INFLUENTIAL FACTORS ON ENHANCING NEIGHBORHOOD INTERMEDIARY SPACES AS A CONTEXT OF CHILDREN'S WALKING TO SCHOOL

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To my kind husband who stood beside his wife at every single step of the way,

To my beautiful daughter who was patient for her mother's targets,

To my beloved mother and father who constantly encouraged

their daughter to her education,

To my kind sister who helped her younger sister in facing the life challenges.

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ABSTRACT

Student's journey to and from school is a routine activity that can influence the acquisition of their environmental knowledge, skills, and their travel behavior that can continue to adulthood. It is a phenomenon that can create real benefits for children and their parents. The school journey can also be affected by the environmental factors both socially and physically. There is a growing trend to motorized travel mode to school in Iran as well as United States of America, United Kingdom, and Australia that can be influenced by many factors. Moreover, it also affects children's interaction with the environments in their journey to school that causes many consequences for them. With focus on student's travel behavior, this study addresses different types of students' travel mode to school and also targets to determine the extent of their active and passive transportation. Moreover, this study discussed some effective factors affecting students' travel mode choice in their way to and from school in Iran. This research was conducted at Omid town as a residential area located in northeast (Zone 4) of Tehran. The method used in this study was analysis of collected data through questionnaires, interviews, and behavioral mappings. Three types of analysis were used to acquire the results including frequency analysis, factor analysis, and confirmatory factor analysis. The results revealed the numerous factors affecting students' and also parents' preference in choosing travel mode to school and back. In this regard, three significant factors were identified as the most important motive factors in choosing active mode in students' journey to and from school: independent mobility, safety and security, and play time. These factors influencing students' travel mode choice in their way to school are considered as significant principles to design appropriate settings for students' journey. It can be also noticed by parents and those who deal with students such as city authorities to create proper sttings for children in choosing travel mode to school that can cause benefits for students.

ABSTRAK

Perjalanan pelajar ke sekolah dan dari sekolah merupakan aktiviti rutin yang boleh mempengaruhi tahap pengetahuan alam sekitar yang diperolehi, kemahiran, dan tingkah laku perjalanan mereka yang boleh ditewskan ke alam dewasa. Ia adalah satu fenomena yang boleh memberikan manfaat kepada kanak-kanak dan ibu bapa mereka. Perjalanan ke sekolah juga boleh dipengaruhi oleh faktor-faktor alam sekitar iaitu faktor sosial dan fizikal. Walaupun pengangkutan aktif seperti berjalan dan berbasikal, mempunyai banyak kelebihan meningkat pengangkutan bermotor telah di banyak negara seperti American States, United Kingdom dan Australia. Trend ini juga semakin meningkat di Iran yang boleh dipengaruhi oleh banyak faktor. Selain itu, ia juga memberi kesan kepada interaksi kanak-kanak dengan persekitaran semasa perjalanan ke sekolah yang member banyak kesan kepada mereka. Dengan memberi tumpuan terhadap tingkah laku perjalanan pelajar, kajian ini mengenalpasti jenis mod perjalanan pelajar ke sekolah dan juga mensasarkan untuk menentukan tahap mod pengangkutan mereka, samada secara aktif dan pasif. Selain itu, kajian ini membincangkan beberapa faktor yang mempengaruhi pemilihan mod perjalanan pelajar ke sekolah dan dari sekolah di Iran. Kajian ini telah dijalankan di pekan Omid sebagai kawasan perumahan yang terletak di timur laut (Zon 4) Tehran. Oleh itu, kaedah yang digunakan dalam kajian ini adalah analisis data yang dikumpulkan melalui soal selidik, temu bual, dan pemetaan tingkah laku. Tiga jenis analisis telah digunakan untuk memperoleh keputusan termasuk analisis kekerapan, analisis faktor, dan analisis faktor pengesahan. Keputusan yang diperolehi mendapati pelbagai faktor yang mempengaruhi keutamaan pelajar dan juga ibu bapa dalam memilih mod perjalanan ke sekolah dan pulang dari sekolah. Dalam hal ini, tiga faktor telah dikenal pasti sebagai faktor yang paling penting dalam memilih mod perjalanan pelajar yang aktif ke sekolah dan dari sekolah: mobiliti bebas, kawalan dan keselamatan, dan masa bermain. Faktor-faktor ini mempengaruhi pemilihan mod perjalanan pelajar dalam perjalanan ke sekolah boleh dianggap sebagai prinsip penting dalam merekabentuk persekitaran yang sesuai untuk perjalanan pelajar. Ia juga boleh disedari oleh ibu bapa dan pihak yang berurusan dengan pelajar seperti pihak berkuasa bandar untuk mewujudkan persekitaran yang sesuai untuk kanak-kanak dalam memilih mod perjalanan ke sekolah yang boleh memberi faedah kepada pelajar.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Traveling between home and school is a daily activity for most children and often for their parents. This everyday routine, therefore, can be aimed to improve children's physical health. In this regard, the school journey is a phenomenon that can change travel behavior and create real benefits for children, their parents and the environment. For this purpose, some planners create one alternative to travel to school by providing Walking School Buses as a program. A walking school bus is like a real bus – it travels at a set time and children join it at designated stops and walk to school, or leave the 'bus' when they want to go home in the afternoon (Osborne, 2005). In this case, children enjoy walking, and parents and children perceive walking to school as a positive way for children's active transportation (Karsten and Vliet, 2006).

