ORIGINAL ARTICLE

Risk ambassadors and saviours: Children and futuring public health interventions

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Abstract

Schools are increasingly positioned as sites for intervening on the bodies and minds of children in the here and now in order to bring about health gain for the future. Public health interventions for schools bring together coalitions of commercial, statutory and philanthropic actors with children and their teachers and carers. Drawing on ethnographic case studies in London, UK, this paper explores two such interventions: one aiming to increase levels of physical activity and one to reduce exposure to air pollution. Both interventions not only evoke care for children's own current and future wellbeing but also fold in imaginaries of collective health futures, which orient and legitimise particular intervention logics and actions. As interventions unfold, children are recruited as monitors of health risks in the present. They are also positioned as risk ambassadors, who will leverage care about unhealthy environments and lifestyles across space, to risky domestic environments, and into imagined health futures. These 'futuring' school-based interventions open up small alternative spaces in which imaginaries of collective and resistant public health practices emerge. However, in the here and now, children appear to be bearing a disproportionate burden of

responsibility, as ambassadors for, and imagined saviours of, public and environmental health.

KEYWORDS
children, futuring, public health, risk, schools

INTRODUCTION

As a policy concern, the health of children perhaps inevitably foregrounds future imaginaries. The bodies and minds of children are often framed as not just requiring care in and for the here and now but also care that is orientated to their future health. Childhood is envisaged as a formative lifestage for building a store of health capitals for individual future resilience and embedding healthy lifelong behaviours and habits. This imagined future is, though, also a collective property. Health futures relate not just to individual children in need of nurture in the present but also to public health—and, increasingly, planetary health, as issues of environmental degradation and pollution become entangled with public health concerns (Herrick, 2020). The increasing prevalence of chronic conditions associated with consumption practices, physical activity and environmental exposures across the life course in post-industrial societies (Ben-Shlomo & Kuh, 2002) is a key rationale for this futuring of children's health as a policy concern (Coveney, 2008). Indeed, calls for policy and research action often explicitly evoke an imaginary of children as a conduit for public health. On air quality, for instance, policy documents underline the potentially damaging future implications of current exposures: one review of published scientific literature conducted by the WHO (2018) noted that "exposure to air pollution can alter children's trajectory through life, pushing them onto a path of suffering, illness and challenge" (p. 18). In a similar vein, declines in physical activity in childhood are linked to rising population obesity levels and a raft of future chronic diseases. Across the UK, there has been increasing interest in getting children and young people to be more physically active, with low levels of physical activity associated not only with obesity (Department of Health, 2016) but also health outcomes ranging across cardiovascular disease, diabetes, cancers and poor cognitive function in later life (Lee et al., 2012; Must & Tybor, 2005; Warburton & Bredin, 2016).

In the context of this concern for future public health, the bodies and environments of children have become an increasing focus of interventions to manage and reduce risks. To speak of interventions that aim to 'manage' children's risks from sedentary lifestyles or air quality evokes multiple registers of risk, which bring into play multiple figurations of the child as both subject to and responsible for risk. First, there are alignments with pathologising or deficit discourses of childhood and youth in which young people and children are framed as inevitably both at-risk and risky, "vulnerable to their own choices, biological development, psychological drivers and social circumstances" (Turnbull & Spence, 2011, p. 940). Second, in relation to social policy more broadly, Turnbull and Spence (2011) note an ontological shift in UK policy discourses, from 'youth as problem' to 'youth as risk', which "extends the scope from concern about presenting problem behaviours to the potential for future problems (or 'negative outcomes') [to emerge]" (940). Third, they also document a trend over time, whereby there is "a drive towards young people, practitioners and parents becoming 'risk managers'" (948),

responsible for the management of risk for the child, young person and family for now and into the future. The circulation of such narratives continues to locate children and young people as both a *source of* risk and *subject to* risk (Brown et al., 2013). Discursively, materialising imagined less-risky futures justifies pre-emptive interventions into children's current lives (Smith et al., 2007; Turnbull & Spence, 2011).

As Hawking et al. (2023) argue, in relation to the UK's school weight measurement programme, such interventions can be framed as 'futuring projects' (Hawking et al., 2023). Hawking and colleagues draw on Hajer and Pelzer's (2018 p. 222) concept of "techniques of futuring", practices that bring "together actors around one or more imagined futures and through which actors come to share particular orientations for action" (Hajer & Pelzer, 2018, p. 222). In their example, Hawking et al. suggest that the individual and collective temporalities of the programme are entangled such that despite being designed as a snapshot measurement of individuals' weights, collected for collective benefit, the programme creates individual, weight-centred pasts and futures for children, with potentially damaging effects.

To an extent, we might say that all public health interventions fold in multiple temporalities, in that they are anchored in current expectations about collective futures. That is, they involve forms of speculation, which direct or orient action in the present towards materialising specific futures (see Beckert, 2013). The ways in which cultural, political and ideological commitments shape modes of intervening in the present have been the subject of considerable critical public health scholarship (see, for instance, Bunton & Petersen, 2002; Lupton, 1995). However, how future-orientation shapes these logics of intervention has been less well explored. As Oomen et al. (2022) suggest, the specific logics at play "structure how actors can interact and engage with certain images of the future" (p. 259). They make certain actions imaginable and make other actions unimaginable or invisible. In so doing, such imaginings of the future—and actions to orient towards these futures—can create (im)possibilities for transformative change (Hajer & Pelzer, 2018).

