PLANNING MALAYSIA:
Journal of the Malaysian Institute of Planners
VOLUME 23 ISSUE 2 (2025), Page 495 – 507

PERCEPTIONS OF SAFETY AMONG ELEMENTARY SCHOOL CHILDREN AND ITS SURROUNDINGS DURING SCHOOL COMMUTES: CASE STUDY FUKUOKA, JAPAN

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Abstract

This study looks at how elementary school students in Fukuoka, Japan, perceive the safety of their commutes. It employs a mixed-methods approach, integrating observational research of school routes with quantitative questionnaires. 165 kids between the ages of 6 and 12 participated in surveys to gauge how safe they thought they were. Real-time insights into environmental risks, such as sidewalk conditions, traffic patterns, and safety infrastructure, were made possible by observational data. Traffic accidents, strange people, and dimly lit streets are the main issues cited; there are also higher risks on the trip home, especially in dim alleys. The existence of "few people" was another common worry. The results underscore the necessity of safer school routes and the significance of cooperation between transportation authorities, educators, and legislators. The report emphasises the need for better illumination, monitoring, and community engagement to improve kids' commute safety and provide a safer environment for school transportation.

Keywords: Fukuoka, Children, Safety, Walkability, Community

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INTRODUCTION

Previous studies have highlighted a positive correlation between active school travel and various neighbourhood characteristics, including physical and social environments, safety, walkability, and social interactions (Ikeda et al., 2018; Martin et al., 2021). While much research has focused on traffic safety, fewer studies have addressed concerns related to criminal activities or potential risks posed by strangers (Bendak, S., 2005; Valentine, G., 1997; Pain, R., 2006). For example, Harumain et al. (2022) explored how the built environment influences mothers' perceptions of their children's independence in walking to school, while Ibrahim et al. (2024) examined broader patterns of children's independent mobility in Malaysia, revealing how environmental and social factors shape commuting behaviours. These findings underscore the need for safe, walkable, and socially interactive neighbourhoods to promote active school travel. This study focuses on a city in Japan where a Japanese school children's perceptions on safety when commuting to school are examined based on the current perception of children in a safe country like Japan.

The study was conducted in Fukuoka, Japan, and it is observed that the school personnel and community volunteers commonly monitor road crossings in areas with high vehicular activity to ensure children's safety. A higher proportion of mothers remaining at home compared to other affluent nations has historically facilitated direct returns from school to home. However, this trend has shifted over the past two decades, with more women entering the workforce, resulting in diversified arrival times and fewer community volunteers overseeing children's commutes. Despite Japan's global reputation for high rates of active school travel, there is limited research on the school travel patterns of Japanese children (Mori et al., 2012), including disparities in transportation modes between journeys to and from school (Trapp et al., 2011; Waygood & Taniguchi, 2020). This study investigates the correlations between neighbourhood-built environments, safety conditions, and social factors, and their influence on school travel among elementary schoolchildren in Fukuoka City, Japan. By examining the walkability of school routes and the perceptions of children regarding unsafe factors, the study contributes to the growing body of research on the interplay between urban environments and children's mobility (Hino et al., 2021; Fallah Zavareh et al., 2023). The case study explores the influence of pedestrian infrastructure, safety measures, and urban planning on shaping school commutes. It also investigates the perceptions of elementary schoolchildren in Fukuoka regarding unsafe factors encountered during their journeys to and from school – an aspect critical to their overall welfare. By analysing the relationship between the urban physical environment and children's walking experiences, the study highlights the importance of fostering collaboration among communities, educational establishments, and urban planners. Such partnerships are vital for

developing pedestrian-oriented school routes that prioritise safety and promote active, sustainable transportation for children. Ultimately, this research underscores the need to create pedestrian-friendly environments that support the well-being and security of young commuters.

LITERATURE REVIEW

The concept of walkability, particularly in relation to school routes, has become a focal point in urban planning. Promoting walking to school not only encourages physical activity but also alleviates traffic congestion and reduces environmental pollution. This literature review examines the walkability of school routes in Japan, exploring the factors that influence it, the benefits of walking to school, and insights drawn from Japanese practices. Numerous studies in Japan and internationally demonstrate the multifaceted nature of walkability. Mori et al. (2012) highlights the significance of safety initiatives and local characteristics in promoting walking to school, while Barati et al. (2021) underscores the influence of built environment features, socio-economic factors, and parental concerns at the route level. Similarly, Su et al. (2013) identifies key determinants such as proximity between home and school, age, traffic density, land use mix, and school-specific characteristics. These findings underscore the importance of implementing tailored interventions – such as safety measures, land use changes, and infrastructure improvements – to improve the walkability of school routes.

