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A TRAVEL SAFETY MODEL FOR WOMEN COMMUTERS

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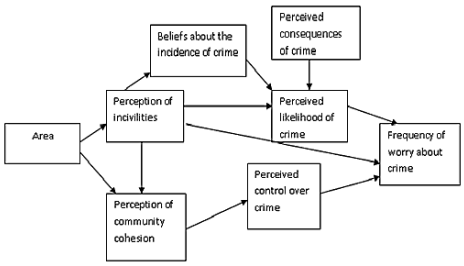
Graphical abstract



Abstract

One of the most serious discussions on the contemporary urban travel in Malaysia is that of the design facilities that have failed to meet the demand of women travelers. This has led to a higher level of concern for a much safer travelling environment for many women travelers within the Kuala Lumpur conurbation. The main aim of this research is to determine the factors of travel safety among women commuter. This empirical research has used the structural fear dimension model as the underpinning theory. A quantitative and personal administered approach through quota sampling was used to conduct the study in Kuala Lumpur urban area. A sample of 312 respondents were selected throughout the survey. The results indicates that only bus service, infrastructure had significantly affect the travel safety of women travelers but when comes to moderating variable effects, only the combination of bus service and infrastructure affect the travel safety of a women travelers.

Keywords: Travel safety; urban travel; vulnerable travelers; structural fear model

1.0 INTRODUCTION

Realizing the fact that in a new global economy where women increasingly command the employment sector, fear of crime has become the central issue and challenges for many engineers especially in designing a so called safe travel environment. Within the Kuala Lumpur Conurbation, there has been limited research done on women commuting needs from the point of origin to the point of destination. In addition, there has been only limited research done towards the needs of women travellers from the engineering aspect. This has led to the increase of fear level that women travellers face while travelling to work. The main aim of this research is to determine the extent of the travelling environment which includes infrastructure design, bus service and social environment towards the feeling of safety among women commuters. This is to ensure that all working women, who live and work in major urban area in Malaysia, can travel safely with a minimal level of fear towards crime. This empirical research has used the structural fear dimension model as the underpinning theory before it proceeds to the engineering process of the actual design. The central question of this study relates to how much of the structural fear dimension model has been taken into consideration before infrastructure planning. The approach to empirical research adopted for this study was one of the quantitative methodologies. Due to the practical constraint, this research limits its comprehensive review of every mode of transport used by the women travellers. Only women riding on the stage buses within the Kuala Lumpur Conurbation have been considered as the main respondents. This research has given an account of and the reasons for the widespread use of structural fear dimension model as a basis in the design of public transport provision in achieving a reasonably safe urban travelling sphere, as what is desired by the

women travellers. It is believed that, with appropriate engineering design, a reduction in fear level faced by many women travellers while travelling can be achieved.

The design focuses on the walkability area and waiting area through appropriate engineering and production process using a structural fear dimension model as a basis of the design. It is believed that with appropriate engineering technique used in the production of the walkways and waiting area for the public transport, the fear level could be reduced thus attracting the usage of public transport when commuting in city centre is concern.

Recent study regarding road transport infrastructure have mentioned that a transportation infrastructure project often involves considerable land use, long-term investment, and huge resource [1]. However no discussion was made on the safety aspect from the feeling of passengers especially women travellers.

Apart from that within the same year of 2014 a group of researcher had also focus on the social capital as an element [2]. They concluded that the pattern of social capital is influenced by when the neighbourhoods is developed, the diversity composition of its people, locations and the surrounding developments.

Not only that, a research on the rural area and the elderly left out women as a subject thus creating a gap for this study to fulfil [3]. They have highlighted that verification of home security needs from the elderly group of people that reside in the rural area so that an innovative solution in preventing house breaking crime could be proposed.

Another study also assessed the factors that affect the movement of passenger such as interior design attributes, information signage visibility and pedestrian behavior [3,4]. This study focus on the movement of the crowd while using the interchange. Again this study failed to consider the movement of vulnerable travellers and their problem that create a gap in this study.

Among other discussion being highlighted on gender study are on the literacy rate among female adult in Malaysia increased to 94.7% in 2004 from 64.7% in 1980 while the female labour force participation rate (FLFPR) in Malaysia has remained stagnant around 47% over the same period [5]. Although their research tap on the labour force participation among female adult, this research had also once again ignore the discussion on the safety aspect of the female travellers while using public transport to commute to work.