Schools are a (or the) primary site for enacting futuring public health projects. Future health is not only a legitimate concern for the education system but a goal that individual schools are increasingly *obliged* to work towards, through a proliferation of 'healthy schools' initiatives (Hanckel et al., 2021). That schools have (in Foucauldian terms) a role in governing the healthy body is perhaps a commonplace observation, and a range of scholarship has outlined the ways in which schools form part of a liberal state apparatus (Bunton & Petersen, 2002; Foucault, 1977). What is perhaps less well documented are the ways in which the school is now embedded in coalitions of bio-governance that extend beyond the state. Many public health initiatives are not top-down implementations from local or national government health departments, but typically more diffuse alliances, enrolling local authorities, academics, philanthropic capital, social enterprises and activist organisations. For instance, on air quality, in 2019 the Urban Observatory in Newcastle administered sensors across 20 primary schools in the city to generate data for the local council and provide educational resources for schools. They teamed up with Friends of the Earth, who are one of several organisations now providing 'clean air packs' for teachers who aim to engage children and their parents or guardians on environmental health issues (Urban Observatory, n.d).

This paper draws on two cases that arise from these kinds of coalitions for 'futuring' public health projects, which are increasingly, in the UK at least (Garnett et al., 2018), reliant on social enterprises and commercial actors for design and delivery. The first intervention, The Daily Mile, addressed physical activity through an intervention based on a 15-min running or jogging activity that is included into the class day. The Daily Mile is promoted by a charity, The Daily

Mile Foundation, which is entirely funded by a large private petrochemical company, INEOS. Their website describes the intervention thus:

> The Daily Mile is simple and free. We want to get children fit for life and fit for learning by encouraging them to run or jog for 15 minutes every day in their schools or nurseries. It is a physical activity which promotes social, emotional and mental health and wellbeing, as well as fitness. It takes place outside in the fresh air during the school day at a time of the teacher's choosing. Children run in their school clothes and no special kit or equipment is required.
>
> (The Daily Mile Website, 2023)

A 'simple and free' intervention with the promise of easy incorporation into the school day has been an appealing proposition, and The Daily Mile has been widely taken up across UK primary schools (Hanckel et al., 2019); in our case study, with support from a local public health department and the enthusiasm of many local schools.

The second intervention, the Breathe London Wearables Study (hereafter, Breathe London) (Varaden et al., 2019, 2021) addressed air pollution, recruiting students to monitor their daily exposure to PM2.5 (particulate matter in the air measuring 2.5 µm or less in diameter) through a wearable sensing device and to participate in surveys and focus group discussions. The aim was to measure air quality exposure at a personal and collective (school) level and to share the data about risks with the students, teachers and parents involved. The wearable device thus acted as a proxy for children's bodies as 'sensing subjects', to monitor levels of air pollution along the routes they walked to and from school, collating this as collective data to represent community exposures. The device was developed and produced by a commercial partner (Dyson), (a large technology company whose products include air purifiers), selected after competitive tendering. The design of the project was participatory, with children engaged as citizen scientists (Varaden et al., 2021), invited to share their knowledge of air pollution and to participate in focus group discussions about their experience and what they had learnt from participating in monitoring. Those leading the intervention (public health academics, designers and engineers) provided opportunities for children to analyse the places and times where they were most likely to be exposed to air pollution and to think with other students about ways to improve it. These interventions can, then, both be considered as futuring interventions, aiming to act on the health risks from sedentary lifestyles and poor air quality in the present, in order to effect an imagined healthier future for all.

In this paper, we explore how the interventions asserted particular imagined futures, and how the logics that underpin futuring projects are enacted, and also brought into question at times by their subjects—children and parents/carers. Our focus is on how these pre-emptive interventions—'futuring projects'—orient particular kinds of action, and how children and their families are positioned as they become enroled (or not) in health futuring.

METHODOLOGY

We draw on two ethnographic case studies of their implementation in primary schools (with pupils aged 5–11) in London, UK. Both Breathe London and The Daily Mile were school-based public health interventions that encompassed aims across temporalities: of acting for children's health in the here and now as well as for collective futures. These interventions targeted the

day-to-day environmental contexts and settings in and around the school where physical activity (or lack of it) and air pollution exposure happen. The research for both case studies was undertaken during 2018–19 before the COVID-19 pandemic. Both drew on ethnographic material generated through participant observation conducted during the adoption and implementation phases of each intervention, semi-structured interviews/focus groups with people delivering and participating in the interventions across schools, as well as reviews of intervention documents. Participants in interviews and focus groups included students and teachers and (for The Daily Mile case study) public health practitioners or (for Breathe London) engineers and scientists. The Daily Mile study (Hanckel et al., 2019) involved participant observation of the intervention in practice across 12 classes in five schools over six months conducted by BH. The Breathe London case involved participant observation of the public engagement arm of an intervention to design and use a sensing device (described in Varaden et al., 2019, 2021) across four classes in two of the five participating schools in London over a period of 2 months, as well as interviews with the designers of the sensing device, conducted by EG.