Factors Influencing Walkability

Walking rates are positively associated with proximity to school, older age, and living in neighbourhoods with lower traffic density (Su et al., 2013). Cole et al. (2007) observed that parents who walked for at least 10 minutes during the school journey were more likely to live within two kilometres of the school, have only one car, lack a driver's licence, and send their children to government schools. Su et.al (2013) further noted higher walking rates among children from families enrolled in government subsidy programs and found that schools located within residential neighbourhoods encouraged walking. Conversely, a greater land use mix in surrounding neighbourhoods was associated with lower walking rates, suggesting that updating street designs could better promote walking to school. Additional factors influencing walking rates include physical activity levels, safety concerns, traffic conditions, parking convenience, children's preferences, age and road sense (Cole et al., 2007). Consistent correlates of walking to and from school also include route safety and family time constraints (Trapp et. al, 2011). Walkability to school – the ease and safety with which children can walk to and from their schools – is critical for encouraging physical activity among children (Lee et al., 2022). Key factors include proximity to residential areas, pedestrian infrastructure, and environmental conditions, all of which significantly

influence children's ability and willingness to walk. Schools located within walking distance of homes reduce reliance on motorised transportation, making walking a feasible option. Safe and well-maintained infrastructure, such as sidewalks and crosswalks, is essential for ensuring children's safety, instilling confidence in students and parents, and promoting walking as a mode of transport. Environmental factors, including air quality, traffic congestion, and natural surroundings, also shape walkability. For instance, busy roads and poor air quality discourage walking due to safety and health concerns, whereas green spaces, parks, and tree-lined streets create more appealing walking environments. Furthermore, walkability factors may differ by gender, with boys and girls influenced by distinct challenges (Trapp et al., 2011). Addressing these barriers requires comprehensive urban planning strategies that prioritise safe, healthy, and attractive walking environments for schoolchildren, emphasising the importance of proximity, pedestrian safety, and environmental quality.

Socio-cultural factors also significantly affect walkability. Parental concerns about traffic hazards and stranger danger often determine whether children are allowed to walk independently. Social norms that view walking as a healthy and sustainable mode of transport can foster a culture of walking among families. Community-led initiatives, such as walking school buses and pedestrian advocacy groups, are instrumental in promoting walkability by raising awareness, advocating for safer infrastructure, and fostering community cohesion around active transportation. Addressing these multifaceted factors is crucial for developing walkable school environments that promote physical activity, safety, and overall well-being among schoolchildren. Understanding the diverse influences on walkability is vital for crafting effective interventions and policies that encourage active transportation among school-aged children. Further exploration of the interplay between environmental, social, and cultural factors will aid in designing supportive environments that prioritise the health, safety, and mobility of young individuals.

Benefits of Walking to School

Walking to school provides numerous benefits to individuals and communities alike. From a public health perspective, regular physical activity improves cardiovascular health, reduces the risk of obesity, and enhances mental well-being among school-aged children. Walking also fosters independence and social interaction, allowing children to develop essential life skills and form meaningful relationships with peers. Furthermore, encouraging walking to school supports sustainability goals by reducing carbon emissions and fostering community cohesion. Despite these advantages, concerns about traffic safety, risks posed by strangers, and unsafe environmental conditions deter many families from promoting walking as a viable commuting option. This research addresses these