The main reason why only central city is chosen is mainly due to the statistics released by National Physical Plan 2012 had further showed that in year 2020 the central region will experience the highest number of urban population. This was followed by Southern and Northern Region.

2.0 LITERATURE REVIEW

2.1. Safe Urban Travelling Environment

The term built environment in this study is merely referring to buildings, streets, parks, and other man-made physical surroundings that affects a person's choices regarding opportunities for physical activity and the safety of engaging in physical activity.

The decision to walk or cycle for short trips often depends on time, purpose, or environmental factors. The travelling features of the built environment such as sidewalks, street lights, traffic, hills, and overall walkability are related to travel behaviors. When the design is concerned, many experts had identified the gap between existing policy tools and what can promote health through community design as a major policy opportunity. This discussion commentary represents a consensus of next actions towards creating built environments that support healthy active living.

2.2 Structural Fear Dimension Model

In 2012, a new phenomenon had hit the discussion on the public security by looking into the aspect of social structure and public security. The study had reported that the most common strategy use to reduce crime would be to increase patrols [6]. The study further clarifies that many strategy have neglected the impacts of economics policies and social structure towards the public security. The emergence of a new social structure creates a new challenging environment for Malaysian working women to cope.

In relation to this, how one perceives the likelihood of crime is however affected by few important variables. Among the variables being discuss are how an individual belief about the crime incidence, incivilities, crime consequences, control and worry over crime as well as the perceptions on the community cohesion.

It can be seen from Figure 1 that the contributory factors to the perceived likelihood of crime are many and intertwined. In any location/area, people had a preconceived perception about the level of inciivilities and community cohesion, which may give rise to the perception on the level and likelihood of crime in that area. This in turn will influence the frequency of worry about crime. Any threat that happens would be influenced by both the beliefs about the crime and the subjective perceptions of the physical and social environment surrounding them [6]. The research also concludes that many perceptions on the social environment is made up of attitudes towards the community cohesion namely the level of influence that a neighbourhood had on the trust and support in the community [7].

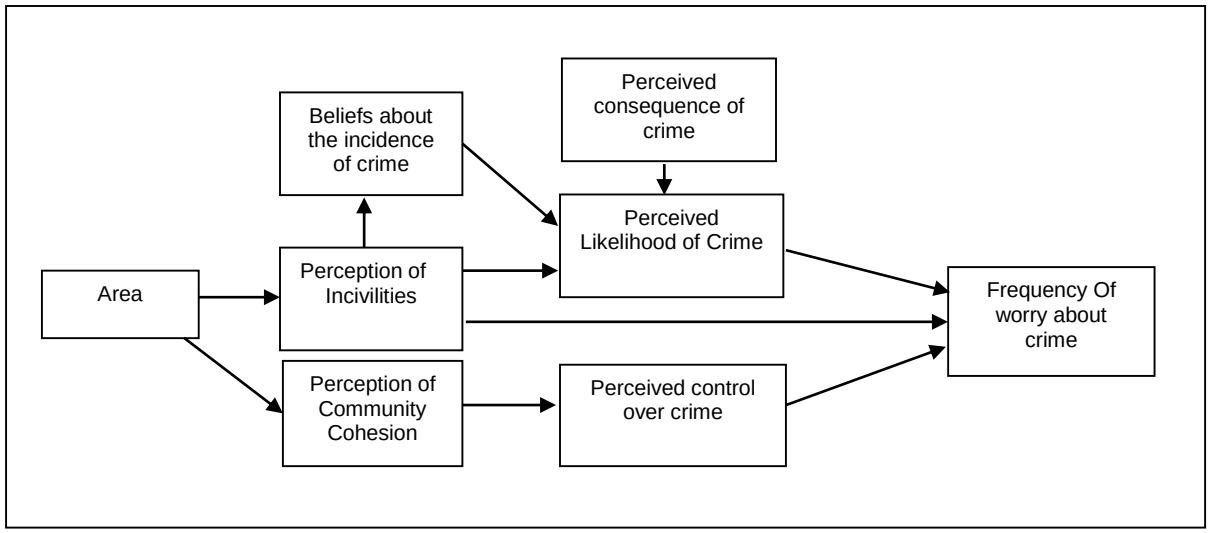


Figure 1 Structural model for the fear towards crime [6]

