ENCYCLOPEDIA on Early Childhood Development

Outdoor play and climate change: Impacts, Adaptation and Opportunities

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Introduction and Subject

Play is essential for healthy child development.[1] Outdoor play, along with the risks that come with it, offers additional unique benefits to children.[2,3]

Unfortunately, climate change is changing the landscape of children's outdoor play, with more frequent and extreme weather events.[4] The impacts of climate change are expected to grow, with nearly 3 billion people living outside the ideal temperature zone by the end of the century.[5] Children will bear a disproportionate share of the climate change burden, affecting their wellbeing in a myriad of direct and indirect ways.[6]

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We examine the potential benefits of outdoor play in the context of climate change and pedagogical opportunities for environmental learning. We also share evidence on how climate change, through factors such as extreme temperatures, wildfire smoke, and flooding impact children's outdoor play and the growing body of evidence on how to adapt outdoor play to these impacts.

Opportunities and Problems

- Outdoor play provides pedagogical opportunities to teach children about nature generally, and climate change specifically.[7-9]
- Climate change negatively impacts the health and wellbeing of young people.[5,10] Against this backdrop, the many health benefits of outdoor play[2,3] are notable.
- Children engaged in outdoor play will be exposed to increased air temperature, including through extreme heat events4, alongside increases to the temperatures of play spaces.[11,12]
- Wildfires, and resulting smoke, will become more prevalent in some parts of the world.[13]
- Storms and flooding, in addition to damaging outdoor spaces[14], can deposit sediment, which can contain various toxins[15].

Research Context

Research into climate change and outdoor play is a new and rapidly growing area of scholarship. Findings come from a variety of disciplines, including education[7,16], sports medicine[17], occupational therapy[18], environmental research[19-21], urban planning11 and pediatrics[22]. Unfortunately, a lack of consistency in language and terminology can make it difficult to find, assess and synthesize research, and there are multiple distinct, but potentially overlapping, terms in use.

Key Research Questions

- What are the benefits of outdoor play in the context of climate change? How can we foster land-based play and connections between children's wellbeing and climate resilience?
- What are the ways in which climate change impacts outdoor play?
- How can negative impacts of climate change on outdoor play be responded to? What Indigenous and land-based approaches can we integrate?

Recent Research Results

Emerging research points to the importance of outdoor play in the context of climate change. It also shows that climate change can negatively impact outdoor play through several pathways, including making play less safe, reducing access to play, and reducing the quality of play that occurs. However, research also highlights the potential for adaptation of play spaces in response to climate change.

Potential benefits: There are benefits to outdoor play within the context of climate change. Outdoor play provides an excellent forum for engaging in education about nature broadly, and climate change specifically.[23,24] For example, studies show that childhood experience in nature fosters subsequent greater environmental stewardship for the natural world within adult life.[25-27] Further, we note that given the many negative health impacts children will experience as a result of climate change[5,10], the numerous health benefits of outdoor play[2,3] are potentially even more relevant.

*Safety***:** There is expected to be an increase in the number of hot days, defined as greater than 30℃.[28] Another consideration is heightened temperatures of surfaces, particularly artificial surfaces, in playgrounds, when exposed to direct sunlight.[11,12] This has implications for children's safety, given that they are less able to tolerate high temperatures for extended periods of time than adults, and are at greater risk of heat stress, sunburns, and thermal burns.[19,28]

Another potential safety concern is the depositing of sediments which contain contaminants, such as heavy metals, into play spaces after flooding or major storms.[15,20,21,29-32] This is particularly concerning for children due to potential impacts such exposures to their developing nervous systems. Children are also at risk as they are more likely to ingest dirt, due to play activities on the ground as well as placing hands in their mouths.[20]

Access: One way reduced access to outdoor play can occur is through children remaining indoors during extreme heat or smoke events, which has been reported in research from Australia[33-36], Bangladesh[37] and Canada[38] Furthermore, extreme weather events can damage play spaces, as was seen after Hurricane Katrina14; residents in regions that experienced flooding were also less likely to access parks[39].

Quality: There is emerging research that climate change can change the quality of children's play. For example, research has found that as ambient air temperatures increase, preschoolers[22],

and older children and adolescents[40] engage in less moderate or vigorous physical activity and increase time spent in sedentary activities. Furthermore, research suggests that during inclement weather children are likely to increase the amount of time spent consuming various forms of media.[36]

Adaptation: There are emerging recommendations for how play spaces can be designed to adapt to some of these negative impacts.[41] Some materials, such as rubber, gravel, or artificial turf become notably hotter than others, especially compared to natural materials, when exposed to direct sunlight.[11,12] Similarly, the colour of artificial materials can impact how hot they become, and many artificial materials can become hot enough to cause burns even on “typical” summer days.[11] Increasing shade can substantially lower temperatures[11,42], particularly shade from trees (as opposed to artificial shade sails)[12].

There are important co-benefits to these adaptations.[43] Adding natural elements (as opposed to concrete or rubber surfaces) improves the ability of play spaces to absorb rainwater during storms.[18,28] Furthermore, it may also positively facilitate play activities with high play value.[18] Schoolyard greening and environmental learning in schools, as well as incorporating Indigenous ways of knowing, are burgeoning areas of scholarship and have the potential to foster greater connections to nature and eco-centric worldviews among children.[44-47]

Beyond changes to physical spaces, it is also important to consider policy. For example, researchers have pointed to the need to develop policies for child care which balance the need for children to engage in outdoor play and physical activity, with the need to protect them from negative health impacts of wildfire smoke exposure.[13]

Research Gaps

Most of the literature focuses on extreme heat and associated thermal effects, with comparatively less research on other impacts, such as flooding, extreme cold, or other adverse weather events. For example, despite increases in wildfires, and wildfire smoke, in many parts of the world, there is a little research on how to effectively respond while maintaining access to outdoor play. Additionally, the study settings are largely confined to manufactured play spaces, such as playgrounds, with relatively fewer studies focused on nature-based play settings.

Conclusion and Implications for Parents, Services and Policy

While outdoor play must be prioritized among parents and service providers so that children can reap the many benefits, climate change impacts on children must also be considered for their safety and well-being. In Canada, current play spaces for young children do not adequately consider thermal comfort and sun safety in their design.[28] There is a need for improved policy and safety guidelines to mitigate harmful effects of extreme heat and UV radiation in children's outdoor play settings[28] so they can spend more time engaging in quality outdoor play.

There is growing evidence on the long-term health effects of wildfire smoke[48-51] and exposure to environmental contaminants from floods and severe storms[21,29]. Appropriate guidelines and policies regarding outdoor play during periods of wildfire smoke and/other adverse climate change events need to be developed to ensure safety and wellbeing of children during outdoor play.

While further research is needed, there is a strong body of evidence to start adapting to the impacts of climate change on outdoor play.[41] Playground shade, particularly natural forms of shade such as trees, shrubs and vines, as well as cooler and more natural playground materials, have been shown to effectively mitigate extreme heat and hot playground surface temperatures.[11,12,18,42] In tandem with this, regular access to drinking water for hydration at child care centres and access to water fountains in parks and playgrounds is critical to extend outdoor play for children.[41] Of course, while various forms of *adaptation* are important, in terms of the design of play spaces, it is also critical to encourage *mitigation* efforts, including reductions in carbon emissions, aimed at minimizing future climate impacts.

We conclude by acknowledging that the work of mitigating and adapting to the impacts of climate change on outdoor play requires collaboration between communities, policymakers, educators, child care leaders, and health professionals; however, there is a clear path forward and concrete actions that can be taken now.

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