Despite the well-published benefits of active transport such as walking and cycling in children, passive (motorized) transportation modes have increased in western countries (Cooper et al., 2003). In UK, using of children's motorized commuting to school increased fourfold between 1970 and 1991 (Tudor-Locke et al., 2002), while in the US there was a 37% reduction in the number of children's active transportation at the same period (Tudor-Locke et al., 2001). In Australia, only one third of trips to school are made using active transport, despite a medium commuting distance of 600 meters (Harten and Olds, 2004). Similarly, in Iran and especially in city of Tehran, there has been an increasing trend towards motorized modes for

home-school travel, and passive travel mode has become a significant feature of daily life for many families (Ahmadi and Taniguchi, 2007). Also, the desire of parents to protect their children by choosing motorized travel mode for them has caused health and safety problems. In addition, increasing parental fear of environmental danger create more restrictions on children's independent mobility.

The interaction between children and environment changes according to children's travel mode: walking to school on their own, accompanied by an adult on foot or by car. But children who are driven to school by car are in the worst situation of learning because they are deprived of dimension of movement. Therefore, they have a limited perception of the environment. While children accompanied on foot are in intermediate situation. It is because, regardless to the children's accompaniment, they walk and therefore they move in their environment. In addition, children who go to school on their own are allowed to go and play outdoors with their friends more than children who are accompanied by adults (Rissotto and Tonucci, 2002). Children who are driven to school are less likely to develop their environmental and social skills which can be learnt by walking and cycling (Ahmadi and Taniguchi, 2007). Therefore, children who go to school unaccompanied have better spatial knowledge than children accompanied on foot or by car. Because accompanied children do not have opportunity to follow their own interests, for example, to go to the stationery shop, and memorize the position of places where they go (Rissotto and Tonucci, 2002), or to go to the park and climb the trees to get the fruits and have fun with their peers.

Literature review on empirical studies toward the interaction between children and outdoor environments are categorized into five different types of outdoor environments including playground, neighborhood environment, home-school way, forest and natural environment, and city and suburb. Table1.1 indicates aforementioned outdoors regarding children's interaction.

