

‘I like the “outernet” stuff:’ Girls’ perspectives on physical activity and their environments

Abstract

Physical activity in Canada mirrors the gender gap observed globally, with boys more likely than girls to meet recommended guidelines. While a growing body of research has examined the relationships between environmental factors and children’s physical activity levels, much less is known about how environments play a role in gendering physical activity. In this paper, using a material feminist approach to environmental affordances, we explore girls’ perspectives on the features of their everyday environments that support or inhibit their uptake of physical activities in Southwestern Ontario, Canada. As part of the larger multi-method Spatial Temporal Environment and Activity Monitoring (STEAM) project, we held six focus groups with girls ages 10-12 years from rural, suburban, and urban schools. Through inductive thematic analysis, we identified two themes: (1) Outdoor matter matters for physical activity, and (2) Social levers and liabilities shape physical activity affordances. Our results indicate that some girls may be better afforded physical activity opportunities by providing proximate outdoor play in spaces with natural elements and diverse infrastructure, coupled with efforts to alleviate social liabilities (e.g., care responsibilities) and leverage social supports (e.g., peers). Based on our findings, we put forward naturalised schoolyards as a potentially gender-sensitive physical activity intervention. This study contributes to identifying the gendered ways in which environments may differentially ‘afford’ children opportunities for physical activity, thereby opening the way for developing more gender-equitable interventions.

Keywords: gender; physical activity; environment; nature; youth

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Introduction

Physical activity (PA) in Canada mirrors the gender gap observed globally, with boys more likely than girls to meet the recommended guidelines for PA (Colley et al. 2011; Hallal et al. 2012). Among Canadian youth ages 5-11 years, only 9 percent of girls meet the recommended 60 minutes of moderate-to-vigorous PA per day, as compared to 18 percent of boys (Statistics Canada, 2015). Moreover, although both boys’ and girls’ PA participation drops off in teenage years, the proportion of girls meeting PA guidelines falls to just 3 percent—making this group the least likely of all youth to achieve the health benefits of PA (Statistics Canada, 2015). Targeting girls’ PA participation *before* this gap widens with age is thus a crucial point of intervention.

Qualitative research has revealed a number of processes underpinning the gender gap, including how boys and girls are socialised into gender-typed activities, the influence of normative feminine body ideals that emphasise thinness over strength, and the dictums of behavioural norms that discourage perspiration and exertion (Gorely, Holroyd, and Kirk 2003; Allender, Cowburn, and Foster 2006; Dwyer et al. 2006; Evans 2006; Vu et al. 2006; Whitehead and Biddle 2008; Casey et al. 2009; Slater and Tiggemann 2010). At the same time, evidence suggests that neighbourhood and school environments play a distinct role in shaping young people’s PA (Tucker et al. 2009; De Vet, de Ridder, and de Wit 2011). Numerous quantitative studies examining this relationship have highlighted the influence of environmental characteristics, such as walkability, park and facility access, and land use, on children’s PA levels (Davison and Lawson 2006; Tucker et al. 2009; McGrath et al. 2015; Mitchell et al. 2016).

Still, much less is known about how environments play a role in gendering PA (Patnode et al. 2010, 9).

In this paper, we explore girls' perspectives on the features of their everyday environments that support or inhibit their uptake of physical activities in Southwestern Ontario, Canada. Specifically, we ask: (1) How do girls perceive aspects of their environments to 'afford' opportunities for PA? and (2) How can understanding girls' geographies of PA inform interventions for gender equity? Given the persistence of gendered inequities in youth PA, many have pointed to the importance of considering gender in designing PA interventions (Dwyer et al. 2006; Vu et al. 2006; Camacho-Miñano, LaVoi, and Barr-Anderson 2011; Moore et al. 2014; Telford et al. 2016; Baskin et al. 2015; Wilk et al. 2018). How to effectively do this remains less clear. It is important to identify the ways that environments play a role in gendering PA because young people may be more exposed to environmental influences given limits on their independent mobilities (Crespo et al. 2013). Indeed, Loebach and Gilliland (2014) argue that young people are particularly captive to the local environments around their home and school, due to extrinsic constraints on their mobility (e.g., parental rules, minimum driving age). As such, we hold that environment is a key point for gender-equity intervention in PA not only among youth, but also for mitigating the gender gap into adulthood. Below, we review the literature on environmental influences on girls' PA. We then turn to develop a material feminist approach to environmental affordances to frame girls' PA experiences in a way that works to overcome dichotomies¹ and determinisms in understanding the role of environments.

¹ Thanks to an anonymous reviewer prompting us to further explore and develop this point.

Conceptualising the place of environment in girls' physical activity

How environments matter for girls' physical activity

Environments have gendered effects on youth PA in diverse contexts. For girls' PA specifically, environmental features including provision of public recreation, transport infrastructure (Davison & Lawson 2006), distance to school, distance to facilities, neighbourhood walkability (Patnode et al. 2010), busy roads (Patnode et al. 2010; Larsen et al. 2012), and area safety perceptions (Villanueva et al. 2013) have been shown to be especially important. The proximity of local PA facilities is a standout dimension of these neighbourhood effects, with numerous studies demonstrating that having PA facilities within a close-to-home radius benefits girls' PA (Norman et al. 2006; Dowda et al. 2007; Evenson et al. 2007; Powell et al. 2007; Pate et al. 2008; Reimers et al. 2014). In a study by Evenson et al. (2007), for instance, girls perceiving having local PA facilities to go to was the most important neighbourhood-level contributor to 6th-grade girls' non-school MVPA. In addition, detecting the gendered effects of environment on PA may depend on how a neighbourhood is operationalized and subsequently measured. Mitchell et al. (2016) found that smaller neighbourhood areas (500 metres around home) better explained girls' MVPA, while larger radii better explained boys' MVPA. These findings indicate that more proximate environments are especially salient for girls' PA.