The analysis presented here integrated findings across the cases through exploring commonalities, differences and connections between practices and discourses identified in the original (separate) case analyses. This drew on the original (largely thematic) analysis from each case and a process of reading these analyses into each other, akin to meta-ethnographic approaches (Noblit & Hare, 1988). BH and JG were involved in data collection for The Daily Mile, and EG facilitated participatory workshops for the Breathe London study which formed a case study of her wider project on air pollution sensing for public health. Working alongside each other as colleagues, we saw overlap between our studies in the ways in which children were 'responsibilised' for future health, in the light of broader shifts we had been exploring relating to the roles of philanthropic capital in public health (Garnett et al., 2018; Green, 2019). This prompted a collaborative re-analysis, to bring together our respective findings on intervention implementation. The re-analysis involved identifying the 'logics' of each intervention (specifically, those relating to location of risk, technologies of monitoring, imaginaries of children's roles and enrolment and resistance), and using the analysis of convergence between them, and points of difference, to identify what might be features of the 'futuring' of interventions, rather than features specific to each intervention. We therefore draw on the advantages of single N case studies, which produce in-depth understanding of processes in one field, and offset the potential weaknesses of over-interpreting from the particularities of the single field through integrating two cases. Our analysis in this paper attends to how the situated logics embedded in public health interventions in schools use the techniques of futuring and explores their effects. All names in quoted material are pseudonyms. Ethics approval for the studies was granted by King's College London (The Daily Mile: LRS-17/18–5510 & LRS-17/18–6465) and (air pollution: LRS-18/19–10426).

FINDINGS

Locating and monitoring risks in children's bodies, homes and environments

The social and environmental causes of both obesity and air pollution harms were well recognised by a range of actors in both interventions. However, as actors described the aims and rationales for rolling out the interventions, these causes were typically framed as providing a set

of more or less enabling or constraining circumstances for people to make healthy lifestyle choices rather than around relations of power or other, more structural, frameworks of understanding health determinants. In The Daily Mile case, for instance, a public health lead flags the environmental causes of obesity, but suggests the intervention (focused on individual behaviour now and into the future) as the seemingly logical solution:

> [W]e were trying to find [...] some intervention that we could support or promote across London that would start to have some kind of, you know, population impact ... to move it away from thinking of the obesity problem as being a problem of individual behaviour and thinking of it in terms an environmental problem [...] So I still kept thinking, you know, that the Daily Mile [was the solution...], if children develop the habit of running a mile a day, 3, 3–5 times a week for 6–7 years, my gut feeling is that regardless of the direct physiological benefits of that time spent running and the improvements in fitness, that I'm fairly clear, you know, have a clear correlation with cardiovascular risk in adulthood, that I think the psychological change that it has, that it will have, it will completely change their whole attitude towards physical fitness activity and it will change their attitude towards their own body and the relationship they have with their body and their confidence, that it will have a kind of a spill-over effect into all other aspects of their life. It'll be like a key, a keystone kind of effect that kind of just creates the arc of change...
>
> (Interview, Public Health Practitioner)

Perhaps unsurprisingly, The Daily Mile Foundation website has no mention at all of the structural or commercial determinants of sedentary lifestyles: instead, a scrolling list of well-known sports people extoll 'running' as 'the solution' for rising levels of obesity. This location of risks in immediate behaviours of children and their families was also a theme in the air quality project. Here too, individual behaviour change was the prioritised solution, although in this case, a key mechanism explicated was engendering an obligation to 'care about' the environment through awareness raising.

In the case of air pollution, risks were located in children's breathing environments by making air pollution visible at the scale of children's bodies. An air quality scientist leading the environmental science component of the study describes how information sharing takes place through the participation of children in scientific monitoring:

> [Breathe London is] also a way of raising awareness of other issues because at the end of the day the kids are being, some of the kids are being driven to school but then how do you stop these kids being driven to school, we need to raise awareness with the parents for them to know that it's not great to do that and that they should change the way they commute to school.
>
> (Interview, Air Quality Scientist 1)

Here, a logic of 'caring about' folds in assumptions that making data visible on health harms will lead recipients of such information to discern the behaviours that make differences in detectible or measurable exposure. Risk information will then leverage appropriate behaviour change (altering routes to school to avoid busy roads; avoiding driving to drop children off). The data are positioned as having agency through visibility and mobilisation: how knowledge might be applied in practice is somewhat taken for granted or elided.

Implicit in the air quality scientist's point around guiding *future* behaviour changes is the responsibilisation of those exposed to poor air for making visible the risks. This highlights the constraints of imagined public health futures. Children are positioned as agents who can leverage action—on route changes to school or on transport mode choices by parents—to reduce their exposure and that of others. However, the study was not simply an awareness raising intervention: it also generated information *with* children and parents. By wearing the sensor in their day to day lives, the children generated data about the practices and spaces that produce and reduce exposure. Although the scientist quoted above talks about awareness raising, a common frame of reference in public health, the intervention in practice involved actively engaging with children's visceral experiences of exposure. It mobilised their knowledge and oriented a particular set of actors towards future change (Hajer & Pelzer, 2018): children most immediately, but also their parents.

