Children's incidental social interaction during travel international case studies from Canada, Japan, and Sweden☆

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ABSTRACT

Incidental social interactions such as seeing a known person while travelling are theorized to contribute to community connections and social capital. It is argued in such work that walking may be a critical factor, but the frequency of such interactions is generally unknown. For children, these community connections may increase independent travel and contribute to their well-being. Previous research out of Japan found that walking was indeed more likely to result in children seeing people in general and seeing a known person. However, it is not clear whether that is a culturally anecdotal finding, or whether similar findings would occur in different cultural and transportation contexts. Reasons why it may be anecdotal include: in most cases, all elementary school children walk to school in Japan; many trips occur at a local level and are conducted by non-motorized modes in Japan; greeting others (*aisatsu*) is a cultural value in Japan. This study examines whether one's transport mode relates to having incidental social interaction during their trips for children aged 10–11 in Canada (177), Japan (178), and Sweden (144). Further to previous work, the research carried out here asked the children what type of interaction occurred (spoke, waved, no interaction, or other) which would relate to building or maintaining community connections. The findings demonstrate that the results are internationally applicable and that most incidental social interactions result in a verbal communication in all three countries.

1. Introduction

Previous research has found relationships between children's travel and incidental community connections (Waygood and Friman, 2015; Waygood and Kitamura, 2009). That research showed that children who walk and who travel independently were more likely to see others during travel, and, in particular, to see others that they knew. However, the survey was conducted in Japan where a cultural value is placed on saying hello to others (*aisatsu*). As well, as highlighted recently in a review of literature on transport and child well-being (Waygood et al., 2017) anecdotal results (i.e. results from one country/city) need to be tested in diverse contexts to test whether the results are consistent or not. Thus, the question remains whether the findings are robust; would they be found in other cultures or locations? Further, related to building or maintaining community connections, when the children notice others, what type of interaction occurs (e.g. simply notice the other, wave, speak, or some other interaction)?

Social connections are important for building and maintaining social capital and community cohesion, but also in general, social relationships. Mental health measures such as social relationships were found to have a higher impact on mortality than alcohol consumption, physical activity, body-mass index (obesity), and air quality; and the impacts are not age-dependent (Holt-Lunstad et al., 2010). As well, Helliwell and Putnam (2004) found that neighbourhood and community ties support both physical and subjective well-being. Important to the current research, Helliwell and Putnam also cite work showing a positive relationship between social networks and improved child welfare. Thus, social relationships are important for health, but most studies on the relationships between children's travel and their health and well-being have focused on physical aspects such as active travel (e.g. Bates and Stone, 2015; Schoeppe et al., 2013) or collisions (e.g. Rothman et al., 2014; Toroyan and Peden, 2007). Further to links with mortality, social relationships are also a strong explanatory factor of subjective well-being, which is a person's evaluation of their overall

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well-being. This is again true for both adults and children (Diener and Biswas-Diener, 2011; Park, 2004).

Children's transportation and health and well-being research has focused primarily on active travel, while little has examined how transportation might influence social interactions. There are numerous types of social interaction including planned, spontaneous, virtual, or face-to-face. They can happen at a destination, but they can also happen during a trip. Sociologists (e.g. Grannis, 2011) suggest that walking in a neighbourhood can contribute to social capital as individuals will incidentally see others, and then gradually develop these incidental interactions into conversations and deeper social relationships. In transportation literature, Carver et al. (2005), using a questionnaire on general travel behaviour and general perceptions of neighbourhood, found that children who reported walking for transport were statistically more likely to have responded that they waved or talked with their neighbours.

Incidental community connections can help build social capital. Grannis (2011) explains four steps starting from two individuals that do not know each other but have geographic proximity. The possibility of walking to local destinations creates the chance that those individuals would see each other. If this is frequent enough, familiarity would increase, and some social interaction could develop (e.g. nodding hello, smiling, small talk, etc.). Eventually, this may lead to intentional social interaction (e.g. visiting the neighbour's home). Through this process, Grannis argues how a walkable, mixed-use environment might support social capital in a community. Related to this, a study that compared highly walkable neighbourhoods to ones with low walkability found that children depicted in drawings of their neighbourhoods more active travel and peer interaction in the highly walkable neighbourhoods (Holt et al., 2008). Waygood and Friman (2015) also found that the most urbanized areas had the most incidental community connections.

