

# ICRP 2019

## 4<sup>th</sup> International Conference on Rebuilding Place

### CHILDREN'S ADAPTIVE BEHAVIOUR IN PERFORMING OUTDOOR PLAY AND LEARNING IN SCHOOL GROUNDS

Nor Fadzila Aziz (a)\*, Nor Diyana Mustapa (b), Janatun Naim Yusof (c)

\*Corresponding author

(a) School of Housing, Building and Planning, Universiti Sains Malaysia, 11800, Penang, Malaysia,  
nfadzila@usm.my

(b) Faculty of Architecture and Ekistics, Universiti Malaysia Kelantan, Bachok, Kelantan, diyana.m@umk.edu.my

(c) Faculty of Built Environment and Surveying, Universiti Teknologi Malaysia, Johor Bahru, Malaysia,  
janatunyusof@gmail.com

#### *Abstract*

Children's outdoor play in school grounds is commonly restrained due to limited spaces and landscape features offered at schools, as well as restrictive school regulations. This research explores children's adaptive behaviour in performing their play activities in school grounds environment. Fieldwork was conducted with 80 children aged 8 to 11 years old from two primary schools in the state of Johor, Malaysia. A qualitative, child-centred approach of data collection was employed to elicit data on children's behavioural and perceptual responses regarding their play in school grounds. The study revealed different play behaviour patterns and preferences among children regarding the use of school grounds during non-formal and informal learning sessions. The children's behavioural and perceptual responses showed that they coped with and adapted to the potentials and constraints of their school grounds environment in order to increase play opportunities. It highlights how children used communal and alternative spaces within school grounds, imagined and reinvented the spaces for play, and manipulated the environmental features found as their play tools. The findings indicate the children's abilities to fit with the environmental discrepancy in order to fulfil their physical, communal, emotional and educational needs through play. This paper argues that children's adaptive behaviour in performing their outdoor play in school grounds environment involved children's autonomy, creative thinking, social interaction and problem solving skills, which contributed to children's environmental learning

© 2019 Published by Future Academy [www.FutureAcademy.org](http://www.FutureAcademy.org).UK

**Keywords:** Children, outdoor play, play spaces, school grounds, environmental learning.



This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## 1. Introduction

Play contributes to children's geographical knowledge and experiences, which is crucial for their environmental learning. Previous studies shown that children utilise spaces and experience the spaces differently from adults (Russell, 2017; Moore, 1986) because children, unlike adults, tend to use space for the purpose of play (Luchs & Fikus, 2018). Children's outdoor play in school grounds may forge meaningful, continuing environmental and social connections and may enhance children's performances because it is an experiential phenomenon that is shaped or influenced by the outdoor context. Consistent with the nature of childhood, children learn during play. Play contributes to children's performances, physically, socially and cognitively. Physically, play directly influences children's motor and sensory activities with the landscape elements and spatial patterns of outdoor spaces that are accessed during hands-on experiences. Socially, play facilitates interaction through sharing, negotiating and turn-taking with peers. Cognitively, play helps children to understand about the environment around them through exploration and discovery (Chawla & Heft, 2002). Therefore, children's outdoor play in the school grounds is a fundamental component of informal learning (Bagot, Allen, & Toukhsati, 2015), which has been referred to as environmental learning by Tranter and Malone (2004).

## 2. Problem Statement

The development of research that views the potential of school grounds as a site for children's play and learning has attracted increasing attention in recent years due to a range of occurrences that are hindering children's play experiences in other outdoor environments. In many countries over the last few decades, including Malaysia, children's freedom to play actively, independently and safely in their neighbourhood and cities has declined dramatically. Children today also have lack opportunities to play with nature and become disconnected from nature. Such changes that hinder children's outdoor play and engagement with nature certainly have profound repercussions on their psycho-physical development (Castonguay & Juras, 2010) and contribute to the rise in psychopathology among children (Gray, 2011). Previous studies have suggested that a lack of engagement with the outdoor natural environment may contribute to lower performances among children in three aspects: physical, social and cognitive (Soga & Gaston, 2016).

