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Exploring the public health potential of a mass community participation event

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ABSTRACT

Background The role of mass participation sports events in encouraging regular physical activity is under-researched. This study explored the public health potential of parkrun, a UK-wide network of free weekly timed 5-km runs in public parks.

Methods A total of 7308 adult participants of parkrun self-reported demographic characteristics, current physical activity and the perceived impact of involvement. Objective data on attendance and 5-km performance were available from the central parkrun database.

Results At registration 25.3% of participants described themselves as non-runners, with this group including the highest proportions of females (53.8 versus 48.9% for the total sample), overweight/obese (45.2 versus 33.2%) and those with a limiting disability (6.1 versus 4.3%). The initial non-runners had the largest increase in 5-km performance (15.8 versus 10.2%), and were more likely to report health-related benefits. More regular attendance was positively associated with perceived benefits. Middle-aged and older adults were well represented overall (60.9 and 14.3% of the sample, respectively).

Conclusions Preliminary evidence suggests that parkrun is attractive to non-runners, with women, older adults and overweight people well represented. The observed fitness improvements and perceived benefits indicate the scope for investigating the effectiveness of parkrun as a cost-effective community-based intervention for improving public health.

Keywords community networks, exercise, physical fitness, public health, running

Background

In the effort to increase population levels of physical activity, community-wide sporting events (e.g. mass participation running and cycling events) have been specifically identified as having untapped potential for public health gain.[1] The inherent inclusivity of such events that inspire activity within the context of social participation may be particularly valuable for encouraging sectors of the population that tend to have lower physical activity levels, for example older adults, women, ethnic minorities and those who are overweight or with health problems.[2]

Despite the popularity of mass events, there is a lack of studies evaluating their impact on sustained physical activity involvement among participants.[3] In a rare example, a prospective follow-up of 2020 participants of the 2007 Dublin Women's Mini-Marathon (10 km), demonstrated the scope of such events for physical activity promotion.[4] The proportion of participants meeting physical activity guidelines had risen from 33% pre-event to 37% 6 months after, with 48% having increased weekly activity by the equivalent of 60 min at moderate intensity. Nonetheless, an additional 41% had reduced their physical activity by the same amount, of which almost half had regressed to low levels of physical activity insufficient for health benefit.[4,5] A subsequent analysis of participants in the 2008 event indicated that 11% had relapsed to low levels within 3 months, and the authors suggested that although mass events can act as a motivator for physical activity, many

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participants need reinforcement strategies to maintain activity after the event.[6]

One rapidly growing mass community event that has potential public health benefit is parkrun. Starting in London in 2004, parkrun has grown into a UK-wide series of free, weekly, timed 5-km runs in public parks, and is expanding internationally.[7] Organized by volunteer teams, the aim is to promote physical activity and community spirit, by providing a safe and supportive environment for exercise. All parkruns take place every Saturday morning throughout the year, with participants running, jogging or walking, all or part of the course. An online registration and results system enable participants to monitor their attendance and progress over time.

From the public health perspective parkrun is notable for encouraging vigorous exercise (jogging/running) which may confer greater health benefits than lower intensity physical activity,[8] and is emphasized in the current physical activity guidelines.[9] Participation barriers are minimized, with no upper or lower age limit, no special clothing or equipment required, and no direct costs. Although some participants already run prior to starting parkrun, others are new to exercise, and parkrun provides the opportunity and support for becoming regularly active. Furthermore, unlike many mass participation events which are one-off or annual affairs, parkrun offers this opportunity on a continuous weekly basis.

Despite anecdotal reports that parkrun has contributed to the adoption and maintenance of regular physical activity, and led to health and well-being benefits for many individuals, no formal evidence exists. This study provided preliminary data to explore the potential for parkrun as a public health intervention through a national survey of participants. We were interested in the extent to which parkrun attracts new exercisers, and particularly those from population sectors traditionally low in physical activity. Furthermore, if health-related improvements in association with parkrun participation were reported, this would suggest scope for future prospective research to examine the potential public health impact of parkrun. Specific objectives were to (1) characterize the parkrun population with regard to socio-demographic and physical activity variables and (2) examine the association between objectively recorded participation levels and fitness change, and subjectively reported outcomes of parkrun involvement.

Methods

Approval was granted by Loughborough University Ethical Advisory Committee to conduct a cross-sectional survey with registered adult participants of parkrun in the UK. All participants provided informed consent and were offered online or paper versions of study materials.

