more alternative routes and bike lanes there are, the more agreeable the individuals tend to be on these attitudinal beliefs. The relationship is weak, with the highest coefficient just at 0.292 (p-value = 0.000) between "Cycling is a healthy way to travel around" and the existence of bike lane.

Table 7. Correlation: Physical Environment and Attitudinal Beliefs on NMT Use

Attitudinal beliefs: NMT use \ NMT facilities		Bike lanes	Alternative routes
The distance to my workplace/school is short enough to cycle	r (p-value) N	.123* (.016) 385	.141** (.006) 385
I prefer to cycle than use the public transport	r (p-value) N		.125* (.014) 388
Cycling is a healthy way to travel around	r (p-value) N	.292** (.000) 388	.286** (.000) 388
I prefer to not cycle when it rains	r (p-value) N		.109* (.032) 388
I do not cycle when it is too hot	r (p-value) N		.143** (.005) 388

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

3.5. Individual Factors and Likelihood to Use NMT

Six (6) attitudinal beliefs towards use of NMT were found to have a significant relationship with all four (4) conditions of likelihood to use NMT: "I am not the type who likes to cycle", "The distance to my workplace/ school is bikeable", "I prefer to cycle than use the public transport", "Cycling can be the quickest way to travel around", "Cycling is a healthy way to travel around", and "I am not fit enough to cycle" (see Table 8). Over-all, the strongest relationship was found between variable "Likelihood to cycle on a good weather" and the belief that cycling is the quickest mode to travel around (coefficient= 0.597, p-value = 0.00, significant at 0.01).

Table 8 also shows the remaining two attitudinal beliefs variable that are found to be significantly correlated with at least three (3) variables for likelihood to walk. Beliefs that "Cycling is dangerous" and "I prefer to not cycle when it rains," showed positive correlation with likelihood to bike at night, to use bicycle at peak hours of traffic,: and for "leisure activities." The one that displayed the strongest correlation, although still weak at the coefficient of 0.294, negative, meaning the more the individual disagrees with this statement the more s/he is likely to use the bicycles even at peak hours of traffic.

Table 8. Correlation: Attitudinal Beliefs on NMT Use and Likelihood to Use NMT

Attitudinal beliefs: Use NMT \ Likelihood to use NMT		On good weather	To travel at night	At the peak hours of traffic	For leisure travel
I am not the type who likes to cycle	*r*	-.426**	-.289**	-.344**	-.355**
	(p-value)	(.000)	(.000)	(.000)	(.000)
	N	389	389	389	388
The distance to my workplace/ school is bikeable	*r*	.222**	.376**	.301**	.296**
	(p-value)	(.000)	(.000)	(.000)	(.000)
	N	385	385	385	384
I prefer to cycle than use the public transport	*r*	.470**	.412**	.462**	.504**
	(p-value)	(.000)	(.000)	(.000)	(.000)
	N	388	388	388	387
Cycling can be the quickest way to travel around	*r*	.597**	.443**	.383**	.516**
	(p-value)	(.000)	(.000)	(.000)	(.000)
	N	387	387	387	386
Cycling is a healthy way to travel around	*r*	.374**	.236**	.254**	.347**
	(p-value)	(.000)	(.000)	(.000)	(.000)
	N	388	388	388	387
I am not fit enough to cycle	*r*	-.275**	-.198**	-.328**	-.228**
	(p-value)	(.000)	(.000)	(.000)	(.000)
	N	383	383	383	382
Cycling is dangerous	*r*		-.278**	-.294**	-.206**
	(p-value)		(.000)	(.000)	(.000)
	N		387	387	386
I prefer to not cycle when it rains	*r*		-.214**	-.237**	-.131**
	(p-value)		(.000)	(.000)	(.010)
	N		388	388	387
I do not cycle when it is too hot	*r*		-.213**	-.237**	
	(p-value)		(.000)	(.000)	
	N		388	388	

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

"I do not cycle when it is hot" is negatively correlated with cycling at night. The more the individual agrees with this statement, the less likely s/he is to use the bicycle even to travel at night, when it is less warm already, and the less likely he is also to use the bicycles at the peak hours of traffic. Both correlations are weak in strength though with coefficients values of 0.213 and 0.237, respectively.

3.6. Models for Likelihood to Walk or Use NMT

Multiple regression analysis was used to determine the models for predicting variables that directly affect the individual's likelihood to walk or use NMT. Resulting models with the highest value of *Adjusted R-squared* were selected.