The home itself was framed as particularly risky in The Daily Mile study. Discussions with one focus group of parents and a teacher illustrate rather starkly this framing of the home as somewhat unmanageable, compared with the school—a positioning clearly acknowledged, and resisted, by the parent in this extract:

> **Teacher**: I think it [The Daily Mile] goes hand-in-hand with diet as well, I mean in school obviously it's controlled, school dinners, and we have healthy packed lunches, but you could do all the miles [laughs] in the world, but if their diet at home and unfortunately we're in a chicken shop culture [laughs].
>
> **Parent 1**: Well that's where you're wrong sweetie because my son has always been quite big, he has put on a little bit of weight for whatever reason but we do eat healthy and we don't have takeaways, we don't eat at chicken shops, we don't get pizzas, I have to cook from scratch every day so it's not to say that he doesn't have vegetables and fruits and stuff, he's just a big boy.
>
> **Teacher**: Yeah...
>
> **Parent 1**: Although he's big he is quite healthy, he's not like...
>
> **Teacher**: He's not a sickly child.
>
> **Parent 1**: No, he's not a sickly child, I mean he has a little bit of asthma but that's not an issue.(Focus Group, School01)

In both cases, then, intervention actors framed the homes of children as risky and at-risk in the present and as sites where knowledge and understanding could be mobilised to effect future change. This framing of home as a space where the intervention could be derailed through 'lack of control' is resisted by the parent above, who undercuts the cipher of a 'risky' present waiting to be transformed into a health future through centring an alternative temporality, that of the here and now, where both the child and food practices are healthy, not risky. However, if the logics of futuring could be deflected, what was notable across both studies was the enrolment of children in the work of monitoring risk in the present and the linkage of this to health futures.

Learning to monitor risk was fundamental to both interventions. This was explicitly foregrounded in the air pollution project, with its aim of developing a wearable monitor to use in this specific study. Children were enrolled as 'citizen scientists', who would wear the device, which was being tested to directly monitor levels of PM2.5 at home, school and on their routes to and from school. The data generated by these monitors were then collated and shared with

children, teachers and others, with the aim of generating discussion to elicit reflection on exposures in different spaces and how these exposures could be minimised.

The Daily Mile case was also replete with risk monitoring technologies. Implementation in the classroom typically involved teachers using the run as a teaching moment, inviting children to monitor directly the effects of the physical activity in their bodies:

> After the run [the teacher] gets them to check their pulse and says "if it feels faster then you have done the right thing…you have improved". One boy says he cannot feel a difference, and he gets told that he "did not work hard enough". The teacher says "…you should be able to feel your heart rate increase and your breathing increase afterwards".
>
> (Fieldnotes from School04, Dec 2018)

These biological accomplishments—felt increases in the pulse rate, heartrate ("make your heart beat faster"), were taught as personal monitoring techniques; technologies to move and situate the intervention in children's bodies, and teach what successful participation meant for future health. Children explained in discussions the immediate outcomes aimed for if they engaged with the intervention in the correct way:

> When your heart beats it means you've been doing very well, you've been running a lot, and you've been doing very well.
>
> (Erin, Year 3,[1] School01, Focus Group)

> I can tell it's working because usually I'm always like *[Participant imitates being out of breath]* after we finish but now it's slowing down, I'm breathing fine again.
>
> (Callum, Year 5, School04, Focus Group)

They linked these activities to individual health futures for themselves and their peers: "it helps to lose weight and you get energy" (Marina, Year 5, School04, Focus Group); "some people are like fat […] if they do The Daily Mile, they will […] find some muscle" (Luka, Year 5, School04, Focus Group). Imagined future bodies were slimmer and fitter: The Daily Mile "helps with your body size, it helps with your heart… you want to live a good life" (Maddie, Year 5, School03, Interview), and enables you to "to look good in a swimsuit" (Lili, Year 5, School02, Focus Group).

Children's accounts of taking part in The Daily Mile, then, focused on their individualised labour and its anticipated future impact on the body, mostly framed as linking health with running and being fit. Absent in their accounts were any discussions of the structural and environmental conditions that enable and constrain health. This was not surprising: these broader social relations were not foregrounded by either the schools implementing the scheme or the materials produced by the charity promoting it.

Collective futurity: Children as conduits for public health

In both cases, the framing of children as in need of intervention now for future public health gains was foregrounded by actors responsible for delivering the interventions. The air quality project entailed a participatory element, where children were given educational sessions on the

causes and effects of air pollution, how it is measured and how they could measure air pollution by using a wearable sensor. These were delivered in schools by scientists and engineers. For the scientists involved, the rationale for a focus on children is both the urgency and the potential for impact, given it is children who are most at risk of pollution harms:

> [C]hildren as you probably know, they're more active, they breathe at a higher rate, therefore they take more you know, air and with it all the harmful pollutants, and also their lungs don't grow into a full capacity if they are breathing dirty air, etc., etc.
>
> (Interview, Air Quality Scientist 1)

In a similar way, The Daily Mile intervention explicitly evoked this life course rationale for caring for physical activity in the present: "*We want to get children fit for life and fit for learning*" (The Daily Mile Website, 2023). As this suggests, at its heart are the dual goals of children's current needs ("fit for learning") and future selves ("fit for life"). The future orientation resonated with both the public health practitioners and teachers in the case study which had adopted the scheme. As one teacher put it, this aimed to be "a habitual habit-forming, long-term initiative". Further, several teaching staff spoke of a moral or ethical obligation to intervene in light of what, for them, would otherwise be catastrophic health futures:

> It's about life-long learning, life-long healthy bodies, that's what you want, you know, we're at a time, we're in a generation where, you know, our children are going to sort of potentially die before their parents, it's horrendous the level of obesity and it's shocking actually, so we have to do something, as educators we have to do something, you know, we can't just sit back and say it's someone else's problem.
>
> (Interview, Headteacher, School01)

