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PERCEIVED NEIGHBORHOOD WALKABILITY AND WALKING FOR PARTICULAR PURPOSES AMONG MOTORCYCLISTS IN BANDUNG CITY, INDONESIA

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Abstract

This research was conducted to predict the effect of perceived walkability on walking behaviour among motorbike users in Bandung, for a specific purpose. The walkability factors tested are safety, security, and convenience. Meanwhile, the specific purpose when doing walking activities is walking for transport and walking for leisure. Binary logistic regression was used to analyse the effect of walkability on walking behaviour. From the results obtained, there is a difference in the effect of perceived walkability on the behaviour of walking for transport and walking for leisure. In addition, there are also differences in the effect of walkability on gender and age groups. The walkability factor that most influences the walking behaviour of people who usually use motorbikes is security and convenience. Although statistically, the effect of walkability is small on the walking behaviour of people who usually use motorbikes, the results are significant. These results show that walkability in the neighbourhood cannot be ignored.

Keywords: Convenience, Perceived Walkability, Safety, Security, Walking for leisure, Walking for transport.

1. Introduction

With the increasing awareness of the importance of physical activity, walkability has received attention in various research fields. The research objects also vary, there are walking behaviours based on age levels, both for children [1-4], adolescents [5-8], adults [9-12], and older adults [13-16]. The research focus for certain age groups gives clearer and more useful results because each age group has different activities and habits so that their walking behaviour is different.

From the research on walkability and walking, the cases for cities in Asia, including in Indonesia, are still limited. In a comparison of walking habits in 46 countries, it was found that Indonesians are the laziest for walking [17]. It takes comprehensive research to find out what factors are related to the laziness of Indonesians to walk. Looking at the trend, there is one fact that cannot be ignored, namely the high level of motorcycle ownership in Indonesia. As in Bandung City, in 2008, there were 443,239 units of motorbikes and ten years later it increased to 1,256,057 [18] which means it increased to 283%. This fact makes motorcycle users in Bandung interesting study their walking behaviour in relation to walkability.

Walking behaviour is closely related to the intention of carrying out the walking activity itself. Commonly, in research with a certain age group object, it is directly related to the intention of walking. For groups of children and adolescents, it is related to physical activity and active transport, both to school and leisure [1-8]. For the study of adults, walking meant more as active transport [9-12], while for the group of older adults, walking related-transport and walking related-leisure [13-16]. In addition, walking is also widely associated with health, both physical and mental health [19-21]. From these previous studies, it appears that there is still very limited research on the relationship between walkability and walking for various purposes, especially for the adult age group.

Based on previous studies, three things indicate a gap that needs to be filled with new research. First, there is still limited research on walkability and walking in Indonesia, especially those related to the intention of walking. Second, there is still limited research on walking behaviour for motorbike users. Meanwhile, for cities in Indonesia, motorbikes are the preferred mode, not only for travel within cities but also between cities. For relatively long distances, motorbikes are the main competitor for public transport, while for short distances it is possible to become a competitor for active transport. It is possible for short distances even if motorbike owners prefer to ride a motorbike rather than walk. The high ownership and use of motorbikes have made the group that has high access to riding a motorbike into a group that has different characteristics from other groups, including in terms of walking behaviour. Third, there are limited studies comparing walking behaviour for transport with walking behaviour for adults. Therefore, this study aims to understand how walkability affects the walking behaviour of people who have motorbikes and the license to drive them themselves. Is there any effect of walkability on walking behaviour? Is the effect of walkability on walking for transport the same as walking for leisure or is it different? Are there differences in the effect of walkability on walking for transport with walking for leisure in different groups, gender, and age groups?

The city of Bandung as one of the big cities in Indonesia with a high number of motorcycle ownership is used as the study location. Binary logistic regression was used to analyse the effect of walkability on walking, both for transport and for leisure.

2. Method

2.1. Participants and procedures

This cross-sectional study was conducted among adults who have access to a motorbike for various purposes, who reside in the city of Bandung. What is meant by having access by motorbike is as a driver, not as a passenger. In other words, participants were residents of Bandung City who had driver's licenses for motorbikes. Based on data from Bandung City in Numbers, in 2018 there were 1,256,057 motorbikes in Bandung City [18], more than 50% of the population.

Paper-based questionnaires were used to obtain data from participants. The survey was conducted during October and November 2018, which involved 10 surveyors. Given that the participants are from the adult group who must have worked, the surveyors came to the house of the prospective participants at the weekends. From the survey results, a total of 1349 questionnaires were collected and can be analysed.

2.2. Dependent variables

In transportation research, walking is studied as a non-motorized mode of transport, either as a single-mode to school [3, 4, 7, 8] or other places [9-12] and as an access/ egress mode for public transport [9, 22, 23]. For other scientific fields, walking is also intended for leisure [5, 13, 24, 25] as part of physical activity for physical and mental health [6, 14, 15]. Everything has to do with walkability.

