Giving children a voice: exploring qualitative perspectives on factors influencing recess physical activity

Introduction

Schools have long been recognised as key settings to provide possibilities for children to be physically active (Dobbins et al., 2013; Martinez-Andres et al., 2012). In particular targeting school recess has been found to be important as school recess can provide a large contribution to children’s overall daily level of physical activity (PA) (Nielsen et al., 2011; Ridgers et al., 2006). A review showed that school recess could contribute up to 40% of schoolchildren’s recommended daily PA levels (Ridgers et al., 2006). However, previous school-based interventions aiming to promote recess PA have reported mixed results (Broekhuizen et al., 2014; Escalante et al., 2014; Ickes et al., 2013; Parrish et al., 2013; Toftager et al., 2014) that could not be explained by the investigated quantitative factors alone. This calls for a more in-depth, most likely qualitative, exploration of factors influencing recess PA to qualify future intervention studies (Dobbins et al., 2013; Martinez-Andres et al., 2012; Metcalf et al., 2012; van Sluijs et al., 2007).

To date, research on recess PA has predominantly focused on quantitative measures, using cross-sectional surveys and school-based intervention studies (Ridgers et al., 2012). A potential problem with quantitative measures is that they typically focus on a narrow set of predefined factors identified by adults. To really understand the factors affecting children’s recess PA it is crucial to observe and listen to children to understand their acts and perspectives (Darbyshire et al., 2005; MacDougall et al., 2004). Two Australian studies have explored factors influencing recess PA from a qualitative perspective and identified that access to facilities/equipment, bullying, school policy, clothes, teacher support (Parrish et al., 2012; Stanley et al., 2012), space, weather, peer influence (Stanley et al., 2012), playground aesthetics, fundamental movement skills and recess duration
(Parrish et al., 2012) are important factors to recess PA. However, these two studies did not take different groups of children into account and it is unclear if these factors are equally perceived by all children, or if they only are perceived by those who are already physically active.

The aim of this paper is to gain knowledge of different groups of children’s perceptions and experiences of factors influencing their PA behaviour during recess. The children differed from each other in terms of gender and PA levels. The rationale of the paper was to bring together data from three different studies and reanalyze it using one common framework.

**Theoretical framework**

Socio-ecological models provide comprehensive frameworks for understanding the multiple and interacting factors of health behaviours and can be used to develop interventions that systematically target mechanisms of change at each level of influence (Sallis et al., 2008). The core concept of the socio-ecological model is that behaviour can be influenced at multiple levels of influence: intrapersonal (biological, psychological); interpersonal (social, cultural); built environmental, political; and natural environmental (climatic) influences (Edwards and Tsouros, 2006; Sallis et al., 2008). We used a socio-ecological model as an underlying framework during the analyses to systematically study factors influencing the children’s PA behaviour during recess. Using a socio-ecological model to systematise the explored factors could guide future interventions to promote recess PA.

**Method**

To be able to study children’s perceptions and experiences of factors influencing their PA behaviour during recess we chose to use a qualitative approach informed by a social constructed ontological viewpoint (Burr, 1995). A qualitative approach allows children to have a more direct voice in the creation of data (Darbyshire et al., 2005; James and Prout, 2005).
Research setting and participants

The target group consisted of middle tier pupils (grade 4-6; 10-13 years old) in order to get a better understanding of PA behaviour among an age group known to significantly decrease their PA (Dumith et al., 2011; Nader et al., 2008). We focused our exploration on various groups of children where the groups differed from each other in terms of gender and PA levels.

The paper is based on a synthesis of three studies supplementing each other (see Table 1). Results from one completed study called for further investigations and led to new specific knowledge in the field of recess PA. In all three studies recess includes all breaks during the school day.