Table 1.1: Different outdoors regarding children-environment interaction

Type of environment	Author/Year	Major findings
Playground	Pellegrini (1990)	▪ Different children's behaviors that may occur due to the age, type of playground, or children-playground interaction provide opportunity for them to learn and develop their skills.
Neighborhood	Francis and Lorenzo (2002), Huttenmoser (1995), Castonguay & Jutras (2009), Karsten and Vliet (2006), Page et al. (2009), Heft (1988), Veitch et al. (2008).	▪ Child participation is a major area of environmental design proactive and research today. ▪ Unsuitable living surroundings influence on longer period of parental accompaniment to children. ▪ Physical activity and independent mobility are likely to be influenced by the type of neighborhood as well as perceptions of that neighborhood. ▪ Form-based description of environment does not change regarding with individual development, but affordances of environment will be changeable with different conditions of individuals.
Home-school Way	Osborne (2005), Ahmadi and Taniguchi (2007), Orsini and O'Brien (2006), Rissotto and Tonucci (2002), Yeung et al. (2008), McMillan (2007).	▪ Walking travel mode creates opportunities for children to explore their environment and know it better. ▪ The categories of motivations for cycling were identified as: enjoyable (fun), better than alternatives (fast), and healthy (fit). ▪ The children who have more independent mobility have more detailed and complete environmental knowledge to represent their routes. ▪ The factors which influence on children's active transportation comprise of children's age, children's fitness, obesity, traffic safety, distance and criminal safety. ▪ The urban forms are the most significant factors in parental making decision about their children's travel mode to school but not as the sole factor.
Forest and Natural Environment	Smith et al. (2008), Fjortoft and Sageie (2000).	▪ The environment scale and size, the features, and also the diversity can affect children's sensitivity, preference and play functions that can be met in natural landscape.
City, Suburb, and Rural Village	Vliet (1983), Kytta (2002).	▪ Children's travel modes are different in city and suburb because of distance, and the biggest city-suburban difference was in walking. ▪ Accessibility to the natural environments creates the highest affordances because of having a rich set of affordances.

The findings obtained from the study regarding playground points to the importance of the types of playgrounds in making opportunities for children to learn from environment and develop their skills. Therefore, children's interaction with environment that can happen by active transportation to school is highlighted. The studies regarding the neighborhood environments emphasize the significance of the

living surrounding design that affects children's fascination to be more active in their journey to school. Therefore, it can affect their travel mode choice to school. The third part of the category refers to the way to school, the benefits and barriers for choosing travel mode to and from school. The finding form those studies which investigate home-school way highlights that walking in home school way is an occasion for children to get knowledge regarding their environment. However, there are some barriers for children to choose it as travel mode such as traffic and criminal safety, children's age and fitness, and also urban form. The fourth outdoor refers to the natural environment that can meet children's preference and function. Therefore, natural landscape with rich set of affordances for children in school journey may fascinate them to change their travel behavior from passive to active. Finally, fifth category compares children's travel mode in city and suburb. It highlights the importance of the distance and affordances in the way that affect children's travel mode choice. Therefore, it is deduced that shorter distance and variety of affordances can change children's travel mode.

Between the two types of active transportations (cycling and walking), cycling is not encouraged due to the high risk of accident, lack of parking space and the risk of being stolen the bikes. There is also restricting traditional norm for girls in Iran regarding cycling. It means that cycling for the girls is not socially good behavior in many parents' view point. Therefore, they prefer not to allow them to cycle. In addition, walking mode gives children the opportunity to explore their environment and know it better (Ahmadi and Taniguchi, 2007).

Walking to and from school would not meet all the physical activity needs of a child in a day (Cooper et al., 2003; Metcalf et al., 2004; Tudor-Locke et al., 2002). However, children who have active transportation to school are more likely to choose these travel modes for other activities. Therefore, they may be more active than their non-active travel counterparts (Cooper et al., 2003; Sjolie and Thuen, 2002).

To improve children's active transportation, planners create some solutions such as walking paths. However, provision of walking paths alone is not sufficient to

promote active transportation (Ogilvie et al., 2004). Nevertheless children from neighborhood with high connectivity and close proximity to pathways have higher rates of walking and cycling compared to neighborhood with low connectivity (Duncan and Mummery, 2005; Saelens et al., 2003). One of responses of children's travel modes has been programs related to Safe Routes to School (SR2S). This program which has been thought basically in Denmark try to impact children's travel and health by making the school routes safer for active travel modes through education (both children and drivers for road safety), enforcement (towards traffic laws around schools) and engineering (towards the street environment along the routes to school to control traffic and to enhance facilities for pedestrian and cyclists) (McMillan, 2007).

Active transportation has been suggested to enhance social interaction and maturation of children and promote independent mobility (Yeung et al., 2008). Since playspaces are relevant places to create social interaction of children, increasing movement and activity with choosing walking travel mode through the arranged playspaces in home-school journey can improve these goals.

Opportunities such as possibility to explore and discover, and constraints such as non-accessibility to favorite places to walk independently are factors which can influence travel behavior to school (Bricker et al., 2002; Dellinger and Staunton, 2002; Sjolie and Thuen, 2002; Ziviani et al., 2004). Therefore, children need to be given opportunities in home-school journey to play for the purpose that their social and physical developments are created along process of play. As Greta Fein (1978) mentioned in her book, *Child Development*, play is important to development. Many of these opportunities are created from the interaction between the physical features of the environment and interests, ideas and intent of the individual which means affordances. According to Gibson's theory (Heft, 1988), affordances mean functional significance of environmental features for an individual.

