A practice theory approach to primary school physical activity: opportunities and challenges for intervention

A significant body of critical scholarship exists problematizing the dominant behavioural-individualist approaches to public health policy and intervention, and practice theories have been noted for their potential in providing an alternative. Children's physical activity in primary school settings continues to be a major area of attention in public health, yet no critical examination of a practice theory approach exists in this context. This paper addresses this gap by applying the prevalent three-elements model of practices to the case of children's school-based physical activity. Drawing on focus group, interview and observation data from pupils, staff and parents at one primary school setting in England, our analysis highlights; first, how the configurations of (a) physical resources (e.g. playground space and equipment), (b) practical know-how (e.g. a skilled understanding of performing the activity), and (c) the socio-cultural significance of practices (e.g. the values and meanings of the activity) impact how, and whether children's physical activity happens, and is sustained or interrupted; and second, by showing how physically active practices are contingent on being simultaneously in harmony or conflict with other routinized practices of the school day. We conclude that the three-elements model offers a helpful framework for understanding school physical activity which de-centres the individual, but that there are challenges in using this analysis to support primary schools as they attempt to enable physically active practices more effectively. Further research is required to develop and evaluate a practice theory approach to promoting children's physical activity.

Keywords: *physical activity; school; children; social practices; public health*.

Introduction

Epidemiological research and public health policies increasingly position physical activity as being important for population health globally (Das & Horton, 2016; World Health Organization, 2018) and the lack of parity in physical activity levels between social groups is significantly related to the persistence of health inequalities (Elhakeem, Cooper, Bann, Kuh & Hardy, 2017). Within this context, ambitions to realise long-term public health goals have led to a focus on children's physical activity. There exists a large body of research delivering interventionist programmes in schools (Love, Adams and van Sluijs, 2019) and numerous government-funded programmes have been implemented internationally (see for example *Designed To Move* in the United States, *Change4Life* in the United Kingdom, *Get set 4 life* in Australia, and *Eat Move Live* in New Zealand).

Notwithstanding some examples of modest improvements in young people's physical activity as a result of these strategies (Lai, Costigan, Morgan, Lubans, Stodden, Salmon & Barnett, 2014), a significant body of critical social science scholarship exists problematizing the intervention approaches that are predominantly adopted for physical activity 'behaviour change', often focusing on target groups to encourage their participation in physical activity through the implementation of discrete interventions (Barnfield, 2016; Baum & Fisher, 2014). These approaches can be characterised by their alignment with the dominant 'ABC' (attitude, behaviour, choice) paradigm in behaviour change policy, which predominantly focuses on targeting the "individuals whose behavioural choices will make the difference" (Shove, 2010, p.1274), supported by targeted communications, social marketing and rewards.

These approaches have been criticized for their inability to account for the way collective activities – such as physical activity – might emerge, or fail to emerge, from the social processes of everyday life (Cohn, 2014), including how healthy or unhealthy

activities are synchronised, assembled and combined in particular configurations (Blue, 2017). Rather, the responsibility for change is ontologically situated with individuals and their choices (Keane et al., 2017) which logically leads to physical activity interventions such as those which provide children with heart-rate feedback (McManus et al., 2008) and utilise personalised goals and rewards (Miller et al., 2018). Often this means parents or teachers are responsibilised to manage children's health (Burrows and Wright, 2007), but there is also a vision of children who are "agentive as consumers of health-oriented messages and products" (p.88). With specific reference to the potentially harmful impact of intervention on children, there is related critique about the tendency to reframe socio-structural issues as individual problems and 'moral' responsibilities (Burrows and Wright, 2007) which can magnify stigma and shame (LeBesco, 2011; Scambler, 2009) and ultimately contribute to inequalities (Williams, 2017).

'Behavioural-individualist' intervention approaches conceal the "vital distinction between mechanisms of aetiology and mechanisms of prevention" (Kelly and Russo, 2018, p.82). Arguably, sustainable 'prevention' of inactivity will only be possible once physical activity is reimagined as emerging from the way social life is organised, rather than as an outcome of the application of a 'dose' of intervention. As such, there is a growing understanding that effective interventions need to account for the complex social processes within which behaviour manifests (Blue, Shove, Carmona & Kelly, 2016). There is a need to reimagine physical activity as emergent in different ways from different practices, and to intervene in collective conventions towards physical activity rather than simply providing opportunities for participation (Vihalemm et al., 2015).

These critiques have been powerful, but we agree with Mykhalovskiy et al. (2018) that an interdisciplinary conversation is needed that moves beyond the antagonistic and oppositional tendency of critical social science scholarship and towards a productive

dialogue *between* critical social science and public health. In light of this perspective, it is important to recognise that little progress has been made in the development of alternative strategies capable of eschewing the problems associated with the individualist-behavioural paradigm yet meeting the challenge of improving children's physical activity levels for which there is a strong epidemiological mandate (Abarca-Gomez, Abdeen, Hamid et al., 2017).