The catastrophic framing obliges urgent action, mobilising not just teachers, scientists, engineers, public health practitioners, children and their parent/carers but also a range of commercial and philanthropic actors. For Breathe London, this includes the Greater London Authority and (for the wider programme), Bloomberg Philanthropies[2] and commercial manufacturer Dyson, who designed and loaned (with no charge) (Varaden et al., 2021) the monitors and backpacks. For The Daily Mile, the charity promoting the scheme is funded by INEOS: interestingly, this was positioned as a 'free' good, although one which potentially incurred costs for a local authority public health team:

> Well you know if, if, if The Daily Mile Foundation was selling the Daily Mile then they'd have a revenue stream and then they could use that, would use that, that would, part of that revenue would go into their marketing budget. But of course it's free so any marketing costs would have to be borne by the public sector.
>
> (Interview, Public Health Practitioner)

These in turn enroled other commercial actors, including a proliferation of companies offering to sell playground modifications designed for The Daily Mile.

A range of more mundane risk technologies also became enroled as the interventions unfolded. Importantly, these orientated to the aggregation of individual monitoring data. In The

Daily Mile, students and staff were encouraged to document miles ran per classroom, which would, at times, be further collated:

> I must have done a staff meeting at some point and [...] an assembly as well, so I launched it to the whole school. We also created a table [- a large chart -] and I made Daily Mile stickers and every time each class had done five Daily Miles they could put a sticker on the chart, so we then saw which was the class who did The Daily Mile most often.
>
> (Interview, Assistant Headteacher, School02)

> [W]e got to a Friday assembly [...where] we announced the whole school total [...] so the Year 6s go around [each week] and they see how many have you [as a class] done this week and they do a weekly [count].
>
> (Interview, Headteacher, School01)

In the case of The Daily Mile, quantity and frequency of movement were emphasised as success, even if such calculations removed children's subjective experiences, such as reported boredom when running around a basketball court for 15 min. Such aggregation technologies oriented to a future in which the data have imagined agency in 'obliging action' from others and presenting the activity (running a mile or monitoring health) as a public good for reducing risk now and in the future. In Breathe London, the data from personal sensors, designed by the manufacturing company working closely with air quality scientists for monitoring exposure, was designed at the outset to be aggregated. For the digital designers working for the chosen company, this task entailed design trade-offs between accuracy at a local, individual level and useability:

> [...] we could've had loads of different sensing content, but it just increases cost, it increases weight, everything, so is, which it's not really worth [it].
>
> (Interview, Engineer who designed sensor)

A heavier sensor might measure immediate environmental exposures more accurately at the local level but be less likely to be used consistently, and thus less useful for generating aggregate data over longer time periods. Air quality scientists involved in testing air sensing technologies emphasised that the research innovation would lie in the number of data points that can be generated, particularly in the home and after school: the scale and standardisation of these data would generate potential statistical power for evidence of air quality:

> Well, to my knowledge, it's the first time we have worked with a big sample like that so there has been 250 children across 5 primary schools again for a whole week who have been carrying the monitor to measure what they're exposed to, so this is the first time that it has been done to that level to be able to characterise pollution rates close to, over a whole week.
>
> (Interview, Air Quality Scientist 1)

> [...] the main goal is for new knowledge, wider knowledge in general, it's not to improve the sensors, it's also to better understand them so then health researchers can go "well hang on a minute, that data might not be so good".
>
> (Interview, Air Quality Scientist 2)

Children enjoyed monitoring their local air quality in real time: this was an appealing mode of participation as citizen scientists. As Lupton argues, the playful capacities of wearable technologies are often promoted in participatory projects because they help "to ludify elements of everyday life that might otherwise be experienced as tedious or hard work" (Lupton, 2020, p. 53). Elements of usability such as weight were clearly important to achieving this. However, an 'accurate' sensor at this local level was less important, scientifically, than the ability to generate aggregate, standardised data. Schools are a particularly valuable site for such future-orientated data aggregation, given the potential for validation of sensing devices, which collated data from 250 children all coming to school at the same time, all leaving at the same time, exposed to the same air, simultaneously producing readings. As this engineer who was part of the team designing the sensor explained:

> [W]hat you want is an indication of the data that you want to be accurate, not necessarily the most accurate sensing technology you can get, but it's about mass collection and almost like that crowdsourcing effect of harvesting the data.
>
> (Interview, Engineer who designed sensor)

Here, then, the primary value of risk data lies not at the level of the individual child, monitoring their own risk, but in the aggregation; epidemiological concerns bleed back into the intervention on the child as a sensing subject. They are sensing not, primarily, to measure their own exposure but to contribute to larger 'harvesting' projects. These are futuring projects, evoking temporalities as well as scale, but they fold back to the local level, with implications for actions in the here and now. As the engineer explained in relation to the sensors: to use this data requires 'a lot of future statistical and analytical work in order to interpret it, but what the research can [also] do is to test whether collective individual data points provide information that is engaging and might be used to guide future behaviour changes'.

