

Educator perspectives on factors influencing children's school-based physical activity

Summary

Formative research is an important first step in the design and development of children's school-based physical activity (PA) interventions. Exploration of educator (headteacher and PE-coordinator) perceptions toward the promotion of school-based PA, including physical education (PE) delivery has however been limited. This study took a socio-ecological approach to explore the barriers and facilitators of children's school-based PA from the perspective of school educators. Interviews were conducted with headteachers ($n=4$), PE-coordinators ($n=4$) and a deputy headteacher ($n=1$) and data thematically analysed using Nvivo software (version 10). Findings suggested that, at an organisational level headteachers were the predominant driving force in the promotion of PA opportunities, yet institutional barriers including low priority for PA and PE were perceived to negate delivery. At an interpersonal level, strategies to increase the delivery of school-based PA were developed, however poor teacher-coach relationships and significant others reduced PA promotion opportunities. Child PA was further negated through intrapersonal factors, including lack of PE-specific teacher training and varying teacher interest in PA and sport. To increase primary school children's school-based PA, barriers and facilitators at the organisational, interpersonal and intrapersonal level must be considered and targeted, and researchers and schools should work in partnership to develop future interventions.

Keywords: Primary schools, Physical Education, Intervention, Qualitative, Formative research

INTRODUCTION

United Kingdom (UK) guidelines recommend children and young people aged 5-18 years should engage in moderate-to-vigorous intensity physical activity (MVPA) for at least 60 minutes daily (Department of Health, 2011). Children achieving this guideline have improved aerobic fitness (Füssenich *et al.* 2015; Janssen *et al.* 2010), academic outcome (Rasberry *et al.* 2011; Singh *et al.* 2012) self-esteem, brain function and cognition (Biddle & Asare 2011; Khan & Hillman 2014; Ortega *et al.* 2008) compared to physically inactive peers. Additionally, there is strong evidence to suggest higher levels of total daily PA can improve children's adiposity, cardiometabolic biomarkers, physical fitness and bone health (Poitras *et al.* 2016). Considering that PA has been shown to track from childhood into adolescence and adulthood (Cleland *et al.* 2012), the importance of early PA promotion in children is warranted. Worryingly however, only 23% of boys and 20% of girls in England aged 5-15 years meet this MVPA guideline (Scholes 2016), making child PA promotion a major public health priority.

Primary schools are a key setting for child PA promotion (Kriemler *et al.* 2011). Children spend on average 180 days/year in school (Bush *et al.* 2011) accruing PA through opportunities including travel to and from school, recess, PE lessons, in-class PA breaks, and after school activities and sports teams (Slater *et al.* 2012). To further promote child PA many UK primary schools appoint one teacher as a PE-coordinator, supporting the headteacher to organise, implement and promote school-based PA opportunities, despite limited formal training (Harris *et al.* 2012; Webster 2011). Yet, even with the provision of PA opportunities and the supporting role of PE co-ordinators, few school-based UK PA interventions have been effective (Metcalf *et al.* 2012; Russ *et al.* 2015; van Sluijs *et al.* 2008) or translated from research into practice to positively impact population levels of child PA (Arnold *et al.* 2016). One possible explanation is that school educators and pupils are rarely involved in the development of school-based interventions, jeopardizing perceived intervention ownership, actual intervention implementation, sustainability and effectiveness (Christian *et al.* 2015; Cole & Horacek 2009; Naylor *et al.* 2015).

Engaging school stakeholders in the development phase of an intervention aligns to Medical Research Council guidance (Craig *et al.* 2008) and can identify factors that influence children's school-based PA to be targeted in subsequent interventions. In accordance with the socio-ecological model of health behaviour (Sallis, Owen and Fisher, 2008), various factors across multiple levels of influence can promote or impede children's school-based PA, including the development of effective intervention components that sufficiently target the school-based barriers to increase PA (Russ *et al.* 2015). Factors associated with school-based PA promotion include school PA policies (Langille & Rodgers, 2010) headteacher values towards health interventions (Christian *et al.* 2015; Persson & Haraldsson 2017) pre-existing teacher attitudes and beliefs regarding PA promotion (Webster, Monsma, & Erwin, 2010; Webster, 2011) as well as time, skills and competence to deliver PA (Clarke J *et al.* 2015). Factors influencing PE delivery include the availability of facilities and resources (Decorby *et al.* 2005; Kirk 2005), organisational priorities (Hastie *et al.* 2012), relationships between teachers and children (Cox & Williams, 2008), and pupil motivation for PE (Berghe, Vansteenkiste, Cardon, & Kirk, 2014). Despite this body of literature, only one known study (Mackintosh *et al.* 2011) used school educators in formative investigate work to assist in the design of a new PA intervention program. Unlike previous formative research, our investigation specifically targets headteacher and PE-coordinator perspectives on factors influencing school-based PA in children from areas of high socio-economic deprivation.