Intervention approaches that move beyond individualist framings do, of course, already exist and are being more widely accepted (e.g. the 'systems approach' to physical activity highlighted in the WHOs (2018) recent action plan). The socio-ecological model (McLeroy, Bibeau, Steckler & Glanz, 1988) has been drawn on to shape curriculum-based physical activity interventions such as *CHANGE!* (Mackintosh, Knowles, Ridgers & Fairclough, 2011), and the 'whole school approach' embedded in the UK's *National Healthy Schools Programme* (Department of Health, 2008) was intended to focus on the organisation of school processes for encouraging healthy behaviours. Yet, despite the intentions to deal with wider social processes, schools have found it difficult to manage interventions tackling the established routine ways that physical activity emerges (Adamowitsch, Gugglberger and Dur, 2014) and there is a tendency for 'lifestyle drift' whereby dominant health discourses responsibilising 'behaviours' undermine and shift policy actions away from their original commitments (Powell, Thurston & Bloyce, 2017).

To support the intentions of public health policy to address broader social processes which shape health, it is crucial for the critical public health community to develop coherent alternatives with utility in research and practice. While school-based intervention strategies are not likely to solve physical inactivity on their own (Love et al., 2019), schools provide a significant socio-material context for children's everyday lives and are already seen as powerful means to institutionalise healthy patterns of behaviour

(Lytle, Seifert, Greenstein and McGovern, 2000). In this context, we seek to explore the value of practice theories as a framework to support physical activity intervention, using the case of children's physical activity in schools as a case study. We seek to contribute to understanding how a practice theory approach can be operationalised to better support schools as they attempt to transition towards enabling physically active practices more effectively.

Theoretical framing

Our approach draws inspiration from repeated calls for a new paradigm of thinking about health behaviour change in which 'health behaviour' is replaced with the term 'health practice' (Nettleton and Green, 2014, p.239), because reifying 'behaviour' "fails to provide any critical insight into what people actually do and why" (Cohn, 2014, p.160). Such calls have led to a flourishing body of work engaging with and extending practice theories, often drawing on foundational concepts such as Bourdieu's (1977; 1984) habitus, field and capital and Giddens' (1984) structuration, action and nexus, among others (see Guell et al., 2012; Nettleton and Green, 2014; Blue et al., 2016). Although a number of varieties of practice theories have emerged, Hui, Schatzki and Shove (2016, p.1) note that they generally share familiar assumptions; "that practices consist in organised sets of actions, that practices link to form wider complexes and constellations – a nexus – and that this nexus forms the basic domain of study of the social sciences." One fundamental benefit of drawing on practice theories, as we see it, is that people's physical activity is immediately set in, and constitutive of, a social and material context that involves broad and deeply held meanings that exist largely in circumstances not of any individual person's making.

Various typologies of practice theory exist (e.g. Reckwitz, 2002; Schatzki, 2001; Warde, 2005) and although there is certainly a lack of consensus among health researchers, we are inclined to agree with Maller (2015) that the version with the most salience for the field in recent years has been Shove et al.'s three-elements model (see Blue et al., 2016; Keane et al., 2017; Meier et al., 2017; Supski et al., 2017). The three-elements model purports that practices 'hang together' (Reckwitz, 2002) when sufficient materials, meanings and competences are both available and coherently intertwined. Materiality refers to the physical resources that often directly implicate the conduct of daily life (Shove & Pantzar, 2005); meanings refer to the shared ways the world is understood amongst practitioners (Shove et al., 2012) often embedded as an unreflexive sense of the 'right' way to do things (Rettie, Burchell, & Riley, 2012); and competences are the understandings, knowledge or skills required for a practitioner to successfully perform the practice.

Beyond the consideration of elements *within* each practice, practice theories also attend to the relationships *between* practices. In line with the three-elements model, they can be in harmony, that is, co-constituting (Shove, Pantzar & Watson, 2012) and mutually reinforcing (Blue, 2017). In contrast, they can conflict (Schatzki, 2002) in that they can compete for resources such as time and energy. This relational interpretation in terms of how practices emerge, persist, decline and combine (Blue, 2017) offers an opportunity to pose questions as to why some practices succeed in recruiting practitioners while others fail (Keane, Weier, Fraser & Gartner, 2017), and how some practices become ingrained in the form of deeply held embodied dispositions which are largely beyond reflexive understanding and others do not (Bourdieu, 1985).

A practice theory approach can be seen in a burgeoning stream of health-related research exploring smoking (Blue et al., 2016), vaping (Keane et al., 2017), eating

(Maller, 2015; Twine, 2015), drinking alcohol (Ally, Lovatt, Meier, Brennan & Holmes, 2016; Meier, Warde & Holmes, 2017; Supski, Lindsay & Tanner, 2017) and food preparation (Meah & Jackson, 2018). As a result, some authors offer a manifesto for practice theory-oriented intervention, exalting it as an 'exciting' – if challenging – new territory for public health (Ally et al., 2016; Kelly and Barker, 2016). Commentary has emphasised that interventions should target all three practice elements (and specifically not just 'meanings') (Supski et al., 2017); should attend to how practices intersect (Blue et al., 2016; Blue, 2017; Maller, 2015); should seek to spread and encourage new practices (Maller, 2015); should pay attention to how practices might appeal and recruit new practitioners (Supski et al., 2017); should consider temporal sequencing and spatiality (Twine, 2015); and should consider the characteristics of practice configurations and their amenability to change (Meier et al., 2017).

Despite these advances, few health-related studies offer an empirical basis for thinking through practice theory-oriented intervention (Ally et al., 2016; Blue, 2017; Keane et al., 2017; Supski et al., 2017). Furthermore, there is room for more critical reflection about the possibilities, limitations and practicalities of an approach which 'pays attention' to the nature of practices (Blue et al., 2016, p.43). Furthermore, although there are some examples of social practice theories being applied to physical activity (Blue, 2017; Guell, Panter, Jones and Ogilvie, 2012; Wiltshire, Fullagar & Stevinson, 2017) this paper is the first attempt at applying the three-elements model of practice theory to children's physical activity in schools.

