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6

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# Understanding children's neighbourhood destinations: presenting the Kids-PoND framework

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### ABSTRACT

Children interact with and are greatly affected by their neighbourhoods. This research aims to understand the places children go in their neighbourhood and their perceptions of them. A child-centred approach was used to map destinations and ask open-ended survey questions, using Maptionnaire (a public participation geographic information system (PPGIS) mapping software). Overall, 1102 children aged 7-13 years, from 19 schools in Auckland, New Zealand participated. PPGIS destinations were mapped with parks, unhealthy food outlets and advertising to contextualise children's neighbourhood destinations. We developed and present here the Kids-PoND (Kids- Perceptions of Neighbourhood Destinations) framework for understanding children's perceptions and use of neighbourhood destinations. We found parks with a variety of options for active play and socialisation are important to children as are shops where children consumed unhealthy food and drink. Our findings have implications for public health, town planning, children and their parents and schools.



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#### **KEYWORDS**

Children; child-centred research; child-friendly cities; PPGIS; affordances

# Introduction

The built environment is defined as the living spaces created and modified by people (Srinivasan, O'fallon, and Dearry 2003). Built environments vary in scale, ranging from single rooms to larger buildings, to neighbourhoods that combine to form urban cities (Nathan et al. 2018). Neighbourhoods are important built environments that have been shown to influence child development, for example, motor skill development, social and emotional competence, cognitive development (Christian et al. 2017) and health behaviours, such as, physical activity, sedentary behaviours and diet (Mitchell, Clark, and Gilliland 2016). Children may be more exposed to their immediate surroundings because while adults may live in one neighbourhood and commute to another for work or other activities, children potentially have less mobility and thus spend a greater proportion of time in their local neighbourhoods.

Neighbourhood destinations, a feature of the neighbourhood built environment, can provide opportunities for children to engage in active play, physical activity and healthy eating. Specific health behaviours such as physical activity accumulation and consumption of unhealthy food and drink have been clearly linked to neighbourhood built environment features such as access to destinations (Mitchell, Clark, and Gilliland 2016). Characteristics (e.g. equipment, walking tracks, landscaping) of destinations such as parks and sports fields have been shown to positively impact physical activity (Smith et al. 2017) and the presence of fast food outlets and convenience stores has been linked to increased consumption of unhealthy food and drinks (Paquet et al. 2017).

The influence of neighbourhood destinations on child development and health behaviours, such as physical activity and nutrition, are perhaps best understood through a socio-ecological perspective (Sallis, Owen, and Fisher 2015). The environment influences humans at all levels of the socio-ecological model from the individual level through to the policy level. Children are active agents both in their neighbourhood environment and their perceptions of it (Kyttä 2004). Knowing more about children's likes, dislikes, and use of destinations will help decision-makers to build better and more tailored neighbourhood destinations that children are likely to use, value and that have additional benefits to health through supporting health promoting behaviours. Children's perspectives on destinations they visit provide greater understanding of the geographies of home and school and neighbourhood within the context of the adult-dominated, regulated and restricted, auto-centric city (Davidson, Smith, and Bondi 2012).

Child-centred research is that which values children's rights of expression (Unicef 1989), utilises methods that value meaningful and active participation by children (Hood, Kelley, and Mayall 1996; Christensen and James 2000; Jones 2008), and have the voice of the child at the centre of the research process (Barker and Weller 2003). Child-centred approaches that elicit children's perceptions are important in order to understand and improve the health, development and wellbeing of children (Morrow and Richards 1996; Holloway and Valentine 2004; Darbyshire, MacDougall, and Schiller 2005). Participatory geography has a history of using innovative methods designed to both appeal to children and allow meaningful participation by them (Wilks and Rudner 2013; Carroll et al. 2015). Children today are 'digital natives' meaning they have not known life without the influence of technology and the Internet (Helsper and Eynon 2010). Web-based public participation Geographic Information Systems (PPGIS) programmes are able to harness digital technologies for participatory mapping and capturing people's perceptions of place (Kahila and Kyttä 2006). PPGIS has been successfully used in a number of countries for conducting child-centred research with, rather than on, children (Brown and Weber 2011; Kyttä et al. 2018). PPGIS methods allow simultaneous analysis of 'soft' place-based data primarily concerned with human experiences, alongside 'hard' objective environmental data using GIS (Kyttä, Broberg, and Kahila 2012). The benefit of PPGIS is it also allows urban structures and the physical characteristics of neighbourhoods to be analysed alongside residents' perceptions of place and deepening understanding through mixed-method approaches (Hemming 2008; Kyttä, Broberg, and Kahila 2012).