The North West of England includes three of the five most highly deprived local authority districts in England (Department for Communities and Local Government 2015). Targeting schools and children in deprived areas is vital as these children have higher reported body mass index, are less active and more sedentary than peers in affluent areas (Drenowatz *et al.* 2010). This is supported by findings that children from areas of higher deprivation are twice as likely to be obese than children in lesser deprived areas, with obesity levels rising year on year (Health and Social Care Information Centre 2016). Accordingly, collaborating with school educators to develop interventions promoting child PA in deprived schools is more likely to lead to long-term, sustained improvements in PA and health (Sallis *et*

1 *al.* 2008). The aim of this study was to explore educator perspectives of factors that influence children's
2 school-based PA in primary schools in highly deprived areas in the North West of England.

4 **METHODS**

5 **Study design**

6 Semi-structured interviews were conducted with school educators to obtain a deeper understanding of the
7 factors that influence children's school-based PA. The study adhered to the consolidated criteria for
8 reporting qualitative research (COREQ) checklist (Tong *et al.* 2007) ensuring transparent reporting of key
9 study components. Informed written consent was obtained from all participants and ethical approval
10 granted from the institutional research ethics committee.

12 **Participants and settings**

13 Participants were recruited from a cluster of four primary schools within a socio-economically deprived
14 area of a large city in the North-West of England, after an initial interest in taking part in a new school-
15 based PA intervention. Two schools held multi-academy trust status (i.e. self-governed), one school was
16 local authority run, and one was a faith school. Interviews were conducted with the headteachers (2 male,
17 2 female) and PE-coordinators of each school (4 female) plus 1 deputy headteacher (male) who was
18 available during the time of the interviews. The four schools in the present study had a staff structure that
19 included a headteacher, PE-coordinator and generalist teachers, typical of most UK primary schools in
20 low socio-economic areas. Headteachers main responsibility regarding PE and PA was to ensure the
21 implementation of school PA opportunities and school PE, while PE-coordinators led on the delivery,
22 promotion and organisation of such opportunities, as described by respondents. All participants held a
23 standard primary teacher training degree. The PE-coordinators included 1 PE-specialist with a higher
24 education degree for teaching PE at primary and secondary institutions, and 3 non-specialist PE-
25 coordinators with no such PE specific qualification.

Interviews

A semi-structured interview guide was developed using open-ended questions to facilitate the exploration of participant views. Open ended questions allow participants to fully express their viewpoints and experiences while offering the researcher the opportunity to ask probing questions as a means of follow-up (Turner 2010). Interview sections included 1) current school PA practices, 2) roles and responsibilities of staff toward PA promotion, 3) and challenges and needs of school PA promotion. Once developed, the interview schedules were piloted with the second and last authors. Piloting helps researchers determine flaws, limitations and weaknesses prior to data collection (Kvale 2008), allowing questions to be re-assembled reducing participant misunderstanding and developing effective follow-up prompts to further understanding (Creswell 2007). Moreover, the principle researcher followed an eight stage interview preparation phase suggested by McNamara (2009) which included (1) choosing a setting to minimise distraction; (2) explaining the interview purpose; (3) addressing terms of confidentiality; (4) explaining the interview format; (5) stating the interview duration; (6) providing researcher contact information; (7) asking if participants have questions before starting; and (8) asking permission to record the interview (see preparation for interview section). Interviews were conducted by the first author between February-April 2015 and lasted 30-60 minutes, with conversations being audiotaped via the use of an Olympus digital voice recorder.