Table 1. An overview of the three studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Study I:</th>
<th>Study II:</th>
<th>Study III:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting</td>
<td>17 schools in Denmark</td>
<td>1 school in Denmark</td>
<td>5 schools in New Zealand</td>
</tr>
<tr>
<td>Period</td>
<td>April-June 2013</td>
<td>June 2014 + February-March 2015</td>
<td>February-March 2014</td>
</tr>
<tr>
<td>Methods and volume</td>
<td>17 days of participant observation</td>
<td>13 days of participant observation</td>
<td>15 days of participant observation (incl. informal talks)</td>
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<tr>
<td></td>
<td>17 go-along group interviews (one at each school)</td>
<td>3 go-along group interviews (one at each grade level)</td>
<td>16 participatory photo interviews</td>
</tr>
<tr>
<td>Target group</td>
<td>10-11-year-old children (grade 4)</td>
<td>10-13-year-old children (grade 4-6)</td>
<td>11-12-year-old children (grade 6)</td>
</tr>
<tr>
<td>Number of participants</td>
<td>111 children (58 girls)</td>
<td>In total 16 children (8 girls) participated in the three go-along group interviews and another 16 (8 girls) participated in participatory photo interviews</td>
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</tr>
<tr>
<td>Foci</td>
<td>Perceived facilitators and barriers for PA, gender and social grouping during recess</td>
<td>PA behaviour and experiences during recess among different PA groups</td>
<td>PA-promoting recess practices in the New Zealand school setting</td>
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</table>

Study I focused on 10-11 years old (grade 4) children’s perceived facilitators and barriers for recess PA, gender and social grouping. In study I, we recruited 17 schools and aimed to explore similarities and differences across schools. The 17 schools represent a wide range of Danish schools varying in
geographic location, school type, number of pupils and grade-levels, socioeconomic status, square meters of schoolyard per child, recess rules and number of play facilities (Pawlowski et al., 2014b).

*Study II* explored PA behaviour during recess among 10-13 years old children (grade 4-6), focusing particularly on the least physically active children. In study II, we selected one of the 17 schools included in study I for further in-depth explorations. In this study we categorised the children into three subgroups (Low, Medium and High PA groups) based on objectively measured PA levels during recess (Pawlowski et al., 2016b).

Recess PA levels are significantly higher in the New Zealand school setting than in the Danish school setting. Therefore, *Study III* focused on PA-promoting recess practices in the New Zealand school setting that could be transferable to Danish schools. (Nielsen et al., 2012; Nielsen et al., 2010). Five primary schools in Auckland, New Zealand were included in our study III. The study was focused on exploring the recess practices applied to the oldest primary school pupils (11-12 years old) (Pawlowski et al., 2015).

**Data collection procedures**

Three qualitative methods were used and combined: participant observation (including informal talks in study III), go-along group interviews, and participatory photo interviews. In all studies we combined the observation method with different interview methods to increase validity (Kawulich, 2005). The specific combination of methods used in the three studies is presented in Table 1 and the methods are further described below.

*Participant observation* was carried out during recess in all three studies to observe behavioural patterns and bodily practice, which are difficult to describe or be aware of (Kawulich, 2005). In study I and study II, participant observations were conducted both prior to interviews and after the interviews. This gave us the opportunity to first have an open-minded view towards the explored
phenomenon and thereafter to have more focused observations guided by the children’s insights (Wolcott, 1994). If we wondered about what we observed in study III unstructured informal talks with children, principals and reception workers were conducted during observations. In study I and study II, the participant observations were conducted by the first author. In study III, the first author conducted the participant observations together with an assistant from New Zealand. In all studies the observations were documented with field notes and photos.

*Go-along group interviews* were conducted in study I and study II. In study I, 17 go-along group interviews (one at each school) were conducted including in total 111 children (58 girls) at the age of 10-11 (grade 4). In study II, three go-along group interviews (one at each grade level 4-6) were conducted with in total 16 children (eight girls) aged 10-13 years old. Children took the researcher on a walking tour around their schoolyard to gain knowledge of children’s perceptions and experiences of their explored social and physical environment during recess (Kusenbach, 2003). The group interviews were carried out by the first author and were filmed using an iPad mini to record interactions and to document who said what. This method provided an opportunity to increase the participation of children and influence the typical power dynamics that exist between the interviewer and interviewee (Carpiano, 2009). We conducted the go-along interviews in groups of approximately six children to explore child-to-child interaction in the explored environment. The participating children were purposely sampled with help from a designated teacher who knew the children and could recruit children with diverse characteristics to ensure variation in gender, social backgrounds and PA levels to allow for contrasting opinions. More details are described elsewhere (Pawlowski et al., 2014a; Pawlowski et al., 2014b).

