

# Association of children's mobility and wellbeing: A case study in Hong Kong



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## ABSTRACT

This study focuses on primary school children in Hong Kong, where their 1) travel behaviour and mobility (school and scheduled activities), 2) autonomy in their daily lives (perceptions and self-esteem), 3) psychological wellbeing (how they rate their happiness in different situations) and 4) interrelationships of the above three aspects were investigated. The research team surveyed 393 primary school students at two selected schools, through face-to-face questionnaire surveys using a variety of question types, such as multiple choice, ordered category items and semantic differential ratings, providing respondents with the opportunity to convey their views within a reasonably structured format. It was found that a majority of children's journeys associated with school and scheduled activities were completed on foot or by public transport, with over 80% accompanied by an adult. As expected, children engaging in active transport rated their journeys as happier than those using motorised transport. Accompanied children also rated their journeys as happier than their unaccompanied counterparts, suggesting that more research about independent mobility from the perspective of the children themselves is needed. Children who perceived themselves more capable of taking care of themselves independently rated their lives as happier than those perceiving themselves to be less able. The findings of this study suggest that children's wellbeing can be affected by many factors, including their own self-esteem, perceived road safety, active travel and independent mobility, amongst other factors. Cities should plan for neighbourhoods that are safer for children to use, socialise and travel in, for the sake of promoting children's wellbeing.

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## 1. Background

'Mobility' refers to "[t]he ability to move or be moved freely and easily" (Oxford Dictionary, 2015). In transport geography, this broadly translates to how easily individuals move or are moved (via one or multiple transport modes) from one place to another through the transport system. Gauging mobility requires a good understanding of humans' travel behaviour through the transport system to engage in different activities, separated by space (Rodrigue et al., 2006). There has been an increasing body of literature in recent years dedicated to research on children's travel behaviour and mobility, often described as 1) whether children's journeys are made independently, i.e. unaccompanied or unsupervised by adults; and 2) whether active (non-motorised) transport modes, like walking and cycling, are used (Fyhri et al., 2011; Lam

and Loo, 2014; Waygood and Kitamura, 2009; Harten and Olds, 2004; Armstrong, 1993).

Very much intertwined with mobility, the concept of "wellbeing" can be dissected into three facets: psychological, social and physical (Pressman et al., 2013). Especially in the context of psychological wellbeing, which is further differentiated by Dolan and Metcalfe (2012) into evaluative (overall satisfaction), experiential (momentary emotions) and eudemonic (purpose and self-actualisation) measures, the relationship between travel behaviour and different measures of psychological wellbeing of children is not well understood. While eudemonic wellbeing does not have any immediate linkage with children's travel behaviour, measures of overall and momentary wellbeing have practical psychological, social and economic applications (e.g. Helliwell and Barrington-Leigh, 2010) and have been used in geographical time-space analysis of everyday activities (e.g. Schwanen and Wang, 2014), amongst various other disciplines.

More specifically in terms of children's mobility and wellbeing, Ramanathan et al. (2014), Romero (2015) and Westman et al. (2013) show that active mobility among children is linked to various psychosocial benefits in momentary wellbeing in the western

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world, but whether this holds true in an East Asian context is not well studied. Also, whether independent and active travel amongst primary school children is associated with more positive evaluative wellbeing (e.g. life satisfaction) remains to be examined in both the western and East Asian contexts. This study also introduces a fresh perspective in investigating children's scheduled activities and associated travels, in addition to the more typical studies that only discuss journeys to and from school. Investigation of children's scheduled activities are an important complement to the general children's mobility literature. This study thus serves as the starting point to fill in these research gaps, in order to better understand the different dimensions of active and independent travel of children. This study also investigates how children's travel characteristics, amongst other key factors, affect wellbeing of children, in experiential (momentary) and evaluative (overall) terms.

This study draws upon the above literature to examine the question of whether higher levels of mobility and autonomy for children have any effect on attitudinal measures of psychological wellbeing, through the children's lens. Through questionnaire surveys, it is possible to consider how children rate different experiences (momentary wellbeing) and evaluate the domains of school and life in general (overall wellbeing), via the concept of "happiness". It is easier for primary school students to understand and describe how "happy" they are, instead of relatively more difficult concepts such as "satisfaction" or "wellbeing". Furthermore, children's own perceptions of their surroundings and self-confidence in daily life provide a voice for the children themselves, such as in previous work by Page et al. (2010) and Tonucci and Rissotto (2001). Children's perspectives are important and deserve more research and recognition. Parents have considerable influence over their child's travel, so listening directly to the child's views, as this study intends, provides an opportunity for adults to work towards improving children's psychological wellbeing with a better comprehension of children's own perceived capabilities and preferences.

Age is a major factor in influencing levels of independent mobility among children, and is often a determinant of when children are ready to safely navigate the street network and neighbourhood environment alone (e.g. Fyhri et al., 2011; Lam and Loo, 2014). The

concept of mobility licences was first proposed by Hillman et al. (1990) to identify when parents would allow their children to do certain things outside of home independently, such as to cross roads, go out after dark, leave school, etc. Parental perceptions on neighbourhood safety and belief in their child's ability to navigate these potential hazards have already been shown to greatly influence children's travel behaviour (Susilo and Liu, 2015; Waygood and Susilo, 2015; Alparone and Pacilli, 2012; Panter et al., 2010). The Italian study by Alparone and Pacilli (2012, p. 113) studied this as the "maternal perception of positive potentiality of outdoor autonomy", i.e. how the mother decides if her child is ready to navigate the outdoors independently, judged by daily ability to take care of themselves, being responsible, socialising skills, and other factors. With parental concerns discussed quite widely in the literature, this study's incorporation of children's own self confidence and perceptions, as discussed in the above paragraph, is a contribution to the literature from a novel, understudied angle.

Formulated from the above and based on the Hong Kong context, a conceptual model has been constructed and is shown in Fig. 1. Conceptually speaking, this study aims to examine children's overall wellbeing, in particular their satisfaction with life, with the factors of 1) children's socio-demographic characteristics, 2) their activities, 3) travel behaviour, 4) self-confidence, perceptions and knowledge and 5) momentary wellbeing. The specific dimensions marked by asterisks fall within the scope of this study, listed along with some other important factors that are worth future consideration, though this is by no means an exhaustive list. To be specific, a list of aims based on the conceptual model is detailed henceforth. The first aim of this paper is to study children's travel behaviour for journeys to and from school and all scheduled activities, among selected groups of Hong Kong primary school children, and how the travel characteristics vary for children of different age and gender. The second aim is to understand children's subjective feelings of their happiness of different experiences (momentary wellbeing) and in the domains of school and life in general (overall wellbeing), in terms of children's age, gender and travel characteristics. The third and final aim is to tie all the strings together, in terms of children's socio-demographic characteristics, self-confidence, perceptions, travel behaviour and momentary wellbeing. This