School grounds were viewed as sites that promote physical activity and that contribute to the development, performance, health and well-being of children. However, children's outdoor play in school grounds is commonly restrained due to limited spaces and landscape features offered at schools, as well as restrictive school regulations. Adults often overlook the values of outdoor play and informal learning that lies outside the classroom for children's environmental learning. Many schools are designed without considering the children's needs and desires, and spaces at schools are often shaped with mediocre design and building standards (Tanner, 2000). The design, policy and management of schools are strongly influenced by the values of adults (Malone & Tranter, 2003b), who often emphasise neatness, simplicity of maintenance, litigation concerns, and the behaviour management of children. Therefore, many schools are designed with conventional school grounds that primarily consist of open expanses of turf and asphalt (Dyment, Bell, & Green, 2017), with a low quality of landscape and a minimal amount of utilized and shaped affordances (Ozdemir & Yilmaz, 2008; Kytta, 2003). Children's outdoor play in this conventional

school grounds is commonly limited to physical activities, which they do not support children's cognitive and physical development or the children's need for a variety of interests and abilities (Dyment et al., 2017)

### **3. Research Questions**

The main research question for the study:

- To explore how children overcome the environmental discrepancy in school grounds in order to fulfil their physical communal, emotional, and educational needs through play.

### **4. Purpose of the Study**

Therefore, this study aims to explore children's adaptive behaviour in performing their outdoor play and environmental learning in school grounds environment. In order to improve children's interaction with the outdoor environment at school, it is important to consider the ways in which the environment was experienced by children, by understanding the children's own unique cultures of play in school grounds

### **5. Research Methods**

A total of 80 children aged 8 to 11 years old from two primary schools in Johor participated in this study (40 children from each school) – an urban school in Johor Bahru and a rural school in Pontian. The sample represents both boys and girls, with equal number of children from each age group. A qualitative, child-centred approach of data collection was employed to elicit data on children's behavioural and perceptual responses regarding their play experiences in school grounds. This study used walkabout interviews (Carrol, Witten, Kearns, & Donovan, 2015; Holt, Lee, Millar, & Spence, 2015), and mapping, and photography as methods with the children in order to understand the children's play experiences and preferences as the central phenomenon of their interaction with the school grounds' properties and attributes.

The fieldwork was conducted at each school separately to enable the researcher to observe whether the patterns of the studied phenomenon were consistent or inconsistent. The fieldwork was conducted with a group of five children. They were grouped according to age group but not gender. Hence, eight groups of children were formed in each school. Two research assistants assisted each group: (i) the first research assistant acted as group facilitator who assisted the children during the tasks, and (ii) the second research assistant acted as non-participating observer who recorded detailed contextual and observational notes in a survey format.

During the walkabout interview session, the children led the research assistants to the significant places in the school grounds while sharing ideas and telling stories in response to the interview questions (Samborski, 2010). The children shared about their outdoor play experiences and the factors that influence the used of spaces in school grounds for their play activities. They also took photos of their play spaces.

All data gathered were analysed by content analysis where children's adaptive behaviour in performing their outdoor play activities were analysed based on their behavioural and perceptual responses during the fieldwork. The processes of analysis make possible the identification of patterns in their responses (Patton, 2002) and the development of themes that reflect different adaptive behaviour of children during their outdoor play in school grounds

## 6. Findings

The study revealed opposite play behaviour patterns and preferences among children regarding the use of school grounds during non-formal and informal learning sessions. Non-formal learning is a learning mode and experience that takes place outside of conventional classrooms (Gilbertson, Bates, McLaughlin, & Ewert, 2006) that involves teachers in the process of learning with children. Whilst, informal learning is a motivated learning that happens without teachers' intervention during children's unstructured time, such as recess, and before and after school in the school grounds, which play is a central function (Frank, Flynn, Farnell, & Barkley, 2018). The children's play behaviour patterns were observed in terms of types of play and places where the activities occurred during both learning sessions.