Walking and independent travel were associated with a greater likelihood of seeing others and seeing people that the children knew while travelling (Waygood and Friman, 2015). However, the sample was from one region of Japan and it may have been an anecdotal finding. Thus, would the result hold for a different area of Japan that is less urban? Further, as Japan values and encourages greeting others, as well as having a population that walks at high rates (e.g. Susilo and Waygood, 2012; Waygood and Kitamura, 2009; Waygood et al., 2015a) it may be an anecdotal finding for that country. As well, few trips by the children in Waygood and Friman (2015) were by car, which may not reflect the reality of some Western countries. Thus, would the results hold in a country where the majority of travel by children is now by car?

The scientific objectives of this research are to determine whether a) are the results robust (e.g. can they be replicated)? b) Would the relationship hold for countries where much more of children's travel is by car?

2. Background

2.1. Community connections

For children, the benefits of better community connections include improved social skills, social interaction, well-being and safety. Interactions with adults, particularly adults who are not the child's parent(s) were associated with improved social skills for the child (Azuma et al., 1992). Such adults could be described as alloparents,[1] who can provide other important benefits such as safety and support (see below).

Social interactions help children to feel a sense of community (Pretty et al., 1996). If a child has strong community connections, then they may be more likely to have social interaction while travelling or

performing some activity in their community. Such face-to-face interaction, as opposed to on-line interaction, has been found to be the most important factor in establishing and sustaining social interactions (Urry, 2002). Positive social interactions and opportunities for identity development were found to enhance connection to the children's environment (Depeau, 2001). Relationships with members of a child's community play a role in building social networks known to affect children's well-being and a sense of belonging (Compas et al., 1986).

Social interaction and a sense of belonging are also important contributions to subjective well-being and quality of life (Diener and Biswas-Diener, 2011; Helliwell and Putnam, 2004; Sirgy, 2012) which also applies to adolescents and young children (Park, 2004; Pretty et al., 1996). For adults, having frequent interactions with friends and trusting one's neighbours and community are related to life satisfaction and happiness (two key elements of subjective well-being) as well as physical health (Helliwell and Putnam, 2004). Well-being and social relationships are associated and the absence of loneliness makes children healthier. Having friendly neighbours is negatively related to feelings of loneliness or experiencing sadness in adults (Helliwell and Putnam, 2004). Although this last relationship has not been demonstrated for children, it would seem intuitive that similar results would be found for them.

For well-being in life it is important for children to be in contact with and interact with other known people, to have parents that protect them and treat them well and to have a personal, safe place to be (Fattore et al., 2007; Pollard and Lee, 2003). The interactions can be 'bonding' where the child would make connections with other children, or 'bridging' where the child would make links with those dissimilar to themselves (e.g. adults, children of different ages or contexts). Feeling and being safe is an important part of children's subjective well-being (focuses on how children are feeling, often operationalized as degree of valence and activation). For children's well-being, Westman et al. (2013) found that children who travelled to school by car experienced significantly less activation (i.e. to a higher extent they felt tired, sleepy, and dull) than those who biked to school. A lack of social interactions with others apart from their family could be part of the explanation of why children experience a lower degree of well-being when they go by car.

Community connections can influence the sense of safety for the child and their parent(s). One reason is that known people may make the children feel secure and, if needed, provide help. Depeau (2001) found that for youth, 'the possibility of casual social interaction with people they knew, whether an adult or a peer, was certainly an attribute that allowed children to feel confident about being in a place, especially if they were alone' (pg. 85). Parents may gain a sense of safety through what is termed 'high visibility' (Bonner, 1997). High visibility is used to describe how someone is always around observing behaviour, and any bad behaviour by children would eventually make it back to parents. The parents of Bonner's study (Bonner, 1997) felt that if their children were always near someone they knew, their behaviour would be more restrained (they would not do bad things without someone who knew them finding out), and a known person could help if the need arose. In children's travel literature that concept was described by McDonald (2005) who commented that common sense suggests that parents' willingness to allow children to travel independently depends on their trust of their neighbours to act on behalf of their children, both to protect their safety and control their bad behaviour. This echoes Hillman et al. (1990) who proposed that the higher independent travel by West German children (to British children) could potentially be explained by cultural differences.[2] Those thoughts are supported by Prezza et al. (2001) found that Italian mothers with a high amount of neighbourhood relations were more likely to grant their child

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[1] Alloparents are defined as adults who help raise a child, despite not being a parent.

[2] In Germany it is socially acceptable for adults to verbally discipline unknown children in public, whereas this is not the case for modern English-culture.

autonomy. In a later study, McDonald et al. (2010) found that a variable for parents who reported a high level of social control was associated with a higher rate of walking or biking to school.