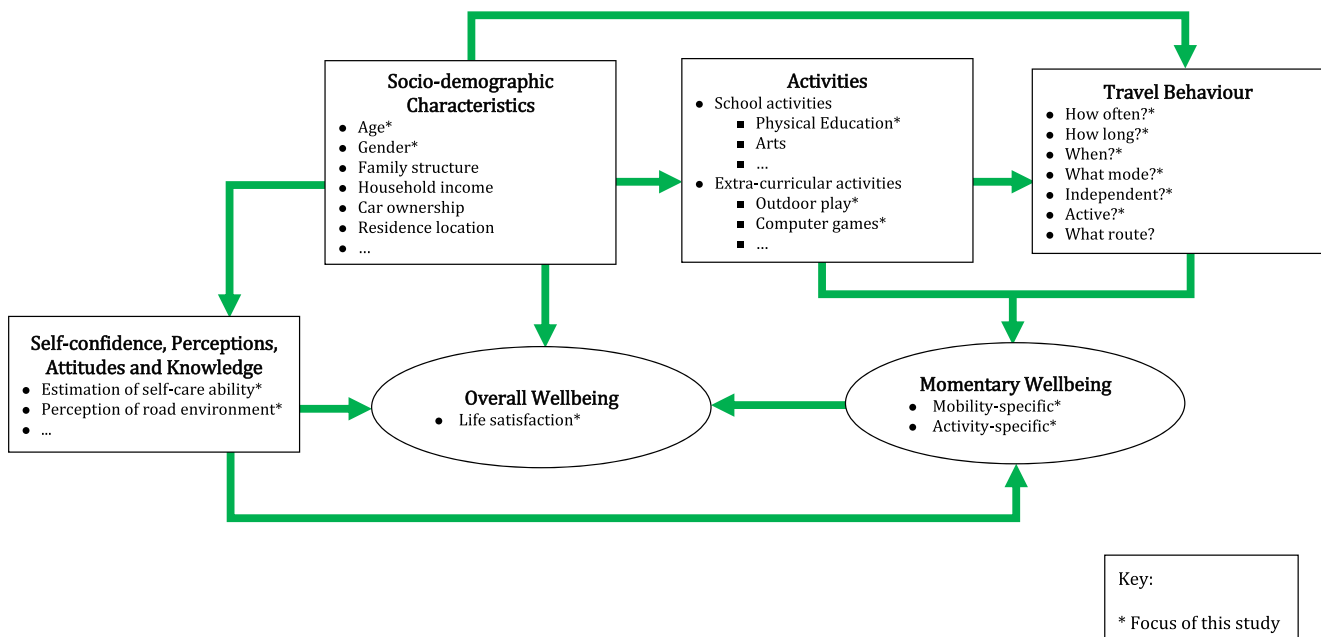


Fig. 1. Conceptual model for analysing children's mobility and wellbeing.

contributes to achieving the ultimate aim of this study, which is to understand the predictors of children's life satisfaction, and point a possible way forward for policymakers to improve children's lives in the East Asian context.

## 2. Methodology

This paper's methodology is based mainly on questionnaire surveys, conducted on both children and parents. This was considered to be the most suitable way to collect data of subjective perceptions and feelings across a large number of school children, supplemented by data on their school travel characteristics provided by their parents. Through using a variety of question types, such as multiple choice, ordered category items and semantic differential ratings, the questionnaire surveys provided respondents with the opportunity to convey their views within a reasonably structured format.

The child questionnaires were administered by a team of trained research assistants via face-to-face interviews with children at their schools. Data were collected about 1) their subjective feelings of wellbeing in their travel and daily life, conceptualised under the umbrella of "happiness", which can be easily understood by children, 2) questions regarding confidence in self-care ability and perception of road-crossing safety in Hong Kong and 3) the duration, number, type and travel characteristics of their scheduled activities. Data with respect to children's reported "happiness" were measured across five items of momentary wellbeing, namely happiness during 1) the journey to school, 2) the journey from school, 3) physical education (PE) lesson, 4) computer games and 5) outdoor play and two items of overall wellbeing, namely happiness with 1) school overall and 2) life in general. The questions were asked beginning "How happy are you in the following situations?" and children answered along a ten-point semantic differential scale, with "very happy" and "very unhappy" at 1 and 10 respectively. Difficult language was avoided in order to enable children to easily understand the question. Apart from "affective experience" of children during travel, previously explored in the literature (e.g. Westman et al., 2013; Romero, 2015), this study design incorporated the proposition that PE lessons, computer games and outdoor play with friends and classmates may also be sources of fun, enjoyment and happiness (O'Reilly et al., 2001; Alexander et al., 2015). Questions regarding self-care ability and perception of road-crossing safety in Hong Kong, on the other hand, were answered along a 5-point scale of ordered categories, with "strongly agree" and "strongly disagree" at either end. The parent questionnaire was distributed to all child participants' parents, asking them to report their child's travel characteristics in journeys to/ from school. The data from both the child and parent questionnaires together have enabled subsequent statistical analysis of reported measures of wellbeing along key variables such as age, gender and travel behaviour. The collected data correspond with the three major aims of this study, and provide a thorough understanding of primary school children's own views.

The study's focus on primary school children is chiefly due to practical considerations. It is the most obvious arena for in-depth investigation of a wide variation of children – who are still at an early stage of learning and development – by key variables such as gender, age, household background and neighbourhood characteristics. They would otherwise be difficult to investigate in a non-school environment. This study may also serve as a starting point for future school-based education programmes that encourage increased walking to school and increased children's independent mobility, while taking into consideration their psychological wellbeing. To include students of different demographic, household and neighbourhood backgrounds, invitation letters were sent to

60 randomly selected Hong Kong primary schools per batch in the 1) fully government-financed (government and aided) and 2) non-fully government financed (Direct Subsidy Scheme, English Schools Foundation, Private Independent School scheme and private) primary school categories, using the official list of schools in Hong Kong as published by the Education Bureau (2013).

After three batches of initial contacting by mail in category 1 and two batches in category 2, one school from each category responded positively. The study, therefore, included one Cantonese-medium government aided school (category 1) and one English-medium English Schools Foundation school (category 2). Fieldwork was carried out over five days from November 2015 to January 2016. Invitation letters were sent to all students' parents in both schools prior to the respective survey days in order to indicate whether consent would be given for their children to participate in the study. The survey respondents consisted of 393 students from the two schools, with around 35 students per grade from Primary 1 to 6 (roughly six to twelve years old) during the survey days by a team of trained research assistants.

## 3. Results and discussion

### 3.1. School and associated journeys

School travel data were provided by children's parents ( $n = 281$ ), describing their child's travel mode, time taken and accompaniment in their journeys from home to school and back. This sub-section shall thoroughly discuss children's school travel, in terms of active and independent travel, travel mode and travel time, which contributes to the understanding of children's travel behaviour with respect to their age and gender. Children's wellbeing in both momentary and overall terms is also discussed with respect to their school travel characteristics, in order to better understand their interrelationships in descriptive terms.