Data analysis and representation

Interview data was transcribed verbatim and each transcript read several times by the first author to help them become immersed in the data (Silverman 2005). Transcripts were read, re-read, imported into NVivo10 qualitative analysis software and analysed thematically (Braun & Clarke 2006). Analysis first began with an inductive approach by initially segmenting the data and coding it to allow specific codes and categories to emerge. The assigning of specific quotes, conversations and paragraphs were then further analysed allowing broader themes to emerge from the data to best encapsulate participants'

meanings. This process, known as open coding is considered a desirable way of enhancing credibility when using semi-structured interviews (Morse 2015). The socio-ecological model was then used to organise themes into broader categories representing intrapersonal, interpersonal and organisational level influences on children's school-based PA. Consequently a combination of deductive and inductive techniques were used to generate codes (Trigwell *et al.* 2015). This allowed the researcher to better represent the multiple levels of influence and how the different levels can impact children's school-based PA. Frequent de-briefing sessions between all authors facilitated the discussion, debate and re-definition of themes.

RESULTS

This study aimed to explore the factors that influence children's school-based PA, from perspectives of school educators in primary schools from deprived areas in the North West of England. Results are presented using main themes corresponding to levels of influence in the socio-ecological model of health-related behaviour, namely, organisational (headteacher belief and value system; child PA needs; low priority for school PA and PE), interpersonal (teacher-coach relationships; significant others), and intrapersonal level factors (teacher PA involvement; lack of confidence, competence and training). Data from headteacher, deputy headteacher and PE-coordinator interviews are combined throughout the results section to promote a deeper understanding and holistic representation of the factors discussed. All participants have been anonymized and pseudonyms used in the following presentation of the data.

Organisational factors

Headteacher belief and value system. Each school offered various PA opportunities for their children throughout the school day, including breakfast clubs, online activities (e.g. wake up, shake up), recess free play, lunchtime multi-skill activities and after school extra-curricular activities. Schools also provided 2 hours of curriculum PE per week with delivery often shared between classroom teachers and

external coaches employed by the schools. All headteachers held positive beliefs toward primary school PA and believed schools were important for establishing a good base for continued PA and healthy lifestyles throughout the life-course.

“I think its (PA) extremely important in a primary school, you’re hoping you’re going to set the children up with the skills, life skills not just, they will be fit and active here, that you know, hopefully you will instil in them the need for a healthy lifestyle that will continue throughout secondary school and into their adulthood” (Janet, Headteacher, School 3)

Moreover, headteachers believed they played a defining role in the availability of school-based PA opportunities, stating a personal interest and involvement in sport as a key factor toward school PA provisions.

“I think that my own interest in sport has helped immensely develop the sports round the school. I personally feel that it's very, very important that children have the opportunity to develop not only healthy lifestyles, but have the opportunity to access clubs and centres outside of the school” (Jenny, Headteacher, School 1)

“Well, I am very keen on PE and sport myself, so what I try to do is ensure that...My philosophy really about sport in school is that children get a broad range of opportunities to play a range of different sports, and take part in physical activity as part of developing healthy lifestyles” (Ryan, Headteacher, School 2)

Such personally held beliefs and active support from headteachers for the promotion of school-based PA encouraged the development of PA opportunities across the school day.

Child developmental needs. The importance and value placed on school-based PA and PE by headteachers was mirrored by the PE-coordinators toward the positive effects that PE and PA have on children’s physical and psycho-social development.

1 *"I think it's [PE] really important, and it helps them not only outside of the classroom but inside*
2 *the classroom too. I've got quite a challenging boy-heavy class this [year], and if we don't get our*
3 *PE in, you know, they really need it... even if it is something at lunch or the lunchtime football*
4 *club...they come in with a much better attitude to learning... And it's really important as well for*
5 *their social skills and development, I think, as well as their physical and fitness."* (Claire, PE-
6 *coordinator, School 2).*

7 School PE and PA opportunities were also described as an important factor for improving academic
8 outcomes and behaviour as well as encouraging participation in PA outside of school.

9 *"Now because I'm a former PE teacher, I think it's beneficial that we do PE. I only have to look*
10 *down in the nursery and reception to see the improvement on academic outcomes...The number of*
11 *children who are starting to become more engaged with sporting activities, not only in school, but*
12 *outside of school, has been enhanced. And there's hardly any punch-ups in the yard at lunchtime"*
13 *(Tommy, Headteacher, School 4)*

14 Recognition by school educators that school-based PA opportunities engendered the development of the
15 children, both academically and holistically, appeared to be key facilitators toward the positive beliefs
16 staff held about PA.