Participants

All registrants of a UK parkrun aged 18 years or above were invited to the study via the weekly parkrun e-mailed newsletter, results e-mails, event websites, the parkrun forum and social networking sources (Twitter, Facebook). Additional recruitment sources were pre-run announcements, posters and flyers at individual events, and an interview with the researchers on the parkrun show, a weekly podcast. All participants completing the questionnaire were invited to enter a random draw to win one of two prizes donated by adidas. Data were collected between February and June 2012.

Measures

Self-reported socio-demographic information included gender, date of birth, marital status and ethnic group. Four questions on employment status, size of employer, supervisory status and occupation category were included for deriving socioeconomic class using the self-coded version of the National Statistics Socio-economic Classification (NS-SEC).[10] In addition, participants reported their height and weight (for calculating body mass index), and answered two questions on general health status, and limiting disabilities or health problems lasting 12 month or longer, from the 2011 census for England and Wales.[11]

Current physical activity was assessed using the International Physical Activity Questionnaire (IPAQ),[12] which asks about the frequency and duration of vigorous and moderate intensity activity, walking and sitting behaviour, over the past 7 days. Participants also self-reported their running status at the time of registering for parkrun as 'regular runner/jogger', 'occasional runner/jogger' or 'non-runner'. Information supplied from the parkrun database for each study participant (identified by unique barcode) included the total number of runs and the date, time and age-graded score of the first, the most recent, and the fastest run.

Subjective ratings of participants' perceptions of the impact of parkrun involvement were recorded for six outcomes identified from written anecdotal reports sent by participants to the parkrun newsletter. These outcomes (fitness, health problems, weight control, mental well-being, confidence for running, sense of community) were rated on a five-point ordinal scale (2 = strongly positive; 1 = slightly positive; 0 = no impact; −1 = slightly negative; −2 = strongly negative).

Data analysis

Non-parametric statistics were used for analysis to accommodate the non-normal distribution of data for all variables. Participant characteristics were summarized using descriptive statistics, i.e. percent, median, interquartile range (IQR). Associations between variables were examined using χ^2 tests for categorical data and Spearman's rank correlation coefficients for continuous data. Group comparisons were examined using Mann–Whitney and Kruskal–Wallis tests.

Age was calculated from date of birth and body mass index (BMI) from weight and height data (kg/m^2). The four NS-SEC questions were combined to derive socio-economic class using the standard three-step procedure.[10] Physical activity data were summarized in accordance with the IPAQ scoring protocol[13] to categorize participants meeting criteria for high, moderate and low levels of activity. The high category is considered sufficient for health enhancement and requires at least 3000 MET min accumulated over 7 days, or 1500 MET min of vigorous-intensity activity accumulated over 3 days or more. This volume of activity is equivalent to five 30-min bouts of moderately intense activity, or three 20-min bouts of vigorously intense activity, per week on top of a basal 60 min of moderate-intensity activity per day.

The 5-km times recorded at parkrun were used as an approximation of the fitness of participants, since a strong correlation between 5-km performance and maximum oxygen uptake exists.[14] Raw times from parkrun are also converted to age-graded scores based on a comparison with world best times for the gender/age group, resulting in a percentage score.[15] Percentage change in age-grade score relative to initial performance was calculated using the difference between the first run and the fastest run, divided by the first run.

Regularity of attendance was calculated using data from the parkrun database to represent the number of runs completed as a percentage of the number of Saturdays in the period between the participant's first and most recent run. Participants ($n = 492$) who had been attending for fewer than 5 weeks were excluded from this calculation, as this was considered too soon to reflect a genuine pattern of attendance. Including these participants may involve the risk of inflating scores for this variable (e.g. by participants who had attended 2 out of 2 weeks scoring 100% attendance).

Results

Survey response

A total of 7308 participants from 130 events provided valid data for the study. This represented 46.8% of the mean number of adults taking part in a UK parkrun per week during the study period (7308/15 625). A regional analysis showed that the response rate ranged from 57.8% in South West England to 27.7% in Northern Ireland. Data on gender and age were available from the parkrun registration database to indicate the representativeness of the study sample of the wider parkrun population. This revealed a similar male/female ratio (51.1/48.9% for the sample versus 51.7/48.3% for the total registered adult population), and a slighter higher mean age (43.4 versus 37.3 years).