For continuity and better understanding of the effect of possible after-school play and other activities on happiness ratings, the whole journey associated with children's travel from school to return back home is analysed, as shown in Tables 1–3 below. From Table 1, school bus was the main transport mode, for 39% of children. This was followed closely by walking at 28% and bus (including minibus) at 10%. Rail, ferry and car had around 7–8% of the share each. Happiness ratings of their journeys departing school was the highest for ferry (8.84), followed by walking (8.47) and school bus (8.13). Students travelling from school back home by bus/ minibus (7.90) rated their journeys as less happy, and lower still were travellers by rail and car (both 7.64).

After the above overview of travel modes and happiness particular to the journey departing school, the discussion is expanded to happiness ratings in terms of both momentary and overall

**Table 1**  
Children's primary travel mode and happiness while departing school.

|              | Frequency | Percentage (%) | Happiness on journeys departing school (mean rating) <sup>a</sup> |
|--------------|-----------|----------------|---|
| Walk         | 78        | 27.8           | 8.47  |
| Bus/ minibus | 29        | 10.3           | 7.90  |
| MTR/ tram    | 22        | 7.8            | 7.64  |
| School bus   | 110       | 39.1           | 8.13  |
| Car          | 22        | 7.8            | 7.64  |
| Ferry        | 20        | 7.1            | 8.84  |
| Total        | 281       | 100.0          | 8.17  |

<sup>a</sup> The happiness rating is on a ten-point scale from 1 (very unhappy) to 10 (very happy).

**Table 2**

Descriptive statistics and statistical testing of the happiness variables along walking status in journey departing school.

| Happiness variables <sup>#</sup> |                    | All (n = 281) |       | Walking to depart school (n = 78) |       | Not walking to depart school (n = 203) |       | Mann-Whitney U for walking status |          |
|----------------------------------|--------------------|---------------|-------|-----------------------------------|-------|--|-------|-----------------------------------|----------|
|                                  |                    | Mean          | SD    | Mean                              | SD    | Mean                                   | SD    | W                                 | p        |
| Momentary wellbeing              | To-school travel   | 7.456         | 2.271 | 7.385                             | 2.314 | 7.483                                  | 2.265 | 8073                              | 0.796    |
|                                  | From-school travel | 8.171         | 2.124 | 8.474                             | 1.985 | 8.054                                  | 2.174 | 7093                              | 0.18     |
|                                  | PE lesson          | 8.764         | 1.86  | 9.026                             | 1.914 | 8.663                                  | 1.838 | 6421                              | 0.009*** |
|                                  | Computer games     | 8.093         | 2.465 | 8.123                             | 2.267 | 8.082                                  | 2.552 | 6998                              | 0.582    |
|                                  | Outdoor play       | 8.95          | 1.48  | 9.256                             | 1.189 | 8.83                                   | 1.57  | 6660                              | 0.04**   |
| Overall wellbeing                | School             | 7.84          | 2.046 | 7.962                             | 2.098 | 7.793                                  | 2.034 | 7429                              | 0.415    |
|                                  | Life               | 8.359         | 1.744 | 8.41                              | 1.739 | 8.34                                   | 1.754 | 7771                              | 0.806    |

p &lt; 0.1.

\*\*\* p &lt; 0.01.

\*\* p &lt; 0.05.

<sup>#</sup> The rating is on a ten-point scale from 1 (very unhappy) to 10 (very happy).**Table 3**

Accompaniment for children's journeys departing school by age and gender.

|              |  | Child's age |              |           |              |           |              |           |              |           |              |           |              | Child's gender |              |            |              | Total      |              | Happiness on<br>journeys departing<br>school (mean<br>rating) <sup>*</sup> |
|--------------|--|-------------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|----------------|--------------|------------|--------------|------------|--------------|--|
|              |  | 5–6         |              | 7         |              | 8         |              | 9         |              | 10        |              | 11–12     |              | Male           |              | Female     |              |            |              |  |
|              |  | <i>f</i>    | %            | <i>f</i>  | %            | <i>f</i>  | %            | <i>f</i>  | %            | <i>f</i>  | %            | <i>f</i>  | %            | <i>f</i>       | %            | <i>f</i>   | %            | <i>f</i>   | %            |  |
| Yes          | Parent(s)  | 16          | 32.0         | 22        | 51.2         | 13        | 27.1         | 13        | 23.2         | 14        | 28.0         | 7         | 20.6         | 43             | 27.6         | 42         | 33.6         | 85         | 30.2         | 8.26   |
|              | School bus<br>driver/ nanny                      | 19          | 38.0         | 13        | 30.2         | 11        | 22.9         | 14        | 25.0         | 12        | 24.0         | 4         | 11.8         | 46             | 29.5         | 27         | 21.6         | 73         | 26.0         | 8.29   |
|              | Helper and<br>other                              | 4           | 8.0          | 1         | 2.3          | 10        | 20.8         | 6         | 10.7         | 9         | 18.0         | 2         | 5.9          | 21             | 13.5         | 11         | 8.8          | 32         | 11.4         | 8.04   |
|              | Combination<br>of two or<br>more of the<br>above | 11          | 22.0         | 6         | 14.0         | 13        | 27.1         | 14        | 25.0         | 10        | 20.0         | 7         | 20.6         | 27             | 17.3         | 34         | 27.2         | 61         | 21.7         | 8.13   |
| No           |  | 0           | 0.0          | 1         | 2.3          | 1         | 2.1          | 9         | 16.1         | 5         | 10.0         | 14        | 41.2         | 19             | 12.2         | 11         | 8.8          | 30         | 10.7         | 7.90   |
| <i>Total</i> |  | <i>50</i>   | <i>100.0</i> | <i>43</i> | <i>100.0</i> | <i>48</i> | <i>100.0</i> | <i>56</i> | <i>100.0</i> | <i>50</i> | <i>100.0</i> | <i>34</i> | <i>100.0</i> | <i>156</i>     | <i>100.0</i> | <i>125</i> | <i>100.0</i> | <i>281</i> | <i>100.0</i> | <i>8.17</i>  |

f = frequency.

<sup>\*</sup> The happiness rating is on a ten-point scale from 1 (very unhappy) to 10 (very happy).

wellbeing. Using the Mann-Whitney *U* test to compare the means of happiness ratings grouped by active versus motorised travel in their journey departing school, some enlightening results were found, as shown in Table 2. The main consideration for using the Mann-Whitney *U* test was to use a more lenient, non-parametric test which does not assume normality and is able to accommodate for variables where normality is uncertain, with various applications in transportation studies, especially in terms of travel-related perceptions/ attitudinal measures along a rated scale (e.g. Xu et al., 2009; Minhans et al., 2014; Dallen, 2007). Happiness ratings were higher nearly all across the board, in particular with happiness in PE class and when playing outdoors with friends, both significant to the  $p < 0.01$  and  $p < 0.05$  levels respectively. While not definitive across all happiness items, children engaging in walking journeys to depart school rated their journeys happier than compared with those departing school by motorised modes. These walking children also found more enjoyment in active pursuits. This is in line with findings by Romero (2015) and Ramanathan et al. (2014), which found that children who walked for school travel had more positive moods.