Local peers—particularly same-age friends—are another significant socio-environmental determinant of girls' PA (Dwyer et al. 2006; Casey et al. 2009; Kuo et al. 2009; Whitehead and Biddle 2008; Camacho-Miñano, LaVoi, and Barr-Anderson 2011; Jago et al. 2011; Baskin et al. 2015; Smith et al. 2015; Snow et al. 2018). Qualitative work by Whitehead and Biddle (2008, 248) has shown how girls' social interactions relate to their PA involvement in local environments: 'The thought of being active without friends or peers ... was extremely

threatening to these girls and many simply would not entertain the idea of being active in such an environment.’ This notion is echoed in quantitative findings from Jago et al. (2011) who found that not only did engaging with PA with a best friend increase the time and intensity of girls’ PA, but this relationship was strongest when PA took place within girls’ home neighbourhoods.

Research has also shown that the ways youth engage with their local environments is often governed by gender relations. For one, the parental regulation of young people’s mobilities plays a role in their geographies of PA, and can be especially constraining for girls. Mackett et al. (2007), for example, using GPS tracking and diaries with children aged 8-11 in the UK, found that boys were allowed to leave home alone more than girls; even having access to a local park did not affect girls’ independent mobility, but it did positively influence boys’. In Canada, Loebach and Gilliland (2014) did not find any gender differences in children’s neighbourhood activity spaces, but parental safety perceptions and parent reports of child mobility predicted children’s distance traveled. They attributed this to decreased mobilities for all children, rather than improvements for girls. This suggests that gendered norms embedded in parenting behaviours can shape how children engage with their local environments for PA purposes. Second, gendered social hierarchies among youth can also shape their neighbourhood mobilities. A key example is qualitative work by Christensen, Mygind, and Bentsen (2015) in Denmark who found that the presence of perceived ‘big boys,’ who children feared might behave poorly, led participants to categorise certain places as ‘bad,’ and was a determinant of spatial mobility for both boys and girls. They thus argue that children’s PA places must be understood as sites of socio-material relations, and move beyond a siloed focus on the physical environment. Ries et al. (2008) found that among African American youth in the US, the perceived competitiveness with which teen boys used neighbourhood PA facilities made these PA spaces exclusionary for teen

girls (see also Pawlowski et al. [2014]). Lee and Abbott (2009), in rural Australia, observed that young people's PA practices are embedded in the localised gendered social structures of place (i.e., young men practicing a wider range of sports and physically laborious activities consistent with the ideal of rural men); these ideals constrained both young men and young women from certain activities. These findings highlight the importance of understanding PA—a gendered health behaviour—as implicated in and constituted by wider gender patriarchal power structures at play, which can have a marginalising and bifurcating effect on who participates in what PA activities and places (Gorely et al. 2003; Connell 2012; Coen et al. 2018).

Related to these gendered social forces, research has shown that girls and boys may also use spaces differently for PA (Robert and Yarwood 2005; Ries et al. 2008; Clark et al. 2011). Clark et al. (2011), for example, reported that many girls perceived themselves to be physically active in localities not necessarily dedicated to PA, such as their own backyards and settings that allowed for unstructured and creative activities. As well, research within the school setting suggests there may be a mismatch between some girls' preferences and the activity spaces provided, with girls often indicating a preference for more secluded areas and “hanging-out” facilities than proffered on school grounds (Pawlowski et al. 2014; Snow et al. 2018). Our study thus focuses on the places that girls deem influential in their daily lives to deepen our knowledge about girls' perceptions of the role that their day-to-day environments play in shaping their PA participation.

A material feminist approach to environmental ‘affordances’

With an aim to move beyond some of the deterministic tendencies in the body of work investigating environmental influences on PA (Andrews et al. 2012; Blacksher and Lovasi 2012),

we draw together theories of affordances with concepts from feminist materialisms (or new materialist approaches) as a critical lens through which we conceive of the relationships between environments and girls' PA. Gibson's (1979) original theory of affordances, grounded in ecology, envisions environmental features as providing opportunities for action, relative to the individual characteristics of animals or humans. While Gibson saw affordances as moving beyond the subject-object binary, meaning that affordances are not inherent properties of environments but rather "equally a fact of the environment and a fact of behavior" (129), some argue it stops short of actually doing so (Änggård 2016). According to Änggård (2016, 78) this is because Gibson's approach ultimately renders the material environment as passive: "the affordances are there for humans and animals to use or not to use." Chemero (2003) provides a way forward by locating affordances instead within *sets of relations* between organisms (in our case, people) and ecological features, as opposed to fixed properties of environments.

We take up Chemero's interpretation of affordances, as emerging in-between places and people, in alignment with new materialist approaches gaining traction in studies of children's outdoor play (Änggård 2011; Malone 2016; Arvidsen 2018; Merewether 2018; Snow et al. 2018). A new materialist perspective draws attention to the mutualities and relationalities of human and non-human agents or matter. Intra-, as opposed to inter-, action destabilizes the classification of humans as possessing agency and matter as inert, and instead sees the dynamic flows and engagements between humans and non-human agents as co-constitutive forces (Barad 2003). From a material feminist perspective, non-human matter thus plays an active role in gendered boundary-making processes; the material "stuff" of places and spaces is vitally implicated in what our bodies do (Barad 2003; Fullagar 2017) and how bodies orient to space (Ahmed 2010).