422 👄 V. EGLI ET AL.

Affordance theory, first described by Gibson in 1979, and built upon by Heft (1988) and Kyttä (2003) is an appropriate lens for analysing children's use and perceptions of neighbourhood destinations. In affordance theory, objects, spaces and things are perceived as opportunities for action (Gibson 2014), socialisation or feelings (Kyttä 2003). For example, objects offer themselves up to be thrown, pulled and/or picked-up. Surfaces are to be run on, climbed on, injured on and/or jumped over (Kyttä 2003). Spaces can invite quiet reflection, socialisation, danger and/or imaginative play. Affordances are situated in-between the person and the environment and are shaped by culture, context, social norms, age, size, development and imagination (Kyttä 2003). For example, a tree can afford climbing only once a child is tall enough to reach the lowest branch, and a chair can afford sitting, but not when the chair is on display in a gallery (Kyttä 2003). The same object, space or thing can be a positive or negative affordance for different people (Chaudhury et al. 2017). This distinction is important for neighbourhood destination research. This study will use the concept of affordances to understand children's likes and dislikes of neighbourhood destinations as it allows researchers to capture the relationship between the intended function and the actual use of spaces as they differ for different children.

The aim of this research is to better understand the places children go in their neighbourhoods, how they use these places, and what they like and dislike about these places using child-centred methodologies. Additional context is provided through mapping objective place-based data based on the results of the children's perceptions of neighbourhood destinations. This research allows children to voice what aspects of their neighbourhood are important to them. Ultimately this information can be used to inform local governments, communities, place-based initiatives, and town planning on how to design and modify neighbourhoods to meet the needs and wishes of children.

#### Methods

### Study context

Auckland is the largest city in NZ with a population of 1.5 million people; roughly 21% of whom are aged under 15 years (Statistics New Zealand 2013). Historically, Auckland grew as a port city fuelled by farming and trade. To accommodate the growing population in Auckland suburbs have been and continue to spread along major road networks to the north and south (Mees and Dodson 2007). New suburbs are emerging on the city fringes and urban renewal is resulting in increasing housing density in inner city suburbs. Most children in NZ attend state schools that are publicly funded. There are a total of 13 years in the school system, divided across primary, intermediate and secondary school (Immigration New Zealand 2016).

### Protocol

This research is part of a larger cross-sectional study, Neighbourhoods for Active Kids (NfAK), of 1102 children attending nine intermediate (years 7–8) and 10 primary (years 1–6) schools, located across nine ethnically, socio-economically, and geographically diverse neighbourhoods in Auckland, NZ. The schools were purposively selected according to a neighbourhood matrix which ensured diversity across features of neighbourhood-level socioeconomic status by school decile (a measure of the proportion of students from high or low socio-economic communities) (Ministry of Education 2016), child-specific walkability (Giles-Corti et al. 2011), and child-specific destination accessibility (Badland et al. 2015). Children completed an online interactive mapping survey (www.maptionnaire. com; a type of PPGIS software). Data were collected from February 2015 to September 2016. Trained research assistants visited participating schools during school hours and followed standard operating procedures to provide child participants one-on-one assistance to complete the PPGIS activity.

Pilot testing of the survey was conducted prior to data collection, to ensure acceptability and utility of the PPGIS activity with NZ children (Oliver et al. 2016). For more information regarding NfAK please refer to Oliver et al. (2016). Ethical approval to conduct the study was provided by the host institution ethics committees (AUTEC Committee (AUTEC, 14/263, 3 September 2014; MUHECN 3 September 2014; UAHPEC 9 September 2014)).

Using the PPGIS mapping software Maptionnaire, children were asked to mark the places they visited in their neighbourhood on the map and asked 'What do you like or dislike about this place?'. No definition of 'neighbourhood' or buffer-boundary was given, and children were free to determine 'their neighbourhood destinations' themselves. The results of other components in the NfAK Maptionnaire survey and PPGIS are reported elsewhere (Ikeda et al. 2018).

