

An evaluation of the implementation of a UK school-based running programme

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Abstract

Background

The adoption of school-based running programmes has rapidly increased in recent years. However, there is a lack of information on how these initiatives are implemented, and how generalisable and sustainable they are. This study evaluated the implementation of a school-based running programme, Marathon Kids (MK), over 7 months. The aim was to understand the context within which MK was implemented in each of the schools and the key elements of implementation including reach, fidelity and dose.

Methods

This study used a mixed method, single group before-and-after design strengthened by multiple interim measurements. Five state-funded primary schools in Leicestershire, UK participated, with 17 teachers and 189 (81 boys (47.4%) and 90 girls (52.6%)) Year 5 pupils (aged 9–10 years) from eight classes. During the 2016/2017 academic year, data were collected via measures at multiple levels (i.e. school and individual) and at multiple time points during implementation. Follow up qualitative data were also collected during 2017/2018.

Results

Marathon Kids achieved good reach, with all pupils opting to participate at some point during the academic year. All schools implemented MK with good fidelity, although the level of implementation varied between schools and over time. The average number of MK sessions held per week ranged from 0.94–3.89 with the average distance accumulated per pupil per week ranging from 0.02 to 2.91 kilometres and boys being more likely than girls to be classed as high-level participators. Despite an initial drop off in participation over time, all schools remained engaged in the programme and continued to implement MK until the end of the school year. Contextual features (e.g., staff capacity and resources) differed between schools and influenced the quality of implementation of MK and the frequency of delivery.

Conclusions

Marathon Kids is a simple, inexpensive and versatile physical activity programme which can be implemented by schools with relative ease. However, schools are diverse settings, with unique challenges to ongoing delivery. Thus, planned adaptations, specific to each school's context, is likely necessary to sustain participation in the longer term.

Contributions To The Literature

- Research demonstrates a lack of generalisable, effective and sustainable school based physical activity interventions which have been translated into practice.
- This is the first study to systematically examine the implementation of a school-based running programme using a robust mixed method approach.
- This study contributes new evidence about how the dose (delivered and received) of a school-based physical activity programme fluctuates over time and the factors which influence its implementation.
- Although we found Marathon Kids to be implemented with good fidelity, adaptations specific to each school's context (e.g., staff capacity and resources) may increase the likelihood of positive outcomes such as sustainability.

Background

School-based running programmes (sometimes referred to as active mile initiatives) typically encourage children to be active during the school day by providing opportunities for pupils to walk and/or run around a marked route in the school grounds for a period of time (e.g., 15 minutes) (1). Grass roots support for school-based running programmes has rapidly increased in recent years (2) and many are being implemented as a pragmatic 'solution' to rising levels of childhood obesity, poor levels of fitness and inactivity (3). Indeed the most well-known example, The Daily Mile™ (4), is reported as being implemented in over 70 countries worldwide, and over 5,867 registered schools have participated in the initiative in England alone (5).

In the United Kingdom (UK), political cross sector commitment for running programmes was reinforced by the 2019 cross-government School Sport and Physical Activity Action Plan (6), which advocated the use of active mile initiatives to establish physical activity as an integral part of the school day. However, evidence for the effectiveness of school-based interventions is mixed (7) and there are limited generalisable, effective and sustainable physical activity interventions which have been translated into practice (8). For example, a recent systematic review with meta-analysis found that school-based interventions had a moderate effect on physical activity during the school day, but this was not reflected in increases in physical activity across the whole day (9). Possible explanations are that intervention components were not effective, and/or they were not implemented appropriately. Consequently, a greater focus on documenting real-world implementation and fidelity as part of evaluations of public health interventions (10), school-based physical activity interventions (11), and school-based running programmes,(12) is needed.

Whilst intuitively running programmes are an appealing investment for schools (13), robust efficacy and implementation evidence is scarce (14). In order to maximise their potential, there is a need to understand which pupils participate in these programmes, if and how programmes can be successfully transferred

from one context to another, and the factors which may constrain or enhance the implementation process (15). This study therefore examined the implementation of a school-based running programme over 7 months to understand the context within which MK was implemented in each of the schools, and the key elements of implementation including reach, fidelity and dose (delivered and received).

Methods

Programme description

Marathon kids (MK) is a school-based running programme managed and delivered by the charity Kids Run Free (KRF). It is described in detail elsewhere (12,16,17), but in brief, MK gives primary school pupils the opportunity to walk and/or run the distance of a marathon over the school year. The programme aims to empower children of all fitness and ability levels to engage in regular physical activity. Pupils are encouraged to walk and/or run laps of a course on the school grounds once or twice a week. For every lap completed, pupils are given a lap band and the total number of bands collected per child is recorded via a digital tracking system (DTS). The DTS provides summary data regarding when pupils participate, how many laps each pupil completes and their accumulated distance and rewards are available upon reaching key milestones, for example, quarter, half, three-quarter and full marathon. Optional on-site support is also provided during a school launch event by a member of staff from KRF who, for example, delivers a marathon themed assembly, demarcates the running route(s) and helps to set up and provides training on the administration of the programme to the MK Champion (member of staff responsible for implementing MK) and a selection of MK Ambassadors (peer leaders). A summary of the programme is provided in Additional file 1 using the Template for Intervention Description and Replication in Public Health Programmes (TiDier-PHP)(18).

Study design

This study used a mixed method, single group before-and-after quasi-experimental design. This design was chosen as a pragmatic approach to exploring the implementation process and informing the development and effectiveness of implementation strategies (as opposed to the effectiveness of the intervention itself), in a way which would have relevance to practitioners and policy makers. Furthermore, it was believed to yield naturally occurring differences in types or intensities of implementation strategies, as determined by the schools and their local contexts, in order to evaluate their influence on implementation (19).