2.2. Travel behaviour context on community connections

Travel is not often directly studied in research on community networks or social capital (Stanley and Stanley, 2014). Grannis (2011) found that most neighbour connections were established when parents were walking with their children to local destinations such as school or the school bus stop. He also found that for people without children, walking dogs explained nearly half of the neighbour connections that people had. However, he discusses as well that it is difficult to measure such interactions. One thing emerges from his research though: people walking locally start to develop community connections. Thus, the general travel behaviour context of the three study areas of this research is needed.

It is perhaps easier to notice people if they are walking regardless of whether one is in a car, on a bus, or walking themselves. As such, a general sense of how many people might be walking gives some context of this likelihood. Often statistics on travel are focused on adults, but the study here was not limited to only seeing a known adult, so statistics on both children's and adults' travel is given below for each country.

2.2.1. Canada

Based on data from 1996 to 2001, Pabayo et al. (2011) found that active travel to elementary schools in Canada peaked at the age of 10 at under 35%. A study of children based on data from a 2006 cross-sectional survey in the Toronto region (Canada's largest city) reported that for children aged 11–12 (n = 2520), 58% came by active modes and 42% by passive modes (Mitra and Buliung, 2012). Larsen et al. (2009) found that for the city of London (a medium-sized city for Canada), Ontario 62% of children aged 11 to 13 used active modes to school, and 72% from school to home. Although Pabayo et al. (2011) did find that living in an urban area increased the likelihood of active travel 3.7 times, the results of the studies cited here are somewhat at odds in that the majority of the population live in urban areas.

National travel patterns for adults are available for trips to work, though this is not necessarily the majority of trips for the entire population (e.g. Miller and Shalaby, 2003). Statistics Canada for the year 2011 found that under half the population commute to work, and that 80% of those trips are by car (74% single occupancy, 5.6% as passengers).[3] The Greater Toronto Area (GTA) has had a relatively stable modal share from 1964 to 1996 where personal cars trips represent just under 80%. For the morning peak, the city of Toronto (as opposed to the GTA) had a modal share of 38.9% for car and passenger, Ottawa-Gatineau 55%, Calgary, 60.9%, and Vancouver 54.6% (Kim, 2008). Thus, for the population in urban centres, the rates of car use are lower. However, overall, the majority of trips in Canada were by car.

2.2.2. Sweden

Children's everyday mobility has decreased in Sweden. Suggested explanations are growing traffic volumes, higher speeds and more aggressive driving, increased distances to schools, services and leisure activities, as well as a growing concern among parents for the aspects of safety and security (Faskunger, 2008). The likelihood that children would go on their own to various destinations in Sweden has decreased from 1981 to 2003. As an example of this development, Faskunger (2008) showed how in the 1980s almost all Swedish children were allowed to go on their own to school while the figure had dropped to under 70% in 2003.

Children aged 6–15 years in Sweden make on average 3.1 trips per day (Schmidt and Neergaard, 2007) mostly by bicycle (34% of all trips)

or car (33% of all trips). A main destination is school and these trips are mostly made by foot or bicycle. Swedish national statistics from 1995 to 2014 showed that children (6–14 years) cycled distances 42% shorter now as compared to distances in the mid-1990s. Adolescents and young adults (15–24 years) cycled distances 46% shorter during the same time period (Swedish national statistics, 2015a). Cars are the main mode for leisure activities (a fifth of the total number of trips made). Almost no 6-year-olds walked or cycled on their own to school, but four out of five 11-year-olds did. Ninety-five percent of children aged 6–15 have access to a bicycle regardless of age, gender and place of residence. Schmidt and Neergaard (2007) found that 29% of all trips were made alone, 43% were accompanied by parents/adults, and 28% were accompanied by siblings or friends.

General national travel patterns for people in Sweden aged 6–84 are available for trips performed outside the home. Statistics Sweden for the year 2011–2014 showed that almost 50% of the trips were work trips, school trips and business travel (Swedish National statistics, 2015b). About 30% were trips for leisure purposes, which includes visiting friends, participating in community programs, visiting cultural activities, and doing a recreational activity. Approximately 14% of the trips were made to reach a service (e.g., doctor's visit) or for shopping purposes. On average, 80% of the population moved outside their home, and 60% of those trips were conducted by car. Men travelled in general more frequently by car whereas women used to a greater extent active modes (walking and cycling).