A study in 1970's had conceptualized social pattern as one of the distributions of a population among different group of social positions [8]. The study added that this had affected the interaction among people. Furthermore, this social structure is ingrained in the social choices people make in their social connection. The distinctions in social are expressed by ways of roles and positions, then on influencing social associations. This will then leads to the general public being divided into different several type of category. In a simplest term, it is known as social structure attribute. A social structure generally refers to how society being categorized into predictable relationships. Since most of the social structure theorists often view the economically disadvantaged groups as being more likely to commit certain crimes, a serious attention is then given to improve the social relationship amongst this group of the society and neighbourhood.

The above findings concur with that of the works of Blau and Blau [9] which relate a social structure with crime incidence. Their research had also found that there is a link between the social cohesion at the community level to rates of crime that happen. On the other hand, researchers had discovered that among the crucial factor explaining a high incidence of delinquency and crime in urban settings has been the loss of social buffers that normally exist in middle class neighbourhoods [10-12]. These incidences are made up of both the formal and informal networks of organizations which include religious groups, business group, and neighbourhood associations.

On the other hand, a research pointed out that crime incidence is not randomly distributed across the neighbourhood in the city area [13]. The research tries to highlight the fact that the incidence of criminal activities does not occur equally in all areas. Kubrin further added that for that purpose, resident living in the neighbourhood can clearly identify the "good" or "bad" area. Moreover, Kubrin discussion also drilled on the issue of the theory of social disorganization which highlight the factual of non-random crime distribution as a point of departure in explaining about the occurrence of crime in certain areas. This is important because occurrence of crime in a particular area of resident will affect the fear of crime among the travellers [14].

Thus, in this study, the theoretical framework constructed indicates that there are three independent variables (bus service, infrastructure and social structure) and three moderating variables (bus service*infrastructure, bus service*social structure, and infrastructure*socia structure) that might have an influence on the feeling of safety when travelling among women commuters (as shown in Figure 2).

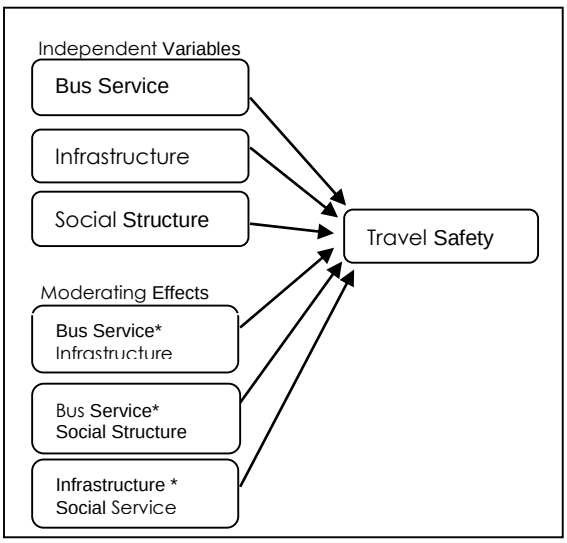


Figure 2 Theoretical Framework with moderating effect

3.0 METHODOLOGY

The research adopted a quantitative approach. This is due the fact that the quantitative approach allowed the researcher to search for truths on the observational issue based on the empirical evidence via the hypothesis method [8]. The research involves three direct independent variables and another three with moderating effect variables. Bus service, infrastructure and social structure cannot be measure directly. Therefore those constructs were measures by multiple indicators [15]. The research utilizes self-administered survey where quota sampling was used to determine the characteristics of women travelers. In this study, all samples were screen for (1) working women who depend on bus to commute to work and (2) women who live in an urban area and work in the city centre. The data were collected at several bus stops in Kuala Lumpur. A total of 312 respondents were interviewed during the survey. This samples size is considered adequate in conducting an analysis through a statistical analysis [16,17].

