

CHILDREN’S INDEPENDENT MOBILITY FOCUSING ON DIFFERENCES BY DISTRICT CHARACTERISTICS IN TOYOHASHI CITY

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1. Introduction

Children’s Independent Mobility (CIM) was defined as the opportunity for children to move freely in the neighborhood without an accompanying adult, which was introduced by Hilman et al¹⁾. CIM is considered as an important factor in children's physical, social, and emotional development. Although CIM has been the subject of several studies, it has not been studied focusing on different modes of transportation.

The purpose of this research is to analyze elementary school (ES) children’s walking and cycling patterns allowed by parents or guardians and children’s state of being allowed to use public transportation, focusing on the distinction between areas with different types of urbanization in Toyohashi city.

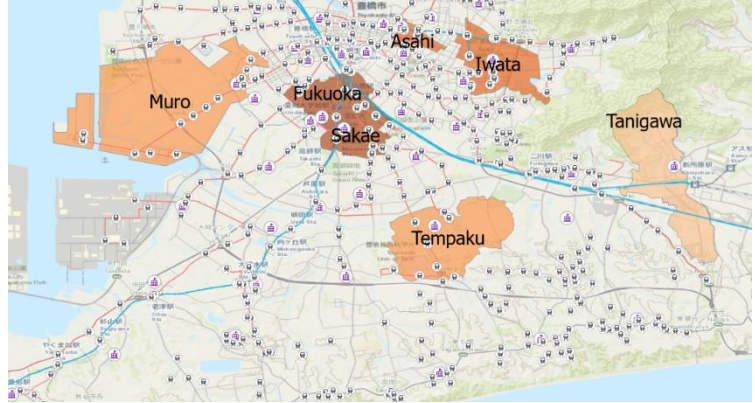


Figure 1 Map of target school areas

2. Methodology

The survey was conducted in a web-based questionnaire at seven schools (Sakae, Fukuoka, Iwata, Asahi, Tempaku, Muro, Tanigawa ES). The reason these seven schools were chosen is due to the accessibility to the usage of different types of public transportation such as train, bus, and tram as well as their population density (Table 1). The guardians are asked to answer their opinion on the range of distance allowed for children to walk and cycle alone and the types of public transportation allowed for children to use alone. The total respondents from these schools were 1101 guardians with the respond ratio being 39%.

Table 1 Population density and public transportation within school areas

Elementary School	Population Density	Public Transportation Access
Sakae	6454	train & bus
Fukuoka	6435	
Iwata	5154	tram
Asahi	5824	
Tempaku	985	bus
Muro	1170	
Tanigawa	340	none

3. Results

a. Range of Distance Allowed for Children to Walk and Cycle Alone

Figure 2 shows the result for children’s average distance allowed to walk alone by their school and grade. The result indicates that as grade increases the range of distance increases. For children from grade 1, the range of distance has almost no difference compared to each of the schools. However, for children in grade 6, there has a fine distinction in the range of distance. Asahi ES children are allowed up to 900m, yet Tanigawa ES children are allowed to walk for around 500m in grade 6. Overall, comparing the target schools there have no major differences between schools and the range of distance allowed to walk alone. A similar result appeared in children cycling alone.

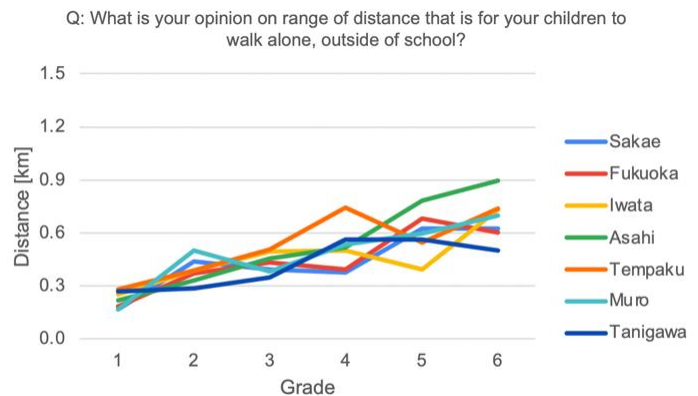


Figure 2 Average range of distance allowed to walk alone

b. Public Transportation Allowed for Children to Use Alone

Figure 3 shows the result for the rate of guardians’ response on each mode of public transportation allowed for children to use alone. Sakae ES and Fukuoka ES children are most likely to use the train and bus alone compared to the other schools, whereas Iwata ES and Asahi ES children are more likely to use tram alone. The “none” section also shows the rate of guardians’ responses to children who are not allowed to use public transportation. The result indicates that Tempaku ES, Muro ES, and Tanigawa ES children are less likely to be allowed to use public transportation alone. Therefore, it can be said that CIM for public transportation

usage increases when there are corresponding public transportation modes within the school areas.

c. Statistical Model Analysis on Range of Distance Allowed for Walking and Cycling Alone

Table 2 shows the result of multiple linear regression analysis when the range of distance allowed for walking alone is the objective variable. In this analysis, children’s schools were categorized into two different groups by their population density, urban area school and rural area school. We are considering Sakae ES, Fukuoka ES, Iwata ES, and Asahi ES as an urban area school whereas Tempaku ES, Muro ES and Tanigawa ES as a rural area school. The p-value for independent variables: grades and opinion on traffic safety are less than 0.1 which shows that these independent variables have a significant relationship with the distance. But the school variable is not statistically significant to the distance. A similar result appeared on the range of distance allowed to cycle alone. Besides, the gender variable is not significant to the range of distance allowed for walk alone although the range of distance allowed for cycle alone is statistically significant. Therefore, it cannot be said from this results that different types of elementary school areas affect CIM to walk and cycle alone.