Children can play in contexts which it is possible to explore and discover. In this way, function of environmental elements and features are discovered by children. Indeed, affordances are created along with children's discovery and

exploration where children is both sensing and moving, observing and acting (Maudsley, 2007; Chawla and Heft, 2002).

Presence of affordances in home-school journey and also existence of the most important key qualities in children's outdoor environments such as accessibility can be an emphasis on choosing home-school journey as a context of children's development and independent mobility in different aspects (Maudsley, 2007).

The impacts of improving children's autonomy reveals that geographic differences affect on children's freedom of movement and it is related to the economic, social and cultural differences among the families (Rissotto and Tonucci, 2002). Moreover, a reduction in children's freedom of movement negatively influences on parental habits (Gershuny, 1993) to accompany children in their school journey, or to drive them to school, reduces children's regular exercise (Armstrong, 1993) that can be happened in school journey, and affects on conditions of urban environment (Royal Commission on Environmental Pollution, 1994) (Rissotto and Tonucci, 2002).

In general, children's activity in outdoor environment can help the development of their physical, social and cognitive competencies. It is necessary to explain that many parents often do not have enough time to accompany their children everywhere; therefore, they forbid their children to be outdoors on their own (Karsten and Vliet, 2006). While, according to Vygotskey's theory (McDevitt and Ormrod, 2002), parents can improve children's cognitive development by involving them in challenging activities, and talking with them about their experiences.

Creating complexity in environment, which causes increasing of affordances, also creating other playspace's key qualities in home-school way such as inviting, stimulating and challenging can create children's favorite environments to play. In this case, such environments can encourage children to choose walking as a travel mode to enhance their independent mobility and to move around freely, and finally can help to change behaviors and habits which can continue to adulthood.

1.2 Problem Statement

Many places where previous generation played are destroyed or are not usable for children. Therefore, these days there are no exploratory places for young children (Gaster, 1991; Wridt, 2004). In addition, many modern cities have been identified as negative places to live (Taylor et al., 1998) especially for children because of their traffic and other hazards preventing children to play outdoors unsupervised, getting physical activity and commuting independently. Generally, children's outdoor play and free access to their neighborhood had decreased remarkably over three generations (Gaster, 1991). Therefore, there is considerable reduction in children's freedom of movement because of the declining in children's access to outdoor spaces to have active free play and improving in children's living condition (Rissotto and Tonucci, 2002) that causes children's accompaniment with their adults more than past. Therefore, one of the most important children's problems towards active free play is low accessibility to open play area in their free time. In addition, children's perception of easy access to open play area is connected with high percentage of their walking and cycling trips, and it influences on children's levels of independent mobility (Timperio et al., 2004).

These days, children play more often in supervised locations near the home for example home yards or play indoors much more. In addition, parents have influenced on these behaviors because they prefer to lead their children to more supervised, planned and organized childhood (Karsten and van Vliet, 2006). Therefore, children today are much more restricted than children of previous generations (Hillman, 2006). Moreover, children suffer from restricted playing outdoors, even though, they benefit from outdoor activities and moving around independently (Karsten and van Vliet, 2006).

When living surroundings where children can move freely have been limited by traffic, vehicles drive fast, and children are not paying attention in urban environments, parents will not allow children to play outside. When the freedom of movement in living surroundings is reduced, the opportunities for social contact with

other children are also reduced. Moreover, unattractive living surroundings restrict opportunities for social contact among children (Huttenmoser, 1995).

On the other hand, long and continuous period of accompaniment in home-school journey may delay the acquisition of spatial and environmental knowledge, autonomy of children in their movement, social interaction with their peers, friends, and adults and also their physical activity (Hillman et al., 1990; Hillman, 1993).