*Participatory photo interviews* were used in study II to stimulate dialogue between the children and the researcher (Clark, 1999; Miller, 2014). Sixteen 11-12 years old children from grade 5 (eight
children from the Low PA group and eight children from the High PA group and equally gender
distributed) were asked to take photos of what they were doing during recess, which were used in the
following individual interviews with the 16 participants. The interviews were carried out by the first
author using an iPad mini to record the conversation. Details on the procedure are explained in another
paper (Pawlowski et al., 2016a). We used the photos as a tool to help guide the interview and to
facilitate clarifying questions. The children could use the photos to trigger their memories and provide
nuanced dimensions of their recess experiences (Darbyshire et al., 2005; Miller, 2014).

Data analysis

To ensure consistency, the first author transcribed all interviews verbatim and wrote out field notes
during each of the studies. We used deductive thematic analysis with the explicit purpose of
identifying factors (themes) influencing recess PA across the studies and to determine how these
factors (themes) were present in the data material to identify patterns within data (Neergaard et al.,
2009). Thematic analysis was performed through a manual coding process (Braun and Clarke, 2006).

First, initial coding identified relevant interview passages and field note excerpts. This data subset
was sifted through repeatedly, coded and finally arranged under headings derived from the socio-
ecological model, developing a set of empirically based codes that were finally organised into distinct
analytical categories.

Ethics

Prior to the data collection, all school principals from the recruited schools approved of the respective
studies. We then informed the children together with the class teachers about the purpose of the
respective study since it is important to ensure that the children understand both their own and the
researcher’s role during the data collection. The teachers handed out informed consent forms for the
parents of the invited children to complete. The participating children could withdraw from the
respective study at any time and pseudonyms were used for anonymity.

According to the Danish National Committee on Health Research Ethics, formal ethical approval was not required as the project was not a biomedical research project. The data-management procedures used in the Danish studies (study I and II) were approved by the Danish Data Protection Agency (2013-41-1900). The data collection procedure used in New Zealand (study III) was approved by the Auckland University of Technology Ethics Committee (AUTEC: 10/95).

Results and discussion

In line with our theoretical framework the results are grouped by the children’s perceived and experienced 1) individual factors; 2) social and cultural factors; 3) built environmental factors; 4) factors at the school policy level and 5) natural environmental factors. All factors found to be influencing the children’s recess PA are examined in the light of previous findings in the field.

Individual factors

Bodily self-esteem and ability

In study I, a group of boys called “the nerds”, were perceived by themselves and their peers as “not sporty”, which made them have low bodily self-esteem. In study II, some of the least physically active children were overweight. These overweight girls also had low bodily self-esteem. They disliked their bodies and wanted to lose weight: "I don’t think mine [body] is really beautiful, to be honest. At my confirmation party people should not look at me because I’m chubby but because I look beautiful in my dress" (Anna, 11-year-old overweight girl from the low PA group, study II). Feelings of bodily dislike and lack of bodily abilities seemed to make these children choose recess activities not requiring bodily skills, such as playing computer games, reading books, painting, listening to music and hanging out talking: “I don’t really want to play soccer because I don’t know the rules
Some of the overweight children in study II also expressed a feeling of being out-of-breath when using their body physically, or they explained that they were physically inactive because of bodily pain: “I often have a headache and I am nauseous or something like that. Then I can only sit or lay down” (William, 11-year-old overweight boy from the low PA group, study II). In contrast, the most physically active children clearly expressed that they mastered bodily skills.