A growing body of work in children's geographies has drawn on Barad's (2003) new materialist notion of intra-action (Rautio 2013, 2014; Arvidsen 2018). Arvidsen's (2018) work, for example, on children's dens (favourite places in natural environments) in Denmark shows how "denning" involves vitality in matter and is a process that comprises the intra-actions of humans and materials. Rather than approaching the child-nature relationship as binary, Arvidsen and others (Merewether 2018; Rautio 2013, 2014; Snow et al. 2018) make a case for situating the child-environment relationship in a flat ontology whereby humans are not hierarchically ordered above matter in terms of agency, but that agency emerges horizontally and relationally between matter and humans. From this perspective, it is possible to move away from romanticised notions of nature or environment and consider that, as Arvidsen argues, perhaps 'In a children's forest, quality should not be determined by pristineness, naturalness or beauty, but rather by temporality, growability and open-endedness.' (Arvidsen 2018, 289). Bringing together affordances with a material feminist lens allows us to see the material environment, not as a one-way determinant of PA, but as a factor in the PA affordance equation, which is continually (re)made through intra-actions.

Methods

As part of the larger multi-method Spatial Temporal Environment and Activity Monitoring (STEAM) project (Western University Non-Medical Research Ethics Board #17918S), we held six focus groups with girls ages 10-12 years (mean age 11.2) from a subset of rural, suburban, and urban schools in the vicinity of London, Ontario, a mid-sized Canadian city. These focus groups followed the Fall 2013 STEAM project cohort. Participants were recruited over a 2-month period in January/February 2014 from a subset of schools (n=4) selected to represent a

diversity of neighbourhoods according to school neighbourhood socioeconomic status (SES) (i.e., percentage of students who live in lower-income households) and geographical context (i.e., urban, suburban, rural) (see Table 1).

Table 1. Student Population Characteristics[§]

SES Variable	Urban	Suburban 1	Suburban 2	Rural	Ontario
Percentage of students who live in lower-income households	20%	25%	30%	8%	19.5%
Percentage of students whose parents have some university education	10%	20%	20%	50%	23.1%
Percentage of students whose first language is not English	10%	15%	30%	20%	24.9%
Percentage of students who are new to Canada from non-English speaking country	SP	SP	4%	4%	3.8%
Percentage of students whose first language is not French	100%	100%	100%	99%	96.6%
Percentage of students who are new to Canada from non-French speaking country	SP	SP	5%	5%	4.1%

SP: Suppressed

[§]Source: Ministry of Education Elementary School Profile

Our methodological approach was grounded in feminist geographical traditions which understand knowledge as always partial and situated (Rose 1997) and a central concern with how socio-spatial structures are implicated in inequities (Thien 2009). We further draw on critical health geography epistemologies which foreground the experiential dimensions of place and encourage the troubling of mundane contexts of health and daily life to upend taken-for-granted features of our environments implicated in health inequities (Dyck 1999). Framed in this methodology, we elected focus groups as a platform to allow our participants to converse about

the aspects of their everyday physical activity environments that were most important and relevant in their experiences. Focus groups can be a valuable method for engaging girls on topics of social and emotional meaning to them, as well as leveraging the salience of peer groups in the lives of young girls in positive ways (Letendre and Williams 2003). Further, given our interest in everyday environments, focus groups allowed us to meet with the girls in a format consistent with everyday happenings within the school setting, as our research was school-based. This helped us to keep the research close to the realm of the everyday situations of our participants, while acknowledging that participants may share openly as well as be influenced by group dynamics (Krueger and Casey 2000).

A total of 28 girls with parental consent to participate expressed interest in the focus group phase of the study. On the day of the scheduled focus groups, the girls were asked to provide verbal assent to participate in the focus group. Nine girls were absent from school and therefore unable to participate. We conducted a total of six focus groups (one urban, two rural, three suburban) with 19 students across four schools. Focus groups had three to four participants, except for one suburban group that had two participants due to student absences.

Within our sample, eleven participants identified as white, three identified as a visible minority, while two identified as mixed ethnicity. Only one student identified living in a single parent household, while two different students identified living mostly in one home but visiting a second frequently. The average number of children in participants' households (including themselves) was 2.29, ranging from one to five. Demographic data were not available for two participants as they chose only to participate in the focus group portion of the STEAM protocol, and therefore did not complete STEAM surveys, including demographic data, earlier in the study protocol.

Focus groups took place in April 2014 at school during school lunch periods (a lunch and snacks were provided), lasted 45 to 60 minutes, and were facilitated by a co-author with a research assistant. We employed semi-structured focus groups as a method consistent with a youth-centred approach in that this technique allowed the girls' to drive the conversation towards foci important to them within particular topic areas (Smith et al. 2015). Focus group participants were asked to identify and describe elements in their daily built environments that either facilitated or hindered their participation in PA, as well as to identify and brainstorm potential changes that could be made to their built environments to better support PA. Participants were informed the focus groups were about health-related behaviours and how where they live affects them, thus making it unlikely the girls self-selected because of any preference for physical activity and/or the outdoors. We did not explicitly ask about gender, as we wanted to foreground the issues that girls identified in how they perceived everyday aspects of their environments in relation to physical activity, while allowing for the possibility for them to raise gender if they deemed it relevant. The discussions were audio-recorded, transcribed verbatim, and verified by a second transcriber. All names used are pseudonyms.