In the city of Tehran, like many other metropolitan areas, there has been an increasing trend towards vehicular modes for home-school travel, and the school journey by car has become a significant feature of daily life for many families. Meanwhile, the city suffers from an air pollution crisis, traffic congestion, and most of its districts are involved in the mal-distribution of schools. School journeys account for approximately 20% of morning rush hour traffic (Tabatabaee, 2001). At the same time the desire of parents to protect their children by driving them to school has caused other problems, such as increased air pollution from car emissions and greater traffic congestion around the schools, which in turn results in fewer children developing autonomy. In addition, the increasing parental fear of danger from strangers and assault is placing even more restrictions on children's mobility (Ahmadi and Taniguchi, 2007).

In summary, it was found that there is no research to explain about the connection between playspaces and home-school way, and that whether playspace in home-school way can influence positively on children’s habit to walk to school. Therefore, there is a lack of study in incorporating of playspaces with home-school journey and their influence on children’s walking to school.

1.3 Research Gap

Previous researches on children’s travel behavior, children’s play in the neighborhood, and properties of children’s environment were reviewed to find a clear understanding on the knowledge of spaces fascinating children to play, and

encouraging walking. As such, study by van Vliet (1983) on children's travel behavior looked for differences of children's travel behavior in two different settings of city and suburb. Likewise, Osborn (2005) investigated safe routes for children, which was regarding road and traffic safety to promote children's active transportations. To improve active commuting to school, McMillan (2005) has also investigated the impact of urban forms on children's travel mode to school. Ahmadi and Taniguchi (2007) also studied children's home-school travel regarding the relations between children's spatial knowledge and their mobility. Such studies were already done by former researchers such as Rissotto and Tonucci (2002). Moreover, the recent study by Romero (2010) was also conducted on children's independent mobility.

Recently, besides Romero (2010), several studies such as Fyhri and Hjorthol (2009), Page et al. (2009), Shokoohi (2010), McDonald (2010) have also been conducted on children's school travel. The research theme of ten studies as examples of study regarding children's travel mode and behavior are summarized in Table 1.2.

Table 1.2: Evaluation of ten studies investigating children's school travel

Author (year)	Context	Participant's age in years	Research Theme
vanVliet (1983)	Typical City & Suburban neighborhood	14-16	Relation of distance and travel mode
Rissotto& Tonucci (2002)	Outer residential suburb	8-11	Effects of limitations on children's autonomy on environmental knowledge
Osborn (2005)	City environment	6-16	Road and traffic safety
McMillan (2007)	Southern & Northern California	Elementary -aged children	Urban and non-urban forms on children's travel mode
Ahmadi (2007)	Town (Tehran)	9,11,13	Relation of children's spatial knowledge and mobility in school travel
Page et al. (2009)	City (UK)	10-11	Independent mobility in relation to physical activity
Fyhri& Hjorthol (2009)	City (Norway)	6-12	Children's independent mobility to school
Romero (2010)	City (Sydney Metropolitan)	9-11	Independent mobility during school travel
Shokoohi et al. (2010)	City (Tehran)	Primary -aged children	Relations of safety & children's walking in different socio-economic status
McDonald et al. (2010)	San Francisco Bay Area	10-14	Social environment on children's school travel

However, it has been overlooked to study the factors affecting how school journeys are made with focusing on their walking. Therefore, a more comprehensive research is required to discover factors that may exist to influence children's preference to walk, and also what factors have an influence on such detected factors. This thesis, therefore, attempts to focus on investigating the factors that affect children's perceptions and preference regarding their walking travel mode choice in

their school journey, and also on how to enhance home-school intermediary spaces to fascinate children to walk.

1.4 The Aim of the Research

The aim of the research is to identify influential factors affecting children's preference to choose walking as travel mode to school by fascinating them to stay in home-school intermediary spaces, and play. This would also find the factors that strengthen or weaken other factors to affect children's walking mode choice. Therefore, the research would reveal some qualities of such spaces that enhance children's physical, cognitive, and social functioning.

1.5 Objectives of Research

To achieve the aim, the following objectives are formulated:

(i) To determine the influential factors on children's choice of walking travel mode;

(ii) To determine obstacles or motivations which have high impact on children's walking to school; and

(iii) To find a model that identifies affecting factors, and affected factors and also the extent of their effects.

1.6 Research Questions

Finding the responses of some questions about this issue can help to achieve the aim more easily and accurately. These questions can be comprised of:

1) What are the effective factors influencing elementary school students in choosing walking travel mode in home-school journey?
2) What are some obstacles and motivations highly influencing children's walking to school?
3) How and in what extent do the obtained factors affect on each other, and what are affecting and affected factors?