For companionship, as seen in Table 3, the vast majority (nearly 90%) of children were accompanied by adults during some or the entire part of their journeys departing school, with 63% of these children being accompanied by their parents or bus drivers/ nannies. Happiness ratings were the lowest for children with independent travel, though it is important to note that there were very few such children, and nearly half of them were in the 11- to 12-year-old category. Again using the non-parametric Mann-Whitney

*U* test, the comparison of means testing was inconclusive ( $p = 0.186$ ), and further testing with other happiness ratings with presence of independent mobility on the school-home journey also yielded no significant results. However, it is still intriguing to note that independent travellers seem to be less happy on their school journeys than their adult-accompanied counterparts. This is a pathway worth exploring in future studies, as the psychological wellbeing of children during travel is still understudied. For example, children rated their journeys on school buses quite highly, which may indicate a preference for children to be with other students of the same school. This interaction is possible on a school bus journey, but not if the child is, for example, driven directly home by his or her parents, or if he or she walks home alone.

**Table 4**

Children's mean school travel time.

|                 | To school (in minutes) | From school (in minutes) |
|-----------------|------------------------|--------------------------|
| Age (years old) |                        |                          |
| 5–6             | 24                     | 25                       |
| 7               | 28                     | 32                       |
| 8               | 24                     | 28                       |
| 9               | 31                     | 36                       |
| 10              | 27                     | 30                       |
| 11–12           | 26                     | 30                       |
| Gender          |                        |                          |
| Male            | 25                     | 29                       |
| Female          | 29                     | 32                       |
| Total           | 27                     | 30                       |

Finally, regarding travel time in Table 4, students on average spent 27–30 min one way for school-associated travels, with girls travelling slightly longer. Travel duration did appear to differ by age but revealed no particular pattern. School travel time for the selected participants in this study are around double the one-way average travel time, at 13 and 14 min, for primary school children in the United Kingdom and Queensland, Australia respectively (National Travel Survey, 2014; Department of Transport and Main Roads, 2012). While this study does not claim to represent characteristics of Hong Kong-wide school travel, the figure of 27–30 min corresponds relatively well with Hong Kong's figure of 38 min from the Transport Department (2014) for home-based travel to school (inclusive of all full-time students, regardless of primary, secondary or other levels of education).

### 3.2. Scheduled activities and associated journeys

With scheduled activities being a common part of Hong Kong children's daily lives, an analysis of the type, number and associated travel of children's scheduled activities is another important aspect of this study, along with the relationship with children's travel behaviour. This sub-section complements the previous discussion about school travel, in terms of understanding children's scheduled activities by age and gender, while at the same time considering their associated travel behaviour. Scheduled activities are becoming more common in increasingly urbanised and high-pressure global cities with a large middle-class segment, and with

Hong Kong as one of the more extreme examples (Karsten, 2014), this study provides a lesser studied dimension for understanding children's travel behaviour.

The scheduled activities and associated travel were self-reported by children, and further categorised based on the Education Bureau's (2012) scheduled activity typology, namely 1) academic, 2) sports, 3) art, 4) interest/ hobby and 5) service. Table 5 shows some examples of these out-of-home activities that surveyed children took part in.

Categorised using the above typology, Tables 6–8 describe activities that the child respondents participated in with respect to the activity type, activity duration and associated travel characteristics, such as travel time and presence of adult accompaniment. From Table 6, it is evident that walking was the main associated travel mode for close to two fifths of the total number of the children's scheduled activities, closely followed by private car at just under a quarter, bus/ minibuses at 17% and rail at 12%. In this respect, though active travel is only associated with 38% of children's activities, there are over three quarters of the activities where the children (often with one or both their parents) walk or take public transport to attend these scheduled activities.

Table 7 shows that the vast majority of children's activities – over four fifths – had associated travel accompanied by an adult, with nearly one half of which being the mother. This indicates the traditional role of the mother being responsible first and foremost to taking care of their children, in this case with respect to the choice of and travel for scheduled out-of-home activities. This is in line with findings in Karsten's (2014) small-scale pilot study on middle-class parents in Hong Kong, where it was acknowledged that mothers in particular exhibited intensive parenting in “choosing, communicating and supervising extracurricular activities” (p. 567), and also Holloway and Pimlott-Wilson's (2014) British study, which found that especially in middle class families, chauffeuring children between scheduled activities represented an important commitment for mothers, and a basis for the child-centred organisation of family time.

Table 8 gives an overview of the scheduled activities by the number of activities, minutes of activities per week and associated travel time per week. As a whole, the surveyed children had 2.61 weekly scheduled activities, with 9- to 12-year-olds averaging at around 3 per week and 5- and 6-year-olds at less than two per week. In terms of time spent participating in scheduled activities each week, once again, 9- to 12-year-olds averaged far higher than their younger schoolmates, at nearly six hours per week. 5- to 8-year-olds still spent over three hours per week participating in scheduled activities. Associated travel time was higher for older students, and understandably so as they would be expected to be capable of travelling longer distances and begin to become more independent. Children aged 5–6 reported less than one hour per

**Table 5**  
Examples of scheduled activities by type.

| Activity type   | Examples   |
|-----------------|--|
| Academic        | Language classes, tutorial centres, cram schools |
| Sports          | Tennis, rugby, taekwondo                         |
| Arts            | Piano, recitation, orchestra                     |
| Interest/ Hobby | Chess, Lego, magic class                         |
| Service         | Red Cross, HK Adventure Corps, Sunday Mass       |

**Table 6**  
Main transport mode associated with travel for children's scheduled activities.

|                  | Frequency | Percentage (%) |
|------------------|-----------|----------------|
| Walking/ cycling | 396       | 38.9           |
| Car/ taxi        | 238       | 23.4           |
| Bus/ minibuses   | 173       | 17.0           |
| MTR/ tram        | 123       | 12.1           |
| Others           | 87        | 8.6            |
| Total            | 1017      | 100.0          |