We chose thematic analysis (TA) because it is a flexible method that we could adapt within our methodological orientation toward privileging participants' voices as well as its usefulness in applied settings, given our research objective around identifying interventions (Braun and Clarke 2006; Braun and Clarke 2014). Stemming from our feminist and critical health geography methodology, we took an inductive, data-driven approach to TA as a way to allow for the most salient topics from the girls' perspectives to be identified, rather than assigning an *a priori* coding scheme. Our approach to TA is consistent with our feminist methodology in what Braun, Clarke, and Weate (2010, 192) refer to as a 'big Q qualitative

approach' which explicitly locates the method in a qualitative paradigm and recognizes the situated nature of knowledge. After familiarizing ourselves with the dataset, our analytic process involved in an iterative process of coding the entire dataset into repeating ideas (Auerbach and Silverstein 2003) using *in vivo* codes in order to centre the girls' voices within our coding framework. These codes approximate what Braun et al. (2010) call semantic coding, meaning that they capture ideas that are more literally expressed in the data. Once the entire dataset was coded, we selected only those codes pertaining to our objective concerning environmental influences on girls' PA to develop themes for this analysis. At this stage, we examined our first-order codes to consider whether there were and geographical differences in responses between urban, suburban, and rural places or geographic patterning. We did not identify any consistent relationships, and thus did not move this forward into our theme construction, but rather decided to draw attention to a handful of geographic differences where they were observed in they way we reported our results. Then, we applied our conceptual framework—a material feminist approach to environmental affordances—as a lens with which to look for relationships amongst the first-order codes to construct second-order themes. Here, we engaged in a process of tracing out relationships amongst the first-order codes and linking them back to our conceptual framework. Our theme names were created to capture these relationships. The lead author carried out the TA and the focus group moderator, along with other co-authors. Critically reviewed our final coding scheme and theme definitions to ensure rigour (Baxter and Eyles 1997; Smith and McGannon 2017).

A material feminist approach to environmental affordances

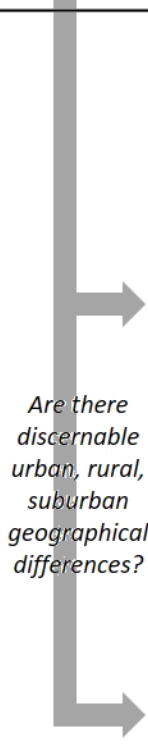
1 st level codes		Themes
"The outernet:" Preferences for outdoor PA	 <p>Are there discernable urban, rural, suburban geographical differences?</p>	Outdoor matter matters for physical activity
"I really like nature so that's where I like playing:" Preferences for natural elements		
"It's kind of boring because there's nothing fun:" Varied equipment and diversified landscapes support PA		
"I like to be in my backyard:" Close-to-home preferences for PA		
"The cars just kind of run over things on my street:" Material safety as a barrier to PA		
"If it's just freezing, I'm going to stay inside and read or something:" Effects of weather/seasonality on PA		
"Ghetto places:" Security as a spatial limitation on PA		Social levers and liabilities shape physical activity affordances
"I'm not allowed to go too far:" Parental rules are present but not necessarily perceived to influence PA		
"If we do something that we want to do, we'll get in trouble by the teachers:" Institutional limitations on activities		
"I want more friends in my neighbourhood:" Importance of local peers for PA		
"I have to watch my brother so I don't really do a lot of physical active things:" Sibling care as a barrier to PA		

Figure 1. Overview of thematic analysis process.

Results

Outdoor matter matters for physical activity

This theme reflects how girls in our study overwhelmingly preferred being active in, as Alexa (age 11) put it, 'the outernet,' meaning 'not in like closed spaces, like, I like to be outdoors' where it was possible to do activities like 'rollerblade and bike.' Preferred places presented opportunities for activities benefiting from wide spatial ranges, such as cycling, running or flying a kite, as well as imaginative play. This theme highlights the where and what of participants' PA,

while drawing attention to the particular materialities of environments that girls perceived to afford their desired PA opportunities; namely, a combination of naturalised settings with diverse built infrastructure within a proximate distance of home. This theme touches on the lack of opportunities girls saw afforded by indoor environments, further underscoring the importance of the outdoors. At the same time, the material hazards of vehicular traffic could qualify the affordance potential of outdoor places, and factors such as season could moderate girls' activities.

The girls we spoke with favoured outdoor environments, including defined places, such as purpose-built infrastructure for PA like tracks and soccer fields, and multi-use sites such as parks, open green spaces, and forests. Such environments offered opportunities for open-ended activities and imaginative play, or as Lauren (age 11) said, to 'have fun and run around and get my crazy out'. Kathleen (age 12), from one of the suburban schools, spoke of how she spent "most of my time in the forest" because it was a desirable setting to 're-enact battles from like Lord of the Rings and Narnia.' The expansiveness of these environments was a vital characteristic that mattered for how girls took up physical activities and, in turn, exercised agency in filling up these spaces. Part of this vitality was linked to the fact that outdoor spaces offered the possibility of changing activities in-situ, as spaces could be used for multiple purposes. Lauren went on to explain that 'when you're at a park if you get bored after playing like sports or something, you can just go to the park and get more exercise there like playing tag or hide and seek,' illustrating how intra-actions between the girls and the material environments generated affordances for PA. This stood in contrast to the materialities of indoor environments, which most girls agreed 'there's not a lot of things to do indoors except in the gym' (Jessica). Indoor spaces were not conducive to being active because they were either too small or subject to

parental restrictions on activities. Poppy, from the urban school, explained, ‘my house is really old so like if we’re upstairs you can hear it downstairs so you can’t, like, I can’t like run around, dance.’

Far from being static “blank canvases,” the particular materialities of outdoor environments had a lively role in how environmental affordances for PA took shape. Most girls favoured natural elements in the places where they were active, such as grass and trees, as opposed to ‘a really open space with like cement’ (Poppy). Girls were quite definitive that outdoor environments which struck a balance between natural and activity-based elements generated more PA affordances. The following exchange among participants from the rural school illustrates their preference for situating formalised play infrastructure in natural-seeming settings:

Researcher: So you really like having a big backyard, a park nearby?

Alina (age 10): Yeah! The park is really nice, though, because it’s got enough trees around the edges and it’s got a baseball diamond and a huge field and it’s got soccer fields... and climbers. And, like, a spider web and swings and everything. But it’s not completely filled with all of this manmade stuff. It’s really nice and open.