17 ***Low priority for school PA and PE.*** Despite the positive views staff held toward school-based PA,
18 organisational barriers, including lack of time and particularly in the smaller schools, a lack of space,
19 often negated the promotion of PA and in some cases the delivery of PE.

20 *"There's so little time to do all the stuff we have to do, and because of the way schools are*
21 *managed and the results, sport and everything does slip off...and it's a shame that it does, but I*
22 *can't go, "Ooh, it's outrageous", because I just know what it's like... the facilities are feeble, so*
23 *the hall isn't treated as the gym hall, and it's not a gym hall, I get that. But [P.E] it's never*
24 *priority"* (Natalie, PE-coordinator, School 3)

1 Lack of time was further associated with the high priorities placed on the academic attainment of the
2 children compared to their PA levels at school. This was described in relation to school standards
3 inspections.

4 *“Currently OFSTED inspection, whilst they will look at health and wellbeing, there isn't the same*
5 *priority given to physical activity as there is to the academic attainment of pupils.” (Ryan – Head*
6 *teacher, school 2).*

7 **Interpersonal factors**

8 ***Teacher-coach relationship.*** External coaches were perceived by educators to be an important facilitator
9 for increasing children’s school-based PA. Schools employed coaches for various reasons, including the
10 delivery of PE, lunchtime activities and after school clubs. Yet, participants believed that to encourage
11 more teachers to engage in the delivery of school PA opportunities, a more collaborative delivery style
12 with coaches was needed.

13 *“I know its brilliant having coaches down, working on site with [the children], but what often*
14 *happens is, they’re [coaches] left to it, and you observe, which is great, and you do absorb a lot of*
15 *the information, but I think there needs to be more of a partnership, and actually more to be able*
16 *to take over that role as it were” (Lauren, PE-coordinator, School 1)*

17 Another teacher however stated that while coaches are important, there should be greater focus on
18 upskilling teacher’s knowledge and understanding of how to appropriately deliver PE and increase
19 children’s school-based PA.

20 *“I think what needs to happen is that teachers themselves need to be up-skilled because it’s the*
21 *teachers who are in the schools, and know the children, and they’re already here...A gymnastics*
22 *coach coming in doesn’t necessarily know the children, it can be hit or miss depending on who*
23 *you’re getting in as well, and they might be off one day, and then you’re stuck. It creates a lot of*

1 *problems. My own view is up-skilling the teachers that are on site.” (Grace, Specialist PE-*
2 *coordinator, School 4)*

3 **Significant others.** While there were perceived advantages and disadvantages of using coaches in
4 schools to promote child PA, all teachers agreed that to increase the probability of children engaging in
5 school-based PA, schools needed a collaboration of all significant others in the child’s life.

6 *“Schools don't work properly... unless all parties are involved. So, if you can get the parents*
7 *involved, the children, the specialists, and the teachers, it's [the relationship] going to be fruitful,*
8 *I would imagine.” (Claire, PE-coordinator, School 2)*

9 It was however the parents and the child’s home environment that teachers believed had the biggest
10 impact on the child’s engagement in PA.

11 *“...it could be something to do with home, because their parents aren't very active, if they're not*
12 *given the opportunities obviously some children are given [opportunities], they go off to extra-*
13 *curricular sports clubs during the week. Lots of mine go to extra clubs and things, and then*
14 *others don't go to any, so already they're slightly behind. So I think it's a lot to do with home*
15 *life.” (Lauren, PE-coordinator, School 1)*

16 Yet one PE-co-ordinator believed that teachers could positively influence children’s PA through role
17 modelling healthy behaviours.

18 *“But what we can do as staff as well is be role models for [the children], do you know? And I*
19 *know it's a massive effort for me to be cycling into work, but I purposefully do that a lot of the*
20 *time, so that the children when they're walking to school...some of them say, “Oh, Miss, I saw*
21 *you”, and I was like, “Oh yes, just trying to keep fit” (Grace, Specialist PE-coordinator, School*
22 *4)*

Most PE-coordinators, while understanding and appreciating that they have a responsibility to promote their pupils' PA levels, were uncertain about what their individual responsibility was.