3.6.1. Predictor and Dependent Variables for Likelihood to Walk

There were twenty six (26) predictors included in the multiple regression analysis for likelihood to walk. Tale 9 shows the four (4) outcome variables for Table 10 shows the resulting models with the corresponding predictor variables for each.

Table 9. Four Aspects for Likelihood to Walk

Dependent Variables for Likelihood to Walk	Codes
1. Likelihood to walk on good weather	DV 1 – Walk
2. Likelihood to walk alone at night	DV 2 – Walk
3. Likelihood to walk at peak hours of traffic	DV 3 – Walk
4. Likelihood to walk when sidewalks are well-paved	DV 4 – Walk

Model for DV1-Walk resulted in an Adjusted R squared value (0.148) with six predictors included. The Adjusted R squared value tells us that this model can account for about 14.8% of the variability in DV1 -Walk (the changes in DV 1 can be explained/caused by about 14.8% of the model). The attitudinal belief that walking can contribute to one's over-all physical fitness appears to have the strongest influence. The negative coefficient of educational level, for example, means that the group belonging to high school undergraduates (the reference value/group) would likely choose to walk more, on good weather, than those belonging to the group who are at least high school graduates and higher. Similarly negative statements such as high crime rate, high traffic volume and negative attitudinal belief "not the type who likes to walk" bearing negative coefficients means that when these attitudes and perceptions are lower, the likelihood to walk under the condition of DV 1-Walk becomes higher. All six variables added statistically significantly to the prediction with the p-values < 0.05.

The model for DV 2-Walk can account for 37.2% variability with the attitudinal belief that walking allows the individual the freedom to choose which route to take (coefficient value: 0.207), as the strongest predictor. Simply saying, individuals who believe that walking allows them to conveniently choose paths that are safest to walk at night increases the likelihood for them to use this mode. The same predictor shows the strongest influence in the model for DV3-Walk (adjusted *r* squared = 0.27), and DV 4-Walk (Adjusted R squared = 0.24). It suggests that the perception that walking provides one with option to take shorter, safer, or more scenic routes, including when traffic is at its busiest, can also convince an individual to walk instead of taking other modes.

Table 10. Determinants of Likelihood to Walk

Models and Predictors included	Standardized Coefficients	p-value
Six-Predictor Model for DV 1: Likelihood to walk on good weather		
(Constant)		.000
I should walk more for physical fitness	.206	.000
I walk regardless of weather	.203	.000
I am not the kind of person who likes to walk	-.189	.000
Educational level	-.131	.014
Crime rate is high that walking is dangerous	-.117	.026
There is so much traffic on the streets that walking is unpleasant	-.117	.028
Adjusted *R* squared	.174	
Nine-Predictor Model for DV 2: Likelihood to walk alone at night		
(Constant)		.762
Walking provides me with flexibility and freedom to choose routes	.207	.000
I do not think I am fit enough to walk	-.177	.000
Walking is the quickest way to travel for short trips	.183	.000
Crime rate is high that walking is dangerous	-.112	.018
Gender	-.179	.000
I walk regardless of weather	.132	.008
The distance from my residence to work/school is walkable	.114	.018
The streets are well-lit at night	.108	.031
Private vehicle ownership	.093	.042
Adjusted *R* Squared	.372	
Eight-Predictor Model for DV 3: Likelihood to walk at peak hours of traffic		
(Constant)		.003
Walking provides me with flexibility and freedom to choose routes	.210	.000
The speed of traffic is usually slow	.196	.000
I do not think I am fit enough to walk	-.139	.008
Walking is the quickest way to travel for short trips	.200	.000
The weather makes it difficult for me to walk	-.114	.024
Bicycle ownership	-.111	.023
I walk regardless of weather	.130	.016
Gender	-.101	.040
Adjusted *R* Squared	.270	
Eight-Predictor Model for DV 4: Likelihood to walk if sidewalks are well-paved		
(Constant)		.000
Walking provides me with flexibility and freedom to choose routes	.180	.002
I should walk more for physical fitness	.143	.011
The streets are well-lit at night	.191	.000
I do not think I am fit enough to walk	-.144	.006
Walking is the quickest way to travel for short trips	.142	.015
Educational level	-.144	.006
Age	-.117	.024
Private vehicle ownership	-.115	.027
Adjusted *R* Squared	.240	

3.6.2. Predictor and Dependent Variables for Likelihood to Use NMT

There were twenty-three (23) predictors included in the regression analysis of the four (4) outcome variables for likelihood to use NMT. Table 11 shows the list of predictor variables while Table 12 hand shows the resulting models.