Open-ended responses and location mapping were entered into the PPGIS programme by either the child or the research assistant, as decided by the child. Research assistants entered children's responses verbatim into the programme. Additional prompting from the research assistant did not occur. The location of the destinations was downloaded from Maptionnaire.com in.csv format and then imported into ArcGIS version 10.5.1 (ESRI, Redlands, California, USA). Open-ended responses about the destinations were uploaded into NVivo v.11 for analysis.

# Coding of open-ended responses

The nature of open-ended responses allows broad insights from a large sample of children, not captured in closed-ended questions (Roberts et al. 2014). Open-ended responses were analysed using qualitative content analysis prior to the analysis of the mapped neighbourhood destinations and sociodemographic characteristics to enhance the objectivity of coding and the credibility and reliability of the results; this means participant information such as age, sex, ethnicity, and school, including the mapped locations, were unknown to the authors at the time of coding (Hemming 2008).

One school was selected (School ID 11) and coded inductively by VE to develop the preliminary coding matrix. To finalise the coding matrix additional destinations were added to the 'destination' node, deductively based on the Neighbourhood Destination Accessibility Index – Child (Badland et al. 2015). The coding matrix was checked by MS and minor changes were made. The final coding matrix was developed into the Kids-PoND framework and used for analysing all 4676 open-ended responses (Figure 1). The codes are hierarchical and start at the centre of the circle going out, however, no weightings are given to individual nodes – that is, the width of a segment does not indicate frequency or importance. This decision was made to ensure accuracy and objectivity of the framework as no accompanying measure of frequency of visitation or length of stay was included in this research (and thus relative importance could not be determined). Upon completion of coding, a random selection of the data (using the RANDOM function in Microsoft Excel) was checked by author MS until saturation occurred. Emerging codes were discussed by authors VE, LM, and MS.

### Mapping neighbourhood destinations

In addition to coding open-ended responses, the neighbourhood destinations marked by children were also mapped using ArcGIS software. Based on the theoretical justification of 'crystallisation' first described by Richardson (1994) where mixed-methods facilitate deeper and more comprehensive understanding of the world; and of affordance theory described by Kyttä (2003), a map was created to provide context to the results of the qualitative content analysis for one primary and one intermediate school located in close proximity to each other. To protect children's privacy of actual neighbourhood destinations, donut geomasking, a method used to change the geographic location of an individual, protecting confidentiality and preserving the pattern (Allshouse et al. 2010) was completed in ArcGIS. Auckland has a unique coastline and road network; therefore, topical map features such as the location of schools, roads, rivers and land boundaries were also excluded to ensure privacy and confidentiality of both the child participants and the schools involved in NfAK. However, features of interest such as parks and the location of unhealthy food outlets were included in the



Figure 1. Kids-PoND framework.

map to 'crystallise' findings and provide context to results of the qualitative content analysis. Existing data from Vandevijvere et al. (2016) were used to map unhealthy food outlets, defined as those that were classed as fast food, convenience or take-away stores. Finally, unhealthy food advertisements, described in detail in earlier NfAK research, were also added to the map, as advertising of unhealthy food influences normalisation of consumption for children (Sadeghirad et al. 2016). The location of advertisements were collected within an 800 m road network boundary around each of the 19 NfAK schools for another study (Egli et al. 2018). Both datasets (i.e. unhealthy food outlets and unhealthy outdoor advertisements), were collected within the same study period as the current study.

# Results

# **Participants**

1102 participants commented 4676 times on the things they liked or disliked about a neighbourhood destination. Overall, 562 (51%) of participants were female and 535 (48.5%) attended intermediate school. The ethnicity of children was roughly approximate to that of the Auckland population with 139 (12.6%) identifying as Māori, 166 (15.1%) as Pacific, 146 (13.2%) as Asian, 24 (2.2%) as Middle Eastern/Latin American/African, 5 (0.5%) as other and 446 (40.5%) as NZ European and other European. A total of 176 (16%) did not state their ethnicity.

# **Open-ended responses**

The main categories that appeared from the open-ended responses were: Destination, Activities, Qualities and Feelings, and the codes that were developed under these categories are described below. The quotations below have not been altered for grammatical correctness.