Researcher: So, do you like more natural things?

Heather (age 11): Yeah! And there’s wild strawberries that you can eat. And lots of flowers.

Researcher: Do you guys like playing in more natural spaces or spaces with like trees of ponds, or do you like manmade things?

Alina: Definitely natural.

Logan (age 11): Natural.

Alina: But swings are nice to have.

Heather: The best kind of thing would be like a forest with tire swings.

This dialogue highlights the value that many girls placed on organic matter, such as flowers, strawberries, and trees, in combination with purpose-built activity infrastructure in creating environments supportive of PA. It is noteworthy that some elements, like strawberries, may have no seemingly direct application to promoting PA, but rather, from girls' perspectives, these features contribute to the overall sensorial quality of place—and this matters for how PA affordances emerge.

In tandem with natural elements, girls often spoke of desiring 'more stuff to do' and more diversified outdoor spaces and equipment for PA, as Bronwyn (age 10) reflected on her suburban neighbourhood, 'There's not much places to go because it's just a horse shoe kind of thing.' Participants indicated that more diverse infrastructure and equipment for PA would enhance their PA experiences, as Alina mused,

It might be nice to have, in the park, have like a bike track that's not just long ...
have kind of curves and everything. I mean, we can ride our bike around the
baseball diamond because it's like fine gravel and there's nobody there normally
but it still would be nice to have like a wooden one with curves and stuff.

Rather than being at odds with girls' preference for natural elements, a greater array of outdoor infrastructure to support their PA needs was very much consistent with a 'forest with tire swings' approach, combining diversified built components with naturalised settings.

The importance of sufficiently diverse built components was emphasised in how girls viewed play equipment at school as sorely inadequate, lacking a variety of features for a range of

physical activities, as Lila (age 11) from said of her suburban schoolyard, ‘there’s just slides and this thing to walk back and forth on on the ground and it’s like... [sarcastic] Yay, fun.’ One suburban group in particular discussed how the playground designated for their age group lacked interesting options for creative play:

Researcher: What kind of playground would you guys like for grade 6s at least?

Alexa (age 11): I don’t even...

Ashley (age 10): Like, four pairs of monkeybars—no two, pairs of monkey bars on each side. Then there’s places to swing.

Alexa: Oh yeah! Swings!

Ashley: Yeah! Swings. And then a teetertotter. Yeah!

Alexa: Yeah!

Ashley: That’d be fun.

Alexa: And, if there’s like a playground you could go inside of it and have a bunch of rooms and stuff like the primary one.

Ashley: Yeah, you can like climb up stuff. Instead, we just have a plank thing that you can walk across.

From the girls’ perspectives, the school equipment for their age group was misaligned with their needs. Both the urban and suburban group expressed interest in using more varied playground equipment that was designated for younger children at school, which they were prohibited from using.

It was also important for outdoor places to be both geographically and economically accessible, evidenced by most girls mentioning preferred sites near home, including their neighbourhood, backyard, and local parks. The journey en route to potential PA places could

determine their affordance capacity, as Heather from the rural school put it, ‘if there was a park within biking distance and it was like on a road where I wouldn’t get killed by a car then I would love that.’ High-traffic roads were a major environmental impediment to PA, across the board; however, rural girls particularly spoke about not walking to school—although for some it was simply just too far—or about not walking to activities after school when it was dark for fear of being hit by cars. When asked about using streets for walking or biking, Heather emphasised the fear associated with high-traffic roads, even with the presence of cycling paths, explaining that ‘it’s not a highway but there’s still a lot of cars and there’s bike trails there. I would pee myself if I had to bike there. I would lose it. [...] Of course, we can’t just have, like, a street with no cars because that’s not really a street so. But maybe that—less area with cars and a bike path would be awesome.’ This point stood in contrast with the experiences of some urban students, as articulated by Jessica, who echoed the comments of others in appreciating that in her neighbourhood because ‘the streets are pretty safe and quiet, so I can ride my bike around and stuff.’ An exception was a suburban student (Kathleen) who enjoyed risky play activities that involved ‘dodging’ cars in traffic. As such, most girls favoured close-to-home outdoor activities because, as Kimberly (age 12) from the rural school said, ‘We have a trampoline. ... It’s free and it’s like outside so it’s near you. That’s a good thing.’ A number of girls spoke about other neighbourhoods that were in walking distance from school as ideal, as Angie (age 12), also from the rural school, observed that other students ‘live all really close to their school so then like for school sports, if it was after school, then parents don’t have to worry about picking you up—you just walk home at night.’ Still, while close-to-home opportunities reduced the barriers stemming from limits on independent mobility, a couple of the rural girls mentioned that they could not get

to some activities they enjoyed independently as they were facility-based and accessible only by car.

Despite the PA-promoting qualities girls identified in outdoor places, they nonetheless concurred that, ‘If it’s just freezing, I’m going to stay inside and read or something’ (Heather). There was consensus among all groups that winter (cold temperatures and shorter, darker days) negatively affected PA, as Lila said, ‘I hate the winter so I’m mostly inside on my x-box or on my phone,’ as well as ‘sometimes the weather... if it’s raining, you don’t really want to go outside’ (Poppy). At the same time, several participants identified winter-specific sports or activities that they enjoyed and would actually increase their PA in winter, such as tobogganing, ringette, and skating. PA thus does not entirely disappear during winter months, particularly when girls participated in organised indoor activities (e.g., skating, ringette, kickboxing). One student noted her activity increased in winter because of the activities she preferred, while Alexa commented that in the summer ‘I only stay out for a little bit because then I’ll get too hot unless I’m in like shade.’ This changeability highlights the contingency of environmental affordances for PA.