Different built environment attributes have a relationship with different walking purposes, and the pattern is not the same between women and men [26]. In this study, there are two dependent variables, the first is walking for transport, and the second is walking for leisure. The following two questions are asked:

- Do you prefer to walk rather than riding a motorbike for short trips around your residence?
- Do you prefer to walk for leisure around your residence, rather than riding a motorbike?

There were only 2 responses to these questions that could be chosen by participants, namely 'Yes' or 'No'.

2.3. Independent variables

Participants felt about walkability was the independent variable. A complete tool for measuring perceived walkability is the Neighbourhood Environment Walkability Scale (NEWS) [27]. However, there are only three measures of perceived walkability used in this study, each of which is not detailed, so it is a total measure. The measures of walkability used are safety, security (safety from crime), and convenience. Safety is a representation of point G, which is neighbourhood safety in NEWS; security is safety from crime (point H), while convenience is what participants feel about the neighbourhood surrounding (point F). The question for perceived walkability is:

- Do you think your neighbourhood is walkable in terms of safety from traffic?
- Do you think your neighbourhood is walkable in terms of safety from crime?
- Do you think your neighbourhood is walkable in terms of convenience?

The response to the walkability measure in this study uses dichotomous data, according to the question, namely "Yes" or "No".

2.4. Individual covariates

Individual covariates include gender and age [6, 7, 9-13]. The participants' gender was transformed into a dichotomous variable, 1 for male and 2 for female. The participants' ages were transformed into a categorical variable with three levels: 1 for 20-34 years, 2 for 35-49 years, and 3 for 50-64 years.

2.5. The Alternative models

Based on the variables to be analysed, there are several alternative models to be tested. The models to be tested are:

$Y1 = f(X1, X2, X3)$, overall, for each gender, for each age group

$Y2 = f(X1, X2, X3)$, overall, for each gender, for each age group

where Y1 is the response to walking for transport, Y2 is the response to walking for leisure, X1 is the response to safety, X2 is the security response, X3 is the response to convenience, and gender is male/female, and the age group is 20-34/ 35-49/50-64 years. Thus, there are 12 models to be tested.

2.6. Statistical analysis

There are two statistical analyses that will be carried out. The first is descriptive statistics, and the second is binary logistic regression analysis. Descriptive statistical analysis was performed to summarize the information about the sample characteristics and the distribution. The goal of the binary logistic regression analysis is to model the dependence of a dichotomous response, both for walking for transport and walking for leisure, which can be factors. IBM SPSS Statistics 20 is used for all stages of statistical analysis.

3. Results and Discussion

With simple questions and response choices, the response rate reached 100 percent, with as many as 1349 participants. About 59 (58.86) percent chose walking for transport mode and about 41 (41.14) percent chose other modes. About 64 (64.27) percent chose walking for leisure and about 36 (35.73) percent chose other. About 45 (45.29) percent rated good for safety and 55 (54.71) rated not good. About 45 (45.14) percent rated good for security and 55 (54.86) rated not good. About 57 (57.38) percent rated good for convenience and 43 (42.62) rated not good. About 64 (63.68) percent were male and about 36 (36.32) percent were female. About 31 (31.43) percent were aged 20-34 years, about 44 (44.26) percent were aged 35-49 years, and about 24 (24.31) percent were aged 50-64 years. Details is shown in Table 1.

The answer "Yes" for walking for transport or walking for leisure is coded as "1", so the answer "Yes" becomes a reference or effect of the cause. Because here is the perceived, three factors of walkability, which are hypothesized to cause the effect of walking for transport or leisure. "Yes" for the response to safety, security, and convenience (code 1) was the reason participants said "Yes" walking for transport/ leisure, which was also given code 1.

After the initial stage of testing is carried out, the three independent variables can be tested. From the results of the binary logistic regression analysis, the three independent variables tested together gave the best results on the model for the overall data and male group. Meanwhile, for the other groups, the best model is to include the variables "security" and "convenience", except for the group 35-49 years, the best model is only when adhered to by "safety" only. The results of the analysis can be seen in Table 2, with the largest Cox & Snell R Square (%) values marked in bold. In this table, it can also be seen that the best model for walking for leisure, both for overall data, groups by gender, groups by age, all show that only "security" and "convenience" have an effect. "Safety" does not affect walking for leisure.

Table 1. Frequency and percentage of data (N=1349).