Body-related barriers to PA such as dissatisfaction with body image and lack of competence were also found in two other studies among adolescents (Stankov et al., 2012; Zabinski et al., 2003). In another two studies there seemed to be a link between lack of fundamental movement skills in children and their non-interest in engaging in recess PA (Blatchford and Sharp, 1994; Parrish et al., 2012). In a review by Stankov et al. 2012, fatigue and physical discomfort were shown as barriers for being physically active among overweight adolescents (Stankov et al., 2012).

Gender

In study II, we found that recess PA behaviour differed between boys and girls. Two-thirds of the children categorised as the Low PA children were girls involved in sedentary socialising activities in the classroom. Boys dominated the High PA group and spent most of their time on the field playing soccer. A boy in study I also mentioned this gender-segregated behaviour during recess: “I have recognised that in most classes there are the soccer boys, a group of boys playing soccer in every recess and then there are those in the classroom. It’s mostly girls” (Simon, 11-year-old boy, study I). In study I, the children labelled play as either “girls’ play” or “boys’ play” depending on to what extent the play demanded bodily competence. Typically, “boys’ play” was defined by sport activities that demanded strength and speed, while “girls’ play” was characterised by less
physically demanding activities, often sedentary: “Soccer and such team sports are typical boy
sports. Boys often do sport. Some girls also do horse riding, knitting and choir, where you are not
moving, you see. Not many boys want to do that” (Emma, 10-year-old girl, study I). Moreover,
some girls expressed frustration when they participated in activities with boys because they felt that
they were bodily disadvantaged and could not physically match the more skilled, faster and stronger
boys: “Sometimes we play together, but many girls don’t like the boys’ rules because the girls don’t
want them to smash the ball and so on. It’s really annoying” (Jessica, 11-year-old girl, study I).

Other qualitative studies have also observed a gender difference in recess PA (Blatchford et al., 2003;
Boyle et al., 2003; Thorne, 1993). Likewise, a review found boys to be significantly more physically
active than girls (Ridgers et al., 2012). Nielsen et al. 2011 showed that the largest gender difference
in children’s overall PA was during self-organised PA like recess. The gender difference between
boys and girls could be explained by boys being more interested in playing soccer than girls (Nielsen
et al., 2011).

Social and cultural environmental factors

Gendered school culture

In all three studies male and female teachers on playground duty were observed to act differently and
with their behavior they were actively shaping and reinforcing gender roles during recess. Male
teachers were mostly seen at the soccer field or in other ballgame areas, whereas female teachers
spent more time at the playground or near the school entrances talking to other teachers or groups of
girls who were hanging out there. In general, monitoring teachers were not observed to interact in
children’s play but if it happened it were mostly male teachers at the New Zealand schools joining a
ballgame. Soccer fields were the dominant play facility at most schools, favoring the boys’ play: “It’s
almost like a soccer camp for boys” (Oscar, 11-year-old boy, study I). At many schools, children
expressed that soccer was one of the only things to do during recess, reducing the girls’ play opportunities.

Similarly, Swain 2005 described school culture as two complementary gendered cultures sharing one school world (Swain, 2005). Several other studies have pictured the schoolyard as a place that is segregated in terms of gender (Epstein et al., 2001; Rönnlund, 2015; Thorne, 1993). Other studies have also shown that teachers perform according to traditional gender roles, reinforcing stereotypes (Larsson et al., 2009; Sargent, 2013; Stidder, 2002; Waddington et al., 1998). Sargent 2013 further found that male teachers were under cultural pressure to perform as ‘male role models’ for the boys, demonstrating masculinity to boys and instilling hegemonic norms of masculinity (Sargent, 2013).

**Peer influence**

In study I, some boys reported that they were playing computer games during recess because their friends did, even though they would rather play ballgames. For example 10-year-old Tom answered: “Just because my friends do” when he was asked why he played computer games despite preferring to play soccer. Similar, the children in study II believed that their friends contributed to their enjoyment of activities. When the children were asked why they participated in activities the most common responses were “because my friends do” and “I like being together with my friends”. Many of the children expressed that they felt a strong bond with some of their classmates and these existing friendships seemed to influence their recess behaviour: “It’s me who has persuaded one of my friends to start playing soccer. I said: Come outside and try to play then you can see how enjoyable it is. Then he started to go out and play and then he actually found it awesome and now he has started in a soccer club” (William, 11-year-old boy from the low PA group, study II). We both found low physically active children
being encouraged by friends to be physically active during recess and high physically active children preferring sedentary recess activities because their friends did so.