Study population and recruitment

The evaluation focused on Year 5 (9-10 years) children although schools were encouraged to implement MK in all year groups. Five schools were recruited to the study, representing a reach of 41.7%. Given that the study was concerned with the organisational (school level) and individual level characteristics associated with implementation, participants from each school included the headteachers and/or deputy headteachers, Year 5 pupils/teacher(s), and the MK Champion (if this was not the Year 5 teacher). Parental consent to participate was also obtained from the pupil's parents/carers and each school provided written consent to participate in the study signed by the headteacher. All participants provided written informed consent and verbal assent prior to participation in any data collection.

Data collection

During the 2016/2017 academic year, data were collected at five timepoints (TP) over 7 months (October 2016 – June 2017) with follow-up data collected during the 2017/18 academic year at two TPs (Fig. 1). Detailed methods for the evaluation of Marathon Kids have been published in elsewhere (12). Table 1 outlines the implementation dimension assessed and the definition adopted, which was specific to MK.

Table 1
A summary of the implementation evaluation measures used

| Implementation outcome | Implementation outcome definition | Description | Data collection | |
|--------------------------------|--|--|---------------------------------|---------------|
| | | | Measure | Time point |
| Reach | The number (%) of pupils and teachers involved in the programme and their representativeness (e.g. by BMI, SES, sex) | Organisational level: | Headteacher interview | Pre-programme |
| | | Characteristics of schools participating in MK | Teacher questionnaire | |
| | | | Pupil questionnaire (Q-SPACE-R) | |
| | | | Observation | |
| | | Individual level: | Teacher questionnaire | |
| | Characteristics of teachers/staff participating in MK | | | |
| | Pupil: | Participation (DTS) | | |
| | Number/percentage of pupils participating in MK | | | |
| | Characteristics of pupils participating in MK | Demographic (SIMS) | | |
| | | Anthropometrics | | |
| | | Questionnaire | | |
| Fidelity of delivery | The extent to which the delivery of MK was implemented as planned | Organisational level: | Teacher/MK Champion interview | TP2 & TP5 |
| | | Conformity to the implementation strategy i.e. use of the 'MK five pillars'* | Pupil focus group | |
| | | Individual level: | Implementation log | Continuous |
| | | Teacher, Pupil | Participation (DTS) | |
| | Observation | TP2, TP3, TP4 | | |
| Dose delivered/received | How much of the MK sessions were delivered and received | Organisational level: | Teacher/MK Champion interview | TP2 & TP5 |
| | | The number of sessions/week pupils participated in | Pupil focus group | |
| | | | Implementation log | Continuous |
| | | | Participation (DTS) | |
| | Observation | TP2, TP3, TP4 | | |

*'MK five pillars' relate to the core principles which underpin the programme: Goal setting, Tracking, Role modelling, Celebrating and Rewards (BMI = Body Mass Index, SES = Socioeconomic status, MK = Marathon Kids, DTS = Digital tracking system, SIMS = School information Monitoring system, Q-SPACE-R = Questionnaire assessing school physical activity environment, TP = Time point)

School level measures

Headteacher interview

Headteachers from each of the schools participated in a semi-structured interview to elicit contextual information pertaining to their school's policies, practices and ethos relating to the promotion, teaching and delivery of physical activity and healthy lifestyles, as well as influences on the decision to adopt the programme. See Additional file 2 for an example of thematic interview/focus group guide used for the evaluation.

Individual level measures

Teacher questionnaire

Pre-programme, teachers responded to a series of open-ended questions about their teaching experience, qualifications and professional development relating to physical education (PE), sport, physical activity and health. In addition, teachers were asked to report their level of physical activity using a single-item physical activity measure (22).

Teacher Interviews

All Year 5 teachers and MK Champions (if different), participated in semi-structured face-to-face interviews. At TP2 and TP5, questions focused on: the characteristics of pupils and schools (participating and non-participating); the extent to which components of the intervention were used and completed; the delivery of MK and teacher satisfaction; pupil behaviour and pupil uptake and perceptions of influences on uptake. At TP6 and TP7, questions explored: the perceived long-term effects on pupils, teachers and school(s); changes to policy and practice, and any factors affecting sustainability.

Teacher log

To obtain data on the frequency and duration of exposure to MK as well as uptake, teachers were asked to complete a weekly survey (Survey Monkey, Palo Alto, California, USA) of each class' participation during the implementation period (October 2016 – June 2017). For example, data was collected on frequency, timing and duration (in minutes) of use of MK during the week as well as contextual information such as surface/route used and supervision.

Pupil

Demographics

At TP1, each pupil's name, date of birth, sex, ethnicity, free school meal eligibility (eFSM) and home postcode were collected from the school information management system. Relative deprivation and area-level socioeconomic status was calculated based on home postcode using the 2015 English Index of Multiple Deprivation (IMD) (20). Home postcodes were uploaded to an online 'postcode lookup' tool[1], which outputted the corresponding IMD rank and decile.

Anthropometrics

Each pupils' standing height and weight was measured and body mass Index calculated (23) pre (beginning of the school year) and post-programme (end of the school year).

Physical activity

Physical activity data were collected pre- and post-programme with a waist worn ActiGraph triaxial accelerometer (GT3X, GT3X+ or BT) (ActiGraph, Pensacola, FL, USA). Participants were instructed to wear the device on their right hip during all waking hours, except when engaging in water-based activities, for seven consecutive days.

Pupil focus groups

Semi-structured focus groups were conducted with pupils at TP2 and TP5. Focus groups were chosen to provide rich data relating to pupils' perceptions of MK, facilitate a detailed description of the implementation of MK, and understand how those perspectives may be different from, or similar to, their peers' as well as their teachers'. One mixed sex group of six to eight year 5 pupils per class participated (n= 53 in total) and were selected by the MK Champions based on the following guidelines: ensuring a range of pupils in relation to, sex, enthusiasm and participation level in the programme (e.g., high, medium and low), as well as their willingness to communicate experiences and opinions.