**Table 7**  
Travel accompaniment for children's scheduled activities by age and gender.

|              |   | Child's age |              |            |              |            |              |            |              |            |              |            |              | Child's gender |              |            |              | Total      |              |
|--------------|---|-------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|----------------|--------------|------------|--------------|------------|--------------|
|              |   | 5–6         |              | 7          |              | 8          |              | 9          |              | 10         |              | 11–12      |              | Male           |              | Female     |              |            |              |
|              |   | <i>f</i>    | %            | <i>f</i>   | %            | <i>f</i>   | %            | <i>f</i>   | %            | <i>f</i>   | %            | <i>f</i>   | %            | <i>f</i>       | %            | <i>f</i>   | %            | <i>f</i>   | %            |
| Yes          | Father only   | 22          | 16.4         | 33         | 22.6         | 24         | 15.7         | 16         | 7.8          | 19         | 9.6          | 11         | 10.4         | 59             | 11.6         | 66         | 15.3         | 125        | 13.3         |
|              | Mother only   | 54          | 40.3         | 44         | 30.1         | 58         | 37.9         | 75         | 36.8         | 57         | 28.8         | 25         | 23.6         | 186            | 36.5         | 127        | 29.5         | 313        | 33.3         |
|              | One adult, other than father or mother                    | 29          | 21.6         | 42         | 28.8         | 45         | 29.4         | 52         | 25.5         | 28         | 14.1         | 11         | 10.4         | 99             | 19.4         | 108        | 25.1         | 207        | 22.0         |
|              | Both parents  | 21          | 15.7         | 16         | 11.0         | 21         | 13.7         | 11         | 5.4          | 26         | 13.1         | 10         | 9.4          | 62             | 12.2         | 43         | 10.0         | 105        | 11.2         |
|              | Two or more adults, at least one of which is not a parent | 7           | 5.2          | 4          | 2.7          | 1          | 0.7          | 13         | 6.4          | 6          | 3.0          | 1          | 0.9          | 18             | 3.5          | 14         | 3.2          | 32         | 3.4          |
| No           |   | 1           | 0.7          | 7          | 4.8          | 4          | 2.6          | 37         | 18.1         | 62         | 31.3         | 48         | 45.3         | 86             | 16.9         | 73         | 16.9         | 159        | 16.9         |
| <i>Total</i> |   | <i>134</i>  | <i>100.0</i> | <i>146</i> | <i>100.0</i> | <i>153</i> | <i>100.0</i> | <i>204</i> | <i>100.0</i> | <i>198</i> | <i>100.0</i> | <i>106</i> | <i>100.0</i> | <i>510</i>     | <i>100.0</i> | <i>431</i> | <i>100.0</i> | <i>941</i> | <i>100.0</i> |

f = frequency.



**Table 8**  
An overview of children's scheduled activities by age and gender.

| Description     | All activities                     |                                     |   | Academic                            |  |                                     | Sports                              |  |                                     | Arts                                |  |                                     | Interest/ Hobby                     |  |                                     | Service                             |  |  |
|-----------------|------------------------------------|-------------------------------------|---|-------------------------------------|--|-------------------------------------|-------------------------------------|--|-------------------------------------|-------------------------------------|--|-------------------------------------|-------------------------------------|--|-------------------------------------|-------------------------------------|--|--|
|                 | Mean number of activities per week | Mean duration (in minutes per week) | Mean associated travel time (in minutes per week) | Mean duration (in minutes per week) | % of total duration of activities per week | Mean duration (in minutes per week) | Mean duration (in minutes per week) | % of total duration of activities per week | Mean duration (in minutes per week) | Mean duration (in minutes per week) | % of total duration of activities per week | Mean duration (in minutes per week) | Mean duration (in minutes per week) | % of total duration of activities per week | Mean duration (in minutes per week) | Mean duration (in minutes per week) | % of total duration of activities per week |  |
| Age (years old) |                                    |                                     |   |                                     |  |                                     |                                     |  |                                     |                                     |  |                                     |                                     |  |                                     |                                     |  |  |
| 5–6             | 1.95                               | 215                                 | 57  | 60                                  | 27.8                                       | 101                                 | 47.3                                | 36   | 16.7                                | 18                                  | 8.6  | 5                                   | 2.4                                 |  |                                     |                                     |  |  |
| 7               | 2.34                               | 223                                 | 81  | 71                                  | 31.9                                       | 82                                  | 37.0                                | 59   | 26.4                                | 3                                   | 1.4  | 12                                  | 5.5                                 |  |                                     |                                     |  |  |
| 8               | 2.72                               | 272                                 | 91  | 99                                  | 36.6                                       | 101                                 | 37.1                                | 53   | 19.4                                | 6                                   | 2.4  | 12                                  | 4.5                                 |  |                                     |                                     |  |  |
| 9               | 3.00                               | 340                                 | 110   | 145                                 | 42.6                                       | 112                                 | 32.9                                | 55   | 16.2                                | 15                                  | 4.5  | 26                                  | 7.6                                 |  |                                     |                                     |  |  |
| 10              | 2.92                               | 325                                 | 120   | 100                                 | 30.7                                       | 125                                 | 38.6                                | 67   | 20.6                                | 9                                   | 2.7  | 29                                  | 9.0                                 |  |                                     |                                     |  |  |
| 11–12           | 2.92                               | 396                                 | 105   | 203                                 | 51.3                                       | 79                                  | 19.9                                | 65   | 16.4                                | 5                                   | 1.2  | 44                                  | 11.2                                |  |                                     |                                     |  |  |
| Gender          |                                    |                                     |   |                                     |  |                                     |                                     |  |                                     |                                     |  |                                     |                                     |  |                                     |                                     |  |  |
| Male            | 2.64                               | 283                                 | 91  | 94                                  | 33.1                                       | 124                                 | 43.7                                | 34   | 12.1                                | 16                                  | 5.6  | 22                                  | 7.8                                 |  |                                     |                                     |  |  |
| Female          | 2.57                               | 296                                 | 96  | 123                                 | 41.5                                       | 77                                  | 26.0                                | 79   | 26.9                                | 3                                   | 1.1  | 18                                  | 5.9                                 |  |                                     |                                     |  |  |
| Total           | 2.61                               | 289                                 | 94  | 107                                 | 37.0                                       | 102                                 | 35.4                                | 55   | 19.0                                | 10                                  | 3.5  | 20                                  | 6.9                                 |  |                                     |                                     |  |  |

week on average for travel related to scheduled activities, while the same figure for children aged 11–12 was closer to two hours. For travel characteristics associated with scheduled activities overall, gender differences were negligible.

Time spent on academic and arts activities generally increased with age, but the same figure for sports activities appeared to drop somewhat. This is possibly indicative of upper years having more homework and their need to manage pre-secondary school preparations (entrance examinations, interviews, visits and the like), leading to the lower participation in sports activities. Also worth pointing out is the gender difference in participation for academic, sports and arts activities. Girls participated in academic and arts activities for about 27% and 133% longer than boys per week on average, while boys participated in sports activities for about 65% longer than girls per week on average. This shows that parents of children in this study do arrange for different types of activities somewhat in accordance with their child's gender, which was also the case for some families in [Holloway and Pimlott-Wilson's \(2014\)](#) study.

### 3.3. Wellbeing and associated factors

Regarding children's psychological wellbeing and its relationship with children's age, gender and travel behaviour, this study continues to use children's self-reported activity data, happiness ratings as well as measures of their self-confidence and perceptions for analysis. This sub-section contributes to understanding various aspects of children's momentary and overall wellbeing, along with how these happiness ratings are associated with descriptive measures of age, gender and travel behaviour. Ultimately, these results all culminate to the comprehensive, major contribution of this study, in tying all strands of analysis together to develop a model explaining life satisfaction of children in Hong Kong.

In understanding momentary and overall wellbeing, this study employed the semantic differential scale, which enabled children to determine how they would feel in different situations, via simple vocabulary, i.e. the polar opposites of “very happy” and “very unhappy”. Graphical overviews by age and gender are shown in [Figs. 2 and 3](#) respectively.