Table 11. Determinants of Likelihood to Walk

Dependent variable (DV) for Likelihood to Use NMT	Codes
1. Likelihood to use NMT on good weather	DV 1 – NMT Use
2. Likelihood to use NMT to travel at night	DV 2 - NMT Use
3. Likelihood to use NMT at the peak hours of traffic	DV 3 - NMT Use
4. Likelihood to use NMT for leisure travel	DV 4 - NMT Use

The selected model for DV 1 – NMT Use (adjusted *R* squared = 0.500) considered the attitudinal belief that cycling is the quickest mode to use to travel around as the highest predictor. Age and gender is also inversely affecting DV 1 – NMT Use, meaning younger people, and males, respectively are mostly likely to use NMTs to travel around on good weather. DV 2 – NMT Use (adjusted *R* squared = 0.408) and DV 4 – NMT Use (adjusted *R* squared = 0.426) has the same strongest predictor for its selected model, "cycling is the quickest mode to travel around" (coefficient value = 0.305, p value = 0.000, significant at p value<0.05).

One possible explanation for the results of DV 2 – NMT use has something to do with the supply of public transport at night, despite jeepney being the dominant mode in the City. Getting public transport is almost always problematic because of longer waiting hours due to either shortage of supply or excess of it. Shortage happens during peak hours, which expectedly would result in longer queuing of passengers. Excess in supply is different situation all in all. At low traffic period, it is the jeepneys that take longer in the queue, waiting for the optimum number of passengers before going their way. In this situation, using a bicycle is indeed quicker than taking the public transport. Gatersleben and Appleton's study in 2007 has noted that for people who have experienced cycling, flexibility of the mode often came up as one of the aspects that made cycling fun. The pleasant experience with cycling as a kind positive reinforcement to the behavior could possibly support the intention to perform the same behavior (using bicycles to commute) in the future.

Table 12. Determinants of Likelihood to Use NMT

Models and Predictors included	Standardized Coefficients	p-value
Seven-Predictor Model for DV 1: Likelihood to use NMT on good weather		
(Constant)		.000
Cycling can be the quickest way to travel around	.466	.000
I am not the type who likes to cycle	-.172	.000
Cycling is a healthy way to travel around	.203	.000
Age	-.111	.005
Employment	.120	.002
Gender	-.086	.039
I am not fit enough to cycle	-.084	.043
Adjusted *R* Squared	.500	
Seven-Predictor Model for DV 2: Likelihood to use NMT alone at night		
(Constant)		.000
Cycling can be the quickest way to travel around	.305	.000
Gender	-.242	.000
The distance to my workplace/school is bikeable	.283	.000
I do not cycle when it is too hot	-.132	.008
Cycling is dangerous	-.135	.007
Income	-.109	.011
The crime rate makes it unsafe to cycle	-.087	.044
Adjusted *R* Squared	.408	
Eight-Predictor Model for DV 3: Likelihood to use NMT at peak hours of traffic		
(Constant)		.000
I prefer to cycle than use the public transport	.170	.002
Gender	-.252	.000
I am not fit enough to cycle	-.179	.000
The distance to my workplace/school is bikeable	.194	.000
Cycling is dangerous	-.124	.013
Bicycle ownership	-.095	.032
Cycling can be the quickest way to travel around	.124	.024
I do not cycle when it is too hot	-.109	.028
Adjusted *R* Squared	.418	

Models and Predictors included	Standardized Coefficients	p-value
Nine-Predictor Model for DV 4: Likelihood to use NMT for leisure travel		
(Constant)		.443
Cycling can be the quickest way to travel around	.346	.000
I prefer to cycle than use the jeepney	.179	.001
The crime rate makes it unsafe to cycle	.157	.000
Age	-.135	.001
I prefer to not cycle when it rains	-.094	.045
Cycling is a healthy way to travel around	.117	.011
The distance to my workplace/school is bikeable	.113	.014
Cycling is dangerous	-.110	.024
Employment	.085	.045
Adjusted *R* Squared	.426	

On the other hand, the strongest predictor for the model for DV 3-NMT Use (adjusted *R* squared = 0.418), is the individual's inherent preference for using NMTs compared to other modes, suggesting people who are inclined to using NMTs are more likely to be using them at the peak hours of traffic.

Inverse relationship is notably seen in negative statement variable (i.e., "cycling is dangerous) implying that the advocacy towards use of NMT should also focus on improving the image of cycling not as a risky, adventure-driven form of activity but one that is as normal as walking. Lorenc, et al. (2008) found out that most interventions in promoting bicycles as modes of transport targeted only the public's fear and dislike of local environments, which did very little to improve the image of cycling. It is therefore imperative that advocacy and publicity campaigns should emphasize that walking and cycling as not intrinsically risky while at the same time addressing the need to improve the physical environment to address safety issues.