Running programme participation

At TP2, TP3 and TP4, pupils' participation in MK during a lunchtime period was assessed using direct observation. Data collected during these structured observations were largely qualitative and involved the researcher making detailed notes of relevant contextual and other information (e.g., weather, route used, duration of the session, level and type of interactions observed (i.e., physical or verbal and prosocial or antisocial interaction), fidelity to the MK protocol, and approximate numbers of pupils participating). Participation in MK was ascertained via triangulating data from the DTS, direct observations and the implementation log completed by teachers. Specifically, data from the DTS were verified using contextual information from the teacher implementation log to determine the dose (i.e., distance covered) for each child pupil over time.

Data analyses

Qualitative data

All qualitative data were deductively coded, using a Framework approach to thematic analysis (24), into a priori themes based on the implementation outcomes of interest (i.e. reach, fidelity, dose). The Framework approach was chosen to help link data from different sources within the study and map the dynamics of implementation over time enabling comparisons between, and associations within, cases to be identified systematically (25).

Quantitative data

Descriptive statistics, expressed as mean and standard deviation (SD) or percentages, were employed to explore the school, teacher and pupil level characteristics, as well as level of implementation (obtained from teacher logs and DTS) over time and between schools.

Results

Overall, five schools, 17 teachers, and 189 pupils from eight classes were recruited to the study. The final sample consisted of 16 teachers and 171 pupils (81 boys (47.4%) and 90 girls (52.6%)).

The schools ranged in denomination, size, location, deprivation (IDACI and eFSM) and performance (Ofsted rating). Schools 2 and 4 were federated (i.e., with one single overarching governing body accountable for both). The characteristics of each school are summarised in Table 2.

Table 2
Summary of school characteristics

| School | Urban/Rural description | Status | No of pupils in the school | Ofsted rating | IDACI (decile) | eFSM (%) |
|--------|-------------------------|-------------------------------------|----------------------------|----------------------|----------------|----------|
| 1 | Urban | Community school | 186 | Good | 9 | 34.9 |
| 2 | Rural village | Church of England Academy converter | 58 | Good | 10 | 11.8 |
| 3 | Rural town and fringe | Church of England | 501 | Outstanding | 6 | 16.4 |
| 4 | Rural town and fringe | Church of England Academy converter | 215 | Good | 4 | 24.7 |
| 5 | Urban | Academy sponsor led | 355 | Requires improvement | 5 | 18.8 |

(IDACI = Income Deprivation Affecting Children Index, eFSM = Free school meal eligibility)

Five head/deputy heads, two teachers and one teaching assistant were recruited for the interviews/focus groups. Of the recruited teachers, five adopted the role of MK Champions, three of whom were male, with an average of 10.2 ± 6.3 years of teaching experience, (4 ± 2.1 years in their current school).

The majority (73.9%) were White British and 26.1% of participants were classified as overweight or obese (Table 3). On average pupils spent $58.9 (\pm 23.1)$ minutes per day in moderate to vigorous physical activity (MVPA) with 38.8% meeting the UK Chief Medical Officer's physical activity guidelines (26).

Table 3
Individual level characteristics of pupils participating in Marathon Kids

| Variable | Male (n = 81; 47.4%) | Female (n = 90; 52.6%) | Total (n = 171) |
|--|-------------------------|---------------------------|--------------------|
| Age | 9.6 ± 0.4 | 9.7 ± 0.3 | 9.7 ± 0.3 |
| Ethnicity | | | |
| White British | 52 (64.2%) | 53 (58.9%) | 105 (73.9%) |
| Asian (South Asian and East Asian) | 3 (3.7%) | 3 (3.3%) | 6 (3.5%) |
| Other | 14 (17.3%) | 19 (21.1%) | 33 (19.3%) |
| eFSM, | 11 (13.6%) | 10 (11.1%) | 21 (12.3%) |
| IMD decile score | 7.14 (± 2.7) | 6.41 (± 2.8) | 6.77 (± 2.6) |
| Overweight and obese | 25 (30.5%) | 24 (24.5%) | 49 (26.1%) |
| Accelerometer variables | | | |
| Monitor wear (minutes/day) | 721.4 (± 83.2) | 704.6 (± 83.2) | 724.3 (± 71.5) |
| School day* monitor wear (minutes/day) | 267.32 (± 122.7) | 221.5 (± 114.3) | 306.6 (± 104.8) |
| Sedentary (minutes/day) | 411.6 (± 67.6) | 420.9 (± 71.3) | 416.83 (± 69.6) |
| Light (minutes/day) | 239.2 (± 39.9) | 229.6 (± 44.5) | 233.84 (± 42.7) |
| MVPA (minutes/day) | 68.1 (± 24.6) | 51.6 (± 18.9) | 58.9 (± 23.1) |
| Pupils achieving ≥ 60 minutes of MVPA on every valid day | 35 (23.8%) | 22 (14.9%) | 57 (38.8%) |
| Pupils achieving ≥ 30 minutes of MVPA on every valid school day | 16 (76.2%) | 5 (23.8%) | 21 (24.4%) |
| IMD 2015 decile scores range from 1 to 10; 1 is the least deprived and 10 is the most deprived. Note, Ethnicity is based on 142 participants, Weight status based on 153 participants, IMD data based on 142 participants, eFSM based on 140 participants, standing height based on 156 participants, accelerometer data based on 96.7% of participants providing valid data. Pupils achieving ≥ 30 minutes of MVPA on every valid school day based on 56.6% of participants providing valid data to examine school-based physical activity. | | | |
| (Values given are means and standard deviations unless otherwise stated, eFSM = Free school meal eligibility, MVPA = Moderate to vigorous physical activity, IMD = Index of Multiple Deprivation, * School day was defined as 08.30–15.00) | | | |

The duration of the focus groups ranged between 28–63 minutes (average 42.5 minutes) and the interviews lasted between 12–43 minutes (average 23.4 minutes).