# Destination

When asked what they liked or disliked about a place, children often replied by simply naming the place, for example, 'it's a library, what's not to like?'. The most frequently named locations were: parks, playgrounds, fields and courts. This was followed by shops, specifically food shops. Other destinations that were important to children were friends' and relatives' houses, specifically their back yards and other spaces within the houses for example pools, and devices like gaming consoles. The beach was a popular neighbourhood place among children who attended schools located near the beach.

# Destinations and activities

The most common Destinations mentioned, aligned with the most common Activities undertaken in each place. This clearly aligns with affordance theory as children described their perception of the utility of a neighbourhood destination e.g. 'I like going to the park, cos I can play with my friends there and climb the trees near the playground.' Playing with friends was an affordance of many parks. Sometimes the affordance playing with friends determined whether children liked or disliked a place; absence of the affordance playing with friends often meant that children didn't like one park as much as another. Furthermore, the activity of climbing trees in parks was a common affordance and was mentioned more often than building tree houses and cubbies, although those affordances were mentioned too. Trees most often afforded climbing in parks, playground and friends' houses. The most common Destinations mentioned by children were play and playing sport, common Activities in the aforementioned recreation settings. The most common sports specifically named by children were soccer, netball, rugby and basketball.

Other commonly mentioned neighbourhood Destinations were shops, specifically food shops. Children often had strong opinions towards food shops based on the affordance to consume unhealthy food and drink. Children who reported eating unhealthy food at shops liked these places, e.g. 'I like this place alot because it sell frozen yogurt which tastes like ice cream and they constantly change the flavours and they have a large variety'. Whereas those who did not report eating or drinking at food shops commonly expressed that these shops were 'boring' or 'mum takes too long at the supermarket, don't like it here'. Shops were places that afforded eating or drinking unhealthy food. Reflecting on the affordance of eating or drinking unhealthy food, these results are further contextualised in the map below.

Nature destinations such as the beach, the forest or bush offered unique affordances that were not observed elsewhere. In particular, these settings were reported in conjunction with imaginary play activities and exploration. Similarly specific features such as trees and grass were reported in the context of affordances like climbing and running e.g. 'i like that it's got lots of trees and i like climbing them, also i like that there's a horse paddock that i can explore stuff in' and 'like, we have a base and we have decorated it and there is a little stream to play with'.

### Destinations and qualities

The most common Qualities aligned with the most common Destinations. The size of the destination was a key topic that was identified through the coding process, impacting the affordance of a particular setting. Children often commented on playgrounds, parks and fields in terms of size. For example, being 'too small for me and my friends to play' or 'I like that it is big and has enough 426 👄 V. EGLI ET AL.

space to run around'. While children liked socialising, they didn't like busy and crowded destinations as this often prohibited the affordance of playing with friends.

I don't like that there are too many people if we want to do some stuff like we have to wait for people to get off the exercise equipment or we there are too many people using the netball courts so we can't play.

# Destinations and feelings

In addition to size, the variety of things to do in a destination was commonly reported by children. Playgrounds were 'boring' if they 'don't have many things to play on', whereas parks that had lots of different options for play were 'fun' e.g. '... its fun theres so much to do there. There a beach if you want to swim a park if you want to play and its a nice place to hang out with friends'. Here it is shown that having a multitude of affordances in one destination is important to children.

# Activities

The most frequently reported Activities in neighbourhood destinations were active play and socialising. The most common forms of play were playing sport, riding bikes, scooters or skateboards and running. The most common form of socialising was being with friends, followed by being with pets and siblings. Eating food was also an activity that was reported often, and the majority of food reported was unhealthy 'its a dairy (kiosk/supperette/corner-store) and they have good lollies (sweets)' and 'I like to buy frozen drinks'. Oftentimes activities occurred together. Active play and socialising were the most common activities that were coded together e.g. 'playing soccer with my friends', this was followed closely by shopping and eating and drinking.

# Activities and feelings

Socialising was the most commonly reported activity and fun places were often attributed to socialising with friends and/or relatives in that place. E.g. 'i get to hang out with my cousin and his dog and my aunty and uncle and we have fun' and 'I like to swim at this house and we do really fun stuff. I like to swing there too. Sometimes my friend is at her dad's house and I don't like that.' The previous quotation gives another example of how the absence of the affordance playing with friends influenced children's perception of a neighbourhood destination, and how children's perceptions of place are not fixed across time.