Research aim and methodology

Our overarching aim was to investigate what practice theories, and specifically the three-elements model, reveal about how children's physical activity emerges over a typical school day. Within this aim, our study had three research questions; (1) which practices

are available to children during a typical school day that require physical activity? (2) how does the configuration of materials, competences and meanings serve to enable or constrain potentially physically active practices, and (3) how are practices enabled or constrained by their inter-relationship to other everyday practices? Through these questions, we sought to understand the dynamics of the practices that demand physical activity in order to set the scene for future intervention activities which would seek not to target children to achieve 'behaviour change' but to target practice configurations themselves.

Once institutional ethical approval had been agreed, one state primary school in a rural English town was recruited to participate in the study. In line with comparable studies (e.g. Twine, 2015) the school was viewed as a site through which to examine the interplay of practices; a case study for learning about physical activity from a practice theory perspective. While we acknowledge that conducting our study in a single school imposed limitations on the generalisations that can be made and potential to explore points of difference between contexts, the approach was considered suitable for our research aims and questions, particularly given the range of methods used. The school was recruited based on an existing research relationship and a willingness to engage with innovative projects related to physical activity. Due to the exploratory nature of the research objectives, no other inclusion/exclusion criteria were considered. The school was below average sized (183 pupils) and was deemed 'Good' in the latest Ofsted inspection report (thereby in line with national averages). Almost all pupils identified as White-British and the proportion of pupils for whom the school received the pupil premium (a UK state allowance for pupils from low-income families) was below average.

Data collection was undertaken in May 2017 by a team of four researchers through a multi-method qualitative approach. Over two days, researchers recorded observations

of PE lessons, break and lunchtime activities, afterschool sports clubs and The Daily Mile[1], to capture a wide range of physically active practices as they occurred in everyday situations. Focus group discussions were carried out with 19 pupils in order to better understand how the children experienced physically active practices. These were conducted during class time in school communal spaces, using engaging and enabling techniques (such as story completion games) to probe the details of children's physical activity. Six additional pupils took part in three separate paired interviews to discuss The Daily Mile. These interviews took place in situ on the playground just after The Daily Mile had finished in order to capture immediate reflections. Three teachers, selected for their availability, participated in interviews and two parents participated in 'walking interviews' whereby one researcher accompanied the parent and child during their walk home from school and asked questions in real-time. Focus groups and interviews lasted between 15 and 30 minutes and were often conducted simultaneously by different members of the research team in order to fit with the compact school schedule. This limited the number of teacher and parent interviews that were possible.

We were able to combine and reconcile the diverse methods of data collection by thinking as a 'bricoleur' (Kincheloe, 2005; Wiltshire et al., 2017) and taking methods to be 'tools' to be best used for particular reasons. In this way, observations were helpful in contextualising practices, interviews with adults were particularly helpful in revealing the practice nexus, and focus groups were helpful in learning about the meanings of physically active practices for children.

[1] The Daily Mile is a non-government-initiated programme originating in Scotland which involves pupils running, jogging or walking 15 minutes during the school day. Over 3000 schools take part in the UK. Information about the programme is available at thedailymile.co.uk

Ethnographic notes were digitized and audio-recordings were transcribed before being imported into NVivo 11 for coding and analysis. Data analysis was carried out by three members of the research team with significant experience in qualitative analysis (FS, GW, SS). After initial exploratory reading of the data, the research team decided to adopt a framework-driven approach to structure the data coding process. This coding was carried out independently by the three researchers before being combined through a consensus meeting and later refined iteratively by email. Initially, researchers identified distinguishable opportunities for physical activity during the school day. These were; walking to/from school, The Daily Mile, classroom lessons, PE lessons, break/lunchtime play, extra-curricular activities and school sport. Each of these opportunities involves a number of practices (e.g. teaching PE/participating in PE).

Data coding was then carried out in two phases. First, data were coded using guiding questions based on the three-elements model in order to illuminate how practices are constituted (e.g. What *materials* enable this practice?). Second, data were then coded using the practice theoretical concepts attending to how practices are inter-related (e.g. Which other *competing* practices is this practice *in conflict* with?). A summary of the practice theory framework analysis is provided as supplementary material as Table 1.

Findings

Materials, competences, meanings and their configuration

The material elements of physically active practices were evident across the seven identified opportunities throughout the school day. For parents and children walking to school, for example, the journey relied upon the materiality of the road and pavement layout being conducive to walking (made more challenging if the parent also had a pram), and the distance between school and home. One parent noted that the journey was “safe” but also that the walk *to* school was more difficult than the walk *from* school because it

involved much more uphill walking. During the walking interview, children were observed climbing on low walls alongside the pedestrian path, and running and skipping during parts of the journey without road traffic. Noticing the various points of ease and difficulty during the walk home highlighted the importance of physical geography, accessibility and urban planning to the maintenance of this practice; issues that are not evenly distributed across geographical areas and social groups (Meier et al., 2017). Where the material and spatial context provided opportunity for play for children, often with friends or siblings, this also shaped their emotional relationship with their active commute.