1.7 Scope of the Study

The study explores the behavioral responses of elementary school students based on their preferences and experiences in home-school journey especially their relationship with playspaces which have been designed in home-school way. The arranged playspaces, in this study, is expected to influence on physical, cognitive and social functioning of young students. In addition, it is expected to influence on parental decision about children's walking travel mode to and from school. This study also evaluates some affordances of playspaces that increases children's preference to walk to school. Moreover, the study discusses some perceived barriers and motivations of children's commuting to school through the playspaces.

1.8 Significance of the study

In aspects of design and planning, this study would reveal the properties, attributes and key dimensions of playspaces and playground and their components when they would be designed as a part of school way. Proper design of playspaces in walking home-school way and creating safety in it with declining risk in their elements and determination of proper place could be influenced to fascinate children to move through them. In this case, it can be one of the most effective factors to stimulate children to walk to school which generate health, mental and intellectual benefits to them. It would also influence parental decision on their children's walking to school that would eliminate their anxiety about their children's commuting to school. In addition, in aspects of urban planning, it could help to

prepare some criteria and a model of analysis of favorable playspaces to design and build suitable routes to school in playspace framework.

1.9 Outlines of Research Methodology

This research looks for children's perceptions and preferences regarding their travel mode choice in their school journey as reflected in their behavioral responses. The units of analysis are elementary school children (aged 7-11 years) and their parents in Tehran. The reasons for selecting this age group of children are because middle childhood, from seven to eleven, is a period that children's brains are well developed physiologically but they do not take on adult roles (Nabhan and Trimble, 1994). In addition, geographic scale which they serve in neighborhoods can support walking and cycling for a greater proportion of the schoolers in this age group than the middle or high schools (McMillan, 2007).

Moreover, the effects of play on intellectual and motional development in this age group are more than the other children's age-groups because of their age situation and their flexibility and effects from outdoor play. Moreover, they have less intellectual and educational involvement. In this period, children have many potential for playing, imagining, creating and receiving (Cobb, 1977). Therefore, they spend time to play more than the others. Moreover, the reason for choosing children's parents as second unit of analysis is that increasing parental fear of dangers such as traffic dangers and social insecurity create more restrictions on children's mobility. Therefore, they prefer to protect their children by accompanying them to school on foot or by car (Ahmadi and Taniguchi, 2007). Consequently, parents play the most significant roles in choosing children's travel modes, especially in this age group.

The data was elicited from multi-source and multi-method data collection measures. Literature in children's experiences regarding their outdoor environments indicated multi-method measures to collect data. Table 1.3 indicates methods that 20

former researchers used to evaluate children's responses towards their outdoor environments.

Table 1.3: Methods of evaluating children's responses towards outdoor environment

Discipline	Author / Year	Method	Number of respondents
Children's independent mobility	Ahmadi and Taniguchi (2007), Karsten and Van Vliet (2006), Veitch et al. (2008), Rissotto and Tonucci (2002), Page et al. (2009).	Behavioral mapping, questionnaire, interview, instrument,	75, 212, 64, 1307
Children's environment	Huttenmoser (1995), Castonguay & Jutras (2009), Smith et al. (2008), Osborne (2005), Kytta (2002), Heft (1988), Fjortoft and Sageie (2000), McMillan (2007), Pellegrini (1987).	Interview, questionnaire, photographing, observation,	1726,926, 28,36,43000, 98,143,35, 30, 29.
Children's behavior	Pellegrini (1990), Francis and Lorenzo (2002), Orsini and O'Brien (2006), Van Vliet (1983), Yeung et al. (2008).	Observation, photographing, Interview, questionnaire, behavioral mapping,	94, 6, 148, 162, 318

The methods utilized in this study were analysis of collected data through questionnaires, open-ended interviews, and behavioral mappings on children to collect their behavioral data.

Besides children, there are two secondary sources such as parents, teachers and school authorities in which data were collected by open-ended interviews. In total, the research utilized 3 different types of measures to collect children's preferences and experiences regarding their home-school intermediary spaces as dependent variables. These measures include children's survey questionnaire, children's behavioral mapping (Rissotto and Tonucci, 2002) as measurement tools to measure children's spatial knowledge which was divided into two parts: blank map and sketch map, and interviews which were divided into three parts comprising children's, parents', and teachers' interviews. Figure 1.1 indicates the methods of collecting the data used in this study.