safety concerns by examining children's perceptions of commuting risks, providing evidence to inform policies that enhance the safety and appeal of walking to school. Addressing these challenges is essential for ensuring children can safely enjoy the physical, social, and cognitive benefits of walking. Walking to school has proven benefits for physical and mental health, social and cognitive development, and even local government finances (Lee et al., 2022). Investigating the interactions between environmental, social, and cultural factors is crucial for creating supportive environments that prioritise the well-being and physical activity of children and while encouraging walking to school. Programs such as walking school buses and safe routes to school initiatives have demonstrated a positive impact on children's ability and willingness to walk to school. Cooper et al. (2005) found that children who walked to school exhibited higher overall physical activity levels throughout the day compared to those who were driven. This underscores the potential of walking to school not only to increase daily physical activity but also to establish lifelong healthy habits. Moreover, walking to school has been linked to improved academic performance and enhanced concentration in the classroom, highlighting its cognitive benefits. Beyond individual benefits, walking to school has broader implications for public health and environmental sustainability. By reducing car traffic around schools, walking helps lower air pollution and supports sustainable transportation practices. This aligns with the increasing focus on environmentally friendly initiatives in urban areas. The advantages of walking to school are multifaceted and extend beyond physical activity. Cole et al. (2007) highlights its potential to reduce costs, improve fitness, and contribute to environmental benefits. They also note that walking to school fosters health-enhancing physical activity, particularly among parents with specific characteristics. Similarly, McDonald et al. (2020) emphasise the economic benefits of promoting active school travel, including decreased transport and injury-related costs. Collectively, these findings underscore the importance of encouraging walking to school to promote healthier lifestyles for children. As Knollenberg et al. (2016) argue, fostering physical activity through walking can significantly contribute to the development of lifelong health and wellness habits.

Lessons from Japanese Practices

Japan's approach to promoting walkability provides valuable insights for policymakers and urban planners globally. Its compact urban design, extensive public transportation network, and pedestrian-friendly infrastructure foster an environment conducive to walking. Emphasising safety, cleanliness, and community engagement, Japan has cultivated a culture where walking is practical, enjoyable, and integral to daily life. By prioritising pedestrian needs and implementing traffic-calming measures and school zone safety initiatives,

Japan serves as a model for creating walkable school routes. However, social changes such as declining birth rate, a reduction in public elementary schools, and increasing after-school activities may influence parental attitudes and children's walking habits over time (Hino et al., 2021). For instance, a study in Chiba, Japan, found that factors like crime safety, neighbourhood connections, and CCTV presence significantly shaped children's walking behaviours (Hino et. al., 2021). They noted that social changes, such as declining birth rate and increasing after-school activities, could influence children's walking habits over time. Consequently, collaborative efforts among education, public health, and urban planning sectors are crucial to preserving the high prevalence of walking to and from school in Japan.

Japanese practices regarding walking to school offer valuable lessons for policymakers and urban planners worldwide. Since its establishment in 1953, this approach has successfully promoted regular physical activity and addressed childhood obesity (Mori et al., 2012). Its success is largely attributed to the availability of schools within walking distance, robust safety measures, and the involvement of parents, school staff, and local volunteers (Mori et al., 2012). Moreover, the practice supports children's autonomy, psychological well-being, and social interactions (Waygood & Taniguchi, 2020). Neighbourhood factors such as crime safety, community connections, and school location play a significant role in influencing walking habits to and from school (Hino et al., 2021). Walking is strongly associated with physical activity, with a minimum of 45 minutes per day being key to meeting physical activity recommendations (Sasayama et al., 2021). Addressing elements like urban design, pedestrian infrastructure, and cultural attitudes can help create environments where walking to school is not only encouraged but becomes standard practice. Embracing walkability principles improves public health, mitigates environmental impacts, and fosters vibrant, interconnected communities where children can thrive. As the global momentum towards building sustainable and healthy cities continues, the lessons learned from Japan's approach to walkability remain particularly relevant and impactful.

RESEARCH METHODOLOGY

This study employs a mixed-methods approach, integrating quantitative surveys and qualitative observations to examine school route walkability and safety for children in Fukuoka, Japan. Quantitative data were collected from 165 elementary schoolchildren aged 6 to 12, focusing on their perceptions of safety during their commutes to and from school. Qualitative observations provided real-time, objective data on environmental factors, including the condition of sidewalks, traffic patterns, crosswalk availability, and safety infrastructure. This

dual-method approach ensures a comprehensive understanding of both subjective experiences and objective environmental conditions.