In line with our finding Blatchford et al. 2003 showed that recess was a social event (Blatchford et al., 2003). Furthermore, another qualitative study also found that peer influence was both positively and negatively associated with PA (Stanley et al., 2012).

**Conflicts and exclusion**

In study I and study II, boys experienced conflicts caused by the importance placed on winning when playing soccer. Many of the boys took the ballgame so seriously that team constitution and rules of play often caused disagreement. A conversation between the moderator and two boys in study I highlighted this:

Nick: Often somebody fights, but not every day

Moderator: What are they fighting about?

Ben: If it is a goal or a free kick

Nick: Or hand ball. They were fighting today about if there was a hand ball

Ben: Alex, he just wants to win

In both studies we also found that boys controlled and dominated the majority of activities during recess and laid the foundation for children’s (non) participation in PA. Many girls wanted to play soccer but felt that they were not fully allowed to join the boys’ ballgames: “*They do not want girls to take part [in soccer games] because they are not good enough*” (Rita, 11-year-old girl, study I).

In study I, we also found that the boys displayed a clear hierarchical division among themselves by calling the boys who were less skilled at participating in sport games “*the nerds*”. These boys felt like outsiders. In contrast, boys who were skilful soccer players reinforced through their behaviour
that they were the “cool” boys and the other boys looked up to them. This was underlined in a discussion between the moderator and a boy in study I:

Greig: Among the boys it is so that some are popular and then the others just follow you

Moderator: Who are the popular boys, what are they doing?

Greig: They play soccer […]. Scott, [an unfit computer gaming boy] you are our outsider

McKenzie et al. 1997 also found many conflicts in PE lessons, suggesting that up to one quarter of lesson time was taken up by conflicts related to organisation of teams, activities and game rules (McKenzie et al., 1997). Another two studies showed that increased teacher supervision during recess could lead to faster conflict resolution and increased PA, particularly among boys (Sallis et al., 2001; Willenberg et al., 2010). Masculine dominance at the soccer field was also discussed by Connell & Messerschmitt (Connell and Messerschmidt, 2005).

**Built environmental factors**

**Space and place experiences**

In study I, children reported feeling “crowded” in the schoolyard at schools with small outdoor areas. Because of overcrowding and excessive noise in the small schoolyards, girls in particular mentioned that they often sought out small secluded areas where they could stay in smaller groups.

A conversation between the moderator and three girls in study I highlighted this:

Lana: Typically, we sit on those couches [at the library] and just talk

Alba: In fact, we are not allowed to stay in here at all but we need to have a place to stay

Moderator: So you wish that you were allowed to stay here?

Catharina: Yes because there are not so many in here so it’s quiet
Also in study II, most of the indoors-staying girls were socialising with their classmates in smaller secluded indoor areas. Among some of the Low PA children, in particular the classroom was perceived as a pleasant place during recess. These children expressed a strong affiliation with the classroom calling it “our” room. It was important to them that they could close the door and not be interrupted by children from other classes: “It’s a cosy place [the classroom], and it’s where you belong. You know the place and you can do what you want to do in that place without being disturbed or others being irritated by you” (Julie, 12-year-old girl from the low PA group, study II). In contrast, most of the high physically active children in this study did not express an affiliation with the classroom.

Two other qualitative studies (Ozdemir and Yilmaz, 2008; Stanley et al., 2012) also found that lack of space was experienced as an important factor influencing recess PA. This is also supported by findings from quantitative studies where more play space per child was positively associated with more recess PA (Cardon et al., 2008; Delidou et al., 2015; Ridgers et al., 2010). Similar to our study Mooney et al. 1991 found that almost half of the 175 children included in their study, mostly girls, wanted the option of staying indoors during recess (Mooney et al., 1991).