Participant characteristics

Table 1 summarizes the socio-demographic characteristics and physical activity levels of the total study sample, and according to initial running status. Less than half the sample (47.0%) identified themselves as regular runners when first registering for parkrun. The remainders were either occasional runner/joggers (26.0%) or non-runners (25.3%). Comparison of participant characteristics by initial running status indicated several differences. Firstly, the representation of women was greater among former non-runners (53.8%) than among occasional (48.9%) or regular (45.9%) runners ($\chi^2 = 30.0$; $P < 0.0001$). Similarly, reports of a limiting disability or health problem were higher among the former non-runners (6.1%) than the occasional (3.9%) or regular (3.5%) runners [$\chi^2 = 20.5$; $P < 0.0001$). The proportions of participants who were overweight or obese differed significantly between the three groups of former non-runners (45.2%), occasional runners (36.1%) and regular runners (25.7%) ($\chi^2 = 210.3$; $P < 0.0001$). Finally, differences in physical activity based on initial running status were evident. The proportions reaching the highly active threshold significantly differed between each of the three groups ($\chi^2 = 339.5$; $P < 0.0001$), as did weekly minutes of vigorous intensity activity and total physical activity (all Mann–Whitney comparisons $P < 0.0001$).

Participants had been attending parkrun for a median of 51 (IQR: 21–101) weeks. The median score for regularity of attendance at parkrun was 42.3% (IQR: 14.0–60.6). A Kruskal–Wallis test indicated that initial non-runners attended more regularly (50.0%; IQR: 31.8–66.7), than occasional (42.9%; IQR: 24.6–60.0) and regular runners (37.5%; IQR: 20.7–57.1) [χ^2 (2, $n = 6646$) = 192.4; $P < 0.0001$].

Health and well-being impact

Using 5-km times converted to age-graded scores as an approximation of the fitness change of participants, Fig. 1 shows the median performance level of participants at their first parkrun, and their fastest parkrun based on initial running status. Across the whole sample, the median improvement relative to the first run was 10.2% (IQR: 5.0–

Table 1. Participant characteristics by running status at registration

Characteristic	*Total sample (n = 7308)*	*Running status at registration*		
		Regular runner (n = 3433)	*Occasional runner (n = 1901)*	*Non-runner (n = 1850)*
Gender, *n* (%)				
Male	3733 (51.1)	1857 (54.1)	972 (51.1)	855 (46.2)
Female	3574 (48.9)	1575 (45.9)	929 (48.9)	995 (53.8)
Age, *n* (%)				
18–34 years	1780 (24.4)	688 (20.1)	553 (29.2)	496 (27.0)
35–54 years	4452 (60.9)	2116 (61.8)	1136 (60.0)	1126 (61.2)
≥55 years	1046 (14.3)	618 (18.1)	204 (10.8)	218 (11.8)
Ethnic group, *n* (%)				
White	7012 (95.9)	3319 (97.6)	1812 (96.3)	1768 (96.5)
Non-white	227 (3.1)	82 (2.4)	69 (3.7)	65 (3.5)
National Statistics Socioeconomic Classification (self-coded method), *n* (%)[a]				
Class 1 occupations	5356 (73.3)	2536 (77.8)	1423 (77.8)	1312 (74.5)
Class 2–3 occupations	906 (12.4)	393 (12.0)	235 (12.8)	261 (14.9)
Class 4–5 occupations	465 (6.4)	238 (7.3)	108 (5.9)	113 (6.5)
Unclassified (never worked)	237 (3.2)	94 (2.9)	64 (3.5)	74 (4.2)
Weight status (body mass index), *n* (%)				
Normal weight (≤24.9)	4825 (66.1)	2536 (74.3)	1209 (63.9)	1004 (54.8)
Overweight (25.0–29.9)	2032 (27.8)	787 (23.1)	563 (29.8)	647 (35.3)
Obese (≥30.0)	398 (5.4)	87 (2.6)	119 (6.3)	181 (9.9)
Limiting disability/illness, *n* (%)				
None	6979 (95.5)	3304 (96.5)	1823 (96.1)	1736 (93.9)
Limited a little/lot	313 (4.3)	119 (3.5)	74 (3.9)	112 (6.1)
Physical activity level, *n* (%)				
High (health-enhancing level)	4221 (57.8)	2391 (75.1)	1010 (56.7)	817 (47.1)
Moderate or low	2485 (34.0)	794 (25.0)	772 (43.3)	918 (52.9)
Physical activity minutes per week (median and IQR)				
Total activity	360 (240–540)	410 (285–590)	330 (220–495)	300 (298–458)
Vigorous intensity activity	160 (90–240)	180 (120–300)	135 (90–210)	120 (60–180)

[a]1, managerial and professional occupations; 2, intermediate occupations; 3, small employers and own account workers; 4, lower supervisory and technical occupations; 5, semi-routine and routine occupations.