School implementation context

The dominant reasons for headteachers adopting MK was the perception that it offered something new and different and/or that it complemented and aligned with other initiatives and policies, and it was accessible to all pupils.

That was one of the draws for us really because some projects don't work because they don't work with the different ethnic groups or because it's something that is very language driven, but for this any child can join in without needing to have it explained to them other than follow that person because they are now running and so are you. Headteacher, School 5 (Pre-programme)

Of the five schools, two (School 1 and 2) implemented MK across all year groups; Schools 3 and 4 implemented it with Key Stage 2 only (7–11 years), and School 5 implemented it with all year groups apart from Reception (4–5 years). Schools experienced various challenges and to varying degrees, relating for example, to staffing and poor facilities and infrastructure, when planning to implement MK. Every school offered MK as a lunchtime activity, which provided additional benefits.

We are a school that has always had activities to do because lunchtime is when you have the most incidents, so we do have structured activities most lunchtimes for everybody anyway, that does help. MK Champion, School 4 (TP5)

School 3 also delivered MK at other times including before school, during PE, at lunchtime and after school. The MK Ambassadors oversaw delivery in Schools 1 and 5, whereas the lunchtime supervisors and the MK Champion took responsibility for delivery in Schools 2 and 4 and in School 3, respectively.

All schools delivered MK throughout the entire academic year although the number of weeks of delivery varied according to the different start time points (10th October to 28th November). Consequently, the minimum distance per week to complete a marathon ranged from 1.51 km (School 1) to 2 km (School 3). The length of the pre-marked route ranged from 70.2 m (School 2) to 124.5 m (School 5) and the dominant surface used for MK across all schools was tarmac, with Schools 4 and 5 using this for 100% of sessions. Three of the schools (School 1, 2 and 4) using existing markings on the playground. School 3 used the perimeter of a teaching block, while School 5's route partly followed the outline of the trim trail on their playground.

Reach

Marathon Kids reached all pupils in Year 5 from all schools at some point during the academic year, although the dose of MK fluctuated. The qualitative data showed that there was a perception among staff that pupils who continued to participate were those who were characteristically competitive and responded positively to challenges (such as completing a marathon). In some schools these were the more active and 'sporty' children, but two of the five MK Champions commented on their surprise at several children participating who did not usually join in optional physical activity at school. This suggests that the programme appealed to an array of children, and not just the already active.

Just looking purely from my class, yes, it's those that are always engaged, always enthusiastic or always try their best whatever you throw at them, they're the ones who tend to do it. But coupled with that you've got those who, shall we say, the less sporty inclined so those who don't necessarily take part because it's too much effort. Year 5 teacher, School 5 (TP2)

Fidelity

To determine the extent to which MK was implemented as intended, the schools' delivery of MK was assessed against the core principles of the programme. In accordance with an approach previously used in school based physical activity interventions (27), fidelity markers were either coded as not employed at all (0), partially employed (1), or fully employed (2), based on data from the DTS, observations, implementation log and interviews and focus groups. The fidelity scores are summarised in Table 4. Whilst all schools scored similarly for fidelity to MK, variation by marker of fidelity was evident. Schools scored the lowest on adhering to the reward-based strategy and issuing rewards at key milestones.

Table 4
Summary of the assessment of schools' fidelity to Marathon Kids (MK)

| MK implementation strategy | Fidelity markers | School 1 | School 2 | School 3 | School 4 | School 5 | Fidelity marker total |
|---|--|----------|----------|----------|----------|----------|-----------------------|
| Celebration | A launch event is held | 2 | 2 | 2 | 2 | 2 | 10 |
| Role modelling | MK Champion and MK Ambassadors identified | 2 | 2 | 2 | 2 | 2 | 10 |
| Goal setting | Opportunity for pupils to participate once to twice a week | 2 | 2 | 2 | 2 | 2 | 10 |
| Monitoring/ tracking | Takes place along an identified marked route | 2 | 2 | 1 | 2 | 1 | 8 |
| | Lap bands are used to monitor laps completed | 2 | 2 | 1 | 2 | 2 | 9 |
| | DTS used to track progress | 2 | 2 | 2 | 2 | 2 | 10 |
| Reward | Rewards issued at key milestones | 1 | 1 | 2 | 1 | 1 | 6 |
| | | | | | | | 63 |
| School total: | | 13 | 13 | 12 | 13 | 12 | |
| | | (81.3%) | (81.3%) | (75%) | (81.3%) | (75%) | |
| (MK = Marathon Kids, DTS = Digital tracking system) | | | | | | | |

Adaptation

Planned adaptations in implementation related to the issuing of rewards and certificates, and to the logging of laps, both of which were recorded as having partial fidelity. Two MK Champions (School 1 and 2) created their own certificates considering these to be more personalised, and/or to better reflect the wider values of MK such as rewarding perseverance (e.g. most consistent runner) rather than just distance. In addition, School 5's MK Champion decided to award certificates and stickers to pupils who were 'close enough', to spur them on.

Because the stickers they produce are big and they are quite nice and stuff so I think that might have an impact; if they see a child walking around with a 10 k sticker, that might get some other people interested. But if you haven't done Marathon Kids for several weeks, 10 k is just so out of range for them that will be difficult. MK Champion, School 5 (TP2)

Lap bands were used in all schools to record the number of laps run during a MK session; however, for pragmatic reasons, School 3 did not adopt these when implementing MK during PE to save time. Instead, each pupil was given a minimum of five laps and pupils were asked to report if they completed more than this.