It was found that children performed more prescribed play and organised physical activity during non-formal learning sessions, which have been given greater promotion during the structured school day (Cardon, Labarque, Smits, & Bourdeaudhuij, 2009; Loucaides, Jago, & Charalambous, 2009). In sum, children were involved more in vigorous and games with rules (Jones et al., 2010), such as football, badminton, rope skipping, the 'ball passing' game, and the 'frog hops' game, especially during the physical education classes. The school field and sports courts were the common places for children's activities during non-formal learning sessions. Normally, teachers supervised the activities and provided the play equipment to allow the children to perform. In contrast, during informal learning sessions, especially during recess time, children performed more unstructured activities and active free-play (Morton, Atkin, Corder, Suhrcke, & van Sluijs, 2016; Jones et al., 2010), which can be characterised more as creative play (Powell, 2007; Stanley, 2011). The children performed imaginative activities such as role play, pretend play and fantasy (Malone & Tranter, 2003a) that did not necessarily require the use of free play equipment, but did need a suitable location for performing the activities (Jones et al., 2010). The findings showed that children at both schools performed their play at other communal spaces in school grounds during informal learning sessions, but not in the school field and sports courts. For examples, they commonly play at semi-enclosed spaces such as multipurpose hall and canteen, and they also play at green areas such as gardens and backyards.

The opposing patterns of children's play had relationship with the availability and accessibility of spaces for play that influenced by the school regulations that allowed or restricted children to play at certain spaces and times. The findings from children's behavioural and perceptual responses also indicated that children tried to cope with and adapt to the potentials and constraints of their school grounds environment in order to increase play opportunities during informal learning sessions. The children's adaptive behaviour is discussed according to the themes developed from content analysis.

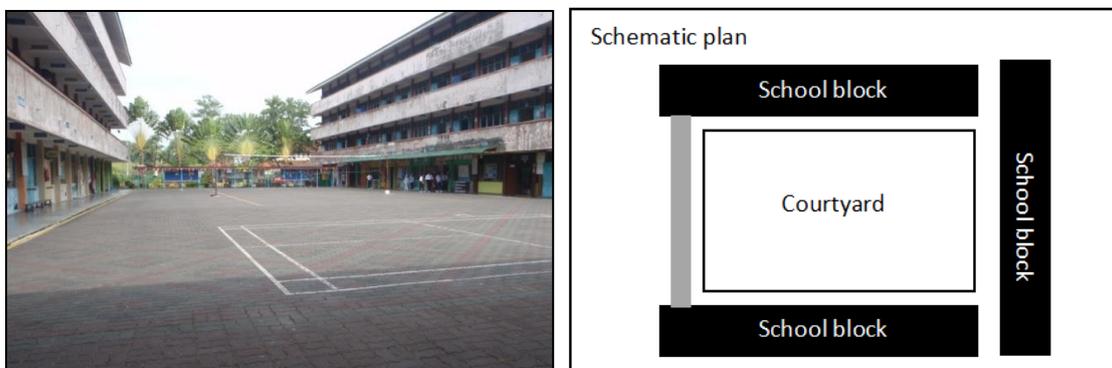
### 6.1. Recognising Restricted Spaces for Play

The school field and sports courts were the common places for children to perform activities during non-formal learning sessions, especially during physical education classes. However, the children realised the restrictions placed on the use of those places during informal learning sessions or without the teacher's permission as part of their school's safety regulations.