# Activities and qualities

Activities like reading and relaxing were also commonly reported alongside Qualities like peaceful, calm and quiet. Running and riding a bike or scooter were commonly reported alongside comments on topography e.g. 'I like to bike up the hill and ride down it really fast.' and the weather 'I don't like that sometimes the field is really wet which means you can't play on it'. The preceding quotation shows that for children affordances aren't fixed and can be dependent on temporary factors like the weather. The surface of places was also important to children's active play activities as the affordances were often clearly positive or negative. Children liked when grass was soft, but disliked when the 'pavement is bumpy, so its easy for me to fall over'.

# Qualities

Children reported aspects of quality in terms of physical attributes of the destinations they visited as well as safety. The size of a destination was reported on most by children. Children overwhelmingly liked 'big' spaces, particularly big spaces that also offered a variety of affordances, and that weren't too busy or crowded e.g. 'I love it there ... its a really big skatepark. it has a good variety of ramps, rails, stairs to skateboard along. its never packed with people'. and 'I like going to nans house, it has so many rooms and lots of space to play'. Additionally, facilities in parks and reserves were important to

children, particularly goal posts e.g. 'like that there are rugby posts up all the time' as they supported the affordance of playing with friends, as well as practicing kicking goals. Facilities such as toilets and water fountains were also important 'I also like that there are toilets and drinking fountains near by.' as they supported affordances such as play, running, bike riding and sport 'so I can get a drink when im really puffed'.

Children also commented on the safety aspects of places in their neighbourhood. The most commonly reported safety concern was other people, followed by traffic, dogs and personal injury. Other people featured heavily particularly in conjunction with litter, rubbish and graffiti and busy or crowded places. Usually safety is considered a feeling (Sandler 1960), however, children referred to it often as a quality about a destination. Children commented that they often felt threatened by teenagers, particularly in skate parks e.g. '... i don't like that in the weekends it's really crowded with lots of teenagers and it they stand on top of you because they tell you what you can or can't do. Sometimes they shout and swear at us.' In shopping centres 'dodgy', 'creepy' and 'drunk people' were also safety concerns and affected children's perception of those neighbourhood destinations 'I don't like it there'. Children reported 'seeing fights all the time there' in neighbourhood places as things they disliked about a place. Children were concerned about traffic in the surrounding streets, they disliked 'too many road crossings' but liked when 'there's not much cars and we can play on the street.'

# Feelings

Children commonly reported that they liked a place simply 'cos its fun', or disliked a place 'because its boring there'. As previously mentioned positive feelings often occurred in conjunction with Destinations where children perceived a variety of affordances were possible and with Activities like socialising with friends and family.

# Neighbourhood destinations

In total, 1102 participants mapped 2559 neighbourhood destinations, with an average of 2.54 destinations per child, a median of 2 destinations per child and a range of 1–12 destinations per child. After mapping the destinations children visited in their neighbourhoods, the most commonly marked places were parks and retail food areas. In addition, the clustering of destinations visited by children were, in most cases, on or next to schools, unhealthy food outlets and unhealthy advertisements in the neighbourhood. Figure 2 is an example of destinations that children from one school visited (note, school not included in the figure and destinations were geomasked for privacy). It is clear from this example that children visited parks and areas with high density of unhealthy food outlets and unhealthy advertising.

While no measure of frequency of visitation or length of stay was included in our research, the most prominent neighbourhood destinations marked using PPGIS were parks that were located close to schools, rather than parks located far away from schools, except in the case of large multi-use parks. The map crystallises the results of the open-ended questions, visually showing the neighbourhood destinations that afforded children playing with friends, and eating unhealthy food and drink, by far the two most common affordances mentioned by the children in this study.

# Discussion

This research builds upon previous studies investigating the places children go in their neighbourhoods (Badland et al. 2015) and children's perceptions of these places (Kyttä, Broberg, and Kahila 2012) using a novel framework and PPGIS methods. This research found that large multi-use parks and natural spaces followed by shops were important destinations for children as they afford opportunities for socialisation, active and imaginative play and shops were associated with consuming unhealthy food and drink.



Figure 2. PPGIS neighbourhood destinations from children attending 1 primary and 1 intermediate school, located in close proximity to each other, in Auckland.