4.0 RESULTS

The first part of the framework will test the direct effect of the independent variable and the dependent variable (Eq. 1). The second part of the framework tries to look at the moderating effect of the independent variable towards the dependent variable (Eq. 2). In order to further understand the nature of the relationship, two regression analyses were carried out.

$$Y = a + B_1X_1 + B_2X_2 + B_3X_3 + \varepsilon \quad \text{(Eq. 1)}$$

$$Y = a + B_1X_1X_2 + B_2X_1X_3 + B_3X_2X_3 + \varepsilon \quad \text{(Eq. 2)}$$

where:

Y = travel safety
B_1, B_2, B_3 = regression coefficients
X_1 = Bus Service
X_2 = Infrastructure
X_3 = Social Structure
ε = error

3.1 Regression without Moderating Effect

$$Y = 132.150 - 0.173X_1 - 0.163X_2 - 0.74X_3 \quad \text{(Eq. 3)}$$

Equation 3 indicates that the dependent variable namely travel safety is negatively associated with the independent variables, namely bus service, infrastructure and social environment. This shows that the higher the dissatisfaction indication on the three variables namely bus service, infrastructure and social structure, the lower will be the travel safety indication among the bus commuters.

3.2 Regression with Moderating Variables

$$Y = 124.981 - 0.004X_1X_2 \quad \text{(Eq. 4)}$$

The regression equation in Eq. 4 indicates that the dependent variable namely travel safety is negatively associated with the moderating variable. Table 1 indicates the effect of each moderating variable towards the travel safety indication. The coefficient value of the three moderating variable involved namely bus service, and infrastructure had significantly affect the travel safety. The result from the two combination of moderating variables between bus*social, and infrastructure*social shows that there is no significant relationship between this moderating effect on women travel safety with the $p \geq 0.05$. This clearly shows that a combination of infrastructure and bus service is the most crucial part in every journey of women travellers.

Table 1 Coefficient Values for Regression Analysis (With Moderating Variables)

Coefficients[a]								
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**	**Collinearity Statistics**	
		B	**Std. Error**	**Beta**			**Tolerance**	**VIF**
1	(Constant)	124.981	.844		148.083	.000		
	Bus Service and Infrastructure	-.004	.001	-.374	-4.266	.000	.315	3.174
	Bus Service and Social Structure	-.002	.002	-.179	-1.344	.180	.136	7.376
	Infrastructure and Social	.000	.002	.022	.146	.884	.106	9.390

a. Dependent Variable: Travel safety

5.0 DISCUSSION

It is generally accepted that adequate, efficient and most importantly a safe public bus services are essential for most urban dwellers especially women commuters who live and work in urban area. However, it cannot be denied that providing these services contributes towards a conflict between the role of a government and the role of a personal operator. As developing countries like Malaysia strive to increase their level of services on public transport provision, safety issues seldom being put into top priority that had constitutes towards a higher feeling of 'unsafe' and 'fear of crime' to most women commuters. Designing a public transport supply that tailed to the need of men wage earners further contributed to the problem.

Table 2 Mean Analysis for Level of Fear Indication among Women Travelers

Measuring Indicator	Mean Score
While walking to and from the stop	4.01
While walking to my work place	4.09
When a street beggar approach me	4.43
While walking alone in this area after dark	4.76
While walking alone in this area during day time	4.36
When I have to wait too long at the bus stop	4.19
While waiting at the stop	4.09
While waiting at the stop during day time	4.17
While waiting at the current stop during night time	4.53
While waiting with homeless people around	4.42
By having someone loiter near my waiting place	4.54
When I have to travel in the vandalize bus	3.99
When I have to share seat with male counterpart	4.36
I am riding alone in the vehicle during off peak	4.49
I am riding alone during peak hour	4.44

*1-Strongly Disagree
5-Strongly Agree

This study discuss the theoretical and empirical evidence of women travelling safety issues while identifying factors that affect women level of safety from various point of view. The discussion would highlight the satisfaction level on the current supply of public transport especially buses. Thus from here the level of safety is being examine based on that satisfaction level. Furthermore the study also focus on the satisfaction level being indicated for the infrastructure provision and their level of safety and the last variable being include in the study is the current social structure that create the social environment while travelling. This is especially true for traveling point which normally took place at the residential area.

The following analysis determines the differences on the level of fear indication of women travellers while using the bus service for commuting to work purpose. To further understand the feeling of fear while travelling, the following conditions were given to create a travelling scenario for women travellers with a given statement "My fear towards crime increase...."