Social levers and liabilities shape physical activity affordances

In conceptualising affordances as situated sets of place-based relations (Chemero 2003), this theme shows how relations at the inter-personal group level intersect with the material characteristics and individual perceptions of places to produce environmental affordances for PA. This theme highlights how same-age peers can positively affect girls’ engagement with PA, how the presence of younger siblings can represent a gendered constraint on girls PA, along with the ways that both exogenously and endogenously drawn safety boundaries contribute to girls’

environmental PA affordances. Girls in our study described risky orientations to certain social contexts that piqued their sense of insecurity. As such, the geographies of feeling safe worked to circumscribe girls' mobilities in ways that marked particular types of environments as off-limits or undesirable for PA.

Girls were very clear that they avoided places they deemed unsafe for PA due to the perceived social characteristics of those places. From a material feminist perspective, Sara Ahmed (2010) argues that how bodies orient to space matters for what bodies do (or do not do) in space. Girls avoided areas locally seen as places to engage in alcohol and illicit substance consumption, as well as 'alleys or places that are known to be violent' (Jenny). As such, girls' risky orientations to these types of places marked them as out-of-bounds for PA, and highlight how the particular embedded set of socio-spatial relations between our participants and these places dis-afforded PA opportunities. Some of the suburban girls identified such locations as a problem in their neighbourhoods. Indeed, this issue was not raised in the urban focus group, and only briefly discussed by one of the rural groups where students expressed concern about being active 'in the city, in alleyways' because 'it's just the people in this world' (Rachel, age 12). The following conversation from one of the suburban focus groups highlights how girls perceive that space can be socially circumscribed in ways that preclude use for PA:

Researcher: Now, on the flip side of things... are there any places where you really don't want to be active – you kind of touched on it with busy roads but are there any other places?

Jenny: Um, ghetto places. [laughs]

Researcher: Can you explain that?

Jenny: Like, um, what's the street called--

Lila: --Places that are unsafe.

Jenny: It's ghetto, okay?

Researcher: What makes them unsafe?

Jenny: People that do bad stuff.

Lila: People that do the mar-i-juana.

Of note, the term 'ghetto' in this context is being used to refer to areas with negative reputations due to social and physical incivilities, as opposed to a racialized ghetto (which is not a feature of London and the surrounding area). The fact that suburban girls expressed greater concern about these places likely reflects the proximity of publicly-funded housing complexes to their neighbourhoods, which was not in the same vicinity of the urban school catchment area. In this way, the perceived social character intertwined with the materiality of places could constrain the geographies of girls' PA, highlighting how affordances are mediated through perceptions.

Girls' PA was further governed by parental rules related to safety, which generally delimited distance, location, time, and independence, as Kathleen explained, 'I have to be in by 9. I can't go out past Dollar Tree [discount goods retailer]. And my parents have to know where I am at all times, who I'm with.' Some girls had to be accompanied by friends or older people if venturing further from home and be reachable via cell phone. Not all girls had parental rules at this age. Most of the girls we spoke with, however, did not tend to see such rules as limiting their PA; rather, they accepted or tolerated parental limits and found workarounds, such as engaging in different activities or adjusting the timing of play. An exception was one suburban group, of which Kathleen was a part, that when asked if parental rules impeded activity all responded, 'Yes! Sometimes,' but the discussion did not elaborate on how. More common was the notion, as

exemplified in this exchange among the urban girls, that parental rules were justifiable and not perceived as a constraint or barrier to PA:

Researcher: Do you guys find that your parents rules about where you can go prevent you from being active?

All: No.

Poppy: They're for safety reasons and stuff...but there's still other things you can do if they say no to something.

Jessica: It's probably because you live so close to [busy street name] and she doesn't want you getting hurt or anything.

Parental regulation and safety perceptions informed how the girls oriented to the PA possibility of places.

Institutional rules also governed girls PA participation and impeded the affordance capacity of certain places. At school, for example, girls were aware that 'if we do something that we want to do, we'll get in trouble by the teachers' (Ashley, age 10) when it came to how they used playground features. Sometimes these limitations designated certain play equipment for certain age groups, while others appeared grounded in safety concerns, as the urban group explained about school recess policies:

Poppy: They don't want us like running around because--

Jessica: On the ice

Poppy: Sometimes at recess we had to have what's called "tarmac recesses" where we couldn't go on the grass because it's muddy and slippery.

In another instance, one rural group spoke about the lack of opportunities for unstructured play and exercise at a local recreation centre which limited their participation to organised sports and

activities, as Taryn (age 12) from the rural school explained: ‘they don’t let you, like the one in [place name] if you want you can put up a volleyball net and play but there’s it’s a lot more organised so you just have to do whatever they’re doing. [...] You don’t feel as free because you have to join in, like it has to be an organised sport not just like... just your choice.’ These comments reflect how external social forces could decisively shape the affordances of PA places, and how girls valued their autonomy and choice in defining their PA practices.

In line with the literature demonstrating the importance of peer relationships for girls’ PA (Casey et al. 2009; Dwyer et al. 2006; Kuo et al. 2009; Whitehead and Biddle 2008; Camacho-Miñano, LaVoi, and Barr-Anderson 2011; Jago et al. 2011; Baskin et al. 2015; Smith et al. 2015; Snow et al. 2018), one of the most significant environmental enablers of PA for the girls we spoke with was the presence of local friends and same-age peers in their home neighbourhoods. Having same-age peers nearby could determine the usefulness of local facilities, as Emily (age 11), from a suburban school said, ‘if you’re not with a friend it gets kind of boring.’ Local friends also afforded opportunities for spontaneous play, thus promoting a context of PA-possibility. Girls who lived in neighbourhoods without local peers characterised this as negative, as Alexa explained, ‘On my street specifically there’s like no kids except for like one kid but they never come out of their house and it’s just a bunch of adults. I have nobody to talk to on my street.’ Being close in age allowed for a level of shared common interest that was a social lever for PA, as this group of suburban girls made clear:

Researcher: Why would having kids in your area make you want to be more active?