2.2.3. Japan

In general in Japan, car use rates are increasing and walking rates are decreasing (Xu et al., 2015). Figs. 1 and 2 show Japanese car and walk trip modal share transition by age (based on Xu et al., 2015). Elementary aged children had the highest walking rates at > 70% in 2010. This is because the majority of children in elementary school in Japan walk to school in walking school buses (Waygood et al., 2015b). Although the walking school buses are not often used for the return trip, most children also walk home (e.g. Waygood and Kitamura, 2009).

For areas where the previous study was conducted (Waygood and Friman, 2015), the majority of the population live in urban areas where the majority of travel is not by private motorized vehicles (Waygood et al., 2015a). Activities such as shopping during the week are still carried out on non-motorized modes to local destinations (e.g. Kitamura et al., 2008). Thus, as many people are walking or cycling, there should be a greater likelihood of seeing others.

2.2.4. Summary of transport differences

Thus, it can be seen that Japan likely has the highest percentage of people walking or cycling, followed by Sweden, then Canada. As a person who is walking is likely travelling slower, they would be visible for longer periods, thus potentially increasing the likelihood that they would be seen.

2.3. Anticipated influences

Each mode is anticipated to have different influences (Waygood and Friman, 2015). Walking is anticipated to have the strongest relationship on seeing a known person based on previous findings (Waygood and Friman, 2015). Cycling is likely also a means of transport at a local level, but may require greater attention due to traffic danger and thus seeing known people might be reduced, following previous work (ibid). A child in a car could very easily occupy themselves with gazing out the window, but the speed of the car and its sense of enclosure may reduce the likelihood of seeing people while travelling (again, following previous work (ibid)). Linking to Grannis (2011), it was argued that walking is most probable to result in interactions, as it is likely at a local level and is slow enough to allow for some interaction. The only hypothesis put forward is that the children will make some interaction when they see a known person.

Transition of car use rate by age in Japan (weekday)
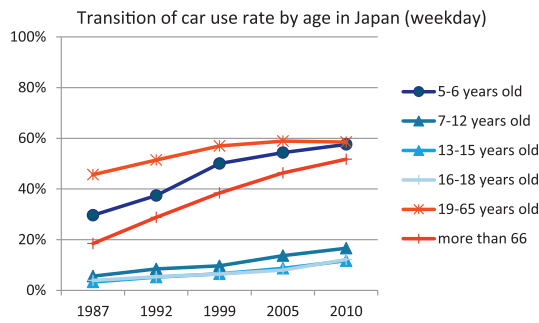
Fig. 1. Transition of car use rate in Japan.

Transition of walk rate by age in Japan (weekday)
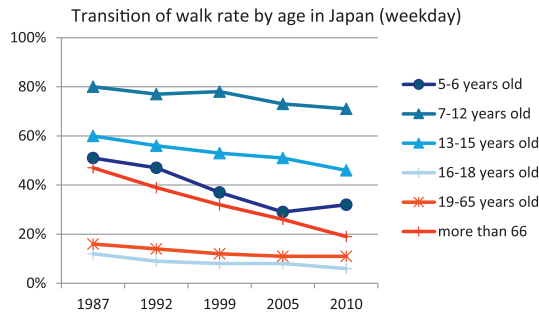
Fig. 2. Transition of walk rate in Japan.

Table 1
Characteristics of participants and modal share for all trips and trips to school.

	Canada (177)	Japan (178)	Sweden (144)
Age	10.38 ± 0.06	10.87 ± 0.03	11.01 ± 0.06
Female	44.1%	61.8%	47.2%
HH car	1.44 ± 0.06	1.81 ± 0.07	2.01 ± 0.08
Have a bicycle	93%	87%	95%
All trips			
Walk	50%	69%	38%
Bike	4%	5%	16%
School bus	9%	0%	3%
Public transport	3%	2%	4%
Car	32%	24%	35%
Other	2%	0%	4%
Trip to school			
Walk	47%	96%	49%
Bike	3%	0%	22%
School bus	13%	0%	5%
Public transport	5%	0%	3%
Car	30%	4%	18%
Other	2%	0%	4%

3. Study description

The data for this research come from paper surveys distributed at elementary schools in Canada, Japan, and Sweden in 2014–2015. The surveys were all developed from a common English version and distributed in the relevant local language (French in Quebec, Canada). The surveys were distributed in October for Canada, December for Sweden, and January in Japan to limit the impact of climate. In total, 529 participant responses (184 in Canada, 189 in Japan, 156 in Sweden) were kept for this research.