Dose of MK delivered

There was good compliance (87.6% ± 6.5%) by the MK Champions in completing the online implementation log, with one school (School 2) completing 100% of the logs. School 4 reported the highest number of sessions per week (3.9 ± 2.5) and School 5 the least (0.9 ± 0.7) (Table 5). The average duration of a MK

session varied between schools with the shortest sessions (0–5 minutes) being when it was used as a warm-up before PE, and the longer sessions (>30 minutes) taking place during lunchtime. This was corroborated by the lunchtime observations.

Table 5
Dose of Marathon Kids (MK) delivered (based on teacher implementation log data)

| School | Class | No of weeks of implementation | No of weeks of completed log data | No of weeks of delivery | No of sessions of MK offered | Average duration of MK session per week* | | | | | |
|---|---------|-------------------------------|-----------------------------------|-------------------------|------------------------------|--|---|----------|----------|-----------|-----------|
| | | | | | | (From launch date to close of programme, minus holidays) | (The number of weeks at least 1 session of MK was held) | 0–5 mins | 5–10 min | 10–15 min | 15–20 min |
| School 1 | | 28 | 23 (82%) | 19 (83%) | 33 | 0 | 0 | 0 | 0 | 6.1% | 93.9% |
| School 2 | | 24 | 24 (100%) | 23 (96%) | 45 | 0 | 0 | 0 | 36.6% | 2.9% | 0 |
| School 3 | Class A | 21 | 19 (86%) | 15 (79%) | 28 | 3.6% | 10.7% | 28.6% | 46.4% | 10.7% | 0 |
| | Class B | 21 | 19 (86%) | 15 (79%) | 29 | 3.4% | 10.3% | 20.7% | 13.3% | 2.9% | 0 |
| | Class C | 21 | 19 (86%) | 15 (79%) | 28 | 3.6% | 10.7% | 21.4% | 55.2% | 10.4% | 0 |
| School 4 | | 23 | 20 (87%) | 18 (94.7%) | 70 | 0 | 0 | 10% | 21.7% | 14.7% | 0 |
| School 5 | Class A | 25 | 20 (80%) | 16 (84%) | 15 | 5.9% | 0 | 0 | 1.7% | 35.4% | 11.1% |
| | Class B | 25 | 20 (80%) | 16 (84%) | 15 | 5.9% | 0 | 0 | 1.7% | 35.4% | 11.1% |
| Range | | 29–33 | 19–24 | 16–23 | 15–70 | 0–1 | 0–3 | 0–8 | 0–49 | 1–18 | 0–31 |
| Mean | | 29 | 21.2 | 18.2 | 32.9 | | | | | | |
| *Percentages do not all add up to 100 due to missing data | | | | | | | | | | | |

Dose of MK received

In all schools, a decline in the distance covered was seen after the first week of implementation; however, thereafter the average distance remained fairly stable. Table 6 summarises the dose of MK received by pupils based on the data obtained from the DTS. The average distance accumulated per child per week ranged from 0.02 km to 2.91 km. The greatest average distance per child per week was observed in School 2 with 1.34 km, and the least in School 5 (Class B) at 0.47 km.

Pupils were classed as being either low, medium or high with regards to participation using the interquartile ranges of the average distance walked and/or ran per week per pupil, taken from the DTS. Across all schools, boys were more likely than girls to be classed as high participating (44% vs 12%). Differences within classes of the same school were also apparent, particularly in School 3 where the average distance per child per week ranged from 0.73 to 2.91. Children in School 1 achieved the furthest total distance of 597.6 km closely followed by children in School 3. School 3 also had the two highest performing classes in terms of average distance per pupil and the most pupils to have completed a marathon. Meanwhile School 2, had the greatest average distance per participant of 32.28 km with 100% of participants having completed a half marathon or more.

The qualitative data support the DTS data with overall participation ebbing and flowing as initial interest and enthusiasm for MK waned before finding 'its natural level'. At the outset some MK Champions reported a mixed response among pupils with some very enthusiastic and others less so, but across all schools initial high participation in MK was followed by a gradual decline.

It started off the first couple of weeks with big mobs of children running; very very keen and enthusiastic. The assembly did enthuse them and that went really well, and then gradually as weeks have gone on numbers have gone down and down to the sort of current point where we maybe have sort of ten running at a lunchtime. MK Champion, School 5 (TP2)

There was also an expectation among school staff at the outset that MK may not have the same appeal and longevity for all pupils; however, they felt that this was typical with many initiatives introduced into school, particularly when pupils self-select to participate. Interestingly, MK Champions frequently commented on how they thought MK was more effective for particular year groups. For example, in School 1, Year 3 had the highest participation rate whereas in School 2, Year 4 were the most committed participants.

Table 6
Dose of Marathon Kids (MK) received (based on Digital Tracking System data)