"I just feel there's a responsibility as a teacher for your children to hopefully gain a bit of exercise in school, but the reality is, I can't say a child in Year Four who I hardly know, and I don't come across, that I am responsible, because I think you've got to at least have the exposure [at home]. A lot of it's educating the parents, though, isn't it?" (Natalie, PE-coordinator, School 3)

Intrapersonal factors

Teacher PA involvement (interests, values and individual commitments). While many teachers across the schools were reported to support and facilitate the development of school PA opportunities, individual teachers (excluding PE-coordinators) were only expected to ensure children received the pre-requisite of 2 hours PE set by the school policy makers. Anything above the 2 hours of PE appeared to be at the discretion of individual teachers.

"The role and responsibility of a teacher is to make sure that those children have access to their requirement in terms of PE curriculum. That's pretty much it I would expect from a teacher's point of view." (Ryan, Headteacher, School 2)

The involvement of individual teachers in PA delivery in school but outside of the curriculum was primarily dependent upon their personal interests, values and individual commitments, such as family priorities.

"It's just hit and miss as to what staff that you've got in place, what their interest is and what their commitments are...Stereotypically [a] primary school teacher of say older generation, [it] could be that they are not so keen themselves on physical activity, that's because [in] primary school(s) they have different interests. So the percentage chance of getting a primary school

1 *teacher who has got an interest...there's a very low percentage, and for me coming to any school,*
2 *that's always a battle.” (Grace, Specialist PE-coordinator, School 4)*

3 Added to this, one PE-coordinator described how a culmination of other factors may affect a teacher's
4 ability to promote PA opportunities at school.

5 *“Some people outside of school don't do sport. I think some of the older members of staff, and I*
6 *include myself in this, have little injuries...people are conscious of their weight, so then they're*
7 *conscious of what they wear, and I think to do sport you have to have the right gear, and people*
8 *don't particularly want to pay, and they won't own trainers, so I think it's a bit of a culmination*
9 *of things really.” (Natalie, PE-coordinator, School 3)*

10 Consequently, while headteachers are an important stakeholder in ensuring the implementation of school
11 PA opportunities and school PE, if staff are uncommitted to deliver school-based PA opportunities,
12 increases in pupil's PA may be restricted.

13 ***Lack of teacher confidence, competence and training.*** A factor thought to limit teacher's ability to
14 deliver quality PE and promote PA was a deficiency in PE training during their initial teacher training
15 program.

16 *“I'm finding in my experience, we have a very, very mixed skills set of our teaching staff, ...partly*
17 *due to the fact that primary teacher training...doesn't focus as heavily as I would hope on*
18 *training teachers to deliver physical education sessions. So a lot of the skill set stems from their*
19 *own personal awareness or personal interest in sport.” (Jenny, Headteacher, School 1)*

20 To improve the delivery of PE, headteachers offered teachers various continued professional
21 development (CPD) opportunities including on-site training delivered by existing staff, and off-
22 site training on specific sports. Despite these training opportunities, PE-coordinators believed

1 many generalist teachers still felt scared, worried and fearful about delivering PE, which may
2 have influenced the teacher's wider promotion and delivery of school-based PA.

3 *"I think people are quite fearful of [PE] at the moment. I think because there is quite a lot*
4 *involved in it, and I think if teachers don't feel very confident with it, they're reluctant to want to*
5 *teach it."* (Lauren, PE-coordinator, School 1)

6 Headteachers and PE-coordinators believed the only way to combat this negative perception of PE
7 delivery was to offer the correct training to build confidence and competence in the area.

8 *"I think that we need more CPD opportunities...I think we need to have more training right from*
9 *the word go...I would say the main thing is the teachers need to be equipped with the right*
10 *skills...remove this negative sort of perception of [PE], and to build confidence in the teachers*
11 *really, instil life skills, offer them correct training, have more observations...so [teachers] know*
12 *how they can move on and improve."* (Lauren, PE-coordinator, School 1)

13 **Discussion**

14 This study sought to explore the perspectives of school educators on factors that influence children's
15 school-based PA in a highly deprived area in the North West of England. Using the socio-ecological
16 model as a framework, the present paper suggests that children's school-based PA is influenced by
17 various organisational, interpersonal and intrapersonal factors.