3.1. Study areas

3.1.1. Quebec, Canada

Quebec is the capital city of the province of Quebec in Canada. The City of Quebec had a population of 516,620[4] in 2011 and the metropolitan area in 2014 had a population of 800,900.[5] For the metropolitan area of Quebec City, over 85% of trips to work were by car.[6] In the central part of the city, this is reduced to 27 to 58%[6], depending on the neighbourhood.

3.1.2. Hadano, Japan

Hadano is located in Kanagawa prefecture; this is the west side of the Tokyo Metropolitan Area. The population in April 2016 was 167,000. Hadano city has four railway stations, it takes 1 h from central Tokyo by rail and it is located in a basin-shaped valley. The main travel mode for adults commuting in Hadano was by private car (48.4%) and rail (26.5%) in 2010. The main travel mode of children's travel to school (7–18 years old) was by foot (62.6%) and rail (21.5%). Bus use rate was 2.8% for adults and 3.4% for children. Bicycle use rate was 7.6% for adults and 5.6% for children.

3.1.3. Karlstad, Sweden

Karlstad is a medium-sized Swedish city located in Värmland

County. Karlstad city had a population of 87,000 in 2015. The main travel mode in Karlstad is the private car (used in 59% of all trips). The number of trips made by bicycle (mainly to work and school) has increased by 4% (between 2004 and 2014) and is now equal to 19%. Nine percent of all trips are done by public transport.

3.2. Participants

The characteristics of the participants and modal shares by country are given in Table 1. The higher percentage of girls in Japan was confirmed; it is simply a demographic anomaly.

4. Analysis

The primary dependent variable for all of the analysis is seeing a known person during a trip (i.e. between the origin and destination; not at the destination). The secondary research question relates to what type of interaction occurred.

4.1. All weekday trips

Here, all weekday trips recorded by the survey that begin or end at the child's home are included. Over a day, if all trips are considered, 53% of the Canadian children saw a known person on at least one of their trips, 91% of the Japanese children, and 41% of the Swedish children.

It can be seen in Table 2 that walking is much more likely (12 ×) to result in a known person being seen than trips by car. This confirms the anticipated relationships discussed above (Section 2.3). Interaction effects of gender with country and mode were tested, but were not found be significant and thus are not included in the final model. Trips to school were 2.4 times more likely to result in a known person being seen.

The average rates of seeing a known person by mode and country are shown in Table 3. As can be seen in Table 2, it is statistically more common for the children in Japan to see a known person on walking trips than for the participating children in Canada (4.1 ×) and Sweden (5.9 ×). This may be tied to the value placed on acknowledging others (*aisatsu*), or simply that there are more people walking or cycling to be seen. No statistical differences were found for cycling or car trips.

4.2. Role of independent trips

In previous research (Waygood and Friman, 2015) independent trips were positively associated with seeing a known person. An independent trip is defined here as any trip where an adult is not present.

Table 2
Binary logistic analysis of a known person being seen for all weekday trips beginning or ending at the child's home.

	Odds ratio	Std. err.	z	P > z	95% Conf.	Interval
Trip to school	2.43	0.37	5.79	0.00	1.80	3.28
Boy	0.82	0.12	− 1.33	0.19	0.62	1.10
Car (ref.)	1.00					
Walk	11.97	3.74	7.93	0.00	6.48	22.10
Bike	1.11	0.77	0.15	0.88	0.29	4.29
Japan (ref.)	1.00					
Canada	0.94	0.35	− 0.18	0.86	0.45	1.94
Sweden	0.69	0.28	− 0.90	0.37	0.31	1.54
Walk*Japan (ref.)	1.00					
Walk*Canada	0.24	0.10	− 3.42	0.00	0.11	0.55
Walk*Sweden	0.17	0.08	− 3.77	0.00	0.07	0.43
Bike*Japan (ref.)	1.00					
Bike*Canada	2.62	2.33	1.08	0.28	0.46	15.00
Bike*Sweden	1.81	1.46	0.73	0.46	0.37	8.84
Constant	0.18	0.05	− 6.14	0.00	0.10	0.31

$N = 1104$; LR chi^2(10) = 299.5; Prob > chi^2 = 0.000; Pseudo R^2 = 0.204.

Table 3
The percentage of trips where a known person was seen by mode and country.

	Canada	Japan	Sweden
Walk	36.1%	68.8%	24.0%
Bike	36.1%	24.3%	29.9%
Car	16.7%	17.2%	17.4%

Table 4
Binary logistic regression on seeing a known person for active travel trips for weekday trips beginning or ending at the child's home.