| School | Class | Dose of MK received | | | | | | | | | |
|------------------|---------|---------------------|---------------------------------|--|----------|----------|------|------|-----------|------|------|
| | | Total distance (Km) | Average distance per pupil (Km) | Average distance per pupil per week (Km) | | Boys (%) | | | Girls (%) | | |
| | | | | Min-max | Low | Medium | High | Low | Medium | High | |
| School 1 | | 597.6 | 21.3 | 0.76 | 0.14–1.7 | 25 | 25 | 50 | 25 | 58.3 | 16.7 |
| School 2 | | 258.2 | 32.3 | 1.34 | 0.92–1.8 | 50 | 0 | 50 | 16.7 | 66.7 | 16.7 |
| School 3 | Class A | 724.0 | 27.8 | 1.33 | 0.73–2.9 | 25 | 25 | 50 | 61.5 | 30.8 | 7.7 |
| | Class B | 447.1 | 26.3 | 1.25 | 0.81–1.8 | 20 | 30 | 50 | 0 | 66.7 | 33.3 |
| | Class C | 602.7 | 23.2 | 1.10 | 0.80–1.6 | 0 | 66.6 | 33.3 | 17.6 | 82.4 | 0 |
| School 4 | | 419.8 | 16.8 | 0.76 | 0.20–1.3 | 0 | 50 | 50 | 30.8 | 61.5 | 7.7 |
| School 5 | Class A | 448 | 20.4 | 0.81 | 0.02–1.9 | 28.6 | 21.4 | 50 | 12.5 | 50 | 37.5 |
| | Class B | 247.4 | 11.8 | 0.47 | 0.02–0.9 | 11.1 | 77.8 | 11.1 | 40 | 60 | 0 |
| Total (n) | | | | | | 15 | 28 | 34 | 24 | 51 | 10 |
| Total (%) | | | | | | 19.5 | 36.4 | 44.1 | 28.2 | 60 | 11.8 |

*Based on data from 162 pupils (km = kilometre)

Level of implementation

Schools were categorised as being high, medium or low implementers based on a combination of the interquartile range of dose of MK delivered, and fidelity of delivery (see Table 7). One school was classified as having a low level of implementation (School 5), three as medium (Schools 1, 2 and 3), and one as having a high level of implementation (School 4).

Table 7
Summary of the level of implementation of Marathon Kids (MK)

| School | Dose of MK delivered | Fidelity of delivery to MK (%) | Level of implementation of MK |
|----------|----------------------|--------------------------------|-------------------------------|
| School 1 | Medium | 81.25 | Medium |
| School 2 | Medium | 81.25 | Medium |
| School 3 | Medium | 75 | Medium |
| School 4 | High | 81.25 | High |
| School 5 | Low | 75 | Low |

Quality of Implementation

The quality of delivery of MK by teachers was assessed via interviews with school staff, focus groups with pupils, and observations. Several themes were identified. Staff capacity and staff buy-in were felt to be the most important determinants of how well MK had been implemented and drove many of the decisions regarding delivery. Noticeably, the role of the MK Champion within each school was thought by some to be a significant factor relating to the effectiveness of the programme's implementation. This was not only in terms of their ability to engage pupils and encourage participation but also in terms of ensuring MK was manageable and 'working for the school'. This was contextualised to the school, although there was an agreement from all that the role of the MK Champion was an essential element of the programme.

I think the programme needs someone who, someone in charge really because it would fall apart. MK Champion, School 1 (TP6)

For example, the MK Champion in School 1 was chosen for the role because it complimented her other responsibilities within the school, (i.e., as lead for healthy schools). In School 2, the deputy headteacher felt that her strategic role within the senior management team helped to gain staff buy-in and ensure that *"Marathon Kids became part and parcel of what we do as a school"*. The influence of the MK Champion was most evident in School 3 given the synergy between the nature and ethos of the programme and his responsibility as PE lead, and in schools 4 and 5 by the absence of a MK Champion as a figurehead for the programme.

All teachers approved of their schools' participation in MK and were supportive of pupils taking part, agreeing that the anticipated health benefits were important and valued. However, all MK Champions and many teachers discussed lack of time as a limiting factor to the degree to which they and other members of staff had been able to engage with the programme.

Teachers are very busy people and lunchtimes in particular are very busy. You're trying to have your lunch first of all and then set up for the afternoon lessons. That's what lunch hours tend to be so there was limited opportunity for us to go out there. MK Champion, School 5 (TP5)

Many pupils highlighted a lack of support from class teachers particularly as time progressed (e.g., in praising their participation and/or providing feedback on their progress). Some teachers, however, were active role models and firm advocates for the programme. Most notably, this was seen in School 1 where both the headteacher and MK Champion participated alongside the pupils. Indeed, in this school staff participation in MK was highlighted by all pupils as being an enjoyable element of the programme and provided a rare opportunity to chat informally with the headteacher. It was also evident during the observations that the headteacher's participation in MK was influential in setting a level of expectation for the school and establishing participation in the programme as the norm.

We have some staff members who were 'well why are we doing that for all the classes?'. I don't have many negative nellies, I'm hoping that because I'm going to go out there and do it, and [MK Champion] has said that she wants to, I'm hoping that we can bring them along with the tide. Headteacher, School 1 (Pre-programme)

In Schools 1, 3 and 5, delivery was predominantly facilitated by the MK pupil Ambassadors with varying degrees of support from the MK Champions and/or other members of staff. This was an efficient method of delivery in School 1, with the introduction of a rota system leading to a structured and organised running of the programme. However, other schools relied almost entirely on the MK Ambassador input due to limited school capacity to organise and champion the programme and at a detriment to the quality of the programme.

For all schools, the timing of MK was determined by logistical influences such as the capacity to supervise and manage the delivery of MK. School 4's high level of implementation of MK was partly attributed to the fact that lunchtime supervisors coordinated delivery. Indeed, when observed, the MK sessions appeared to be an organised and consistent part of the school's lunchtime routine.

Most of the time now you don't even know you're doing it because you automatically just do it and you don't know that you are just doing it yourself. Year 5 boy, School 4 (TP5)

School 2 (federated with School 4), used the same approach to delivering MK where the MK Champion also frequently referred to the programme as becoming *'routine'* and part of the *'status quo'*. However, participation in MK was equally perceived by many pupils from both schools as a compulsory activity whereby they were required to achieve a minimum number of laps before being *'allowed'* to play, and indeed the lunchtime supervisors were often observed providing instructions to pupils in an authoritarian manner rather than encouragement. While this style of implementation may have contributed to the high dose of MK, it may have been at the expense of pupils' sense of enjoyment and autonomy of the activity, as one pupil stated: *"Sometimes it's a bit of a torture because you just want to play."* Year 5 boy, School 2 (TP5).