From [Fig. 2](#), there was a recurring phenomenon of happiness ratings for 8- or 9-year-olds being slightly lower than children both younger and older than them, such as 8-year-olds in to-school travel, school overall and life in general, and 9-year-olds in from-school travel, PE class and playing computer games. In short, the happiness ratings dipped slightly for 8- or 9-year-olds, and the reason would require further investigation to confirm whether this is only peculiar to this particular set of students, or whether this is a wider phenomenon. One conjecture could be that 8- and 9-year-old students, at around Primary 3, were being subjected to Hong Kong's Territory-wide System Assessment (TSA) preparation and examinations during the survey period, and as a result rated their happiness as lower. While this is not the foremost focus of this study, it would be helpful for policymakers, educators and scholars alike to continue their discussion and research in order to confirm whether the Primary 3 TSA exams have played a part in causing children to be less happy.

To test for differences across age groups and with little linear directional cues to consider, ANOVA was employed and significant differences between different age groups were found for happiness during to-school travel, playing computer games and for satisfaction with school overall, significant to the  $p < 0.01$ ,  $p < 0.05$  and  $p < 0.05$  levels respectively, as seen from [Table 9](#). This lends some evidence especially in terms of there being a level of dislike – at the very least, lesser enjoyment – for the journey to school and

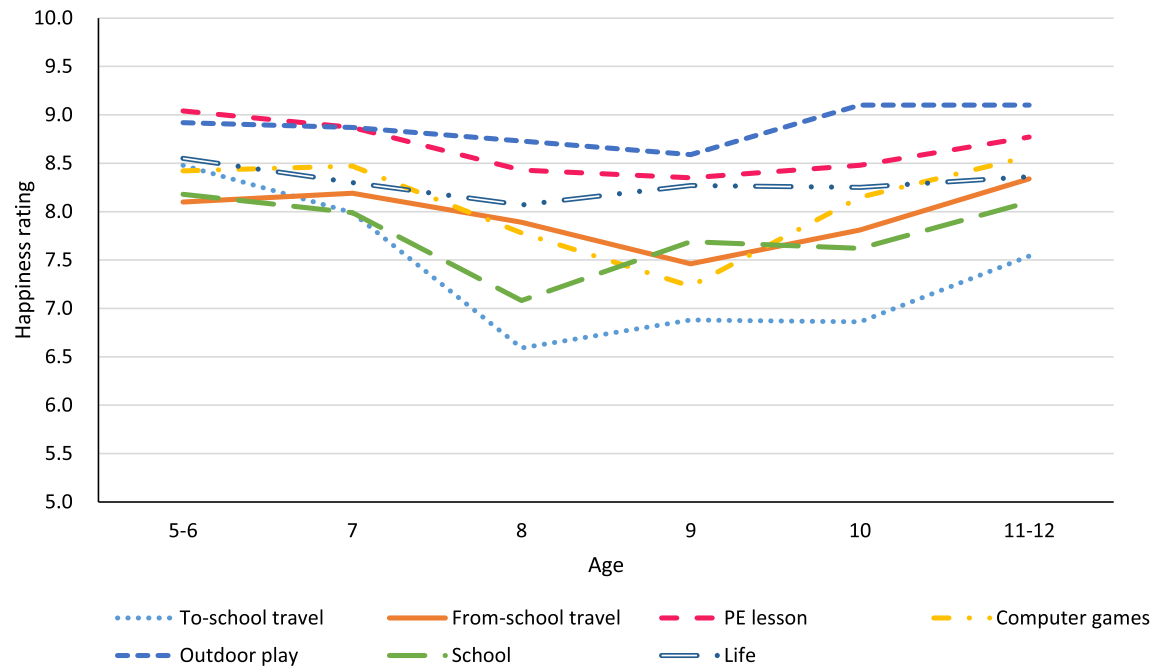


Fig. 2. Overview of children's self-reported happiness ratings in different situations by age.

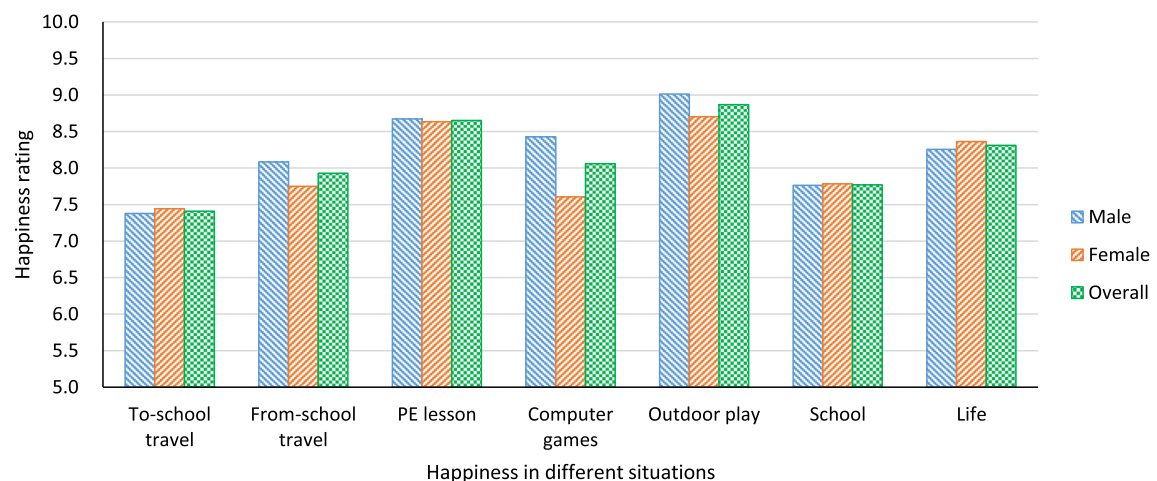


Fig. 3. Overview of children's self-reported happiness ratings in different situations by gender.

for school overall amongst children aged 8 or 9, that is around Primary 3.

From Fig. 3, there were considerable gender differences for from-school travel, playing computer games and outdoor play, at 0.34, 0.82 and 0.34 higher for boys than for girls. Boys feeling happier than girls while “playing on computer games with friends” is in line with findings in the literature that found boys to be more likely to play and be dependent on computer games: those dependent on computer games regarded the experience as “fun, excitement, a challenge” (Griffiths and Hunt, 1998, p. 478). Similarly, for “playing outdoors with friends”, boys enjoyed it more, which is comparable with findings in an American study by Larson et al. (2011, p. 9) which found that “more boys than girls went outdoors to just play or hang out” among other outdoor activities. It may be possible to relate this finding with higher self-reported enjoyment in boys’ travel while departing school, in comparison with girls, possibly meaning more opportunities for outdoor play and socialising with friends.

Overall, for all surveyed children ( $n = 393$ ), the means of the happiness items ranged from a low of 7.41 for the journey to school, to a high of 8.87 for outdoor play with friends. Standard deviation was highest for the computer game item. Differences by gender were tested for using the non-parametric Mann-Whitney  $U$  test once again, and significant differences between boys and girls were found for enjoyment of playing computer games, as expected, at the  $p < 0.01$  level, as seen in Table 10. Comparatively higher enjoyment for boys during outdoor play was noted but not to a significant level. Boys did however enjoy their travel departing school more than girls weakly significant to a  $p < 0.1$  level, confirming the earlier finding that was indicative of boys being keen on enjoying their journeys home, perhaps via after-school play or other activities, more so than girls.