The results obtained from the analysis for the level of fear indication are shown in Table 2. This is a very important analysis in order to find an answer on how to reduce the fear while travelling with stage bus service into city centre for working purpose.

Most of the women who responded to this question had indicated that they were either 'strongly agree' or 'strongly disagree' with the statement given regarding their level of fear indication while travelling on the whole journey. It is obvious from the table that the most indication of fear was being spotted on the walking activities during night time with a mean score of 4.76. Second layer of fear indication were being highlight by having someone loiter near my waiting place. The overall means score result had indicated a higher level of fear was reported by women travellers while travelling from their home to their work place in the city centre.

Question like 'I feel Safe ...' was used to tap on the feeling of safety indication. The answer to this question is very important because it will help to determine on the strategy to be used to reduce the travel fear factor among the women travellers as indicate in the second objective. To be able to design a specific solution to the problem face by women travellers, the analysis on the actual feeling of safety among these riders must first be evaluated. The following analysis drilled out the frequency analysis among the bus riders on the feeling of safety at a given situation or condition while travelling.

Figures 3-5 illustrate the breakdown of feeling of safe accordingly from 'agree to strongly agree' according to situation given to them. It provides detailed analysis on the state of travelling condition experience by daily stage bus users. The result from the finding revealed that more than 76.6 % of the total respondent had indicated 'a strongly agree' that they feel safe walking with an ample lighting install on the street. This was followed by walking with a CCTV monitoring (74%), when no street beggar (53.8%) and walking in a guarded walkways (34.3%). Nevertheless the rest of the respondent had agree on the all the given attribute that make them feel safe while travelling with 65.7 % on guarded walkways being indicated as the highest. Overall indication of 'safe' by all age group had been obtained when the respondent were asked on 'safety while walking on a given situation'.