	Frequencies	Percentages (%)
Gender		
Male	859	63.68
Female	490	36.32
Age group		
20-34	424	31.43
35-49	597	44.26
50-64	328	24.31
Walking for transport		
Yes	794	58.86
No	555	41.14
Walking for leisure		
Yes	867	64.27
No	482	35.73
Walkability - Safety		
Yes	611	45.29
No	738	54.71
Walkability - Security		
Yes	609	45.14
No	740	54.86
Walkability - Convenience		
Yes	774	57.38
No	575	42.62

All Cox & Snell R Square (%) values obtained are less than 20%. Among the best models for all groups, the largest Cox & Snell R Square score is 14.8%, which is the value of the effect of "security" and "convenience" on walking for leisure for the group of women. The effect of "security" and "convenience" was also greater than that of other models (14.6%) on walking for transport for the 20-34 year age group. This means that in these models, the effect of walkability (security and convenience) is 14.8% affecting the female group explaining walking for leisure, and 14.6% affecting the 20-34 years group explaining walking for transport. In other words, other factors outside the model that explains walking for leisure in the female group are 85.2% and other factors outside the model that explains walking for transport in the 20-34 years group are 85.4%. For other models, the influence of other factors is much greater on the dependent variable than the walkability factors tested in the model.

Table 2. Value of Cox & Snell R Square (%).

	Saf (X1)	Sec (X2)	Con (X3)	Saf, Sec (X1, X2)	Saf, Con (X1, X3)	Sec, Con (X2, X3)	Saf, Sec, Con (X1, X2, X3)
Walking for transport (Y1)							
Overall	7.3	6.3	7.3	8.6	9.8	9.7	**10.6**
Male	7	5.4	5.5	8	8.5	7.9	**9.1**
Female	7.9	8	11.3	10.1	12.9	**13.6**	No sig. for Saf
20-34	3.8	8.6	11.6	No sig. for Saf	No sig. for Saf	**14.6**	No sig. for Saf
35-49	**10.2**	5.1	5.8	No sig. for Sec	No sig. for Con	7.7	No sig. for Sec & Con
50-64	7.1	5.2	4.7	No sig. for Sec	No sig. for Con	**7.2**	No sig. for Sec & Con
Walking for leisure (Y2)							
Overall	5.3	6.8	7.3	7.7	8.5	**10**	No sig. for Saf
Male	4.4	5.2	5.5	6.2	6.7	**7.8**	No sig. for Saf
Female	7.1	10	11.2	11	12.4	**14.8**	No sig. for Saf
20-34	5.5	7.1	7.7	No sig. for Saf	9.1	**10.6**	No sig. for Saf
35-49	7	7.9	6.9	9.7	9.2	**10.5**	No sig. for Saf
50-64	2.7	4.7	7	No sig. for Saf	No sig. for Saf	**8.6**	No sig. for Saf & Sec

The best models produced for each group are as follows:

Walking for transport

- Overall

  Ln P/1-P = -0.359 + 0.462 Safety + 0.426 Security + 0.604 Convenience

- Male

  Ln P/1-P = -0.249 + 0.543 Safety + 0.377 Security + 0.457 Convenience

- Female

  Ln P/1-P = -0.547 + 0.649 Security + 0.979 Convenience

- 20-34 years

  Ln P/1-P = -0.607 + 0.721 Security + 0.992 Convenience

- 35-49 years

  Ln P/1-P = -0.116 + 1.119 Safety

- 50-64 years

  Ln P/1-P = -0.108 + 0.627 Security + 0.572 Convenience

Walking for leisure

- Overall

  Ln P/1-P = -0.099 + 0.695 Security + 0.734 Convenience

- Male

  Ln P/1-P = 0.060 + 0.624 Security + 0.637 Convenience

- Female

  Ln P/1-P = -0.395 + 0.820 Security + 0.922 Convenience

- 20-34 years

  Ln P/1-P = -0.235 + 0.702 Security + 0.760 Convenience

- 35-49 years

  Ln P/1-P = -0.009 + 0.817 Security + 0.667 Convenience

- 50-64 years

  Ln P/1-P = -0.081 + 0.518 Security + 0.805 Convenience

In accordance with previous studies [1-16], walkability affects walking behaviour, both for transport and for leisure. Although the effect was not very large, the results were significant. For people who usually ride motorbikes for various purposes, the results obtained show that their walking habits are more influenced by other factors than safety, security, and convenience of walkability in the neighbourhood. These results may not prove or disprove the results of the study, which states that Indonesians are lazy to walk [17], but again it proves that walkability affects walking behaviour.

From the walkability factors tested, it seems that people who usually use motorbikes do not really care about safety (security from traffic) when they walk. Only in the age group of 35-49 years does the safety factor have the most influence.

4. Conclusion

Several walkability factors in the neighbourhood were tested for their effect on the walking behaviour of people who usually use motorbikes for certain purposes, namely walking for transport and walking for leisure. Safety, security, and convenience affect walking behaviour among motorbike users. Meanwhile, the effect is different in walking for transport and walking for leisure. The effect also differs in different groups, men and women, as well as 20-34 years, 35-49 years, and 50-64 years.

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