Finally, the ultimate aim of this study is to gauge whether, and if so how, children's life satisfaction can be explained along the key variables of age and gender, as well as momentary wellbeing, travel behaviour, scheduled activities and children's self-confidence

**Table 9**  
ANOVA of the happiness variables by age.

| Happiness variables |                    | Sum of Squares | df   | Mean Square | F    | Sig.     |
|---------------------|--------------------|----------------|------|-------------|------|----------|
| Momentary wellbeing | To-school travel   | 197.15         | 5    | 39.43       | 8.48 | 0.000*** |
|                     |                    | 1799.90        | 387  | 4.65        |      |          |
|                     |                    | 1997.04        | 392  |             |      |          |
|                     | From-school travel | 31.06          | 5    | 6.21        | 1.24 | 0.288    |
|                     |                    | 1928.08        | 386  | 5.00        |      |          |
|                     |                    | 1959.14        | 391  |             |      |          |
|                     | PE lesson          | 27.29          | 5    | 5.46        | 1.42 | 0.216    |
|                     |                    | 1479.10        | 385  | 3.84        |      |          |
|                     |                    | 1506.39        | 390  |             |      |          |
|                     | Computer games     | 82.79          | 5    | 16.56       | 2.77 | 0.018**  |
|                     |                    | 2094.97        | 350  | 5.99        |      |          |
|                     |                    | 2177.76        | 355  |             |      |          |
|                     | Outdoor play       | 12.91          | 5    | 2.58        | 1.04 | 0.391    |
| 938.62              |                    | 380            | 2.47 |             |      |          |
| 951.52              |                    | 385            |      |             |      |          |
| Overall wellbeing   | School             | 51.40          | 5    | 10.28       | 2.42 | 0.035**  |
|                     |                    | 1645.44        | 387  | 4.25        |      |          |
|                     |                    | 1696.84        | 392  |             |      |          |
|                     | Life               | 8.72           | 5    | 1.74        | 0.53 | 0.757    |
|                     |                    | 1284.64        | 387  | 3.32        |      |          |
|                     |                    | 1293.36        | 392  |             |      |          |

p < 0.1.

\*\*\* p < 0.01.

\*\* p < 0.05.

**Table 10**  
Descriptive statistics and statistical testing of the happiness variables by gender.

| Happiness variables <sup>#</sup> |                    | All (n = 393) |       | Boys (n = 211) |       | Girls (n = 182) |       | Mann-Whitney U for gender |          |
|----------------------------------|--------------------|---------------|-------|----------------|-------|-----------------|-------|---------------------------|----------|
|                                  |                    | Mean          | SD    | Mean           | SD    | Mean            | SD    | W                         | p        |
| Momentary wellbeing              | To-school travel   | 7.41          | 2.254 | 7.379          | 2.299 | 7.445           | 2.214 | 19453                     | 0.820    |
|                                  | From-school travel | 7.931         | 2.236 | 8.085          | 2.241 | 7.751           | 2.228 | 17043                     | 0.059*   |
|                                  | PE lesson          | 8.655         | 1.963 | 8.671          | 1.935 | 8.635           | 2.005 | 19221                     | 0.834    |
|                                  | Computer games     | 8.059         | 2.473 | 8.429          | 2.329 | 7.606           | 2.582 | 12389                     | 0.001*** |
|                                  | Outdoor play       | 8.87          | 1.57  | 9.014          | 1.357 | 8.702           | 1.781 | 17203                     | 0.198    |
| Overall wellbeing                | School             | 7.774         | 2.078 | 7.763          | 1.967 | 7.786           | 2.211 | 19881                     | 0.538    |
|                                  | Life               | 8.305         | 1.814 | 8.256          | 1.9   | 8.363           | 1.718 | 19444                     | 0.824    |

p < 0.05.

\*\*\* p < 0.01.

\* p < 0.1.

<sup>#</sup> The rating is on a ten-point scale from 1 (very unhappy) to 10 (very happy).

and perceptions. The variable describing happiness with life in general was used as the dependent variable, which was determined to be normal with its skewness and excess kurtosis within an acceptable range (−1.27 and 1.42 respectively). Statistical analysis by ordinary least squares linear regression was conducted. Table 11 shows the table of coefficients from the model. Collinearity diagnostics were examined, and the VIF and condition indices were of no concern. The model summary produced a satisfactory R<sup>2</sup> value of 0.266, which indicates that the model explains nearly 27% of the variability of the model. The p-value of the ANOVA between group means of independent variables in this model stood at p < 0.001, which is indicative of a strongly significant result.

From Table 11, momentary wellbeing for school travel, PE lessons and outdoor play items were all positive predictors for higher happiness with life in general, at the p < 0.05 level (p < 0.01 for PE lessons). The relationship of life satisfaction with momentary wellbeing in the computer game item was weakly significant, but with a negative sign at the p < 0.1 level. This indicates that higher happiness while playing computer games is a weak predictor of poorer overall wellbeing in terms of life satisfaction. Higher overall self-care ability and overall perception of road-crossing safety in Hong Kong were significant predictors for increased happiness of life in general at the p < 0.1 and p < 0.05 levels respectively. This lends

support to the proposition that children's increased confidence of independent self-care ability can heighten satisfaction with life in general, as can children's perception of road-crossing in Hong Kong as a whole to be safe for at-grade navigation.

Parental licence to cross roads, while significant at the p < 0.01 level, was unexpectedly negatively associated with the psychological wellbeing of the children. In other words, for children who said they were allowed more often by their parents to cross roads alone actually tended to rate their lives as less happy in general. Incidentally, this may also echo with the earlier finding for momentary wellbeing that children who were accompanied in travel on average rated those journeys as happier than those travelling independently. This may at first glance seem to relate with the effect of age, as there were more independent travellers in the older age groups. However, after considering all variables in the model, increased age was positively associated with overall life satisfaction at the p < 0.05 level. Perhaps primary school children, regardless of age, actually prefer to have an adult accompanying them to and from school.