During the walkabout interview sessions with the children, it was common to hear responses from the children such as, *"We cannot play on the field during recess."*, *"We are not allowed to play here [field]."* The restriction on the use of the field can be shown to have prevented the children from playing on the field. A 10-year-old boy from the urban school spontaneously expressed his desire to play football during recess while the data were being collected. He said, *"It would be best if we could play football during recess."*

At the urban school, the paved area which is the school courtyard consisting of the sports courts, which its use was also prohibited during recess as highlighted by the following excerpts by two 9-year-old boys: *"I don't like to play [on the courtyard]... because the teachers will scold us, I cannot play"* and *"The teachers do not allow us to play [on the courtyard]"*.

The restrictions had limited the children's activities during informal learning sessions. In addition, the design of the courtyard, which was surrounded by the school blocks (see Figure 1), also have limited the children's activities because the children perceived that their movements could be easily observed and that the teachers often kept an eye on them.



**Figure 01.** The courtyard that consisted of the sports courts at the urban school is surrounded by the school blocks.

### 6.2. Modifying Communal Spaces within School Grounds as Play Spaces

Since there were restrictions on the use of the school field and sports courts during informal learning sessions, other communal spaces within school grounds were found to be alternative spaces for children's play. Surprisingly, semi-enclosed spaces at both schools were found to become the main spaces for children's play. In the urban school, the semi-enclosed spaces included the mini hall and the canteen, which were both located next to each other, apparently became the immediate play spaces for children, especially during recess (Figure 2). However, in the rural school, the semi-enclosed spaces referred to the school's multipurpose hall. The children normally played pseudo-football, chasing and running, hide-and-seek, the 'AEIOU, stop!' game, and other traditional games such as *Batu Seremban*, *Ceper*, and *Datuk*

*Harimau*. The finding is unexpected and in contrast with previous studies by Dymont (2005) and Stanley (2011), which found that children frequently perform their activities in the green areas of school grounds during recess.



**Figure 02.** The mini hall was the immediate and alternative play space for children at urban school during recess

Children's access to semi-enclosed spaces is due to the permission given by their teachers for them to play in the spaces, particularly in the mini hall and multipurpose hall, during informal time as stated by the children at both schools. Therefore, those spaces replaced the function of the fields and the sports courts simultaneously to become an alternative space for children's activities. The findings are supported by the children's narrations from the walkabout interview. A 9-year-old boy from urban school said, "I can imagine this mini hall like a huge field... Here, I can run before school. Sometimes, I play the 'AEIOU, stop!' game..." Another child, a boy aged 8, claimed, "There are spaces [in the mini hall]... I can run, play chasing and running, and jog." Their counterparts from the rural school also shared the same views. For instance, a 9-year-old boy perceived the multipurpose hall as his play space. He said, "I could play many things [in the multipurpose hall] such as Bentes."

In sum, the semi-enclosed spaces appeared as alternative play spaces and social gathering areas to the existing field and courtyard – the places to continue hands-on, creative activities with minimum social pressure (Stanley, 2011). Indeed, normally, children are more active in spacious than restricted environments (Ridgers, Fairclough, & Stratton, 2010).

### 6.3. Imagination and reinventing play spaces

Apart from using the communal spaces for their play activities, children at both schools also imagined and reinvented other spaces or features within their school grounds for play, such as bicycle shed, gazebo, tree trunk and sculpture. The children in the rural school reinvented the bicycle shed as play spaces for their 'crocodile' game. In the 'crocodile' game, a child pretended to be a crocodile and tried to catch a peer, the victim. They imagined the iron bars in the bicycle shed to serve as places for victims to seek protection from the crocodile (Figure 3). The children climbed on the iron bars for protection. They also used the terms 'low tide' and 'high tide' – the crocodile could not climb on the iron bars to catch victims during a low tide but could do so during a high tide, thus making the iron bars unsafe for victims

during a high tide. Although they did not engage with natural features in this game, they applied their understanding of natural phenomena of low and high tides. The process involved naturalistic and symbolic values of nature (Kellert, 2002).