	Odds ratio	Std. err.	z	P > z	95% Conf.	Interval
Trip to school	1.96	0.33	3.97	0.00	1.41	2.74
Boy	0.53	0.14	− 2.38	0.02	0.31	0.89
No adult	4.56	3.41	2.03	0.04	1.05	19.74
Bicycle (ref.)	1.00					
Walk	9.97	6.49	3.54	0.00	2.79	35.68
Japan (ref.)	1.00					
Canada	4.92	6.03	1.30	0.19	0.44	54.40
Sweden	4.22	5.22	1.16	0.25	0.37	47.68
Walk*Japan (ref.)	1.00					
Walk*Canada	0.11	0.10	− 2.44	0.02	0.02	0.65
Walk*Sweden	0.10	0.08	− 3.07	0.00	0.02	0.44
Boy*Japan (ref.)	1.00					
Boy*Canada	2.45	0.95	2.30	0.02	1.14	5.24
Boy*Sweden	1.20	0.51	0.43	0.67	0.52	2.76
Independent*Japan						
Independent*Canada	1.00	0.25	− 1.43	0.15	0.06	1.57
Independent*Sweden	0.28	0.28	− 1.27	0.21	0.04	2.02
Constant	0.06	0.06	− 2.87	0.00	0.01	0.41

$N = 740$; Likelihood Ratio chi^2(12) = 157.5; Prob > chi^2 = 0.000; Pseudo R^2 = 0.154.

Table 5
Percentage of trips where a known person was seen.

	Canada	Japan	Sweden
Walk	40.7%	70.2%	26.9%
Bike	37.5%	21.6%	26.5%
Girl	37.7%	69.4%	30.6%
Boy	43.6%	57.2%	22.0%
Not independent	33.9%	34.9%	22.9%
Independent	40.8%	66.5%	27.1%

Table 6
Of all weekday trips, the percentage where a known person was seen and the type of interaction that occurred.

Known person	Canada	Japan	Sweden
Of all weekday trips, % where a known person was seen	32.2%	53.6%	23.5%
Of all weekday trips, social interaction occurred	25.1%	36.9%	19.7%
- Spoke	54.5%	58.2%	65.2%
- Waved	20.1%	9.5%	18.8%
- Other interaction	3.2%	1.0%	0.0%
- No interaction	22.1%	31.3%	16.1%

Although some car trips may be with a non-adult in Canada, those trips could still be considered an escorted trip in that the children participating in this study could not independently use that mode. Thus, the role of independent trips is examined only for non-motorized modes.

For weekday trips, 60% of trips in the Canadian sample were independent, 75% in Japan, and 64% in Sweden. If a measure of having at least one trip that was independent is used, 70% of the Canadian children, 99% of the Japanese children, and 91% of the Swedish children met this measure.

As can be seen in Table 4, independent trips have a positive influence (4.6 ×) on seeing a known person. It would appear that travelling independently, the child may be more observant of their surroundings, or that they are making trips to locations where it is more likely to see a known person. Trips to school are again shown to be more likely (2.0 ×) to result in this occurrence. Here, girls are 1.9 times more likely than boys to see a known person.

The average occurrence of seeing a known person by mode, gender, and independent trips across the three countries are shown in Table 5. Statistically (Table 4), compared to bicycle trips, trips on foot are nearly 10 × more likely to result in children reporting having seen a known person. For trips on foot, in Canada it is 9 times less likely than in Japan, and in Sweden 10 times less likely. Boys in Canada are more likely (2.5 ×) than boys in Japan to see a known person (all else being equal).

4.3. Type of interaction

The question here is: If a child sees a known person, did they have some kind of social interaction with them? Over all trips in a day, 44% of children in Canada had some incidental social interaction during their travels, 71% of Japanese children, and 36% of Swedish.

From Table 6, it can be seen that for the majority of trips in Japan, the children see someone that they know. In Canada, during roughly one third of trips a child will see someone they know, and in Sweden less than one quarter.

If the children do see someone they know, the majority of them spoke to that person. The Swedish children were the most likely to have had some interaction (spoke or waved) if they saw someone, followed by the Canadian children, and finally the Japanese.

Overall, when occurrences and interactions are both taken into account, over one-third of trips by Japanese children resulted in some interaction, a quarter of Canadian children's trips, and one-fifth of the Swedish children's trips.

Those results are descriptive, so a multinomial logit analysis was conducted on the type of interaction for all weekday trips that begin or end at the child's residence (Table 7). The base case is not seeing anyone.