17.2), with a Kruskal–Wallis test revealing significantly greater improvements for the initial non-runners (15.8%) than occasional (11.3%) and regular (7.6%) runners [χ^2 (2, $n = 7122$) = 794.6; $P < 0.0001$]. No inter-group differences in performance improvement were observed based on demographic or health characteristics. There was a moderately strong correlation ($r_s = 0.53$) between performance improvement and number of runs completed.

Table 2 summarizes the percentage of participants perceiving a positive impact of parkrun involvement. Physical (fitness, weight and health) and psychological (mental well-being and confidence for running) benefits were reported significantly more frequently among participants who were not regular runners at the outset. The social aspect (sense of community) did not differ by initial running status.

Figure 2 compares the proportions of participants reporting a positive impact of parkrun based on attendance regularity. χ^2 analyses suggested that for all outcomes there was a positive association between frequency of attendance and perceived benefit ($P < 0.0001$).

Discussion

Main finding of this study

This study provides preliminary data on the profile of parkrun participants, their change in fitness and their perceived changes in health and well-being. The majority of participants were not regular runners or joggers before registering for parkrun, with a quarter doing no running/jogging at all. This quarter was more likely to include women, and those

who were overweight, or with a limiting disability or health problem: all groups that are overrepresented in adult physical inactivity statistics.[2] The initial non-runners also recorded the greatest improvements in objective measures of aerobic fitness. Over half of all participants reported benefits for health, weight control and psychological well-being, with these benefits consistently reported most frequently by those who attended most regularly.

What is already known on this topic

Socio-demographic characteristics of parkrun participants can be compared with population-based data from Sport England's Active People Survey on the number of adults participating in any form of recreational running, jogging or athletics at least once per week.[16] These data indicate annual increases among both men and women, with the gap between them narrowing each year. Nonetheless, 2012 figures show a female/male ratio of 40%/60%, whereas parkrun participation among women is only marginally lower than for men (49 versus 51%).

Older age groups are also well represented at parkrun. The Active People Survey results show that running/athletics involvement decreases with age, with 53% of younger adults (16–34 years), 40% of middle aged (35–54 years) and 7% of the older age group (≥55 years), participating weekly.[15] In contrast, parkrun is most popular among the middle aged (61%), and has a relatively high proportion of older adults (14%). The proportion of participants at parkrun reporting a limiting disability or illness (4%) is similar to the Active People Survey data (5%), but there are fewer parkrun participants of non-white ethnic origin (3 versus 10% in the Active People Survey), and only 9% were classified in the lower NS-SEC classes (i.e. lower-supervisory and technical occupations and below) compared with 49% in the Active People Survey.

The levels of physical activity reported by parkrun participants are high when compared with general population data from the European Union Eurobarometer study,[17] in which the proportion categorized as highly active was 31% across the 15 countries and 29% in the UK (36% of males and 22% of females). This is unsurprising given that parkrun represents voluntary participation in vigorous activity. However, relevant comparison data exist from another mass participation running event (2007 Dublin Women's Mini-Marathon), with 32% meeting the criteria for the highly active category.[4] Notably, the participants who were non-runners when registering for parkrun were averaging 2 h of vigorous intensity activity per week by the time of the study, with nearly half of them (47%) reaching a threshold of physical activity considered sufficient for health benefits. Furthermore, these participants also had the largest improvement in fitness during their involvement with parkrun. This is an important observation from the public health perspective, since vigorously-intense physical activity is most strongly associated with health-related fitness and health gain.[18]

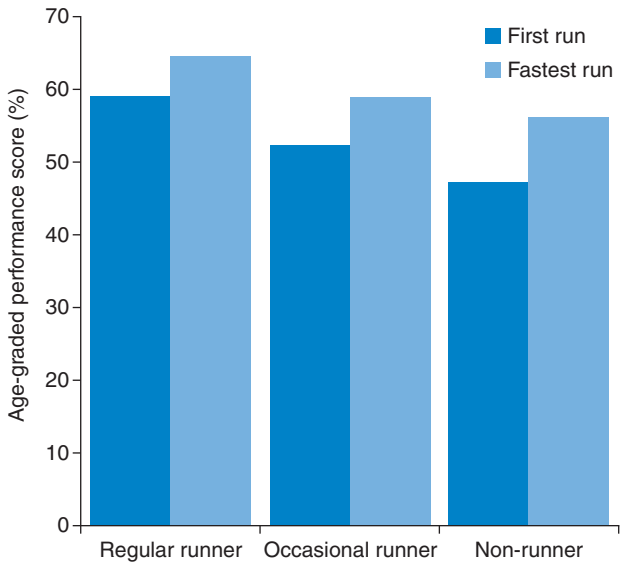

Fig. 1 Change in the performance level of participants from their first to their fastest parkrun based on initial running status.