The study was conducted at Meihoku Elementary School, Meinohama of Fukuoka City, chosen through purposive sampling to target children who commute on foot. Fukuoka, the fifth-largest urban area in Japan with a population of 1.6 million, is known for its extensive public transportation network, including buses, JR lines (JR Kyushu and JR West), subway systems, private railways, and ferries. Minami Ward, one of Fukuoka's seven wards, served as the geographical focus of the study. A total of 165 elementary schoolchildren aged between 6 to 12 years from Meihoku elementary school participated in the study. Respondents were selected using a non-probability purposive sampling technique, specifically targeting students who commute on foot. This method was chosen to provide valuable insights into the safety and environmental challenges of walking to and from school, aligning directly with the study's research objectives. By focusing on children who walk to school, the approach emphasised their unique experiences and perceptions of navigating urban school routes. The observation method complemented the survey data by offering a detailed, real-time, objective assessment of the physical environment along the school routes. Researchers directly observed and documented key factors, including the condition of sidewalks, the frequency and visibility of crosswalks, traffic flow patterns, lighting, and the presence of safety measures such as pedestrian signals and barriers. This observational approach captured critical environmental factors influencing the walkability and safety of school routes, providing a layer of detail that might not be fully captured through survey responses alone (Bendak, 2005; Ikeda et al., 2018). By directly experiencing and documenting the conditions children face, the study provides valuable insights into how environmental factors influence children's perceptions of safety during their commute. The descriptive analysis method systematically categorises these observations, enabling researchers to present a clear overview of the findings and highlight areas requiring improvement (Mitra & Buliung, 2011; Hino et al., 2021). By combining observations with descriptive analysis, the study creates a comprehensive picture of the walkability and safety of school routes in Fukuoka. Descriptive analysis was applied to both the survey and observational data, offering a detailed understanding of the safety challenges and infrastructure issues that impact children's active school travel.