Another example is when children play the 'ghost' game. The children use the gazebo in their school grounds to seek protection from the ghost and used the tree trunk or sculpture as a 'ghost house'. Children who touched the tree trunk became ghosts and were required to catch other players, and children who disturbed the ghost house (sculpture) caused the ghost to exit the house and attempt to catch them. Such rules created in the 'crocodile' and 'ghost' games made the games more challenging and fun. Children's engagement with pretend play and games with rules also indicates their engagement with environmental opportunities for sociality.



**Figure 03.** The iron bars in the bicycle shed as places for victims to seek protection the 'crocodile game

#### **6.4. Manipulating Environmental Features in School Grounds as Play Tools**

The children did not only modified the spaces as their play spaces, but they were also creative in manipulating other objects found in the school grounds which they perceived as their play tools, especially during informal learning sessions when play equipment was not provided to them. They encountered other environmental features through free play and had more freedom to utilise loose materials, both natural and manmade, in the school grounds as their play tools. For instance, bottle caps, erasers and broken mosaics afforded the children in the rural school to play *ceper* game. While plastic food wrappers and pieces of hotdog afforded the children in the urban school baiting and catching lizards hiding in shrubs.

The process of manipulating the environmental features involved productivity activities when the children changed the properties of the environment in accordance with their desires (Chawla & Heft, 2002) including the functions and forms of features (Aziz & Said, 2015). In terms of changing the functions, the examples included visualizing the appearance of a table, whiteboard or edge of corridor or drain as goalposts, and manipulating a drinking bottle, stone, or soda can as a ball in a pseudo-football game (Figure 4). Even though no changes in form were involved, the way the children shaped the function of the features enabled them to perform the activities when the real goalposts and ball were unavailable for their play.

Children also manipulated environmental features by changing its forms such as created self-made jewellery from *Ixora sp.* flowers. The children at the urban school connected the structure of the *Ixora sp.* flowers to make jewellery. In order to make it more interesting and challenging, the children used different colours of *Ixora sp.* flower, yellow and red. The children also perform it in a sense of competition by producing the longest jewellery or in the shortest time (Figure 5).



**Figure 04.** Children at the rural school use recycled bottles to play pseudo-football in the multipurpose hall.



**Figure 05.** A final piece of self-made jewellery

The attributes of loose materials permit children to utilise and manipulate the objects in many ways because the objects have no single or obvious purpose. It depends on children's creativity and imagination in turning the objects into their play tools (Freeman & Tranter, 2011). The finding signifies that children are not only creative and imaginative but also have the ability to solve their problems (McDevitt & Ormrod, 2002). The children in this study understood games with rules and sought other alternative discourses when performing their favourite games (Christensen & James, 2000), such as football, badminton and *sepak takraw*. For example, they applied the concept of goalpost to the whiteboard, table, and edge of corridor in the pseudo-football game.

## 7. Conclusion

In the study, the children still performed their play activities in the school grounds even though the school offered limited spaces and landscape features, and although the school regulations restricted them from playing at certain times and in certain places. This is shown through the behavioural patterns children displayed when playing during non-formal and informal learning sessions, as well as their perceptual responses to the attributes of their school grounds.

The children recognised the places that can afford their play and the places that cannot. For example, the children were aware that they could play on the school fields during physical education classes or school events, but not during the informal learning sessions, such as recess. At the same time, they also recognised other potential places in the school grounds and their properties and attributes, either appropriate or not, that might afford them play with fewer restrictions. They also overcame the constraints and perceived the potential affordances of the school grounds as an opportunity to utilise and shape the environment. For example they perceived other places such as canteen, multipurpose hall, and corridor as

the immediate play spaces for them. Although the places were not well-equipped and were inappropriate for play, the children adapted to the environmental discrepancy by adjusting the functions of place as well as modifying their behaviour. They created their own play spaces and games, and they manipulated the environmental features that they found as their play tools. Hence, their positive behavioural and perceptual responses with the environment enabled them to play.