Conversely, in School 5, roles and responsibilities for delivering MK were not so clearly defined. Consequently, frequent disagreements were observed among the MK Ambassadors and between the MK Ambassadors and other pupils in the playground leading to disruption in delivery. In this school, pupils felt that adult support was needed to deliver MK, specifically to help protect the integrity of the monitoring system (i.e., the perception that pupils lacked authority to deal with cheating and disruptive behaviour). In hindsight, teachers also reflected on this challenge.

Yeah in all honesty I didn't have the time to run it properly. What it really needed is a member of staff out there in a tracksuit and trainers every day running alongside the children, being that role model. MK Champion, School 5 (TP6)

The distal nature of most of the MK Champions to pupils' participation in MK furthermore meant that there was often a delay in them receiving feedback on their progress and distance covered, if they received any at all. Many pupils described how this compromised their motivation to participate in MK.

We should get like a 'well done' from our teachers. They don't really say anything... I think it would encourage us to keep doing more and more bands. I think that would like encourage us. Year 5 girl, School 4 (TP5)

Discussion

This evaluation was conducted to determine the extent to which a school-based running programme, MK, was implemented. Specifically, it sought to understand the key elements of implementation including reach, fidelity and dose.

Reach

MK appeared to appeal equally to both the active and non-active pupils in the schools; however, boys were more likely to be classified as high participating than girls. This is perhaps not surprising given that pre-programme a higher percentage of boys were meeting the physical activity recommendations, and gender differences in physical activity participation is one of the most pervasive findings in the literature (28). Systematic gender differences in how school-based running programmes are received has also recently been reported elsewhere (29). Research further suggests potential differences in how much physical activity children gain from interventions, with a greater tendency for girls to (verbally and physically) interact together while participating (30). This is significant as social factors are powerful motivations for children's participation in physical activity, especially for girls (31) and this seems to be the case here. Previous research posits that physical activity could provide an appropriate context within which to facilitate the development of peer relationships (32) and that friendships are associated with the promotion of self-worth, positive attitudes toward physical activity, and an increased likelihood of continued participation (33). Given the social nature of walking and/or running (with autonomy over how e.g., in pairs and/or groups) and incorporating both participants and MK Ambassadors, MK appears to provide appropriate opportunities for this. It is recommended that schools encourage staff to participate and become role models for the initiative as well as encourage pupils to participate together and facilitate social cohesion.

Fidelity

All schools implemented MK with good fidelity, achieving 75% or above adherence to the programme's implementation strategies. The qualitative data confirms that this may be attributed to the simple nature of the programme and suggests that it is easier to achieve good fidelity with simple programmes such as MK, compared to more complex multicomponent programmes which are susceptible to poor fidelity, particularly in real world contexts (11). There is also the added benefit of such programmes requiring very little or no ongoing investment in infrastructure and resources, making it credible for large scale dissemination and adoption (34). Whilst these findings suggest that more could be done to improve the fidelity of MK's implementation, the appropriateness of 100% fidelity, has been called into question (35,36). Durlak (2015) (35) contend that there may be a minimum threshold for implementation fidelity at which desired programme outcomes are obtained. Indeed, heterogeneity in implementation is expected. This is particularly so within a school setting where adaptation is a necessity for strategies which target one or more levels within the system that supports the adoption and implementation of the intervention (37). Planned adaptations to the implementation of MK were seen in the current study and are recommended (e.g., issuing of rewards and certificates and logging of laps); however, it is important that the underlying features of the programme are maintained (38).

Dose delivered

Although the programme was delivered with high fidelity, the dose of MK delivered differed considerably between schools. Interestingly, the high frequency of sessions in some schools did not translate to distance accumulated. Recent literature comparing the implementation of a school-based run/walk programme and a classroom-based physical activity break reported that the run/walk programme offered a higher dose of physical activity programming (27). The variation could be partially accounted for by the delivery of MK at different times of the day, and hence the degree of autonomy they allow (16), as well as the variability in influence of the MK Champion. The presence of a champion, (i.e., an individual with sufficient influence and autonomy to galvanise the whole school and secure commitment from staff and pupils), has been demonstrated to be a predictor of school physical activity programme implementation (39) and to influence pupils' participation (16). Indeed, champion-led programmes have advantages with respect to their acceptability, feasibility, and sustainability (40) and it is possible that their involvement, or lack of it, within the participating schools is responsible for some of the effect on dose (delivered and received) within the current study. For meaningful sustained impact, it is recommended that schools recruit a member of the school community who is willing and has capacity to lead the initiative, as a champion.

Dose received

In all schools a decline in participation in MK was seen after the first couple of weeks suggesting a novelty effect, whereby the programme's perceived newness may have had an initial motivational effect on pupils which was not sustained over time (41). This is consistent with the findings observed in many other school-based interventions (42). Motivational constructs such as enjoyment are believed to be an important determinant of long-term participation (43) and likely to play a more important role in sustaining participation. It is recommended that schools emphasise fun and enjoyment of school-based running programmes and developing a positive experience over and above competition or distance covered. This can be helped by communicating and reinforcing the multiple benefits of participating to pupils, particularly the more immediate short-term benefits (e.g., fun, opportunity to get some fresh air and spend time with friends).

Strengths and limitations

The strengths of this study included the use of mixed methods, measures at multiple levels (i.e., school and individual) and the collection of these data at multiple time points during implementation and at follow-up, thereby providing a more holistic understanding of the implementation context in a sample of English primary schools.