The physical objects in the playground were significant during playtime activities, including climbing apparatus, sports equipment, concrete and grass sections of the playground surface, and painted lines on the concrete surface for games – all of which can be considered as resources that are likely to be differentially provided for across diverse school contexts. Different playground areas became meaningful for the children as they created games during their breaks and as lunchtime supervisors enforced rules about the suitability of those games. Also, material elements of the playground were meaningful in different ways to school leaders. For example, recently purchased matting, laid over a small section of grass, connected two concrete courtyards and created a full circuit for The Daily Mile. This overcame teacher associations with poor safety. Previously, wet grass prevented the activity from happening at all, indicating the privilege of health and safety policies within the physical activity domain. This additional matting served to enable The Daily Mile, suggesting that schools may reflect on how non-human arrangements relate to, encourage or disrupt the enactment of physical activity.

Practices demanding physical activity required competences on the part of the performers (children and adults) in order to take place. These ranged from basic

competences such as an understanding of road safety from parents and children during the walk to/from school, to more complex skills required in PE and school sport activities. During a girls' lunch-time cricket club, for example, participation was observed as frequently disrupted and compromised by children's limited understanding of the game and ability to coordinate their bodies, the ball and bat in line with the conventions of the game. The result was a somewhat chaotic experience, disrupting the practice for all participants. This suggests that obvious targets for future intervention are either raising competence levels of pupils or adapting the game so that less competence is required to meet the demands of the practice.

Classroom-based teaching practices illustrate how competences imbued with particular sets of associations and meanings were required for 'active learning' during classroom lessons to take place. Some teachers considered the controlling of children's movement in lessons to be a crucial teaching skill, reflecting understandings about teacher responsibilities towards academic attainment. Asking pupils to 'sit still' and avoid 'fidgeting' were observed in teachers' repertoires, deployed particularly in year groups engaging with state-required tests. Nonetheless, a staffroom interview with a teacher revealed that active learning is possible but requires a different approach to teaching and behaviour management, with new repertoires that encourage movement without allowing it to be disruptive. This highlights the difficulties in overcoming 'sticking points' of practices which are established and embedded in the collective conventions of a social context (Hargreaves, 2011) and which relate to understandings about the role of the school.

The social significance of physically active practices is important for how practices come to be meaningful (Blue et al., 2014), and different associations had constraining and enabling effects across the school. Perhaps unsurprisingly, enjoyment

and fun were common ways that children described the physically active practices that they took part in. One pupil simply said that The Daily Mile was "more fun than reading". This enjoyment, however, was often accomplished through the activities being contingent on other meaningful understandings such as friendship and achievement. For example, a pupil explained that The Daily Mile was a good chance to "meet up with your friends", and the achievement of rewards and stickers enabled positive associations and bolstered the appeal of The Daily Mile. Furthermore, some children described how they had been fearful of tripping during The Daily Mile before the new matting was installed, showing how simple 'material' interventions might shape meanings (reduce feelings of fear) which helps sustain a practice.

Examining practices in this way revealed the significance of individual elements, but also – importantly – how the configuration of elements had emergent properties as 'wholes' which were not possessed by their individual component parts. Hence, the three-elements of materials, competences and meanings appeared to work in combination, sustaining the practice through their coherence. These practice interrelationships will have local significance. In our case study school, the practice of playing football (soccer) at lunchtime was constrained for some of the girls. During a focus group, one girl said that "the boys won't pass you the ball if you're playing football... girls can be just as good as boys." Despite the necessary physical resources (balls, goal posts and playground space) being materially available, those materials were meaningfully understood as being 'not for girls' – an understanding linked closely to their competence (actual or perceived) in performing the practice. As a result, the practice of breaktime football was a gendered activity which happened in a collectively, if informally, agreed zone in the playground and which generally excluded girls. Understanding practices in this way illuminates where cues about social significance or meaning are embedded in the local material

environment (Meier et al., 2017) and might be open to change, or where there are relationships between elements that might be particularly persistent (Nettleton and Green, 2014).

Practices in harmony and conflict

For the children who walked to school, this practice was largely enabled by being in harmony with the routines and goals of their parent/guardian. One parent, Jodie, explains how she could carry out parenting practices with her daughters (age eight and ten) while interacting with them on the walk home; "I like to ask them [children] about their day and they don't have loads of distractions. It's just us." She explained that her daughter had experienced some teasing in school recently and that these walking conversations were important parental support opportunities. Walking from school was therefore enabled by her positive associations of it as an opportunity for practicing parenting (or, perhaps, mothering) in a socio-material space free from "distractions". In this instance, the interrelationships between travelling and parenting practices are co-constitutive, tightly connected, occur simultaneously and hold each other in place (Meier et al., 2017) in a way that enables physical activity. Adding to this, walking home was further locked into place for Jodie because it synchronised with necessary domestic shopping routines.

In contrast, some pupils were driven to school because this practice was routinely enacted in combination with parents' travelling to work. As Emily (age nine) simply put it, "my mum's got work every morning, so we've got to go in the car to get there on time." This inter-practice relationship exemplifies what Meier et al. (2017, p.210) refer to as the "temporal connectedness of sequences of actions". In the morning routine, the bundle of practices is performed in a necessary order, and the practice of 'driving to school' out-competes the practice of 'walking to school' because driving is better harmonised with

the routines associated with parents' fixed employment schedules. As such, far from being a health-related 'decision', these examples echo Blue's (2017) finding that physical activity depends on the way a range of practices are synchronised; those that directly support physically active practices and practices that more broadly make up everyday life. Indeed, this example troubles the way in which parents can be responsibilised for not enabling their child's health by not walking them to school. Furthermore, the temporal organisation of practices related to fixed employment schedules or domestic labour (often carried out by mothers) are likely to impose greater constraints on parents in lower socioeconomic groups as well as those in more challenging geographical circumstances. As such, changing 'travelling to school' practices may involve the difficult task of tackling the way that children's routines are shaped by the organisation of practice routines outside the school's jurisdiction (Southerton, 2013).

