Impact of Playing at Traffic Park on Traffic Safety Education among Elementary School Children: a Case Study in Toyohashi

Toyohashi University of Technology, Student Member, Noudsaka Yimmavong
Toyohashi University of Technology, JSCE Member, Kojiro Matsuo
National Institute of Technology, Kagawa College, Kosuke Miyazaki
Toyohashi University of Technology, JSCE Member, Nao Sugiki

1. Introduction

A traffic park is a park in which children or visitors not only play and amuse themselves but at the same time learn traffic knowledge and traffic rules by playing with traffic lights, pedestrian crossings, road signs, etc[1]. In Japan, most of the pedestrian traffic accidents occur among 7-year-old children[2], that is, before and short time after entering elementary school, because around this age, their traffic safety sense is not sufficient while their walking opportunities increase, which increases the risk of road accidents. Through traffic parks, children around the age get a chance to learn by performing many new traffic safety activities which otherwise they would not have done anywhere else. However, there have been no studies that analyze the traffic safety impact of traffic park. Therefore, this study, as a case study in Toyohashi, aims to evaluate the impact of playing at traffic park on traffic safety education among children by critically analyzing and comparing the frequency of children using traffic parks and the effects on children's road safety sense especially in terms of "rule awareness" and "actual behavior".

2. Methodology

Although there are many methods for research data collection such as observation, survey, interviews, and focus group discussions, for this research best suitable and most effective method of web-based questionnaire survey (Google Form) was used. A questionnaire survey was distributed to two target schools in Toyohashi city: Mukaiyama elementary school and Shinkawa elementary school, which are near to Toyohashi Mukaiyama traffic park. Children are asked to answer with the help of their guardians. The contents of the questionaire survey consisted of school grade, gender, and questions of the 10 items of traffic rules shown in **Table 1**, with each question having two sub-questions surveying for "rule awareness" and "actual behavior". Parents were then enquired about the frequency of their children using the traffic park before and after enrollment in elementary school along with their purpose of use and opinion. The total respondents from both schools were 359 students with the response ratio being 54.6%. The data obtained from the questionnaire survey were then aggregated and analyzed to understand the basic attributes of children's awareness and actual behavior on traffic safety rules. To further understand the main possible factors affecting the traffic safety awareness and behavior of children, multiple regression analyses were carried out.

Table 1 Items of traffic rules in the survey

Q1. Using pedestrian crossing when crossing the road
Q2. Running to cross pedestrian crossing when in hurry
Q3. Riding a bicycle on the left side of the road
Q4. Riding a bicycle side by side with family or friends
Q5. Riding a bicycle with two people
Q6. Riding a bicycle to pass across when the traffic light turns yellow
Q7. Crossing in two steps when turning right at an "intersection with a traffic light"
Q8. Stop where there is a "stop" mark when riding a bicycle
Q9. Stop while riding a bicycle if there is someone trying to cross the pedestrian crossing
Q10. Crossing the railroad crossing while riding a bicycle

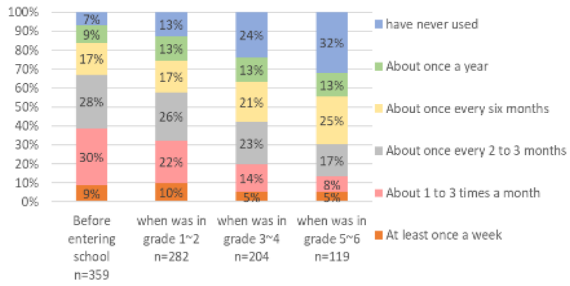

Fig.1 Frequency of children using the traffic park

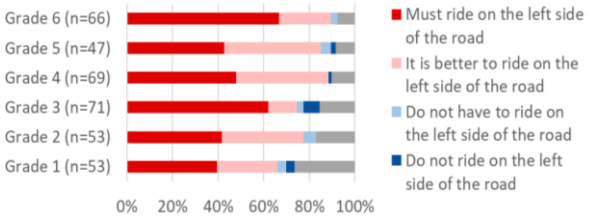

Fig.2 Awareness based on school grades (Q3)

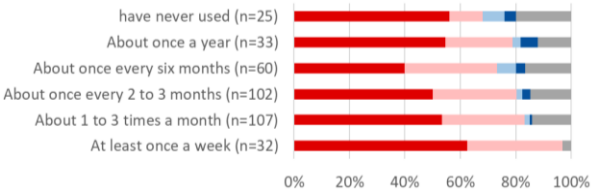

Fig.3 Awareness based on frequency of children using traffic park before enrollment (Q3)

3. Results of analyses

3.1 Basic data aggregation and analyses

Fig.1 shows the frequency of children using traffic park by school grades, indicating that children play at the traffic park most often before they enter elementary schools, and the frequency decreases as their grade goes up.

Next, looking at the case of Q3 (Awareness: Should you ride on the left side of the road when riding a bicycle?; Behavior: When you ride a bicycle, do you ride on the left side of the road?), **Fig.2** shows that younger students of low-grade classes are not aware of this traffic rule while elder students are more aware. On the other hand, **Fig.3** indicates that students who use the traffic

park more often, the majority are more aware of this traffic safety rule. **Fig.4** shows that elder children often do not perform according to this rule since higher school grade children had more answers of ”not often ride on the left side of the road”. Moreover, **Fig.5** indicates that traffic park may have no clear impact on their actual behavior for this traffic rule, since the proportion answers **“**not often ride on the left side of the road**”** not decreases as the frequency of use of traffic park increases.