Children as risk ambassadors

The school, as a learning and caring environment, is also therefore a perfect laboratory for harnessing standardised data relating to the social and environmental conditions of children's health. However, children were not merely recruited as producers and monitors of these data *but also* as potential ambassadors, responsible for mobilising risk knowledge not just across time but also space. In both cases, implementers envisaged children's responsibilities for disseminating out, to risky (and, as we have seen, possibly resistant) domestic settings:

> [B]ut I think also [...] that engaging with the children is just, the way to go because if you get the children then you will get to the parents [...] and that came across again through the conversation with the children, with schools, through the interviews, through the focus groups I did, that if you want to engage with the parents you have to do it through the children because the children will give information to the parents, even if the parents don't want to hear the information.
>
> (Air Quality Scientist 1)

Both interventions sought to 'educate' or 'influence' parents and carers through children as ambassadors for health futures. In Breathe London, sharing the data generated in the intervention with participants was considered a novel dimension, and researchers wanted to test whether this was productive for knowledge translation. This was explicitly articulated by those implementing the interventions. Children were asked to complete a survey before and after wearing the sensor, which included questions on whether they had talked to anyone about air pollution (see Varaden et al., 2019); over half reported telling parents or others about the project (Varaden et al., 2021). Participation in pollution sensing, and learning to monitor, was intended to transfer risk knowledge—and with it, an obligation to care—into other domains.

For The Daily Mile, a number of teachers and the public health practitioners spoke about how running each day would not just encourage the individual child to develop correct habits for their future health but also act as a conduit through which children would translate 'good habits' into home and family life through their influence:

> Yeah, schools cannot be in isolation and my school certainly isn't, it's part of a community, and if we're serious about educating children you have to educate the parents, because we have them [the children for] 15% of their time […] the rest of the time they're with their biggest influence, so if we can influence that mindset of the parents then, you know, that means that we're more likely for what we do in school is to be built on and continued once they leave school.
>
> (Interview, Headteacher, School01)

> Imagine if this was going, if this, if their kids were doing this for 5 years, it would, it could, it could transform the whole family in that time couldn't it?
>
> (Interview, Public Health Practitioner)

This latter ambition positions the child ambassador as a kind of saviour for future health, whose actions can be transformative, beyond the school. The anticipated mobilisation of knowledge into the home was apparently enacted in practice, given children's accounts of telling their parents about The Daily Mile:

> [I]n Year 5 […] I'd tell my parents how many laps I did, and also when I used to, if I tripped up I'd tell them if I did better than before, I would tell them, especially when the first time, because it was a new thing and I really wanted to let my parents know I'm doing it, I told them.
>
> (Axel, Year 6, School04, Focus Group)

However, not all children were necessarily successfully enrolled as ambassadors, with some resistance. As Zac (Year 5, School04, Focus Group) said of The Daily Mile "I've complained to my parents about it". In his rejection of the ambassador role, Kane suggests how foregrounding of experience ("boredom") in the here and now can trump the futuring logics he attributes to both school and the home:

> Well when my mum's cooking and my dad's home, and sitting on the table or watching some football or something, I'm like […] "The Daily Mile is so boring," and they're like, "Why?" and I'm like, "Because you have to run," and they're like, "Well

it's good exercise," and my parents take the school's side, which I do not understand, like, "The Daily Mile is good for you," it is not.

(Kane, Year 5, School04, Focus Group)

Alternative future imaginaries

In their complaints, Zac and Kane simply resist enrolment as ambassadors for future health. Other actors suggested alternative futuring imaginaries, which centred health as a value, but were less bound in the individualising and behavioural logics that were prioritised in intervention implementations.

In particular, the limits of behaviouralism were attended to by children in both cases. In Breathe London, for instance, in one of the participatory workshops with students, one child cited a classmate's father's job (as a taxi driver) as blameworthy and contributing to toxic emissions (Fieldnotes from Focus Group 01, June 2019). Such blaming and shaming might be an inevitable outcome of individualising and responsibilising behaviour: yet this was, to an extent, resisted in the ensuing discussion between the children. Participation also unfolded in ways that highlight different and unintended outcomes of the intervention. Prior to their leading a school assembly on air pollution and its health effects, author 2 asked one member of the scientific team whether the children are also taught about what the sensor in the backpack does. A poignant example of alternative imaginaries of care was reported when they claimed some children understood the backpack they wore to monitor pollution was somehow 'cleaning' the air and caring for the environment directly rather than simply monitoring (Fieldnotes, June 2019). Similarly, many raised in workshop discussion examples of active and practical care for the environment in other contexts and shared practices they already engaged in, such as using re-useable water bottles rather than plastic ones (Fieldnotes from Focus Groups 01 and 02, June 2019; see also Varaden et al., 2021).

In The Daily Mile, some children attended to the limits of framing physical activity as a healthy and normative good, commenting that the Daily Mile was only appealing "if you can move" (Jimmy, Year 5, School02, Focus Group) and "if your mobility is good" (Lili, Year 5, School02, Focus Group). Others, as we have suggested, at times, disrupted the narrative of health benefits flowing directly from The Daily Mile or nuanced the linkages between activity, fitness and obesity:

> Actually, it's not just unhealthy foods that can make you fat and I don't think The Daily Mile can just be for like fitness, it could be like for your heart and like to encourage us to be more fit and stuff.
>
> (Penny, Year 6, School04, Focus Group)

Widening out reflections on structured activity and health, some mentioned a range of other healthful activity in practices outwith the intervention, such as running in the park, cycling for fun, doing sport or in everyday practices: "My sister has to run towards the train station. She runs 1 mile, 3-4 miles a day" (Holly, Year 3, School04, Focus Group). Other children noted benefits in the moment rather than futuring benefits of engaging with The Daily Mile, such as sociability and connection to others: it provided "a lot of time to spend with your friends" (Luka, Year 5, School04, Focus Group) or "play around with my friends" (Nicki, Year 6,