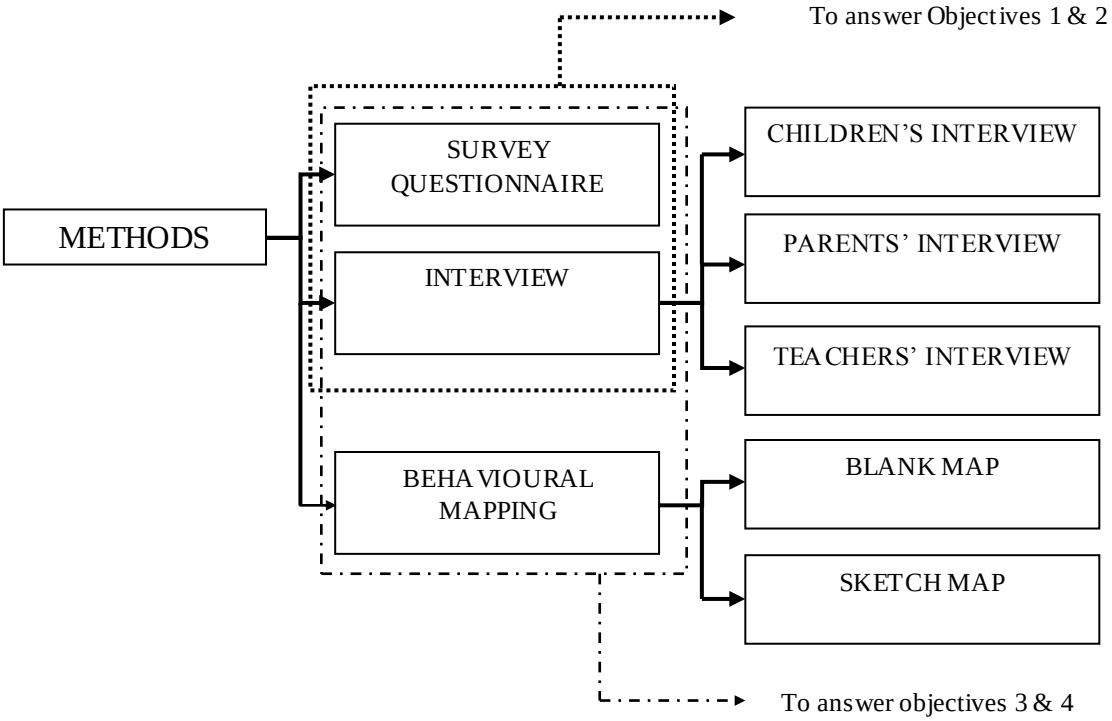

Figure 1.1: Methods of eliciting data

After gathering the data, they were statistically analyzed, both descriptively to analyze behavioral mapping as qualitative research methodology, and inferential to analyze the survey's and interviews' data as quantitative research methodology. Firstly, survey questionnaires gathered from children were analyzed inferentially. Then, behavioral mapping was evaluated in two phases including descriptive and inferential. They were analyzed descriptively to evaluate how and what children know about their neighborhood environment. Then, they were analyzed inferentially to incorporate as a factor in relation with other factors captured by questionnaires. The interviews support the obtained results from the analysis to confirm them.

The heart of this study is to find cause-effect relationships that may exist among the factors affecting children's preference for walking in their school journey. The planning of this research was conducted in six stages:

(i) Definition, background and theories and concepts of children's behavior and their perceptions and preference regarding their travel mode to school;

(ii) Synthesis of intermediary spaces and their role in home-school journey;

(iii) Data collection through the questionnaire surveys, interviews in three phases, and using behavioral mapping in two different types as explained earlier;

(iv) Descriptive and inferential statistic analyses on children's, parents' and teachers' responses toward home-school intermediary spaces, and children's perceptions regarding such spaces;

(v) Demonstration on findings of home-school intermediary spaces attributes and design values that motivate children to choose walking as travel mode to school, and conclusion and implication of study.