Bronwyn: Because I can hang out with them and play with them.

Researcher: Can you not play with younger or older kids?

Lila: Well, older kids in our school think they're too cool so they don't hang out with grade 7 or 6s.

Jenny: That's true

Researcher: What about the really little kids?

Jenny: They're annoying in my neighbourhood.

Researcher: How so?

Bronwyn: They, like, talk too much.

Girls indicated that sharing common interests in activities was more likely with proximate age peers and this was important for how they engaged in PA.

On the other hand, having to care for younger children was largely a social liability for PA. Although it could have positive effects for some, assuming responsibility for younger siblings was mainly a negative influence on the PA of most girls. Caring for younger siblings could be a barrier to PA by slowing girls down to keep pace with smaller children, adding responsibility to be vigilant, and circumscribing mobility limits to those allowed for younger children. This could inhibit how girls moved through their neighbourhoods and PA spaces, as Ashley noted, 'I have to watch my brother so I don't really do a lot of physical active things.' Many girls responded, 'YES' to the question 'Does the fact that you have to watch your siblings limit your activity?' This caregiving burden may also contribute to the gendered context of physical activity participation. In contrast, for some girls playing with younger children was enjoyable, and encouraged them to move more, as Kathleen described: 'we usually play tag the whole way home and I usually carry like a library in my bag. So, I'll be like running with a library and [child's name] will be like, "I'm going to get you!" and I'll be like "No"' and it's— kids are great. That's what they're best for is getting you physically active.' Of note, this was not

discussed by any of the rural groups, but that may be an artefact of family composition or potentially parenting concerns relating to leaving younger children in sibling care in more isolated environments.

Discussion

Taken together, our results indicate that girls may be better afforded PA opportunities by providing proximate outdoor play in spaces with natural elements and diverse infrastructure, coupled with efforts to alleviate social liabilities (care responsibilities, institutional rules) and leverage social supports (peers). Our *Outdoor matter matters for physical activity* theme showed how the materialities of outdoor environment played an animated role in girls' engagements with PA, with environmental affordances for girls' PA emerging in the intra-actions among our participants, the built environment, and natural elements. *Social levers and liabilities shape physical activity affordances* demonstrated that the capacity of local places to support girls' PA could be just as easily bolstered or undermined by the local social context (e.g., geographies of safety) and their interpersonal social responsibilities (e.g., to care for siblings). Given that social factors, especially local peers, intersected with environmental factors in ways that could make material aspects of local environments useful (or not) for girls' PA, our study supports the need for new materialist approaches to account for the sets of intra-actions among human and non-human matter in shaping PA affordances.

One of our key findings is the importance of outdoor environments for girls' PA, in contrast to some work that has suggested girls are more active in indoor environments (Dunton et al. 2007; Ries et al. 2008; Klinker et al. 2014; Pawlowski et al. 2014). Based on the experiences of girls in our study, we recommend that a key component to consider in promoting girls' PA is

facilitating their engagement with, as Alexa put it, the ‘outernet.’ Importantly, time spent outdoors can be a major contributor to overall PA (Ferreira et al. 2007; Gray et al. 2015), and children generally are spending less time outdoors (Zorzi and Gagne 2012). Not only did the girls in our research articulate a clear preference for outdoor PA, but they also explained this was because outdoor spaces (particularly with natural elements) afforded more variety, autonomy, and unstructured opportunities for PA. This stands in counterpoint to some quantitative research that has shown girls to be more active around retail environments, and even gone so far as to propose shopping as an active leisure strategy for girls’ PA (Dunton et al. 2007). Such interpretations risk biasing interventions toward traditional gender stereotypes. Indeed, Brown et al. (2008) suggest that girls’ greater mobility around shopping centres may be due to parental perceptions – which, we add, may be gendered – of retail spaces as surveilled, and therefore safer, sites. This begs the question as to what extent existing PA interventions may be influenced by preconceived gendered stereotypes about the places where girls are active.

The embedding of gendered assumptions in PA intervention design could contribute to why evidence of the effectiveness of PA interventions is mixed overall (Atkin et al. 2011; Mears and Jago 2016), and why, for example, a systematic review by Mears and Jago (2016) found that after-school interventions benefited boys’ moderate-to-vigorous PA more than girls. Klinker et al (2014) also found that girls achieve a smaller proportion of their daily MVPA outdoors as compared to boys, but our research would suggest that intersecting social factors could be contributing to diminished outdoor affordances in certain circumstances. Grounding interventions in qualitative evidence that incorporates youths’ experiential accounts may be one way to avoid inadvertently reinforcing old gender binaries that circumscribe girls and women to private or indoor spaces, and ultimately undermine PA possibilities (Fleming, Lee, and Dworkin

2014). It is noteworthy that the girls in our study did not explicitly identify gender—for example, talking how being a girl affects their neighbourhood mobility, PA options, or caregiving responsibilities—as a barrier or facilitator of their engagement with PA. This is somewhat surprising given the strong associations between gender identities and physical activities, but is perhaps less overt given that we were not focused on the context of school physical education, which can be a highly-polarized gendered environment (Gorely, Holroyd and Kirk 2003). It is also possible that the “sameness” of the focus group context, with all girls and a woman moderator, created a basis for tacit assumptions about shared experiences that girls deemed unnecessary to articulate (Mannay 2010)