School03, Interview). These 'present' rather than future benefits for wellbeing were not fore-grounded by intervention implementers. Whilst neither study emphasised sociability as a benefit, in the case of The Daily Mile, it was at times explicitly deterred. One teacher, for instance, reminded her class before they went out to run that "you are not out there to play!" (Fieldnotes, School02, Dec 2018). Another recounted in an interview that sociability was a sign the children were no longer committed: "after six or seven [laps of running around] some of them [the children,] were kind of like they were done, they were walking and they were chatting, they were, you know… they'd had enough" (Interview, Physical Education Lead, School05).

Thus, children's accounts suggest that, even when enroled in projects of risk monitoring or as ambassadors, they are not 'blank slates', unreflexively adopting the logics of the intervention. Rather, as active agents, they assemble more expansive imaginaries of health, in both its current contours, and its potential futures. Albeit small and limited, these alternative articulations of care for health, environments and each other play alongside the behaviour change orientations that underpin the interventions in practice. In the context of public health interventions for COVID-19, Albers (2023) notes a similar 'assemblage' of how children navigate multiple logics to navigate conflicting social obligations (such as safety and trust), within the somewhat con-strained agency they have as children. In our case, children are navigating the intervention logic —of leveraging individualised behaviour change to materialise collective health futures—and their own needs for care, sociability and deflecting boredom in the present. Referring to employment that is harmful for the environment, and the closing down of blame in discussion, or reflecting on the ways in which physical activity is (or is not) possible in everyday life, opened up the space for children to confront the complexities of how livelihoods are entangled with the political economies of air pollution or place to play; economies they (and their parents) have limited control over. Thus, albeit in a limited way, neither futuring nor the behavioural frame are all-encompassing, and the social relations and practices engendered by these interventions do open up possibilities for more collective understandings or imagining of the conditions for future public health.

DISCUSSION

We have examined the ways in which two public health interventions in schools enacted particular imaginaries of future health. We have suggested that as they unrolled, these interventions—and the public engagement around them—enroled children as 'ambassadors' for public and environmental health. Risks to their health in the here and now were oriented— through technologies of monitoring, aggregating and mobilising—as conduits for enacting healthier futures, with children bearing a disproportionate burden for realising these futures. The strengths of this study are that it draws on cases of different health risks (inactivity and air pollution), aiding analytic purchase and transferability. The weaknesses are the usual ones of secondary analyses. These include reliance on data already generated and an inability to go back to test systematically emerging analytical claims. In this analysis, one issue that might have benefitted from further data generation was the contrast of how playfulness was positioned across the two cases: seemingly discouraged in The Daily Mile, but encouraged in Breathe London. This weakness may be particularly pertinent as we have focused on similarities around futuring and have not had space to unpack in much detail the ways in which framing of

responsibility is shifting as risks such as air pollution become entangled in public health (see, for instance, Herrick, 2020).

A first finding is that, although physical activity and air pollution exposure are determinants of human health that are well recognised (in the literature and by many actors in the field) as deeply embedded in environments and structural relations, the solutions foregrounded were largely behavioural, relying on either direct behaviour change (in the case of The Daily Mile) or children's role as 'prompters' for parental behaviour change in the case of Breathe London. That public health interventions for social problems are targeted largely at behavioural solutions is neither a surprising nor novel finding. This reflects the medicalisation Crawford (1980) saw as 'healthism', an increasing tendency from the late 1970s to frame health as not only the dominant value of society but one that we are all personally responsibilised for maximising (Nettleton, 2002). Despite political rhetoric acknowledging the structural and, more recently, commercial, determinants of health, there is a well-documented tendency, in the UK and many other settings, of what has been called 'lifestyle drift' (Baum & Fisher, 2014): that is, a broader ideological commitment to neoliberal models of responsibility that shape national and local policies in ways that focus on the individual as the primary site of responsibility for health. Even where higher level policies do address social determinants, the contingencies of local practice typically reconfigure implementation as orientated to individual rather than collective responsibility (Powell et al., 2017): what Williams and Fullagar (2019) call a 'citizen shift' in accountability.

What our analysis adds is a consideration of what this 'citizen shift' in accountability means for children in school settings. First, it contributes to the legitimisation of a range of corporate and philanthropic actors in public health. As Herrick (2008) has noted, identifying issues such as obesity as 'crises' can generate what she calls 'philanthropic entrepreneurialism', as both for-profit and non-profit agencies enter a field to promote programmes that are positioned as meeting an urgent need. Both our case study interventions were supported and delivered through complex coalitions of commercial and philanthropic actors; the former were also actors in the very conditions that create or profit from sedentary and toxic environments. In the case of The Daily Mile, the large petrochemical company (INEOS), which funds the charity promoting the scheme, is implicated in the conditions for sedentary lives and has direct interests in fostering individual physical activity interventions rather than reduced car transport, say, as the favoured solution. In the case of Breathe London, the technology company who successfully bid to develop the monitor is also a producer of air purifiers. Such coalitions of actors are increasingly evident in many contemporary health interventions (Garnett et al., 2018). Yet the roles of these actors were largely invisible in our data as contributors to risk and only positioned as contributors to solutions. This intersection of neoliberalism, healthism and, now, corporatisation of public health provision has perhaps medicalised children and young people more than any other population group and has intensified the drivers of lifestyle drift in interventions.