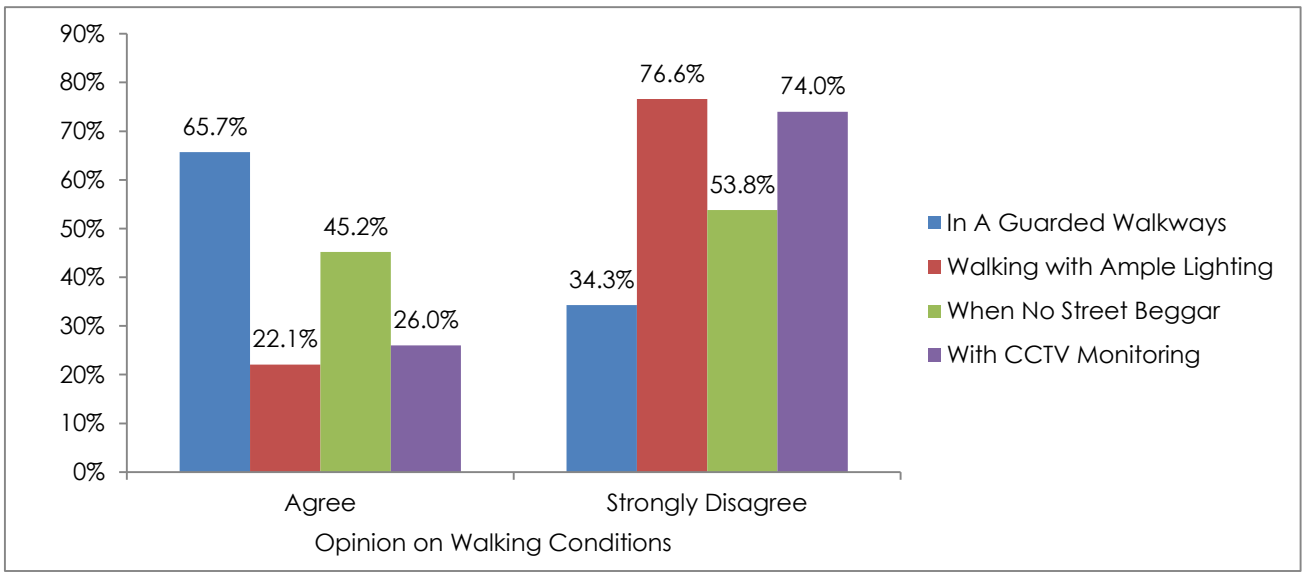


Figure 3 Feeling of Safety Indication While Walking

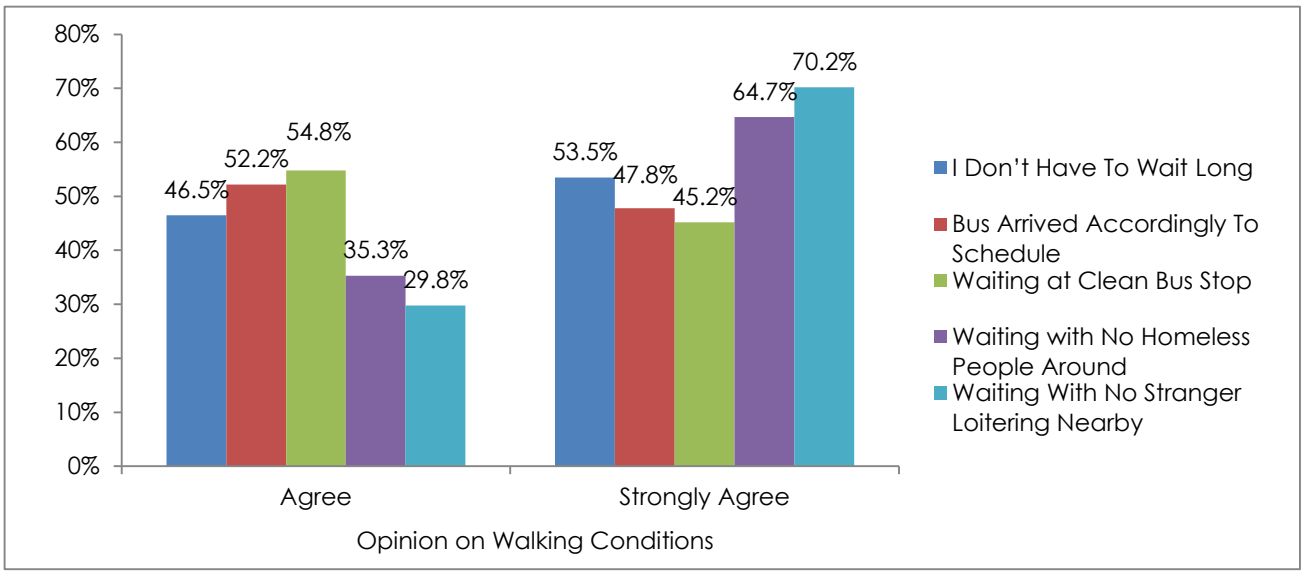


Figure 4 Feeling of Safety Indication While Waiting At the Stop

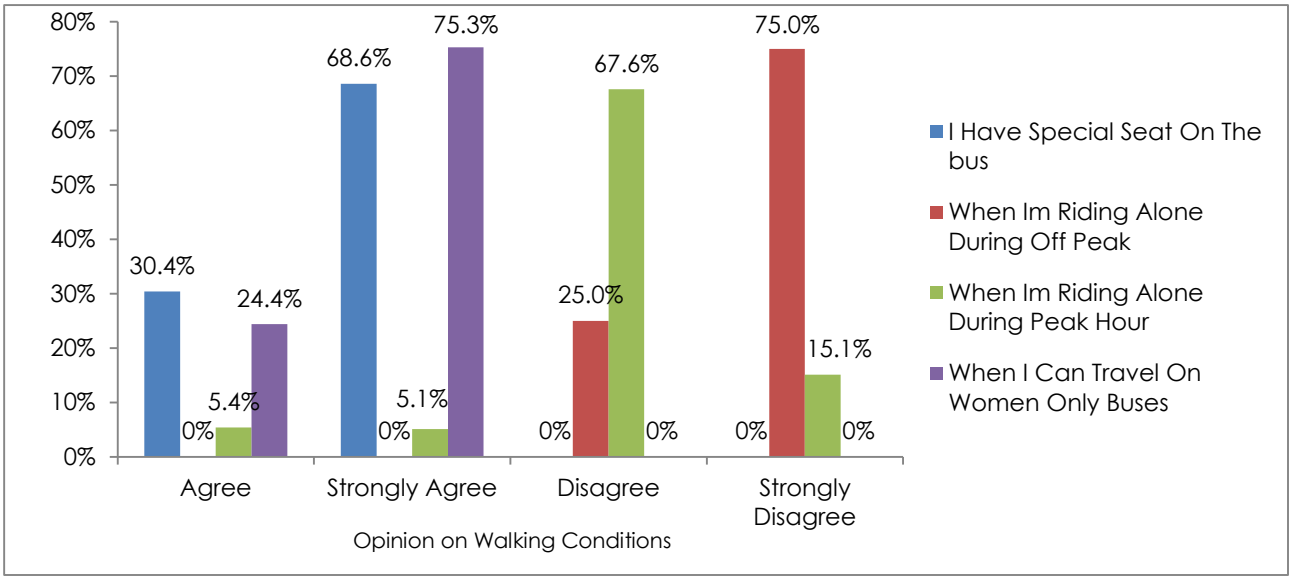


Figure 5 Feeling of Safety Indication while in the Vehicle

Having known the fact that while travelling by bus is concern, most women commuters had to depend on a set of travelling system which consist of the walking, waiting and being in the vehicle before they reach a final destination. Therefore a set of descriptive analysis of current state of waiting was also carried out in order to look at feeling of safety while waiting at the current stop. Around 70.2% of women travellers had indicated that they feel safe waiting at the stop when there is no strangers loitering nearby. This was then followed by feeling of safety indication while waiting with no homeless people around (64.7%).

Having the second last node of transport while travelling is to be in the vehicle, the feeling of safety at this stage is also important to tap. This is also a very important analysis in order to find an answer on how to reduce the feeling of fear among the women travellers who live and work in the urban area.

Most of the women who responded to this question had indicated that they were either 'agree or 'strongly agree' with the travelling condition given that makes them feel safe while travelling. What was interesting in this data was that the most strongly disagree statement were given to the condition where a women feel safe while riding alone during off peak hours (75%). This was followed by an indication disagree on the statement 'I feel safe when I am riding alone during peak hour'. Apart from that, around 75.3% of total response had indicated the highest level of safety indication when they can travel on women only buses.

6.0 CONCLUSION

In order to implement a successful and perceived-as-safe urban transportation system, a collaboration of all parties including the government (central and local), users and operators are much needed. Combination of all party would develop a more holistic service and infrastructure provision that would give a maximum satisfaction not only towards women travellers but also towards all users. Unless the government adopt the improvement on both the service and infrastructure, travelling safe will not be attained.