From this analysis, a few general things can be noted: gender does not play a role, and as previously shown walking is more associated with seeing a known person. For interactions, trips by walking (6.4 ×) and cycling (2.3 ×) are more associated with speaking with the known person than trips by car. The participants in Canada (− 2.8 ×) and Sweden (− 3.7 ×) are less likely to see and speak with someone on trips

Table 7
Multinomial logit regression of interaction type on all weekday trips.

	Odds ratio	Std. err.	z	P > z	95% Conf.	Interval
Didn't see a known person (base case)	1.00					
Spoke with a known person						
Car (reference)	1.00					
Walk	6.37	0.22	8.24	0.00	1.41	2.29
Bike	2.31	0.38	2.18	0.03	0.08	1.59
Boy	0.84	0.17	− 1.03	0.31	− 0.50	0.16
Japan (reference)	1.00					
Canada	0.36	0.19	− 5.29	0.00	− 1.41	− 0.65
Sweden	0.27	0.21	− 6.08	0.00	− 1.72	− 0.88
Constant		0.23	− 7.05	0.00	− 2.05	− 1.16
Waved to known person						
Car (reference)	1.00					
Walk	3.25	0.34	3.48	0.00	0.52	1.84
Bike	2.47	0.53	1.71	0.09	− 0.13	1.94
Boy	0.86	0.28	− 0.56	0.58	− 0.70	0.39
Japan (reference)	1.00					
Canada	1.04	0.32	0.12	0.91	− 0.59	0.67
Sweden	0.61	0.37	− 1.34	0.18	− 1.21	0.23
Constant		0.37	− 8.03	0.00	− 3.73	− 2.27
No interaction when a known person was seen						
Car (reference)	1.00					
Walk	6.06	0.30	5.96	0.00	1.21	2.39
Bike	2.66	0.53	1.86	0.06	− 0.06	2.01
Boy	0.79	0.22	− 1.09	0.28	− 0.67	0.19
Japan (reference)	1.00					
Canada	0.31	0.25	− 4.80	0.00	− 1.66	− 0.70
Sweden	0.12	0.34	− 6.09	0.00	− 2.77	− 1.42
Constant		0.30	− 6.96	0.00	− 2.67	− 1.49
Other interaction with known person						
Car (reference)	1.00					
Walk	6.18	1.07	1.69	0.09	− 0.29	3.93
Bike	0.00	1510.18	− 0.01	0.99	− 2972	2947
Boy	0.69	0.75	− 0.49	0.62	− 1.84	1.10
Japan (reference)	1.00					
Canada	1.45	0.75	0.50	0.62	− 1.09	1.84
Sweden	0.00	961.94	− 0.02	0.99	− 1900	1871
Constant		1.14	− 4.66	0.00	− 7.55	− 3.08

n = 1106; Likelihood Ratio chi^2 = 262.5; Prob > chi^2 = 0.000; Pseudo R^2 = 0.111.

than the Japanese children. The only significant relationship for waving to someone was walking (3.2 ×). For seeing a known person and not interacting, walking (6.1 ×) is more associated than driving, and the participants in Canada (− 3.3 ×) and Sweden (− 8.2 ×) were less likely to have trips with this result. Finally, only walking (6.2 ×) was more associated with having some other sort of interaction.

5. Discussion

The previous findings by Waygood and Friman (2015) on seeing a known person while walking were found to be robust within Japan, and across two different continents, strongly suggesting that the results are applicable in at least wealthy countries for children's travel in urban settings. In line with the previous work, independent trips were also confirmed to have an influence beyond that of mode use. In this study the importance of the trip to school was highlighted as it is two times more likely to result in a known person being seen which relates to previous work by (Grannis, 2011). Further, in this new research, it was shown that the vast majority of such occurrences result in some interaction, with the majority of cases resulted in verbal interaction.

Differences were found between the countries, with the Japanese children reporting more frequently trips where they spoke to someone, but the difference for waving was not significant. The Japanese children were also more likely to see someone, but not interact. A number of possible explanations exist for this. One may be that small interactions are occurring such as eye contact, small hand or head movements that are not being captured by our survey. It could also be that if one regularly sees people, it is not "an event", so one is less likely to interact.

One means of resolving this question would be to conduct interviews with the children and ask them directly why no interaction occurred.

Future research questions would be to examine whether there are links between a child's social network (friends, community) and the likelihood of seeing known people. Research from the USA (Grannis, 2011) found that trips for children (e.g. to school, to the school bus stop, etc.) were associated with the creation of community networks. Are the trips being made by children themselves (i.e. independent travel) developing and expanding their social networks?