The children's behavioural and perceptual responses suggested that they coped with and adapted to the potentials and constraints of their school grounds environment. The children's adaptive behaviour led to the improvisation of a Person-Environment fit between them and their environment and resulted in the actualisation of potential affordances. When the children played in and engaged with their environment, they thought creatively and logically, increased their autonomy, interacted with others, moved around, developed their confidence, and developed problem-solving strategies. Their actions indirectly contributed to their environmental learning as they developed an understanding about the environment and their own capabilities, and developed skills through outdoor play in the school grounds. Adults frequently dismiss children's outdoor play in the school grounds as frivolous, meaningless, hazardous and a waste of time, forgetting the benefits of play for children's development. However, outdoor play is linked closely with children learning in a spontaneous and fun way. Children's learning through play is appropriate to their development stage and the best preparation for adulthood.

The study indicates that school grounds are important in the context of children's environmental learning. Therefore, school grounds should be designed by considering the children's needs and desires, and the children's vary interests and abilities. Children's needs in this respect can be met by designing a school grounds environment that offers both natural and man-made elements and a variety of spaces. The variability of elements and spaces in the school grounds environment serves different developmental purposes for children. School administrators and teachers also should recognise the potential of school grounds for children's environmental learning by allowing children to play and engage with the environment. They also should recognise how informal learning sessions, especially recess, form an essential part of the school day for learning.

## Acknowledgments

The study was funded by USM Short Term Grant (304/PPBGN/6313299).

## References

- Aziz, N. F., & Said, I. (2015). Outdoor environment as children's play spaces: Playground affordances. In B. Evans, J. Hornton, & T. Skelton (Eds.) *Play, Recreation, Health and Well Being. Geographies of Children and Young People*, 9, 87-108. Singapore: Springer.
- Bagot, K. L., Allen, F. C. L., & Toukhsati, S. (2015). Perceived restorativeness of children's school playground environments: Nature, playground features and play period experiences. *Journal of Environmental Psychology*, 41, 1-9.
- Cardon, G., Labarque, V., Smits, D., & Bourdeaudhuij, I. D. (2009). Promoting physical activity at the pre-school playground: The effects of providing markings and play equipment. *Preventive Medicine*, 48(4), 335-40.
- Carrol, P., Witten, K., Kearns, R., & Donovan, P. (2015). Kids in the city: children's use and experiences of urban neighbourhoods in Auckland, New Zealand. *Journal of Urban Design*, 20(4).