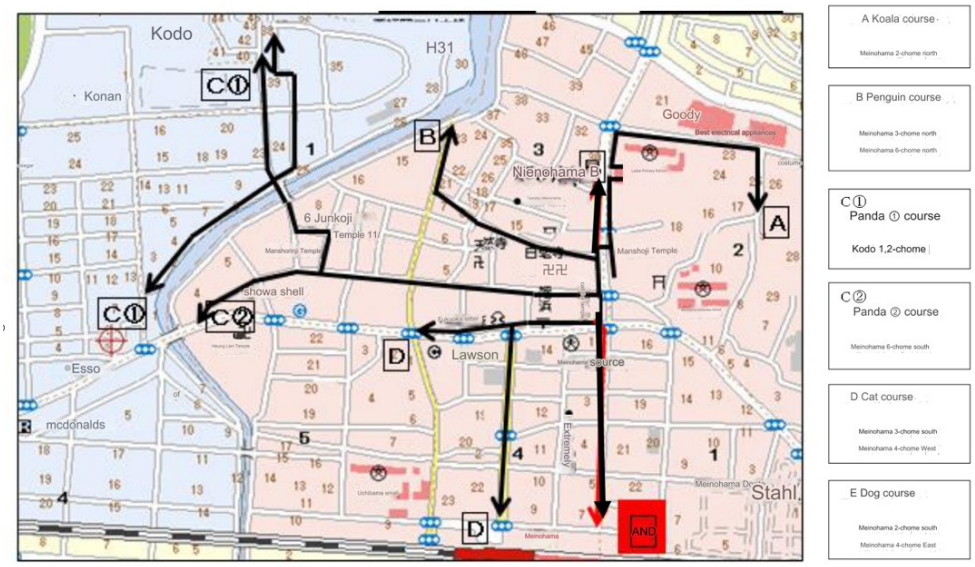

Figure 1: Map routes of schoolchildren in Meihoku elementary school

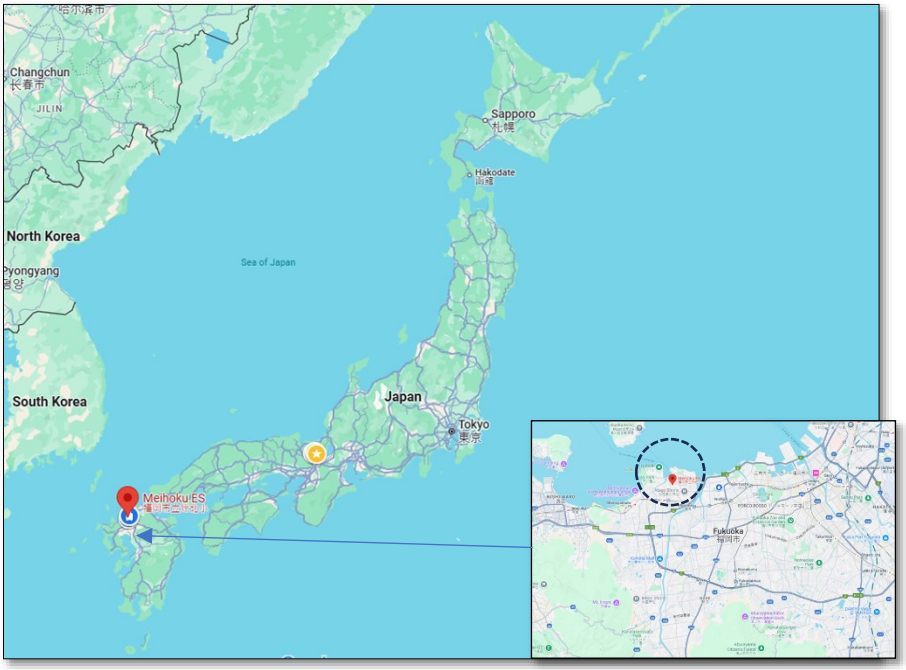

Figure 2: Case study location, which is in Meinohama, Fukuoka, Japan.
(Source of map: Google Map)

RESULTS AND DISCUSSION

The questionnaire survey was given to 165 primary schoolchildren aged 7 to 12 years old (n = 165) in Fukuoka, Japan. The gender distribution was nearly equal, with 47.9% male and 46.7% female respondents, while a small percentage did not specify their gender. The respondents were spread across six grades, with Grades 1 and 2 having the highest representation at 21.2% each. Grade 4 followed with 16.4%, Grade 6 with 13.3%, Grade 5 with 12.7%, and Grade 3 with 11.5%. A small portion (3.6%) did not indicate their grade (see Figure 1 and Figure 2). The survey collected data on travel times to school, identifying mobility patterns and challenges. The largest group (27.3%) reported a travel time of 6 to 10 minutes, predominantly male (53.3%). A similar group (25.5%) indicated a travel time of 11 to 15 minutes, evenly distributed between males and females (21 respondents each). Other significant groups included 17 females and 13 males reporting a travel time of 16 to 20 minutes, while 21 respondents (12.7%) reported a travel time of 0 to 5 minutes, with a slight female majority (52.3%). Smaller groups reported longer travel times, with 5.5% taking 21 to 25 minutes, 4.8% taking 26 to 30 minutes, and 0.6% taking more than 30 minutes. Nine respondents (5.5%) did not report their travel time. To assess traffic safety, the survey addressed children's experiences with traffic, pedestrian infrastructure, and any traffic accidents they had witnessed. It also inquired about encounters with suspicious individuals during their commutes to gauge perceptions of personal safety and the frequency of such incidents. The final section examined environmental factors that made children feel uneasy, including poorly lit streets, isolated areas, and other conditions affecting their comfort and safety on the way to school. To better understand the traffic safety and mobility challenges faced by children on their way to school and in their neighbourhoods, a questionnaire survey was conducted. The survey aimed to gather direct insights from the children about their experiences during their commutes. It included questions about their interactions with traffic, the modes of transportation they used, encounters with suspicious individuals, and environmental or social factors in their neighbourhoods that made them feel uncomfortable or unsafe. The following section provides a summary of the key findings from the survey.

The survey findings reveal significant safety concerns for children during their commute to and from school. Among the 21 respondents, most children (57.1%) did not provide an answer regarding whether they had witnessed traffic accidents on their route to school. However, 38% of respondents (8 children) reported witnessing traffic accidents, with Grade 2 students (4 respondents) accounting for most of these incidents. When asked about traffic accidents on their way home from school, 60.9% (14 out of 23 respondents) reported witnessing accidents, with Grade 2 students (5 respondents) and Grade 1 students (4 respondents) again being the most frequent reporters. Notably,