Using a child-centred approach, this research allows children to voice the neighbourhood destinations that are important to them. The strength of this research is in its mixed methods approach. It examines open-ended responses that were 'crystallised' with objective neighbourhood data to further contextualise the responses and deepen understanding of children's neighbourhood destinations (Richardson 1994; Hemming 2008). Data were analysed using an inductive approach to qualitative content analysis based on a socio-ecological model of health behaviours and affordance theory.

The findings were developed into a comprehensive new framework that can be used in future research. The framework was developed using a large sample of children, Kids-PoND can be modified to fit different needs and cultural and socio-demographic contexts.

Overall, this research shows that children participating in the NfAK study valued destinations that provided them multiple opportunities for active play and socialisation. Multi-use parks with good facilities and amenities and natural features were frequently mentioned in relation to the many and varied prospects for play, interaction with nature, and activities with friends. This research illustrates the various practical ways the theory of affordances can be used in place-based research with children. While no measure of frequency of visitation or length of stay was included in our research, the most prominent neighbourhood destinations marked using PPGIS were parks that were located close to schools, rather than parks located further away, except in the case of large multi-use parks. Other research findings from interviews with parents indicate that parents and children are willing to travel further distances to visit more attractive parks (Veitch et al. 2006). Echoing the voices of children in this study, perceived park and neighbourhood safety are also important factors in determining park use (Veitch et al. 2006; Perry, Saelens, and Thompson 2011). The

relationships between distance, neighbourhood design and frequency of visitation are also shown in studies of food outlets (Thornton et al. 2017).

In this study children perceived shops as destinations where eating unhealthy food and drink were considered positive experiences. While much of children's diet is controlled by parents, studies have shown children and parents influence each other when purchasing food (Gram 2015; Calderon et al. 2017). While unsupervised food purchasing behaviour among NZ children is largely unknown, on average children who choose snacks unsupervised make less healthy food choices than children under supervision (Brown et al. 2010). These findings are in line with the results of this study: children liked going to shops to consume unhealthy food and drink.

This research did not include size parameters or indeed any predetermined adult-centric definition of what constitutes a 'destination in your neighbourhood'. Because adult-centred ideas and concepts were not forced onto children while conducting the research, the effect of power differentials, (e.g. where children feel pressured to respond a certain way in response to the adult authority figure) was minimised (Hemming 2008). This is a strength of child-centred research methodologies, as well as the approaches taken to conduct this research. However, it is interesting to note that the median number of 2 neighbourhood destinations per child was 2 and the mean was 2.54. This low number could reflect participant burden, as the NfAK PPGIS survey also included other questions and activities not presented in this paper, or it could reflect children's front-of-mind neighbourhood destinations or those that are most important to them.

Similar to recent systematic review findings by Smith et al. (2017), facilities and amenities like toilets and drinking fountains were reported by children in this study as important components of parks, fields, courts and reserves. This finding supports research with adults that shows these amenities are important for adults, particularly older adults (Alves et al. 2008). Cohen et al. (2015) found that recently renovated parks had higher visitation rates and overall greater levels of physical activity by children than unrenovated parks. However, others have found no statistically significant difference in physical activity levels between renovated parks and unrenovated parks (Anthamatten et al. 2011). Further research into the impact of park renovation of facilities and amenities among Auckland parks would add greater depth to understanding children's use and perception of parks and playgrounds. Questions might include: Do renovations improve or add more facilities and amenities to parks therefore providing greater affordances for play and socialisation? Or do park renovations increase visual appeal and decrease perceptions of danger from injury? Or both?

# Future research

Future research includes using Kids-PoND as the foundation for quantitative research on children's use and perceptions of neighbourhood place, as well as informing interview questions in qualitative research studies. A limitation this research was that frequency and duration of time spent in neighbourhood destinations was not measured, so detailed quantitative information could not be combined with the PPGIS data. An additional limitation is that information needed to quantify food and drink consumed in neighbourhood destinations was not collected. Future research possibilities include large research studies that combine PPGIS with GPS accelerometers and detailed diet and food purchasing information.