3.7. Factors that Deter Walking and NMT Use

The main deterrent to walking identified is extreme weather (too hot or too rainy), followed by problem of peace and order, and pollution coming from motor vehicles. Results showed that compared to these three, basic pedestrian facilities such as adequate amount and properly maintained sidewalks appeared not to be a hindrance to walking. The reason for this is that people believe that if the trip necessitates them to walk, lack of space should not be a hindrance. They can always use the narrow roadsides or snake their way around parked vehicles. On the other hand, weather was seen to be a hindrance due to health implications of walking under extreme weather conditions.

Table 13. Deterrents to Walking and NMT Use

	Frequency	N	Percent
Will not walk in…			
Extreme weather (too hot or too rainy)	359	394	91.1
There is a problem of peace and order	295	395	74.7
Pollution coming from motor vehicles	274	394	69.5
Motor vehicles travelling at high speed	266	396	67.2
There is garbage and litter on the sidewalks	232	395	58.7
Absence of sidewalks	213	395	53.9
Not well-maintained sidewalks	201	394	51.0
Inadequate amount of sidewalks	194	395	49.1
Will not use NMT in…			
Extreme weather (hot or too rainy).	352	393	89.6
High incidence of bike theft	316	393	80.4
Notable pollution from motor vehicles	300	393	76.3
Motor vehicles travelling at high speed	292	393	74.3
Absence of bike lanes	274	393	69.7
Absence of safe parking for bicycles	273	393	69.5
Lack of facilities/bike shops for emergency/urgent repairs of bikes	258	393	65.6

Few people mentioned the issue about “stray dogs”, as deterrent to both walking and bicycling. This response was extracted from the “others” category in the multiple choice/response items the part of the questionnaire pertaining to deterrents to walking and use of NMT. The open-ended questions were only limited to providing respondents with “others” category, where they include other items which were excluded in the prepared list of choices.

The responses on stray dogs as deterrents were negligible, percentage-wise, to be significant. The responses were also grouped together under the “others” category, along with other reasons such as “lack of time”, “old age”, and “lack of skills” (to use the bicycles). For this reason, they were not included in the model development. However, the practical relevance of bringing forth the issue on stray dogs as a safety concern for both pedestrian and bicycle users is one that is worth looking into. For one, this is often neglected in the social marketing for promotion of walking and use of NMT. In Philippines, are more often associated with public health concerns than with mobility or transportation. Stray animals are ordinary sights in many neighborhoods in Iloilo City, and this normalness has resulted in the lack of initiatives to address this particular safety concern for walkers and cyclists.

4. CONCLUSION AND RECOMMENDATIONS

This study affirmed findings from previous studies on the socio-economic correlates of walking and NMT use. It exhibited the varying differences in travel characteristics between gender, age groups, income groups, employed and unemployed individuals, between differing educational levels, and between owners and non-owners of private vehicles. The assumption that walking and NMT use would be much higher in individuals coming from the lower socio-economic strata also holds true for Iloilo City. However, this is predominantly affected by the individual’s access to these forms of transport. Respondents articulated their intention to use bicycles but are unable to, not because of the obvious deterrents, but mostly due to inability to own one. Iloilo City is one of those cities in developing countries with captive pedestrians, for reasons stated above.

The predictors in both walking and use of NMT provide a positive outlook of individuals in the viability of these modes of transport. However, negative perceptions such as “cycling is dangerous” included in the models simply shows that these positive perceptions can possibly change for the worse if the City remains complacent and disregards the need for better pedestrian and NMT facilities. Enhancing the capabilities to increase the functioning of people as mobile

individuals, as discussed in the CAT, is still important if walking and cycling rates are to increase significantly.

The City must be able to find ways to lessen the impact of deterring factors, and invest more on improving existing facilities and building in places that are lacking, to facilitate convenient travel by bicycle. It is important that common destinations and key facilities such as basic school and local shops serving essential needs are within walkable or bikeable distances of most properties. Expanding the current bicycle lane network could be one strategy that is worth looking into.

Further studies incorporating and comparing costs of using different modes, including fuel costs, should be conducted to determine if cost is also a factor in one's likelihood to walk or use NMT. In addition, it is also important to determine the threshold distances that people walk or use NMT for its practical significance in locating basic facilities.

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