At the same time, one of the most significant barriers girls identified was institutional policies that relegated their play and activities to equipment and spaces, particularly at school, that did not meet their needs. This finding echoes work elsewhere that has highlighted the limitations of school-based infrastructure for girls’ PA. For example, Hayball et al. (2017) in Scotland, with youth 10–12 years-old, reported that girls identified a lack of age-appropriate play equipment as problematic, and Pawlowksi et al. (2014), in Denmark, reported that girls preferred more secluded spaces for outdoor school PA than typically provided. Telford et al.’s (2016) longitudinal Australian study, reported that school environment mattered for boys’ PA but not girls’, which the authors suggest may be because schools offer PA opportunities that are taken up more by boys. Notwithstanding these challenges, Camacho-Miñano, LaVoi, and Barr-Anderson (2011), in their systematic review, found support for the effectiveness of school-based PA interventions for girls, but recommend that they should be gender-sensitive. Together with our findings, we suggest this indicates that school environments require a gender-sensitive re-design to make them more supportive of PA participation for all students.

Naturalising playgrounds (or schoolyard greening) may present an opportunity to address the shortcomings girls identified in school infrastructure for PA. Research has found that natural schoolyards (i.e., school yards with trees, gardens, and other natural elements) appeal to a wider variety of student interests, and can support a breadth of play opportunities that promote all forms of physical activity (Dyment and Bell 2007; Dyment, Bell, and Lucas 2009; Mårtensson et al. 2014; Pagels et al. 2014). Reporting the benefits of woodland areas to girls' MVPA with increasing age, Pagels et al. (2014) argue that this may be a particularly important approach for enhancing girls' PA specifically, and preventing the widening of the gender gap. Given that the girls in our study highlighted (a) a preference for outdoor PA places with natural elements, (b) a desire for environments that support varied activities, and (c) the inadequacy of their school facilities, naturalised playgrounds may be a potentially useful gender-sensitive intervention. It is important to note that naturalising does not mean “natural.” Naturalising refers to altering components of the landscape to include natural elements, like logs and large stones, to play on. Our participants enjoyed naturalised elements of outdoor play spaces, such as forests and open grassy areas, in conjunction with more structured equipment, such as monkey bars and swings. Such varied terrain allowed participants exercise agency in moving between more purposeful and imaginative activities.

Our research shows how when girls' perspectives are taken into account, it is possible to move beyond the traditional binary socio-spatial alignment of femininities with private indoor spaces and masculinities with public spaces in conceptualising PA-promoting environments. At the same time, while the in/outdoor binary has been historically gendered, so too has nature/culture. Alaimo's (2008) writing on feminist materialism has drawn attention to feminist struggles to dissociate women from nature—with nature as part of the nature/culture binary that

historically marginalises women and girls—while calling for work that de-essentialises nature and challenges dualisms that marginalise groups. We thus argue that we can do some of this de-essentialising work here by positively reclaiming nature associations by recognizing girls’ agency in the intra-actions with natural and built elements in shaping PA affordances. If we are to, as Alaimo urges, re-imagine nature—here through girls’ eyes—we argue, in line with Änggård (2011), that it is possible to see ways forward that advance gender equity in PA using naturalising interventions. Änggård locates the equity-promoting potential of natural elements in that they may not be gender-coded in the ways that human-made play infrastructure could be from the onset, although via socio-material intra-actions natural elements can still take up gendered significance. From our perspective, recognising girls as agentic and knowledgeable, and grounding research in their experiences, helps to ensure that we are not uncritically aligning girls with nature while challenging the in/outdoor gender typecasting of PA.

We acknowledge that our study is highly context specific to Southwestern Ontario, with its particular types of land use development, policies, and climate; however, rather than seeing this specificity as a limitation, we contend that work to understand how environment, gender, and PA intersect needs to grapple with the specificities of geographical contexts. This extends beyond material context to the social norms that are locally ascribed within environments. While it is helpful to look for consensus in the evidence around the links between environment and PA, lack of consensus does not mean that certain features are not relevant for certain groups of people in certain places. Our findings pertain to a selection of girls in Southwestern, Ontario, but more work is needed to determine for whom and where within the local region these findings remain meaningful before being translated into interventions. As one of us has argued elsewhere, interventions to support equity in physical activity may need to be highly context specific (Coen,

2018). Furthermore, we also need to understand more about how the competing demands of girl's lives and time intersect with environment to shape the spatio-temporal context of PA. Several studies have pointed to time as a constraint on girls' PA (Biddle et al. 2005; Dwyer et al. 2006; Sherar et al. 2009; Slater and Tiggemann 2010). Indeed, a few participants in our study expressed disappointment when homework impeded active play, as Taryn lamented, 'some nights you just get a stack of it, so it's like, ok, I'm like guess I'm doing this for the rest of the night.' These types of comments indicate that PA is not necessarily integrated into girls' lives to the extent they may wish. Future work would benefit from adding a temporal component to consider how we account for spatio-temporal processes in conceptualising the role of environments in gendering PA. Use of Ecological Momentary Assessment in conjunction with other qualitative methods (e.g., photovoice or child-led tours) may be one way to accomplish this (Loebach and Gilliland 2010).

Conclusion

Our study identified several ways that environment shaped girls' PA opportunities conceptualised as *Outdoor matters matters for physical activity* and *Social levers and liabilities shape physical activity affordances*. We argued that due to girls' preferences for outdoor PA and natural elements, along with the mismatch between girls' preferred activities and school-based infrastructure, naturalising school play spaces could be deployed as a gender-sensitive PA intervention. Our findings not only support the evidence that environments influence PA in gendered ways, but also demonstrate that girls are highly aware of the animated ways the local materialities matter for their PA. Centring girl's perspectives is imperative for understanding

how environments afford physical activity opportunities, and how physical activity becomes gendered.

Declaration of interest statement

None to declare

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