18 All headteachers believed that their positive values and beliefs towards PA, stemmed from their personal
19 interest or involvement in sport and PA, and was central to their support of school-based PA opportunities
20 for children. Personal positive values of key stakeholders, regarding health and wellness of children may
21 significantly influence the availability of PA opportunities along with maintenance of healthy school
22 initiatives (Christian *et al.* 2015; Langille & Rodgers 2010; Persson & Haraldsson 2017). Previous
23 investigations suggest positive headteacher PA beliefs can facilitate the adoption, implementation and

1 continued support of school PA opportunities (Stolp *et al.* 2014). Added to this, as teachers are ultimately
2 responsible for implementing PA initiatives and interventions (Russ *et al.* 2015) stakeholder support for
3 PA may be particularly important for the sustainability and continued effectiveness of PA initiatives. It is
4 vital therefore that headteachers take a lead role in monitoring teachers adherence to school-level PA
5 policies (Langille & Rodgers 2010) while teachers recognise their potential role in supporting children to
6 reach the recommended amounts of daily PA.

7 School educators in this study perceived school-based PA opportunities to engender the development of
8 children, both academically and holistically. Yet, the lack of time, poor facilities and academic pressures
9 were reported to negate the delivery of school-based PA, despite these perceived benefits. Evidence
10 supports the positive relationship PA can have on children's academic attainment (Singh *et al.* 2012) and
11 at the very least, incorporation of PA into the school day has no negative effect on academic attainment
12 (Rasberry *et al.* 2011). Nevertheless, the low priority placed on PA by OFSTED (Office for Standards in
13 Education, Children's Services and Skills) meant that school PA provision and opportunities were not
14 recognised through inspection, and therefore, was lower on the priority list for these schools than
15 academic achievement. What's more, evidence suggests that academic pressures from time devoted to
16 subjects such as English, Science and Maths, inhibit the development of children in curriculum subjects
17 such as PE (Powell 2015). Therefore, aligned with previous work (Langille & Rodgers 2010) higher level
18 acknowledgement from standard agencies such as OFSTED are needed if PA opportunities are to be
19 maintained and promoted in primary schools located in deprived regions.

20 If time, space and academic pressures are limiting factors for the delivery of PA in schools, then the
21 integration of PA into the classroom may be an avenue for schools to consider, as some evidence supports
22 the use of classroom PA for improving child PA levels (e.g., Hill, Williams, Aucott, Milne, & Thomson,
23 2010). Webster (2011) suggests that generalist teachers can be supported to promote children's PA in
24 academic lessons by implementing movement breaks, and, at recess and in before and after school
25 settings. Considering previous research has highlighted teacher failings in regard to the infrequent

1 delivery of PE (Morgan & Hansen, 2008) promoting PA across the school day is appears necessary.
2 Accordingly, in addition to increasing teacher competence and confidence to teach PE, CPD opportunities
3 that support teachers to promote PA across the school day, in ways that may not necessarily require
4 teachers to teach sport-specific concepts/skills, may further benefit children's PA and health (Webster,
5 2011).

6 Congruent with previous research (Clarke J *et al.* 2015; Langille & Rodgers 2010), school educators, and
7 in particular the PE specialist, believed school staff can positively influence children's PA, including
8 health and wellness through role modelling. Yet variations in teacher's personal interest, values and
9 individual commitments largely determined how involved staff were regarding their school PA
10 participation. While established curriculum guidelines specified 2 hours PE a week, anything over and
11 above this was at the discretion of individual teachers. Consequently, a dilemma exists in schools between
12 the promotion of PA by headteachers and the varied delivery of PA opportunities by teachers. Evidence
13 from the pre-service teacher literature suggests that numerous factors, including pre-university
14 experiences in PE, perceived competence in PA, and perceived competence in PA promotion, impact a
15 teachers attitudes towards school-based PA promotion (Webster et al., 2010). Therefore, it is imperative
16 to change teacher's attitudes towards the promotion of school-based PA, especially if children are to
17 receive and benefit from more PA opportunities. While Webster (2011) suggests that the pre-service
18 education years are a critical time to improve teachers' perceptions of PE and school-based PA
19 promotion, it also appears vital to change the attitudes of current teachers in-service

20 The involvement of significant others in a child's life, including parents, teachers and coaches, were
21 viewed by teachers to play a role in promoting children's PA. Yet, while most staff believed that teachers
22 had some responsibility to promote children's school-based PA, what that responsibly was, was poorly
23 established. Todd et al., (2015) reported that teachers experienced moral dilemmas, especially in deprived
24 areas, as to whether it was their responsibility to address the social aspects of children's health. This
25 dilemma was similarly found in the present study, however teachers believed the school and parents

1 should both be responsible for addressing the children's health issues. This is especially important
2 considering that positive early PA experiences, including both parental and teacher support for PA can
3 positively influence the engagement of children in PA in later life (Thompson *et al.* 2003). Considering
4 this, during the design of PA interventions, efforts could be made to target improvements not only in the
5 school environment, but also within a family's psycho-social environment as parents are a key
6 cornerstone in the reinforcement of positive healthy behaviours at home (Brown *et al.* 2016; Christian *et*
7 *al.* 2015). Accordingly, it is advised that for intervention success a strong focus should be on improving
8 PA opportunities of the whole family with a particular focus on the child as the agent of change to
9 positivity influence family behaviour.