Second, our findings show that citizen shift has positioned children as potential 'saviours' of uncertain and potentially catastrophic, environmental and health futures. In both our case studies, children were enrolled to leverage future health. Drawing on a literature review, Gale et al. (2016) note the proliferation of 'risk work' done by health (and other) professionals in the context of drivers in the UK and other jurisdictions to accelerate the work of public health policy. They attest to the pervasiveness and reach of the work required to attend to risks for future health. What is notable in our study is the extent to which these kinds of work are being devolved to children. In our two cases, at least, interventions for public health did not merely

address children as the subjects of care in relation to risk but actively recruited them as risk monitors for the here and now—and, importantly, as risk ambassadors, who would carry care for health and environments into other spaces and into future time. At one level, children's agency was imagined as somewhat restrictive and pre-emptive, as performers of largely simplistic health fixes, such as avoiding busy roads with high air pollution levels or running for 15 min in a regulated way. However, as risk ambassadors, responsibilised for materialising healthier public and planetary futures, they were also positioned as potential saviours. By acting out behaviours to improve health, from running around to carrying a sensor, these interventions used the present as a space and time for action oriented towards a particular future, linking individualised risk monitoring to an imagined future where (in our cases) there is collective care for the environment and a future-public of physically active citizens prioritising their health.

Actors and practices orient towards this goal and, as we have suggested, in doing so, these 'techniques of futuring' (Hajer & Pelzer, 2018) demand care for one's health *for* future health. This futuring is particularly resonant in the case of children's bodies: not only in the case of obesity (Coveney, 2008; Warin et al., 2015), but as we have shown, also for the risks from exposure of toxic air. Sheldon (2016), in her reading of the 'child' figure in speculative fiction, speaks of the ways in which the face of the child has become a 'resource' in cultural discourse about climate catastrophe, not so much in need of 'saving' but positioned as a potential saviour: "the child as resource is freighted with expectations and anxieties about the future" (2016: 3), but that future is uncertain. If the futurity embedded in public health campaigns resonates with social ideals of children as embodying future hope, it sits less well with individuals struggling to manage in the here and now. Warin et al. (2015) suggest attending to the taken for granted temporalities of future orientation in public health by unpacking the meanings of shorter horizons that narrow possibility and constrain practices when planning interventions. The findings from our cases reinforce this implication and also suggest the virtue of attending more closely to how children are positioned, ideologically, in the futuring technologies of interventions. Orientating towards a future that foregrounds children as ambassadors and saviours forecloses other possibilities for intervening in the world. Across our two cases, as the interventions unfolded, both the problems, risks and the potentials for solutions were located primarily 'in' children, their homes and day to day settings. Imagining future health in children's bodies deflects attention from the structural and systemic causes of unhealthy environments in the present.

We have suggested a number of ways in which children, and their parents, resist the logics of futuring interventions: through reconfiguring attention to the present and through articulating alternative modes of care for health and environments. If the logics of an intervention foreground a futuring imaginary, its impacts may be more nuanced on the ground. Drawing on Mol's (2002) work, Will (2017, p. 294) argues that medical "fields are rarely as monolithic as [they] might appear", and that unpacking the effects and affects of interventions requires studying practices, and their multiplicities, rather than assuming that these will produce surveillance and discipline. To an extent, this was evident in the discussions and observations of our two cases, which surfaced small resistances, alternative practices of children and questions about whose interests or concerns were being foregrounded and thus attended to. What future health might look like is illustrated in the various constraints and resistances encountered by the people recruited to these interventions and with whom we spoke. Yet, even within these moments of nuance and inquiry, such as when the structural and systemic causes of unhealthy

environments were acknowledged in an intervention, the labour of care for, and saving, the future sat largely with children and young people.

CONCLUSIONS

Two public health interventions in schools aimed to address the current and future implications of unhealthy environments. Our analysis articulates some implications of the futuring technologies of public health, through which children come to be positioned as bearing a disproportionate responsibility for not only their own future health but as saviours for collective health futures. Children are recruited as not only risk managers for threats to their health in the here and now but also as risk ambassadors for the future. These futuring projects entail complex coalitions that increasingly include commercial and philanthropic capital, whose interests are best served through individualised risk solutions. Although futuring interventions emphasised risk work and foreclosed other articulations of care for health, in practice, interventions also opened up alternative futuring projects and attention to the present. These might be fruitful departures for alternative health interventions, which enable more collective responsibility for sustaining healthy environments.

AUTHOR CONTRIBUTIONS
Benjamin Hanckel: Conceptualization; investigation; writing—original draft; writing—review and editing; methodology; formal analysis. **Emma Garnett**: Conceptualization; funding acquisition; investigation; writing—original draft; writing—review and editing; methodology; formal analysis. **Judith Green**: Conceptualization; funding acquisition; investigation; writing —original draft; writing—review and editing; methodology; formal analysis.

DATA AVAILABILITY STATEMENT
The participants of this study did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research, supporting data is not available.

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ENDNOTES

[1] In the UK, children attending primary school in Year 3–Year 6 are usually aged between 7 (Year 3) and 11 years (Year 6) old.

[2] https://www.breathelondon.org/about.

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