Other examples of the outcomes of practice interrelatedness were evident in the enactment of The Daily Mile. The Daily Mile was generally in harmony with friendship practices, and Dan's (age nine) description during the interview was fairly typical;

> Usually, I'll just run when I'm waiting for some of my friends. And then when my friends get here, I usually catch up to them and then we just run and just chat along the way. It's pretty fun.

However, practices are "not uniform planes upon which agents participate in identical ways" (Warde, 2005, p.138), and a few children talked about the constraining role that the enactment of friendship could have on the enactment of the running practice. Some children prioritized talking over running, which meant that these children, "don't really run. They start to talk and they don't really have a go or anything". We view this as an example of children performing a kind of friendship which is not in harmony with the physical movement ideally required for The Daily Mile, so they adapt their practice and walk rather than run. Interestingly, there was some evidence that the performance of

different kinds of friendship is related to gender, something that warrants further investigation given the continued gender gap in physical activity levels. Furthermore, performing different kinds of friendships was relevant because, as another participant explained, The Daily Mile is less enjoyable when,

> there's people in front of you with big back packs that are just walking and chatting. So like, you can't get through so you have to ask. But then half the time they won't hear you and they'll just carry on chatting. So you have to go around and get your shoes a bit mucky.

In this instance, friendship enacted as "chatting" has a disruptive effect on the collective practice. As such, the organizing teleoaffective structure of practices (Schatzki, 1996), that is their purpose and emotional associations, must be considered when attempting to understand how a practice is enacted in different contexts.

Other opportunities for physical activity during the school day included walking to the local art gallery, taking class trips to the nearby park and conducting lessons in the neighbouring woodland area. Observations and discussions with teachers suggested that these opportunities were contingent on teachers who saw themselves as taking a 'progressive' or 'innovative' approach to teaching and learning. Teachers emphasised though that physically active learning opportunities were constrained by pressures relating to UK educational policies. As a teaching assistant explained,

> Physical activity, I think, gets a back foot because of OFSTED valuing maths and literacy. And I think the teachers get a lot of pressure. I know they could teach in a physical way. But I think there's a lot of pressure on timetable time to fit it in.

The participant explains how the 'pressure' of academic attainment leads to physical activity through school trips and outings becoming de-prioritized. We see these educational policies as the context in which certain practices are positioned as being 'progressive', against the embedded routines of normal practice, and potentially unsustainable. Policymaking practices can be seen as co-existing in "enormous networks of action chains" (Schatzki, 1996, p.103) with powerful associations cutting across the

nexus to inform how teaching practices become meaningful in different ways. Indeed, the very idea of 'innovative' and 'progressive' physically active teaching, as identified by some of our teacher participants, suggests that they were pushing against collective conventions relating to quiet, sedentary classes.

Teachers participating in our study saw their innovative work as being enabled by supportive and encouraging school leadership, an example of teaching practices being in harmony with localised (school-level) leadership practices. This supports the assertion that in the right practice conditions, practitioners can shape their engagement with practice routines. As the crossing points of multiple practices (Reckwitz, 2002), teachers acting within harmonious practice configurations can facilitate localised change to enable the emergence of physical activity, just as parents can integrate a walk to school with shopping, parenting or a trip to the park. However, this is only possible if the practices they are enacting collaborate appropriately.

Conclusion

In an attempt to advance an understanding of how practice theories might inform public health research and intervention, this study has made a distinctive contribution by applying the three-elements model to the context of children's physical activity during a school day. First, it illuminates how a practice theory approach to physical activity can be applied as a theoretical lens to reveal the complex ways that school-based physically active practices are enabled and constrained. The three-elements analysis reveals the contingent nature of a primary schools' physically active practices. Analysis has shifted focus away from individuals to the different ways that physical activity emerges from practices for which it is a requirement, such as travel to school, or part of its purpose, such as PE. The ways that physical activity emerges depends on the configurations of practice elements which are drawn on in the enactment of practices, and also on practice

interrelationships across the nexus. Our analysis has illustrated how physically active practices can be supported when there is harmony with related practices, and constrained when there is conflict (Shove et al., 2012). Further research may include consideration of the way persistent sedentary practices compete with physical activity. A practice theory understanding of physical activity would frame the goals of intervention in terms of shaping a nexus which supports routine, habitual physical activity.

Second, our analysis begins to illuminate the focus of interventions required to create habitual physical activity. For example, the practices implicating children's physical activity might be in conflict or harmony with routines, practices and policies that may have been otherwise invisible, but which create important connections. We found connections between attainment and calmness in classrooms, between gender and sports, and between parenting *and* working and active travel to school. There are important human and non-human coordinators of practice, such as teachers and parents, policies, timetables and material structures. A three-elements analysis provides one way of understanding this complexity, by illuminating contingent eco-systems or processes, rather than influences or causes (Shove et al., 2012). As such, it illuminates the need for intervention which has multiple strands and purposes, engages multiple actors, partners and stakeholders and is able to emerge and change over time (Lang and Rayner, 2007).