3.2 Multiple regression analyses

In this study, “answer to each Question” were categorized into positive answers (=1) and negative answers (=0) as the dependent variable. In the case of Q3, for awareness the answers “Must …” and “It is better …” were in the positive, and the others were in the negative; and for behavior the answers “Always …” and “Often …” were in the positive, and the others were in the negative, respectively. We also used the frequency of using traffic park before entering elementary school (dummy), School grade (continuous), and elementary school dummy as the independent variables. **Table 2** shows that the variables: the frequency of use of traffic park “at least once a week”, “about 1 to 3 times a month”, “about once every 2 to 3 months” and school year (grade) were statistically significant with 90% confidence level. **Fig.6** shows the values of coefficients of the significant variables, indicating that students who use traffic park at least once a week had more awareness of riding a bicycle on the left side of the road than those who have never used traffic park by 0.287, which had more influence than a factor “school grade” about 7 times. **Fig.7** shows items of traffic safety rules asked in this study by whether the frequency of traffic park usage affected or unaffected children’s awareness as well as behavior. In the case of Q8, Q9, and Q10, most of parameter values of predictor variables that are associated with usage frequency of Traffic Park was positive values and their P-values were significant, which indicate that children’s both of awareness and their actual behavior are affected. Additionally, there are Q1, Q3 and Q4 which the Predictor variables of usage frequency of traffic park is significant only in term of awareness. Besides that, there is no significant predictor variable on Q2, Q5, Q6, Q7.

4. Conclusion

From the results of the questionnaires survey analyzed by the basic data aggregation and the multiple regression model, we can say that playing at traffic park affects the children's awareness and behavior regarding traffic safety rules. By using the traffic park, elementary school children are more aware of traffic safety rule. Therefore, traffic parks are valuable on traffic safety education for children to learn traffic knowledge. In this study, we only analyzed based on the frequency of traffic park before they enroll in elementary school. We will analyze by using data of usage frequency of traffic park after they enter elementary school, but at that time “Structural equation modeling” will be used to consider more complicated structures.

REFERENCES

1) Atsushi Kaneko, Thesis “交通戦争の残影交通公園の誕生と普及をめぐって”, Shizuoka university lifelong learning education and research, No10, 2008
2) ITADA INFORMATION, Traffic accident analysis report, No.116

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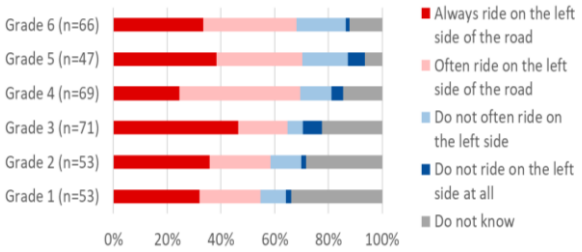

Fig.4 Behavior based on school grades (Q3)

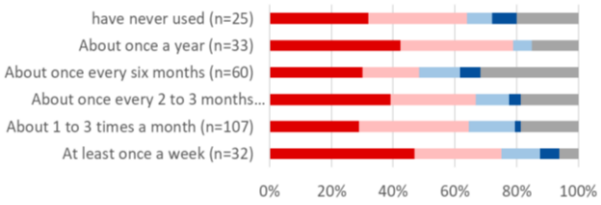

Fig.5 Behavior based on frequency of children using traffic park before enrollment (Q3)

Table 2 Result for multiple linear regression analysis on Q3 (awareness)

	Coefficients	P-value
Intercept	0.508	0.000
About once a year	0.125	0.227
About once every six months	0.067	0.474
About once every 2 to 3 months	0.147	0.098
About 1 to 3 times a month	0.164	0.068
At least once a week	0.287	0.009
school year	0.042	0.001
elementary school	0.033	0.495

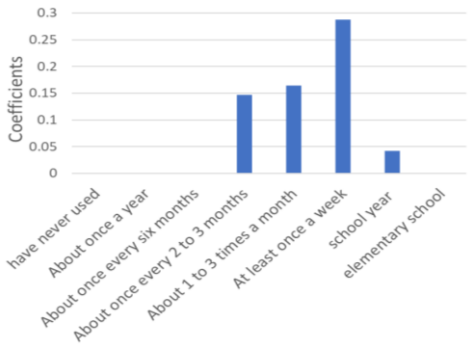

Fig.6 Values of coefficients from the multiple regression analysis on Q3 (awareness)

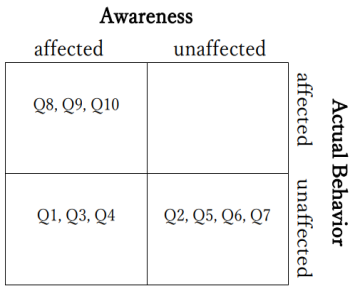

Fig.7 Items of traffic safety rule affected or unaffected by the frequency of using traffic park