Independent trips had a positive association with seeing known people in this research and previous work found that CIM was associated with creating neighbourhood social capital (Weller and Bruegel, 2009). Further, children's independent mobility (CIM) was also found to be associated with knowing where to get social interaction (Lim and Barton, 2010). Thus, from a perspective of child well-being (Pollard and Lee, 2003; Waygood et al., 2017) independent trips by children are beneficial.

Those results suggest that encouraging and facilitating independent walking by children could increase their community connections. Other researchers have found a positive link between regularly waving or talking with neighbours and walking for transport in boys and girls (Carver et al., 2005). Having such connections can improve parental confidence to let children travel independently (Bonner, 1997; McDonald, 2007b; McDonald et al., 2010), so it would appear to be a positive feedback cycle. Unfortunately, as has been noted in various developed countries, children's active and independent travel (to school) is generally on the decline (Buliung et al., 2009; Grize et al., 2010; McDonald, 2007a; Shaw et al., 2013; Susilo and Waygood, 2012).

Lastly, the cities in the study were not identical in population size. The role of the built environment was examined in Waygood and Friman (2015) in a different area of Japan, but it is not clear whether this would be the case in Canada or Sweden. Future research could examine whether differences exist for different cities or built environments in those countries.

A number of questions arise with respect to these findings and current trends. If active travel better supports local connections and community, and those are associated with higher measures of well-being such as subjective well-being, then might a decrease in active travel by children be associated with lower subjective well-being outcomes? Or, with modern day technology, is it less important to have such physical connections when the Internet and other communication technologies (ICT) facilitate easy social interaction? In a situation where youth have freedom to travel, some research suggests that ICT is used to facilitate face-to-face interaction (Kamargianni and Polydoropoulou, 2014). However, for younger children who might have more restrictions on their mobility, what might be the role of ICT for local connections and social interaction? Is it facilitating or substituting? There are many questions, and not all of them lend themselves to quantitative analysis. Along with other questions related to noticing or not, interacting or not, qualitative research that allows for discussion and deeper understanding of these relationships could greatly improve the knowledge state of these interactions.

The policy implication may be that if a government wishes to support healthy and connected communities, it should encourage walking. Means of encouraging walking include increasing density, land-use mix, reduced vehicle speed, and addressing psychological barriers. In a review of environmental determinants of active travel for children, Panter et al. (2008) found that social interactions, shorter route length, road safety, facilities that support active travel, and urban form all were related to increased active travel. On urban form, increased social interaction was depicted by children in more walkable neighbourhoods (Holt et al., 2008) and community connections were most common in the most urban areas in a previous study (Waygood and Friman, 2015). Traffic calming was found to be consistently associated with both increased walking and decreased injuries (Rothman et al., 2014). Walking school buses are one means of addressing safety and personal security issues (e.g. Waygood et al., 2015b)) without changing the urban structure.

The Japanese government specifically aims to increase community cohesion through events such as local festivals (Robertson, 1987). Further, as mentioned above, people are encouraged to greet others (*aisatsu*), which may result in the children being more attentive to those around them. This research has found that it is more likely for Japanese children to see a known person during their travels. Obviously, to see others while travelling between two points, there must be others, so the high percentage of independent trips by children in Japan likely helps, though Sweden also had high independent mobility levels, but this was not reflected in a high likelihood of seeing a known person. However, the Swedish children were the most likely to travel by car (Table 1), thus, it may be the high number of walking trips that explains the difference. Thus, policies that encourage and support walking could lead to the development of social capital as described by Grannis (2011). This paper has shown that walking and independent travel are more associated with seeing known people, which would support previous studies linking such behaviour with community relations and social capital.

6. Conclusions

Seeing a known person may contribute to a sense of community and increase the perception of safety for the children and their parents, thus potentially increasing the likelihood of children making independent trips. Further, those interactions are part of social relationships that are important for children's well-being. Confirming previous work, walking was found to be the mode most associated with seeing a known person during travel for children aged 10 to 12 in Canada, Japan, and Sweden. Nearly all children in Japan saw someone they knew during their trips at least once over a day, for Canada roughly half of the children, and for Sweden roughly 40%. If having some interaction with that person is considered, the percentages reduce to 71%, 44%, and 36% for Japan, Canada, and Sweden respectively. The majority of those interactions were verbal. Independence was found to play a role in seeing a known person beyond trips being on foot or by bicycle.

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