Despite these conceptual advances, future research is required to interrogate how practice-based intervention might be implemented within such a complex school system, especially given the disappointing outcomes of other 'whole school' physical activity interventions (Adamowitsch et al., 2014). Furthermore, there are questions about how changes to the practice nexus might be evaluated when the ways that the dynamic configuration of practices might evolve cannot be predicted (Keane et al., 2017).

As a final point of reflection, we also seek to highlight a significant limitation of the three-elements model as a framework for analysis, which is important given the growing prevalence of its use in practice-oriented critical public health. We are sympathetic to Watson's (2017) comment that although the three-elements "has provided the basis for attempts to reconceptualise possible targets for intervention… it has little to say about the means through which power operates" (p.172). Power relations across the nexus are important for the way practices interrelate, are made possible and change. For example, power is implicated in the way that health and safety and attainment policies can be privileged when competing with physical activity. Power is also central in the supportive leadership which enabled our teacher participants to enact 'progressive', physically active teaching practices. Power is, of course, also present in the notion of intervention, in terms of who has the legitimacy to impose a programme of change. The three-elements model emphasises practice co-existence and obscures how and why "some practices and practitioners are able deliberately to affect the conduct of practices and practitioners elsewhere" (p.173). For example, the unequal capacity for practitioners to overcome employer obligations and walk their children to school is not easily accounted for. The danger is that power and politics become 'bracketed off' (Cohn, 2014), when they are central to the social processes involved in social change.

We conclude that despite important limitations, the three-elements model offers a helpful framework for understanding school physical activity which de-centres the individual and focuses on the social processes from which habitual physical activity does, or could, emerge. However, its capacity to effectively support interventions which challenge and shape routinized patterns of action is yet to be demonstrated (Hargreaves, 2011). Future research can pursue the research agenda that this paper opens up, and explore the implications of practice-oriented intervention across the practice nexus

475 (Houlihan and Browne, 2019) for the purposes of shaping children's routinized physically
476 active practices during a school day.

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References

Abarca-Gómez, L., Abdeen, Z.A., Hamid, Z.A., et al. (2017), Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. *Lancet*, 0(0), 1-16.

Ally, A.K., Lovatt, M., Meier, P.S., Brennan, A., & Holmes, J. (2016). Developing a social practice-based typology of British drinking culture in 2009-2011: implications for alcohol policy analysis. *Addiction*, 111, 1568–1579.

Barnfield, A. (2016). Grasping physical exercise through recreational running and non-representational theory: a case study from Sofia, Bulgaria. *Sociology of Health & Illness*, 38(7), 1121–1136.

Baum, F., & Fisher, M. (2014). Why behavioural health promotion endures despite its failure to reduce health inequities. *Sociology of Health & Illness*, 36(2), 213–225.

Blue, S. (2017). Maintaining physical exercise as a matter of synchronising practices: Experiences and observations from training in Mixed Martial Arts. *Health & Place*, 46, 344–350.

Blue, S., Shove, E., Carmona, C., & Kelly, M.P. (2016). Theories of practice and public health: Understanding (un)healthy practices. *Critical Public Health, 26*, 36–50.

Bourdieu, P. (1977). Outline of a theory of practice. (R. Nice, Trans.). Cambridge: Cambridge University Press. Bourdieu, P. (1980). The logic of practice. Stanford, CA: Stanford University Press.

Bourdieu P. (1984). Distinction: A social critique of the judgement of taste. Cambridge, MA: Harvard University Press.

Cohn, S. (2014). From health behaviours to health practices: An introduction. *Sociology of Health & Illness, 36*, 157–162.

Das, P. & Horton, R. (2016). Physical activity—time to take it seriously and regularly. *The Lancet*, 388(10051), 1255–1256.

Department of Health (2008). Healthy Weight, Healthy Lives: a Cross-Government Strategy for England. Retrieved from https://extranet.who.int/nutrition/gina/sites/default/files/GBR%202008%20Healthy%20Weight%2C%20Healthy%20Lives-%20A%20Cross-Government%20Strategy%20for%20England.pdf

Elhakeem, A., Cooper, R., Bann, D., Kuh, D., & Hardy, R. (2017). Birth weight, school sports ability and adulthood leisure- time physical activity. *Medicine and Science in Sport and Exercise*, 49(1), 64–70.

Giddens, A. (1984). The constitution of society: Outline of the theory of structuration. Berkley: University of California Press.

Guell, C., Panter, J., Jones, N.R. and Ogilvie, D. (2012). Towards a differentiated understanding of active travel behaviour: Using social theory to explore everyday commuting, *Social Science and Medicine*, 75(1), 233-239.

Hargreaves, T. (2011). Practice-ing behaviour change: applying social practice theory to pro- environmental behaviour change. *Journal of Consumer Culture*, 11(1), 79–99.

Houlihan, C. and Browne, A. (2019). Change Points: A toolkit for designing interventions that unlock unsustainable practices. Manchester University [online]. Available from https://nexusathome.files.wordpress.com/2018/11/change-points1.pdf.

Keane, H., Weier, M., Fraser, D., & Gartner, C. (2017). 'Anytime, anywhere': vaping as social practice. *Critical Public Health*, 27(4), 465-476.