#### Implications

This research has many implications for children and parents. Multi-use parks with a variety of options for active play were perceived by children as 'fun' and provided more opportunities for play, socialisation and physical activity. When parents decide the route to travel to and from multi-use parks with their children, it may be beneficial for parents to avoid passing shops, therefore removing the opportunity to purchase and consume unhealthy food and drinks.

Similarly, the implication from this research for schools, focuses on reducing opportunities for children to purchase unhealthy food and drink via recommended travel routes. The existence of the location of unhealthy food outlets around NZ schools is well established (Day and Pearce 2011; Vandevijvere et al. 2016; Egli et al. 2018). For school travel plans and services like walking school buses purposely planning routes that do not familiarise children to shops selling unhealthy food and drink and do not provide them opportunities for purchasing unhealthy food could be important considerations. When children travel independently they do not always take the shortest route (Ikeda et al. 2018) and it may be that familiarity of a route is more important for them as well as the affordances they provide (McMillan et al. 2006). Policy regulation restricting the marketing of unhealthy food and drink around schools in NZ needs to be implemented in order to protect children from unhealthy marketing on their way to and from school (Day and Pearce 2011; Vandevijvere et al. 2018).

Specifically, for town planners, local councils and urban designers the Kids-PoND framework presented in this research could be a useful tool for consulting with children to inform place-based initiatives as well as planning, monitoring and evaluation of neighbourhood destinations. For example, our findings supported the importance of park amenities. Urban designers, planners and local councils may consider these features (e.g. toilets, drinking fountains, etc.) for parks in their local areas. Considering children in urban design and town planning are of particular importance in a rights based approach to understanding and promoting the place of children in cities (Unicef 1989).

Children's positive perceptions of shops as places to consume unhealthy food and drink have important implications for public health practitioners as well as policy and government regulation. In NZ unhealthy food outlets are located in close proximity to front of school gates, and nationwide schools located in areas of high deprivation are more likely to have unhealthy food outlets and the associated unhealthy food advertising located in closer proximity to the front of school gate than schools located in areas of low deprivation (Vandevijvere et al. 2016). This affords children attending schools in areas of high deprivation with closer and more frequent opportunities for consuming unhealthy food and drink (Vandevijvere et al. 2016).

In NZ this clustering and volume of unhealthy outlets and advertising is particularly important as NZ has one of the highest rates of childhood overweight and obesity levels in the world (Devaux and Sassi 2011). Children from highly deprived neighbourhoods in NZ are also more likely to be overweight or obese than children from less deprived neighbourhoods (Ministry of Health 2015). The authors acknowledge that removing opportunities to engage and consume unhealthy food and drink from near children's schools may be perceived by some as an overstepping of the role of public health and providing a 'nanny state' (Wiley, Berman, and Blanke 2013). However, in light of NZ's extreme childhood overweight and obesity prevalence rates, the lessons learned from government regulation of tobacco industry show significant public health gains are possible from increased restriction of marketing and availability (Hoek 2015). Government regulation to prohibit food outlets located in close proximity to schools from selling unhealthy food and drink should be considered in an attempt to remove the opportunity and subsequent responsibility away from children. Likewise, a government tax on unhealthy food and drink such as a sugar tax, or the removal of the goods and services tax on healthy food and drink (such as fruits, vegetables and plain milk) may have important public health implications both on what children purchase as well as the apparent preference for unhealthy food outlets to be located near schools and in areas of high deprivation (Vandevijvere and Swinburn 2015). Doing so may also be an important step towards reducing the inequitable distribution of poor health outcomes that can occur as a result of a diet high in unhealthy food and drink (Sushil et al. 2017).

# Conclusion

This research sought to understand the places children go in their neighbourhoods, what they like and dislike about these places and their overall perceptions of them. This study used a child-centred approach to analyse a large number of PPGIS open-ended survey responses combined with objective GIS data to further contextualise neighbourhood destinations for children. The Kids-PoND framework summarises these children's voices and presents results in a figure that could be useful for researchers, town planners, urban developers and local councils when considering the place of children in cities and urban areas. The research showed that for children in Auckland, parks were places to play with friends, play sport, run, ride bikes and explore, shops were places to consume unhealthy food and drink, and nature destinations were places for quiet introspection, exploration and imaginary play. The implications of this research support policy restrictions and tighter regulation on unhealthy advertising and food outlets located near NZ schools, and the provision of amenities in parks to support children's active play.

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