81.25% of those who witnessed traffic accidents used walking as their primary mode of transportation. These findings align with previous research by Mori et. al (2012), who emphasised the importance of policies and infrastructure that ensure safe commuting for children in Fukuoka, Japan. Their study highlighted that safe school routes are critical for promoting both traffic safety and public health, underscoring the need for continued improvements in infrastructure and community awareness to minimise risks for children. In addition to concerns about traffic safety, the survey also explored encounters with suspicious individuals. Male respondents reported encountering suspicious behaviour, such as chasing, abuse, hiding, staring, wandering, and voyeurism. The highest frequency of these incidents occurred during commutes from school to home (7.5%), followed by 1.3% from home to school and 1.3% after school and during school holidays. For female respondents reported encountering suspicious behaviour such as chasing, strangers staring from cars, calling, voyeurism, or individuals loitering at the roadside and staring at them. These incidents were reported during commutes from school to home (3.9%), from home to school (2.6%), as well as after school and during school holidays (7.8%). According to Komiya (2017), 74% of Japanese parents experience anxiety about their children being in the public spaces. The Japanese National Police Agency also reported approximately 4,000 crimes involving elementary schoolchildren that occurred on the street, with most of these incidents happening when children were alone. In addition to encountering suspicious individuals in public spaces, children also expressed concerns about certain places along their school routes that make them feel uneasy. Male respondents reported that 6% felt uncomfortable passing through paths far from the main street, while 7.8% of female respondents were concerned about their safety when choosing routes with fewer people. Both groups expressed concerns about heavy traffic as well. Regarding the surrounding neighbourhoods, both male and female respondents identified roads with few people, quiet roads, dark areas, and heavy traffic as major safety concerns, and they tended to avoid these routes. These results align with Lin et al.'s (2017) research, which found that among NZ European, Mori, Samoan, and other Pacific parents, the most common concern was remote or hidden streets that were less visible to passers-by and less accessible by pedestrians. However, for Asian and Indian parents, "traffic danger" was the primary concern regarding children's safety. According to Valentine (2017), most parents surveyed agree that elementary schoolchildren are particularly vulnerable to dangers like kidnapping (45%) and road accidents (34%), with many believing that female children are more likely to encounter peril than male children. As a result, female children are more often restricted from entering public spaces compared to their male counterparts.

CONCLUSION

The findings of this study offer valuable insights into the factors that elementary schoolchildren perceive as unsafe during their commutes, addressing the research objective of understanding these perceptions to inform safety improvements. The study identified several key risks, including traffic accidents, encounters with suspicious individuals, and feelings of unease, particularly in environments characterised by "dark" streets and alleys. Notably, children reported observing more unsafe factors on their way home from school, highlighting the need for targeted interventions during this part of their commute. These findings reinforce the importance of prioritising pedestrian safety and designing secure school routes. The study successfully met its objectives by systematically analysing the children's perceptions through a structured quantitative approach, complemented by direct observations and comprehensive data collection. The evidence underscores the necessity of incorporating children's perspectives into urban planning and policymaking to create environments conducive to safe and enjoyable walking experiences. However, the study is not without limitations. The non-probability sampling method and the focus on a single elementary school in Fukuoka may limit the generalisability of the findings to other regions or contexts. Future research could expand the sample size, include schools from diverse geographical and socio-economic settings, and explore longitudinal changes in children's safety perceptions. Additionally, integrating qualitative methods, such as interviews or focus groups with parents and educators, could provide a richer understanding of the underlying factors influencing these perceptions. In conclusion, this study provides crucial lessons from Fukuoka that emphasise the importance of addressing safety concerns in school routes to enhance walkability and promote active transportation among children globally. Policymakers, urban planners, and educators should collaborate to design interventions that not only improve safety but also foster children's independence and engagement with their urban environments.

ACKNOWLEDGEMENT

This research project is funded by Sumitomo Foundation 2021, a collaborative research initiative between Fukuoka Women University, Japan and Utsunomiya University, Japan.

ETHICAL STATEMENT

This study has received ethical approval UM. TNC2/UMREC_1954 from UMREC. Parental or guardian consent was obtained for children's participation, ensuring voluntary involvement, anonymity, and confidentiality. No personally identifiable data was collected. Consent to publish findings was also secured. The

study adheres to UMREC's ethical guidelines and regulations for research involving children.

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Received: 7th December 2024. Accepted: 5th March 2025