Kelly, M. and Barker, M. (2016). Why is changing health-related behaviour so difficult? *Public Health*, 136, 109-116

Kincheloe, J. L. 2005. “On to the Next Level: Continuing the Conceptualization of the Bricolage.” Qualitative Inquiry 11: 323–350.
Lai, S.K., Costigan, S.A., Morgan, P.J., Lubans, D.R., Stodden, D.F., Salmon, J., & Barnett, L.M. (2014). Do school-based interventions focusing on physical activity, fitness, or fundamental movement skill competency produce a sustained impact in these outcomes in children and adolescents? A systematic review of follow-up studies. *Sports Medicine*, 44(1), 67–79.
Lang, T. and Rayner, G. (2007). Overcoming policy cacophony on obesity: an ecological public health framework for policymakers. *Obesity Reviews*, 8(1), 165-181.
LeBesco, K. (2011). Neoliberalism, public health, and the moral perils of fatness. *Critical Public Health*, 21(2), 153–164.
Love, R., Adams, J. and van Sluijs, E.M.F. (2019). Are school-based physical activity interventions effective and equitable? A meta-analysis of cluster randomized controlled trials with accelerometer-assessed activity. *Obesity Reviews,* 1-12.
Lytle, L.A., Seifert, S., Greenstein, J. and McGovern, P. (2000). How do children’s eating patterns and food choices change over time? Results from a cohort study. *Am J Health Promot*, 14, 222–228.
Mackintosh, K.A., Knowles, Z.R., Ridgers, N.D., & Fairclough, S.J. (2011). Using formative research to develop CHANGE!: A curriculum based physical activity promoting intervention. *BMC Public Health*, 11, 831–844.
Maller, C. (2015). Understanding health through social practices: performance and materiality in everyday life. *Sociology of Health and Illness,* 37(1), 52-66.
McLeroy, K.R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, 15(4), 351–77.
Meah, A., & Jackson, P. (2018). Convenience as care: Culinary antinomies in practice. *Environment and Planning A*, 49(9), 2065–2081.
Meier, P.S., Warde, A., & Holmes, J. (2017). All drinking is not equal: how a social practice practice theory lens could enhance public health research on alcohol and other health behaviours. *Addiction,* 113, 206–213.
Mykhalovskiy, E., Eakin, J., Beagan, B., Beausoleil, N., Gibson, B.E., Macdonald, M.E., Rock, M.J. (2018). Beyond bare bones: critical, theoretically engaged qualitative research in public health. *Canadian Journal of Public Health*, 109(5), 613–621.
Nettleton, S., & Green, J. (2014). Thinking about changing mobility practices: how a social practice approach can help. *Sociology of Health & Illness*, 36(2), 239–251.
Powell, K., Thurston, M., & Bloyce, D. (2017). Theorising lifestyle drift in health promotion: explaining community and voluntary sector engagement practices in disadvantaged areas. *Critical Public Health*, 27(5), 554–565.
Reckwitz, A. (2002). Toward a theory of social practices: a development in culturalist theorizing. *European Journal of Social Theory*, 5, 243–263.
Rettie, R., Burchell, K., & Riley, D. (2012). Normalising green behaviours: A new approach to sustainability marketing. *Journal of Marketing Management*, 28(3-4), 420-444.
Scambler, G. (2009). Health-related Stigma. *Sociology of Health & Illness*, 31(3), 441–455.
Schatzki, T. (2002). *The site of the social: A philosophical account of the constitution of social life and change*. University Park, PA: Pennsylvania State University Press.
Shove, E. (2010). Beyond the ABC: climate change policy and theories of social change. *Environment and Planning A*, 42(6), 1273–1285.

Shove, E., & Pantzar, M. (2005). Consumers, Producers and Practices Understanding the invention and reinvention of Nordic walking. *Journal of Consumer Culture*, 5(1), 43–64.

Shove, E., Pantzar, M., & Watson, M. (2012). *The Dynamics of Social Practice: Everyday Life and How it Changes*. London: Sage.

Supski, S., Lindsay, J., & Tanner, C. (2017). University students' drinking as a social practice and the challenge for public health. *Critical Public Health*, 27(2), 228–237.

Twine, R. (2015). Understanding snacking through a practice theory lens. *Sociology of Health & Illness*, 37(8), 1270–1284.

Vihalemm, T., Keller, M., & Kiisel, M. (2015). *From Intervention to Social Change: A Guide to Reshaping Everyday Practices,* Ashgate Publishing, Farnham.

Watson, M. (2017), 'Placing power in practice theory', In *The Nexus of Practices,* Hui, A., Schatzki, T. and Shove, E. (eds), London: Routledge.

World Health Organization (2018). Noncommunicable diseases. Retrieved from http://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

Williams, O. (2017). Identifying adverse effects of area-based health policy: an ethnographic study of a deprived neighbourhood in England. *Health & Place*, *45*, 85–91.

Wiltshire, G., Lee, J., & Evans, J. (2017). 'You don't want to stand out as the bigger one': exploring how PE and school sport participation is influenced by pupils and their peers. *Physical Education and Sport Pedagogy*, 8989 (March 2017), 1–14. http://doi.org/10.1080/17408989.2017.1294673

Wiltshire, G., Fullagar, S., & Stevinson, C. (2017). Exploring parkrun as a social context for collective health practices: Running with and against the moral imperatives of health responsibilisation, *Sociology of Health & Illness,* 40(1), 3–17.