10 Limited communication between teachers and specialist coaches, and thus, limited knowledge transfer,
11 may have reduced teachers' motivation and desire to deliver PE when the coaches contract with the
12 school ended. This is supported by previous research that suggests the presence of coaches can reduce
13 teacher involvement and attendance in PE (Powell, 2015). This is worrisome as specialist coaches are
14 reported to have limited knowledge of the learners, learning environment, curriculum and pedagogy
15 (Petrie *et al.* 2014). In the present study and similar to previous research (Sloan, 2010), teachers suggested
16 that coaches should be more supportive in helping generalist teachers to develop competence and
17 confidence to deliver PE. Therefore if existing practices including observations are ineffective for
18 teachers learning, the provision of alternative CPD opportunities for teachers appears vital (Kirk, 2012).
19 Accordingly, while schools appear to value specialist coaches, better working relationships between
20 coaches and teachers appear vital to support teacher development and the sustained delivery of high
21 quality PE and PA.

22 **Strengths and Limitations**

23 This is the first study to formatively explore the multiple levels of influence on primary school children's
24 school-based PA from the perspective of headteachers and PE-coordinators. Furthermore, this is the first
25 study to explore these factors in a highly deprived area of England, which is vital given the negative

1 impact low socio-economic status has on children's current and future PA and health. These findings are
2 valuable for school educators and coaches, as well as academics designing and developing school-based
3 PA interventions. Nonetheless and despite these strengths, caution should be undertaken when
4 generalising the findings to populations outside of deprived regions in the North West of England.
5 Finally, it is acknowledged that the headteachers from the four primary schools held generally positive
6 attitudes towards PA and hence may not be representative of the voice of headteachers generally.

7 **CONCLUSION AND IMPLICATIONS**

8 School educators perceived various organisational, interpersonal and intrapersonal level factors to
9 influence children's school-based PA. At the organisational level, headteacher's beliefs and values
10 towards PA and sport influenced their support and promotion of school-based PA opportunities and
11 associated teacher CPD opportunities. Time constraints, academic pressures, and, limited resources and
12 facilities were found to impede children's school-based PA however. In addition, perceived factors
13 inhibiting the delivery of PE and PA opportunities by teachers included low teacher competence,
14 confidence and skill level, plus teacher's motivation for delivery, which appeared to be influenced by
15 their personal interests, commitments and values related to PA. Lastly, teachers called for better working
16 relationships between teaching staff, parents and coaches, to ensure children had the best opportunity and
17 support to become more active.

18 To help children accrue health-enhancing MVPA on school days, barriers to the provision and
19 delivery of quality PA and PE opportunities must be targeted in future interventions. Considering a lack
20 of training is a key barrier to children's school-based PA it is suggested that existing teachers are
21 educated on the importance of PA for children's health, and how teacher attitudes and behaviours can
22 inhibit or facilitate a child's participation in school-based PA opportunities. Furthermore, promoting
23 headteachers and PE-coordinators recognition that PA can enhance academic achievement and out of
24 school development may motivate teachers to support and promote children's school-based PA. There is a
25 need for suitable CPD opportunities that build teacher's confidence in, and perceived importance of,

1 promoting and delivering PA across the school day. This may help to reduce the impact of the
2 organisational barriers of a lack of time and space to deliver PE and PA opportunities, enabling teachers
3 to hit targets set for academic attainment whilst supporting children to be physically active. Yet, for
4 school staff to fully internalise ownership and support the implementation and delivery of school-based
5 PA interventions, their input during the development phase of interventions is crucial. Consequently,
6 understanding and keeping the needs of headteachers, teachers and pupils in mind should not only help to
7 cultivate school buy-in, but support researchers and schools to work together to develop, implement and
8 evaluate school-based PA interventions that are sustainable and effective at promoting child PA in the
9 long-term.

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