There are five stages in the research methodology which include:

1.9.1 Stage 1: Literature Review

This preliminary stage gathers information on history of children's school journey and travel mode to school, definition and explanation on major types of children's travel mode, aftermaths (side effects) of different types of travel mode on children's behavior, proposed solutions for children's problem in their traveling to school, children's play behavior towards the environment, and also children-environment relationships and related theories.

1.9.2 Stage 2: Synthesis of Children's Home-School Intermediary Spaces

The data gathered in stage 1 gives insight on the favorable spaces for play in children's viewpoint in their school journey that lead researcher to consider the study area with such properties. The various playspaces preferred by children are tabulated in a table which indicates a set of children's domains that will be considered in the research to evaluate the factors affecting children's preference to choose walking as travel mode to school through such playspaces.

1.9.3 Stage 3: Data Collection

To collect the data of children's preference and experience regarding their traveling to school and also children's view regarding barriers and motivations in their walking to and from school, the questionnaire will be distributed to children. Further, to find the data that may not be included in the questionnaire and also to get some examples which are just in children's mind, children's interviews will be conducted. Parallel to this, parents' and teachers' interviews will be done to find some barriers on children's walking to school in their viewpoints. Finally, to know children's spatial knowledge which is related to children's interaction with environment, behavioral mapping will be implemented. Therefore, five measurement strategies will be conducted in this study.

1.9.4 Stage 4: Data Analysis

The focus of the analysis is to discover the factors that affect children's choice of walking travel mode to school. The data of children's responses are including of their social, physical, and cognitive functioning in the neighborhood environment. The statistics include frequency and percentage distributions, measures of valid response adequacy, and measures of the research factorability. The qualitative data sourced from parents and teachers will strengthen the quantitative

result by refining, explaining and elaborating them (Creswell, 2012). The quantitative results will be obtained by Factor Analysis of the data sourced from children. The results will be confirmed by Confirmatory Factor Analysis as an advanced approach that tests very special model of how variables are connected to the underlying constructs (Leech, Barrett & Morgan, 2005).

1.9.5 Stage 5: Documentation of Findings

The prominent factors in home-school intermediary spaces as a realm of children's walking will be presented in the following format:

(i) Effective factors on children's travel mode choice in their school way;
(ii) Motivations and barriers in home-school intermediary spaces that affect children to walk;
(iii) Intermediary spaces as a context of children's walking in their school journey;
(iv) The differences between the effected factors and effecting factors that influence children's preference for walking to school;
(v) Structural model of influential factors on children's fascinating to walk;
(vi) Implications of intermediary spaces in children's travel mode.

1.10 Organization of the Thesis

The thesis comprised five chapters including:

Chapter one introduces the issue of the research. The chapter also contains the research aim and objectives. In addition, the research gap, scope of the study, research design, and overall thesis structure are also presented in this chapter.

Chapter two defines the meaning of home-school journey and also the intermediary spaces in children's home-school way. Then, it reviews children's travel modes to and from school and also their preferences and experiences regarding choosing travel mode in their school way. Moreover, the chapter reviews some perceived barriers by children and their parents that prevent children to feel free to choose walking as travel mode to school. Then, the chapter turns to children's environment, and discusses children's interaction with outdoor environment, children's play and environmental experience. Next, it discusses on different aspects of children's school traveling. Finally, the chapter concludes some remarks of children's active commuting to school through enhanced intermediary spaces.

Chapter three presents research design utilized in this study. It also explains how to collect data which is divided into three major types including survey questionnaire, interview, and behavioral mapping. It is followed by the types of analysis using in this research including Frequency Analysis, Factor Analysis and finally Confirmatory Factor Analysis. It also defines these three types of analysis specially Confirmatory Factor Analysis which will finally reach to creation of a model.

Chapter four presents the findings of the research together with discussion. The findings are the factors influence children's preference for walking in their school way. Then, the findings are discussed in different aspects including classification in Factor Analysis, children's viewpoint, and their correlation with each other. Finally, the chapter discusses about the importance and amount of factors' effect on each other obtained by the model made in this research.

Chapter five concludes this thesis with a discussion on the overall findings. It discusses classification of the factors affecting children's walking choice, the most effective factors and also factors' interrelations in home-school intermediary spaces. It also explains the simple form of CFA model created in this research. Further, the chapter discusses on planning and design aspects of home-school way as a context of children's walking. It also states some research limitations and suggests some ideas to improve the research method.

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