- Castonguay, G., & Jutras, S. (2010). Children's use of the outdoor environment in a low-income montreal neighborhood. *Children, Youth and Environments*, 20(1), 200-230.
- Chawla, L., & Heft, H. (2002). Children's competence and the ecology of communities: A functional approach to the evaluation of participation. *Journal of Environmental Psychology*, 22(1), 201-216.
- Christensen, P., & James, A. (Eds.). (2000). *Research with Children: Perspectives and Practices*. London: Falmer Press.
- Dyment, J. (2005). Green school grounds as sites for outdoor learning: Barriers and opportunities. *International Research in Geographical and Environmental Education*, 14(1), 28-45.
- Dyment, J., Bell, A., & Green, M. (2017). Green outdoor environments: Settings for promoting children's health and wellbeing. In H. Little, S. Elliott and S. Wyver (Eds.) *Outdoor Learning Environments: Spaces for exploration, discovery and risk-taking in the early years*. Allen and Unwin Academic.
- Frank, M. L., Flynn, A., Farnell, G. S., & Barkley, J. E. (2018). The differences in physical activity levels in preschool children during free play recess and structured play recess. *Journal of Exercise Science & Fitness*, 16(1), 37-42.
- Freeman, C., & Tranter, P. J. (2011). *Children and Their Urban Environment: Changing Worlds*. London: Earthscan.
- Gilbertson, K., Bates, T., McLaughlin, T., & Ewert, A. (Eds.) (2006). *Outdoor Education: Methods and Strategies*. Champaign, IL: Human Kinetics.
- Gray, P. (2011). The decline of play and the rise of psychopathology in children and adolescents. *American Journal of Play*, 3(4), 443-463.
- Holt, N. L., Lee, H., Millar, C. A., & Spence, J. C. (2015). Eyes on where children play': A retrospective study of active free play. *Children's Geographies*, 13(1).
- Jones, N. R., Jones, A., van Sluijs, E. M. F., Panter, J., Harrison, F., & Griffin, S. J. (2010). School environments and physical activity: The development and testing of an audit tool. *Health and Place*, 16(5), 776-783.
- Kellert, S. R. (2002). Experiencing nature: affective, cognitive, and evaluative development in children. In Kahn, P. H., & Kellert, S. R. (Eds.) *Children and Nature: Psychological, Sociocultural, and Evolutionary Investigations*, 117-151, Cambridge, MA: MIT Press.
- Kyttä, M. (2003). Affordances and independent mobility in the assessment of environmental child friendliness. (Doctoral of Philosophy dissertation). Helsinki University of Technology, Finland.
- Loucaides, C., Jago, R., & Charalambous, I. (2009). Promoting physical activity during school break times: Piloting a simple, low cost intervention. *Preventive Medicine*, 48(4), 332-334.
- Luchs, A., & Fikus, M. (2018). Differently designed playgrounds and preschooler's physical activity play. *Early Child Development and Care*. 188(3).
- Malone, K., & Tranter, P. J. (2003a). School ground as sites for learning: Making the most of environmental opportunities. *Environmental Education Research*, 9(3), 283-303.
- Malone, K., & Tranter, P. J. (2003b). Children's environmental learning and the use, design and management of schoolgrounds. *Children, Youth and Environments*, 13(2), 87-137.
- McDevitt, T. M., & Ormrod, J. E. (2002). *Child Development and Education*. New Jersey: Merrill Prentice Hall.
- Moore, R. (1986). *Childhood's Domain: Place and Play in Child Development*. Croom Helm, London.
- Morton, K. L., Atkin, A. J., Corder, K., Suhrcke, M., & van Sluijs, E. M. F. (2016). The school environment and adolescent physical activity and sedentary behaviour: a mixed-studies systematic review. *Obesity Review*, 17(2), 142-158.
- Ozdemir, A., & Yilmaz, O. (2008). Assessment of outdoor school environments and physical activity in Ankara's Primary Schools. *Journal of Environmental Psychology*, 28(3), 287-300.
- Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods* (3<sup>rd</sup> ed.) Thousand Oaks: SAGE.
- Powell, M. (2007). The hidden curriculum of recess. *Children, Youth and Environments*, 17(4), 86-106.
- Ridgers, N. D., Fairclough, S. J., & Stratton, G. (2010). Variables associated with children's physical activity levels during recess: The A-CLASS Project. *The International Journal of Behavioral Nutrition and Physical Activity*, 7(1), 74.
- Russell, W. K. (2017). When is a slide not a slide? (or what happens when we think differently about and beyond design). In *How to Grow a Play Space*. Routledge, London.

- Samborski, S. (2010). Biodiverse or Barren School Grounds: Their effects on children. *Children, Youth and Environments*, 20(2), 67–115.
- Soga, M., & Gaston, K. J. (2016). Extinction of experience: the loss of human–nature interactions. *Frontiers in Ecology and the Environment*, 14(2), 44-101.
- Stanley, E. (2011). The place of outdoor play in a school community: A case study of recess values. *Children, Youth and Environments*, 21(1), 185-211.
- Tanner, C. K. (2000). The influence of school architecture on academic achievement. *Journal of Educational Administration*, 38(4), 309-330.
- Tranter, P. J., & Malone, K. (2004). Geographies of environmental learning: An exploration of children’s use of school grounds. *Children’s Geographies*, 2(1), 131-155.