d. Statistical Model Analysis on Rate of Guardians Allowing to Use Public Transportation Alone

Table 3 shows the result of logistic regression analysis to identify the rate of guardians allowing to use public transportation alone for children, including train, tram, and bus. In this analysis, children’s school variable categorized into four groups. It shows that children in higher school grades, lower level of guardians worry on traffic and crime safety, and higher level of guardians’ opinion of being watched over by people around (besides train) leads to a higher level of CIM of using different types of public transportation alone. Children who use public transportation with their guardians frequently are more allowed to use train and tram to use alone. In addition, only children whose guardians use bus frequently are more allowed to use bus alone. We can understand that Sakae ES and Fukuoka ES children are more allowed to use train and bus than Iwata ES and Asahi ES children. Tanigawa ES children are also more allowed to use train alone than Iwata ES and Asahi ES. This might be the indication that even if there has no station within the school area

Tanigawa ES students are familiar with the nearest station, Shinjohara Station. From Tram section, we can see that Iwata ES and Asahi ES students are more allowed to use tram than the other schools. However, Tempaku ES and Muro ES have a lower rate of being allowed to use tram than Sakae ES and Fukuoka ES due to their lack of accessibility to train and tram. This indicates that Sakae ES and Fukuoka ES have highly allowed to use tram because they are more familiar with the train, leading them to have a higher allowing rate also for tram than Tempaku ES and Muro ES.

4. Conclusion

In conclusion, target schools’ population density situation has no influence on CIM among boys and girls for walking or cycling alone. However, the target school district does affect CIM to use public transportation alone because children are more familiar with using their assigned public transportation. Even there has lack of accessibility to tram such as Sakae ES, they are still encouraged to use tram because Sakae ES children are familiar with train.

References

1) Mayer Hilman, John Whitelegg, John Adams, One False Move ... A Study of Children’s Independent Mobility, London: Policy Study Institute, 1990.

Acknowledgement

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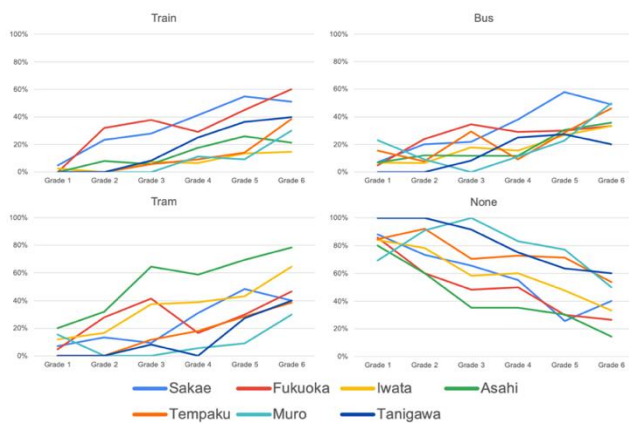


Figure 3 Rates of guardians allowing to use public transportation alone

Table 2 Result for Multiple Linear Regression Analysis on Range of Distance Allowed for Walking and Cycling Alone (adjusted R²=0.24)

	Walking		Cycling	
	Coefficients	P value	Coefficients	P value
Intercept	-0.14	0.10	-0.35	<0.01
School (urban=1)	0.07	0.11	0.04	0.54
Gender (boy=1)	0.05	0.18	0.12	0.02
Elementary Grade 2	0.20	<0.01	0.15	0.04
Elementary Grade 3	0.34	<0.01	0.40	<0.01
Elementary Grade 4	0.40	<0.01	0.58	<0.01
Elementary Grade 5	0.56	<0.01	0.93	<0.01
Elementary Grade 6	0.88	<0.01	1.34	<0.01
Watch Over by People Around	-0.02	0.58	-0.05	0.23
Traffic & Crime Safety	0.19	<0.01	0.30	<0.01

Table 3 Logistic Analysis on Rate of Guardians Allowing to Use Public Transportation Alone (adjusted ρ²=0.26, 0.20, 0.13)

	Train		Tram		Bus	
	Coefficients	P value	Coefficients	P value	Coefficients	P value
Intercept	-6.57	<2e-16	-3.92	<2e-16	-4.24	<2e-16
Elementary Grade 2	1.60	0.01	0.65	0.05	0.39	0.27
Elementary Grade 3	2.17	<0.01	1.51	<0.01	1.04	<0.01
Elementary Grade 4	2.41	<0.01	1.45	<0.01	0.97	<0.01
Elementary Grade 5	2.94	<0.01	1.96	<0.01	1.63	<0.01
Elementary Grade 6	3.14	<0.01	2.48	<0.01	1.83	<0.01
Gender (girl=1)	-0.58	<0.01	-0.56	<0.01	-0.42	0.01
School (Sakae, Fukuoka)*	1.91	<2e-16	-0.78	<0.01	0.80	<0.01
School (Tempaku, Muro)*	0.32	0.33	-1.63	<0.01	0.34	0.16
School (Tanigawa)*	1.04	0.02	-1.81	<0.01	-0.25	0.58
Watch Over by People Around	0.12	0.45	0.50	<0.01	0.30	0.03
Traffic & Crime Safety	0.88	<0.01	0.72	<0.01	0.60	<0.01
Frequency of children using public transportation with guardians (More than once per month = 1)	0.76	0.07	0.83	0.02	0.02	0.96
Frequency of guardians' usage of public transportation (Public Transportation=1)	0.43	0.13	-0.16	0.65	0.96	0.01

*school (Iwata, Asahi)