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Appendices

1. Moderator's guide for Daily Mile interviews
2. Moderator's Guide for Pupil Focus Groups
3. Moderator's Guide for Staff Interviews
4. Observation Guide

1. Moderator's guide for Daily Mile interviews

Section	Questions
Introductory questions	How long has this school been doing the Daily Mile? Does everyone enjoy doing the Daily Mile?
Meanings	- Why do you enjoy / not enjoy the Daily Mile? - Not every school does the Daily Mile, why do you think this school does it? - How does it make you feel before/during/after? - What's the first thing you think of when you think of the Daily Mile?
Materials	- What can you see when you run around? - What does the ground feel like when you are running? - What can you hear and smell when you are running? - Are there other places at home or near your house where you could also do the Daily Mile? - Does it matter what you are wearing when you run?
Competences	- Do you find the Daily Mile hard, easy or somewhere in between? - When you start, do you feel confident that you will finish? - Are you good at running and walking? Why? - Do you ever compare yourself of other people in your class? - Do you feel like you are fit? - Do you feel like you are healthy?

2. Moderator's Guide for Pupil Focus Groups

Section	Activity and questions
Introduction and warm up	- Thanks for taking part. - Information and consent. Icebreaker 1: Imagine you could go on holiday anywhere for a whole week. What would you choose to do? Icebreaker 2: Get up and move around – talk to each other and work out who lives the furthest away from school. Order yourselves across the room.
Your school	- Tell me about your school. What do you like about it? - How would you describe your school to an alien? (Facilitator draw picture son the flipchart as children describe). - What would you change if you were in charge?
Your day	- Tell me about your school day. **ACTIVITY:** Draw before school, morning, lunch, afternoon and after school… something you do (one point in the day per child). What is your favourite way of spending time?
Being physically active	- What does it mean to be physically active? - What activities do you do that get you breathing hard? Let's act them out. - Where do you do them? - How does it feel to be physically active? What do you like about it? Parents and teacher: - Do your parents do physical activity? What about your teachers? - Tell me what they do. - Do you think they like it?
Physically activity culture	**ACTIVITY** DICE with a story stem on each side. Create a short story by rolling the dice. Sit in a circle. Facilitator writes story on flipchart. TALKING STICK, teddy etc. 1. Tom was really good at running. He was fast and he liked playing football and was a brilliant swimmer. His best friend, Sam, didn't like running about and Tom was sad about this. One day at lunch, Tom decided they would do something really exciting… 2. A group of friends from year ? got together one Saturday to play. They were sitting sipping some lemonade in a sunny garden, trying to decide what to do. Suddenly, Poppy came up with a great idea… 3. Jamie's parents were surprised when Jamie asked to join the school cycling club. They thought that… 4. Georgie was a new girl at the school. It was her first day. Some of the other children in her class went up to her at break and said "you can play with us". She was very glad to have some new friends. They all went together to… 5. Martha was so excited to get home from school and tell her parents what she had been asked to join in with the next day. She was going to be part of the… 6. It was a rainy, cold, wintery day and Josh and his friends were a bit bored. They were trying to decide what to do. In the end, they decided to…
Wrap up	Would you like to do more things that are physically active? What would you like to do? Thank you! (Distribute stickers)

3. Moderator's Guide for Staff Interviews

Section	Activity and questions
Introduction and warm up	- Thanks for taking part. - Information and consent. Icebreaker – How long have you taught here? What are you doing over the summer?
Your school	- Tell me about the school. What do you like about it? - How would you describe your school to an alien? - What is the one thing you would change about it if you could wave a magic wand?
Your leisure time	- I know how hard teachers work… Tell me about your weekends. - Favourite way of relaxing. What's your one luxury that you wouldn't do without
Being physically active	- What does that mean? - How do you feel about doing 'sport' or 'being physically active'? - What do you do that is active? - Where do you do them? - [Some people don't like being physically active. Why do you think that is?] How physically active do you think children at your school are? What would make them more active? What about out of school? How much physical activity do you think the children do when they're not here?
Physically activity culture	**ACTIVITY** Let's write a list of all the places and times that children are physically active in school. I'll start: - Some walk or cycle to school… Let's write a list of all the times they are sedentary: - Eating their lunch
Wrap up	Would you like to do more things that are physically active? What would you like to do?

4. Observation Guide

Topics of interest for observation (non-exhaustive) for Drop-offs, Pick-Ups, Playground Activities, and PE Classes
SPACE - What is the physical layout of the space, what does the area look like, what is in the immediate proximity of the setting, what surrounds it etc.?
OBJECTS - What are the physical things/objects that are present? (e.g. cars, street signs, road infrastructure etc.)
EVENT – What is the main event that is taking place, what is the purpose of the event?
ACTOR(S) - Who are the range of people involved? (Estimation of numbers over the observations period, demographics and general characteristics; are there actor groups, are some actors more dominant than others?)
INDIVIDUAL ACTS – what are the single/discrete acts that are taking place? (Getting out of a car etc.)
ACTIVITIES – Are there groups of behaviour acts that seem to be related? (E.g. single actions such as: parking, getting out of the car, saying goodbye etc.)
TIME and SEQUENCING– What is the time of day, day of the week, time of the month, season etc. How long do activities take? Is there anything interesting about the sequencing of events?
GOAL(S) - What are the goals that people are trying to accomplish?
FEELINGS - What are the emotions that are being felt and expressed? How are these expressed etc.?