**Lack of play facilities**

Both in study I and study II, many children preferred to stay indoors during recess because of a perceived lack of play facilities: “We just sit indoors talking [...]. Well, there is not really anything to do during recess and if we go outdoors you can only play soccer” (Maya, 12-year-old girl, study II). In study I, the perceived lack of recess facilities resulted in very different behaviour for boys and girls, respectively. If the boys did not get the facilities they wanted, they were often very creative in playing something else or using alternative facilities (e.g. benches were used as soccer goals, door sills and stairs as ramps for skateboards and scooters, and
playhouse roofs as parkour facilities). Girls engaged in more passive activities when the facilities they wanted to use were occupied. Similar to this, “waiting” was a frequent activity observed in the schoolyard, particularly among the girls in study II.

In three previous qualitative studies (Parrish et al., 2012; Stanley et al., 2012; Thompson et al., 2001) children also experienced lack of play facilities as a barrier for recess play. This is supported by a review finding a positive association between recess PA and overall facility provision as well as the provision of unfixed equipment (Ridgers et al., 2012). Recently, a study by Delidou et al. also showed a positive association between PA and recess equipment (Delidou et al., 2015).

**School policy factors**

**Outdoor play policy**

In four out of five New Zealand schools in study III, children were required to be outside during recess all year round. When asking the children if they would rather stay indoors during recess, most children preferred to stay outdoors because there were more things to do outside. In contrast, children at many Danish schools in study I could decide themselves whether they wanted to stay indoors or outdoors during recess. However, similar to the New Zealand children in study III, many Danish children expressed in study II that if there were many different play facilities in the schoolyard, they would prefer to do activities outdoors during recess: “It’s irritating not to decide yourself, but if we had a nice schoolyard I would actually decide to play outside” (Alex, 11-year-old boy, study II).

Other studies have also found that use of outdoor school environments facilitates play and is associated with increased levels of recess PA (Dessing et al., 2013; Fairclough et al., 2012; Ridgers et al., 2011; Wood et al., 2014).
Use of electronic devices

At 16 out of 17 Danish schools in study I, the children were allowed to use electronic devices such as mobile phones, tablets and computers during recess, and almost every child who participated brought these electronic devices to school on a daily basis. Many of the children, both boys and girls, stated that their electronic devices were tempting to use during recess and that they were barriers for recess PA. "The boys just sit playing [on their mobile phones] and they never want to come out playing soccer" (Victor, 10-year-old boy, study I). Many children suggested that, to increase recess PA, the school should restrict the use of electronic devices: “Maybe they [the school management] should just abolish use of computers, you have such a short time to be outside playing” (Sara, 10-year-old girl, study I). Conversely, at four out of five New Zealand schools in study III, electronic devices were not permitted during recess. The arguments for not allowing electronic devices at the New Zealand schools were reduction of recess PA and the anti-social culture they induced: “They are anti-social devices and we prefer children to be physically active in the playground” (principal, study III).

Another study from Sweden also found that use of smartphones led to greater physical inactivity during recess, particular among boys (Raustorp et al., 2015).

Recess duration

In study III, three of the five New Zealand schools had a lunch break lasting 50 to 60 minutes which was approximately twice as long as the Danish lunch breaks reported in study I. The longer recess duration in the New Zealand schools potentially doubled the time for recess PA. Moreover, the principals at these schools stated that longer recess periods enabled starting up PA-promoting activities such as organised sports or opening up alternative facilities for free play such as the sports hall and swimming pool. In study II, at a Danish school with shorter recess periods, children expressed...
that their recess periods went too fast to get the full potential out of the recess period. Particularly the High PA children who played soccer were observed to use the time prior to recess to plan their activity. These boys also explained that the 10 minutes afternoon break was too short to get to the field and start a soccer game: “We can’t even get there [to the soccer field] in 10 minutes” (Louis, 12-year-old boy, study II).