Finally, as different types of motorised travel may have different relationships with children's happiness with life in general, the primary travel modes for children's school journeys were analysed separately using dummy variables in the linear regression model,



**Table 11**  
Coefficients from the linear regression model.

| Model   | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.     | Collinearity Statistics |       |
|---|-----------------------------|------------|---------------------------|--------|----------|-------------------------|-------|
|   | B                           | Std. Error |                           |        |          | Tolerance               | VIF   |
| (Constant)  | 1.995                       | 1.069      |                           | 1.867  | 0.063    |                         |       |
| Age   | 0.175                       | 0.080      | 0.164                     | 2.196  | 0.029**  | 0.556                   | 1.799 |
| Gender  | −0.207                      | 0.207      | −0.059                    | −1.001 | 0.318    | 0.906                   | 1.104 |
| Happiness – to-school travel                            | 0.110                       | 0.049      | 0.145                     | 2.253  | 0.025**  | 0.751                   | 1.332 |
| Happiness – from-school travel                          | 0.107                       | 0.052      | 0.130                     | 2.068  | 0.040*** | 0.787                   | 1.270 |
| Happiness – PE lesson                                   | 0.203                       | 0.062      | 0.214                     | 3.301  | 0.001*** | 0.735                   | 1.361 |
| Happiness – computer games                              | −0.072                      | 0.043      | −0.102                    | −1.678 | 0.095*   | 0.836                   | 1.196 |
| Happiness – outdoor play                                | 0.170                       | 0.074      | 0.147                     | 2.311  | 0.022**  | 0.766                   | 1.306 |
| Number of activities in a week                          | −0.103                      | 0.066      | −0.091                    | −1.550 | 0.123    | 0.894                   | 1.119 |
| Parental licence to cross roads                         | −0.288                      | 0.094      | −0.235                    | −3.072 | 0.002*** | 0.528                   | 1.892 |
| Independent travel departing school                     | 0.252                       | 0.356      | 0.046                     | 0.707  | 0.480    | 0.743                   | 1.345 |
| Overall self-care ability                               | 0.193                       | 0.114      | 0.101                     | 1.696  | 0.091*   | 0.871                   | 1.148 |
| Overall perception of road-crossing safety in Hong Kong | 0.232                       | 0.104      | 0.135                     | 2.227  | 0.027**  | 0.839                   | 1.193 |
| Main travel mode departing school                       |                             |            |                           |        |          |                         |       |
| Ferry   | −0.149                      | 0.426      | −0.022                    | −0.350 | 0.727    | 0.795                   | 1.257 |
| Car   | 1.300                       | 0.422      | 0.195                     | 3.078  | 0.002*** | 0.770                   | 1.298 |
| School bus  | 0.294                       | 0.257      | 0.082                     | 1.142  | 0.255    | 0.600                   | 1.668 |
| Rail  | −0.924                      | 0.421      | −0.135                    | −2.192 | 0.029**  | 0.813                   | 1.230 |
| Bus   | −0.115                      | 0.365      | −0.020                    | −0.315 | 0.753    | 0.778                   | 1.285 |

Reference groups:.

Gender = Female.

Main travel mode departing school = Walk.

\*\*\*  $p < 0.01$ .

\*\*  $p < 0.05$ .

\*  $p < 0.1$ .

instead of a binary analysis of active versus motorised travel modes. Children using rail transport (mainly MTR) to depart school were less happy with life in general (significant at the  $p < 0.05$  level) when compared with the reference group of “walking”. This may be indicative of rail transport being crowded and uncomfortable for children, and the need for modal transfer(s) when the MTR is used. In contrast, children being picked up from school by car were happier with life in general (significant to the  $p < 0.01$  level) when compared with walking. One distinct proposition here may be that children from wealthier family backgrounds are able to afford to put their children on school bus service or drive their children to/ from school, instead of having their children take the MTR, and these children happen to rate their lives happier. Ultimately, whether independent and/ or active travel predict children's wellbeing, as a result of family background and socioeconomic status, is outside the scope of this study, but would undoubtedly be worthwhile for researchers to further investigate.

Other variables, such as gender, number of scheduled activities in a week and independent travel for departing school were not statistically significant at the  $p < 0.1$  level. However, some of these results' directions do give some potential cues for further study. For example, less weekly number of activities pointed toward predicting a higher life satisfaction rating. This may illustrate that children prefer fewer scheduled activities, perhaps a couple they actually enjoy. This may serve as a starting point for investigation with a wider sample of primary school children, to understand the potential effects of scheduled activities and their associated travel with self-reported ratings of psychological wellbeing, in addition to the more usually investigated school travel characteristics, in order to achieve a more comprehensive understanding of the complex interplay between children's mobility, wellbeing and their own perceptions.

#### 4. Conclusion

This study discussed children's travel characteristics and psychological wellbeing (momentary and overall), along with their

interrelationships. Key findings that represent major contributions to this study's aims are summarised hereafter.

Over half of travel associated with scheduled activities and departing from school were completed mainly on foot or by public transport. Most children's journeys were accompanied by adults, especially for children aged 9 or under. Children's momentary wellbeing during travel was investigated, and results revealed happier school travel for active and accompanied journeys. Children who walked to depart school rated these journeys considerably happier than their counterparts who used motorised transport. Furthermore, children who departed school walking rated PE lessons and outdoor play with friends as significantly happier than their non-walking counterparts. Children travelling accompanied by adults (particularly school bus drivers/ bus nannies) rated these journeys happier than their independently travelling counterparts. Regarding travel behaviour and momentary wellbeing, it seems that increasing the rate of active travel and keeping the current status quo of low independent travel seems to be a viable way forward to improve primary schoolchildren's momentary wellbeing.

Regarding children's overall wellbeing, in particular their satisfaction with life, a linear regression model was used to identify explanatory factors. Overall, happiness during school travel, PE and outdoor play, children's confidence in their self-care ability, positive perception of road-crossing safety in Hong Kong and being driven from school by car (relative to walking) were significant predictors of increased psychological wellbeing. Happiness while playing computer games with friends, parental licence provision and using rail to depart school (relative to walking) were negative predictors. In terms of improving overall psychological wellbeing, a reasonable way forward may be to continue improving neighbourhood road safety in Hong Kong to enable children to feel safer when using the road network, and also improve children's self-esteem via teaching them the skills needed to better take care of themselves.

In summary, using the conceptual model in Fig. 1, this study explored the factors behind children's life satisfaction, namely 1) age and gender under socio-demographic characteristics, 2) their school activities and extracurricular activities, 3) dimensions of

their travel behaviour, 4) their own estimation of self-care ability and perception of the road environment and 5) both activity-specific and mobility-specific momentary wellbeing. The conceptual framework that this study has proposed allows researchers to consider the children's socio-demographic characteristics, their activities, their travel behaviour, perceptions and momentary wellbeing in a holistic manner.

In moving forward, future research may consider complementing children's own views with parental perception data, focusing on child-parent differences in the perception of children's capabilities, for better understanding of children's mobility and wellbeing. This would fit under the umbrella of perceptions, attitudes and knowledge in the conceptual model, which may contribute to shaping children's overall wellbeing and life satisfaction. Future studies may also examine other relevant socio-demographic characteristics and travel behaviour variables as listed in the conceptual model, such as children's residential locations and their actual travel routes to and from school respectively (Lam and Loo, 2014). Actual – in addition to perceived – neighbourhood characteristics may affect when children are granted mobility licences by parents, and travel behaviour is also likely to be closely related as well.

Considering the above conclusions and recommendations, it is hoped that this study may enable policymakers to plan for and regulate neighbourhoods safe for children to use, socialise and travel in. Children's mobility and autonomy interact with wellbeing in a complex manner. Further research would allow deeper investigation into the interplay between children's travel behaviour and parental concerns, alongside various facets of children's wellbeing and development.

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