The main limitation faced in carrying out the research lies mostly on the statistics being obtained from the local government which is not updated accordingly. Adding to it, the available police report failed to specify the location characteristics and the activity of victims when crime happen leads towards the difficulties in getting the actual scenario of crime occurrence in urban centre. Moreover lack of research conducted in this area in Malaysian scenario has further created another limitation especially in terms of supporting evidence from previous research pertaining to the local environment in Malaysia especially on the issues of women as the main travellers.

This research has thrown up many questions in need of further investigation. For future research, a household survey should be conducted in order to achieve a more rigorous finding especially on both users and non-users of bus services in an urban area. Not only that, the inclusion of educational trip by most women living in urban area would also significantly improve the study. Considerably more work would need to be done to determine the impact of crime experience towards the travel behaviour of the household.

More research needs to be undertaken to provide a clear understanding of women's lives, their domestics and family responsibilities and their preferred work and leisure pattern particularly at local level. Ensuring the ways women use public places especially when a trip by bus is concerned is an important element to consider in order to produce a good planning practice because every transport services and infrastructure supply would affect women level of safety especially on the perception of personal security including concern for crime. In conclusion a normal 'one-size-fits-all' approach, cannot be used in any transport provision be it on the facilities or the service provision.

As awareness of the public transport needs of people with restricted mobility is increasing, further research on other group of users such as the safety of restricted mobility group which includes the elderly and disabled group would further add to the improvement of this research. The research would benefit the society as the demographic trends indicate that over the coming decades the number of people with restricted mobility would increase in line with the rises of elderly population.

It would be interesting to assess the effects of all forms of public transport with respect to safety issues. Therefore, future research should also be looking at all forms of public transport supply in Malaysia Major urban area.

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