Similarly, other studies have shown that the longer the recess duration, the more children engaged in PA (Parrish et al., 2012; Ridgers et al., 2007).

**Organised activities**

In study III, it was common for the New Zealand children to have the opportunity to participate in teacher-organised sports during recess. Organised sports were offered to create equal possibilities for attending sport activities, and this especially helped children that were not very skilled in self-organising play for longer periods of time: “Some children aren’t skilled for self-organised play and that’s why we have the lunch club where these children meet in the last part of their lunch break and play together with a teacher” (principal, study III). This viewpoint was also found among children in study I. In this study the children, mainly girls, thought it would reduce conflicts and create more play across genders and age groups if teachers were involved as play initiators, creating teams, or acting as referees: “If the teacher took the time to take part in foursquare or so the play would be more fair” (Susanne, 11-year-old girl, study I).

In a study by Huberty et al. 2011, having trained teachers initiating recess activities increased PA, especially in overweight children (Huberty et al., 2011). Also, in a Danish study, teacher-initiated competitions and tournaments appeared to increase recess PA (Mikkelsen, 2014).
### Natural environmental factors

#### Weather

In study I, bad weather conditions seemed to be one of the main barriers for recess PA. Many children, particularly girls, did not think it was fun to play outside in rainy or snowy weather. They preferred to stay indoors doing sedentary activities: “We like it when it’s a bit warm because then it’s much more fun to be outside because you can do more. When it’s cold or rainy then you really don’t want to do so much” (Camilla, 11-year-old girl, study I). Additionally, at some schools the children were not allowed to use some specific outdoor areas during rainy weather in order to prevent dirt being brought indoors: “When there is snow or wet, we aren’t allowed to be out here” (Cathie, 10-year-old girl, study I).

Similarly, in an Australian study children perceived weather as a barrier to recess play because they were forced to stay indoors in both wet and hot weather conditions (Stanley et al., 2012). Another Australian study also found children’s enjoyment of recess PA to be seasonally influenced with higher enjoyment of recess PA in March (mean maximum temperature of 22.9°C) than in June (mean maximum temperature of 10.7°C) (Hyndman et al., 2015).

### Findings across the layers in the socio-ecological model

In all, twelve factors perceived to influence recess PA were identified across the layers in the socio-ecological model: two individual factors (bodily self-esteem and ability, and gender); three social and cultural environmental factors (gendered school culture, peer influence, and conflicts and exclusion); two built environmental factors (space and place experiences, and lack of play facilities); four school policy factors (outdoor play policy, use of electronic devices, recess duration, and organised activities) and one natural environmental factor (weather).

These twelve factors found to influence the children’s recess PA stem from all layers of the socio-
ecological model. A key strength of the socio-ecological model is its focus on multiple levels of influence, which broadens options for interventions (Sallis et al., 2008). However, because the socio-ecological model specifies multiple levels of influence, and there are multiple variables at each level, it may be difficult to determine which of the identified factors are most important and to whom. Few studies have quantified the relative contribution of factors on PA in the different layers of the socio-ecological model. Giles-Corti and Donovan (2002) compared the ability of psychological, social, and physical environment variables to explain PA. Even though associations were strongest for the individual variables and weakest for the physical environment variables, each category of variables was significantly related to PA (Giles-Corti and Donovan, 2002). Another study showed that the likelihood of walking at recommended levels was nearly eight times higher in people with both high individual and physical environment scores, compared with those with low scores on both (Giles-Corti, 2006).