Whilst the modest sample size may limit the generalisability of the findings, a strength of the study was the recruitment strategy employed to ensure, as far as is possible, representativeness (in terms of size, socioeconomic status and geographic location). Due to financial limitations and the ambition to have equitable representation, the evaluation only focused on one year-group (Year 5). Whilst this may limit the applicability of the findings across the primary school setting more broadly the benefit of using this approach was the ability to examine within-school differences between Year 5 classes within the same school.

Conclusion

Findings suggest that MK is a simple, yet versatile programme which can be implemented in a variety of school-based environments. The programme had good reach and was delivered with good fidelity, although the dose of MK (delivered and received) fluctuated. Many contextual factors, which differed between schools, influenced the quality of implementation and the frequency of delivery. Whilst this complexity provides challenges, it may also offer opportunities to optimise implementation and inform adaptations specific to the schools' contexts, thereby increasing the likelihood of positive outcomes and programme sustainability.

Abbreviations

MK: Marathon Kids; UK:United Kingdom; KRF:Kids Run Free; DTS:Digital Tracking System; IDAC:Income of Deprivation Affecting Children Index; TP:Time point; PE:Physical Education; IMD:Index of Multiple Deprivation; eFSM:Free School Meal Eligibility; SD:Standard Deviation; MVPA:Moderate to Vigorous Physical Activity

Declarations

Ethics approval and consent to participate

The study has been approved by the Human Participants Ethics Subcommittee of Loughborough University (R16-P116). All participants provided written informed consent and verbal assent prior to participation in any data collection. Parental consent to participate was also obtained from the pupil's parents and carers and each school provided written consent to participate in the study signed by the headteacher.

Consent for publication

All participants gave permission for their data to be published in an anonymized form.

Availability of data and materials

The data sets supporting the conclusions of this article are available upon request to the corresponding author.

Competing interests

None declared

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Authors' contributions

AC and LS initially conceived the original study design. AC collected data and led the analysis. LS and AR independently checked the initial qualitative coding strategies and emerging coding frameworks and LC, JH and TG then served in the capacity of a peer-debriefers. AC conceived and wrote the first draft of the manuscript. All listed authors reviewed and contributed feedback and critical comments on drafts of the manuscript before approving the final version. All authors read and approved the final manuscript.

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Figures

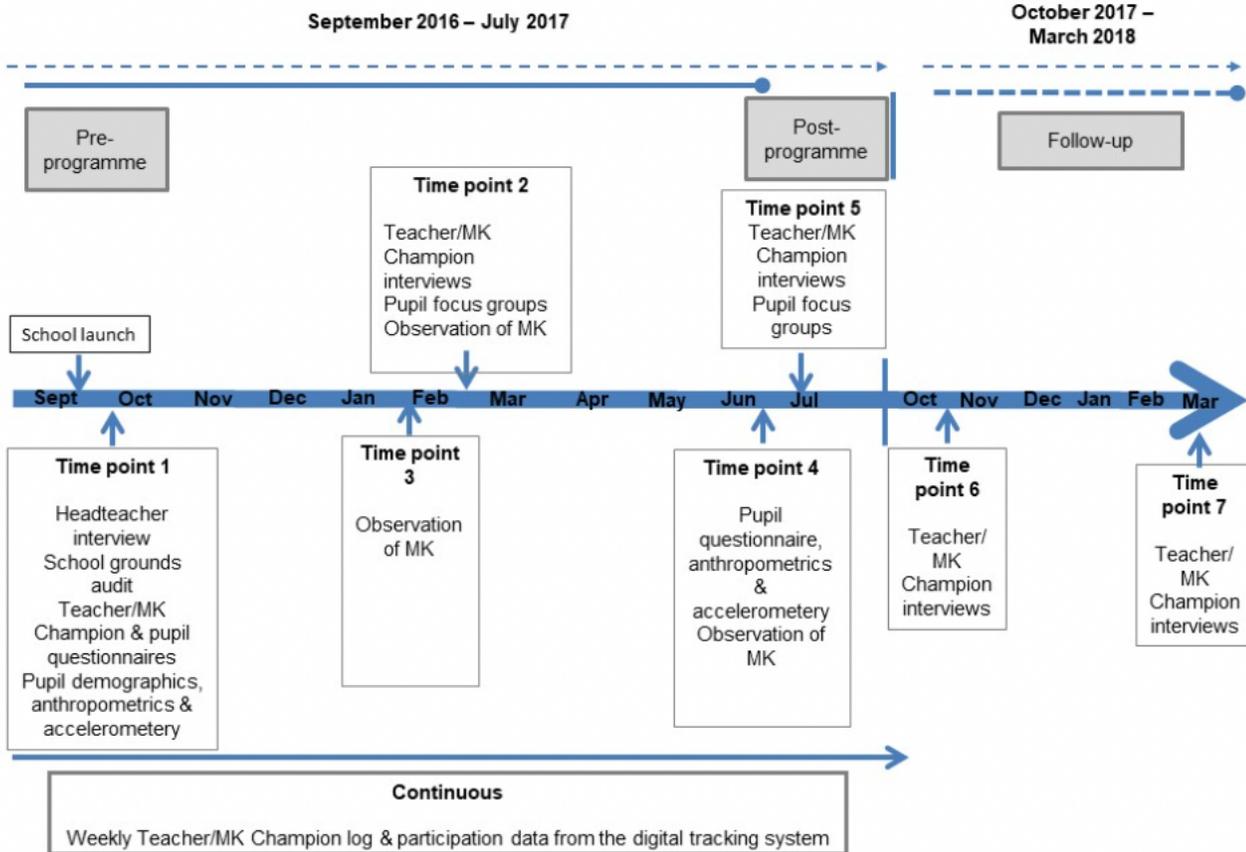


Figure 1

A summary of the evaluation process for Marathon Kids (MK)

Supplementary Files

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