It is also important to stress that the socio-ecological model is a simplification of reality and that the factors are interdependent and influence each other (Sallis et al., 2008). For example, we find it difficult to consider the individual layer without considering the social layer. In our opinion an individual is socially constructed which means that children are dependent on their relations and cannot be seen independent from them. For example, one child’s bodily abilities will always be assessed and developed in relation to other children and adults. Moreover, providing the individual child with motivation and skills to change PA behaviour during recess will not be effective if recess environments and policies make it difficult or impossible to change the behaviour. In our study, some children stated that they did not want to play outdoors during recess because they had no outdoor facilities motivating them to play. The children explained that more motivating play facilities in the schoolyard were needed if they were to be forced to play outside during recess. Therefore it is important to understand that there is a reciprocal relationship between the multiple
factors across layers. For example, motivating and teaching children to increase recess PA might be implemented together with the creation of recess environments and policies that make it convenient and attractive to change recess behaviour. In summary, the creation of supportive social and physical environments is likely to be more effective in increasing recess PA levels than only targeting a single layer in the socio-ecological model.

**Methodological discussion**

The synthesis of three different study designs created a richer form of data and greater credibility of results. Studying 17 relatively different schools in study I strengthened the transferability of the study (Mason, 2002). The consistency of findings across the 17 schools underpins that they are prevalent throughout a variety of school environments in Denmark and widely recognised by children. The prolonged case study at one school in study II facilitated establishment of a more confidential relationship between the children and the researcher, which eased an in-depth understanding of the explored. Study III helped us gain an analytical distance to our research and see the Danish school context from the outside (de Jong et al., 2013; Prasad, 2005).

In terms of both findings and validity, we wanted to use both observation and interviews in all three studies. Particularly in study I and study II, we benefitted from using multiple supplementing qualitative methods. In study III, we did not have the possibility to conduct formal interviews, but we included many informal talks during our observations.

Including adults’ views could possibly have broadened the findings of factors influencing children’s recess PA. However, according to “the new child paradigm”, it strengthened our research to acknowledge children as individuals independent of the perspective of adults (James and Prout, 2005). We found that the children had clear opinions on factors influencing their recess PA and they even suggested ways to mitigate some of the perceived barriers for their recess PA.
Conclusion and practical implications

Different groups of children, based on gender and PA levels, had different perceptions and experiences linked to factors influencing their recess PA. Researchers and professionals working with children’s recess PA should be aware of the different perceptions and not treat children as one homogeneous group in future recess interventions promoting recess PA. This speaks for implementing a combination of actions addressing factors from different layers in the socio- ecological model to tailor future interventions promoting recess PA among all types of children.

Our suggestions are:

- Designing schoolyards with smaller secluded spaces might motivate girls to play outdoors and designing diverse outdoor spaces without predefined activities might also invite children to engage in less gender stereotyped play.
- Providing varied PA promoting facilities in the schoolyard, for example different unfixed equipment, might motivate some of the indoor staying girls to play outdoors.
- Rethinking indoor spaces (e.g., classrooms) as space for PA (e.g., showing music videos on a screen to facilitate dancing) might also be a motivation for recess PA among the children who feel comfortable staying in the classroom.
- Implementing a policy supporting outdoor PA during recess in all weather conditions might increase the recess PA level, in particular among children with low PA levels mostly staying indoors doing sedentary activities.
- Providing teacher-organised play activities with less focus on competition and skills might be implemented as a play opportunity to reduce play hierarchy and conflicts. Particularly girls who want to play gender-mixed soccer but feel excluded by the boys might be more included in the play if a teacher is controlling the game instead of the boys.
- Making it possible to move virtual play into the real world might support PA among the
boys playing computer games by providing spaces (e.g., hidden scrub areas) and play
facilities (e.g., castles, moats and foam swords) in the schoolyard. A more controversial
suggestion, also voiced by the children, is implementing a policy to reduce the screen time
during recess.

- Prolonging recess duration might enable more time for free play activities, organised
activities and use of alternative facilities and spaces (e.g., sports hall or swimming bath).
- Fostering self-belief in children lacking bodily self-esteem might increase these children’s
motivation to use their bodies. More research in this field is needed to suggest exact how the
schools could foster self-belief in the children to increase bodily self-esteem.

Acknowledgement

In all three studies, we thank the participating schools, teachers, children and families for their
enthusiastic participation. Thanks also go to the three anonymous reviewers who offered insight and
suggestions that improved the manuscript.

Funding

The Danish Cancer Society funded the study.

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