Table 2. Difference in the proportions of participants reporting positive outcomes attributable to parkrun, based on running status at registration

Self-reported outcome	*Regular runner,* n *(%)* (n = *3396)*	*Occasional or non-runner,* n *(%)* (n = *3714)*	*Relative risk (95% confidence intervals)*	*Significance (P)*
Fitness	2905 (85.4)	3589 (96.4)	1.13 (1.11, 1.15)	<0.0001
Health problems	1303 (38.5)	2109 (57.0)	1.48 (1.41, 1.56)	<0.0001
Weight control	1434 (42.2)	2425 (65.3)	1.55 (1.48, 1.62)	<0.0001
Mental well-being	2573 (75.7)	3230 (86.7)	1.14 (1.12, 1.17)	<0.0001
Confidence for running	2161 (63.7)	3204 (86.0)	1.35 (1.31, 1.39)	<0.0001
Sense of community	2956 (87.0)	3177 (85.4)	0.98 (0.96, 1.00)	0.055

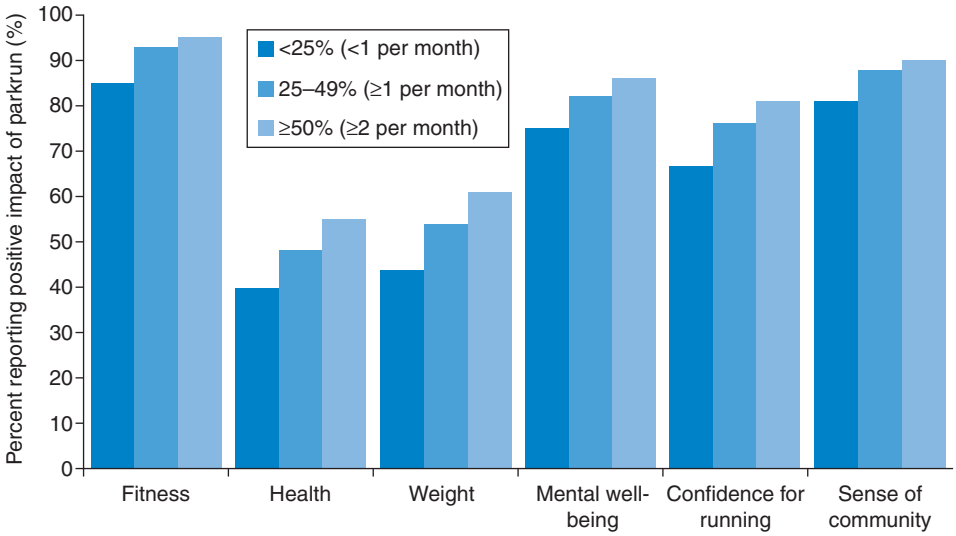

Fig. 2 Percentage of participants reporting positive health and well-being outcomes of parkrun, based on attendance regularity.

In addition to observable fitness changes, subjective ratings of the impact of parkrun suggested that the majority of participants benefitted in terms of health, weight control and psychological well-being. The value of exercise for helping manage a range of health conditions or symptoms is well established.[19] However, there is also evidence that exposure to green space is associated with health outcomes,[20] and has a role in reducing socioeconomic health inequalities.[21] Additionally, spending time outdoors and among nature has been demonstrated to positively affect psychological health.[22]

What this study adds

This study provides the first data on the public health potential of parkrun, a rapidly growing, regular, free, inclusive and community-based physical activity opportunity. The preliminary evidence suggests that parkrun may contribute to increasing physical activity and well-being among community members. The perceived impact of taking part includes physical, psychological and social benefits, and a sizable proportion of non-runners are progressing to regular vigorous exercise and increasing their fitness after starting parkrun. The overall socio-demographic profile of participants suggests that the current format of parkrun is effective in attracting some sections of the community, with women and older adults well represented, along with overweight people and those with limiting disabilities. However, the numbers of ethnic minorities and people from lower socio-economic groups are disproportionately low. It would be important to explore if this is an indicator of parkrun contributing to increased health inequalities in some areas, or a reflection of the embryonic nature of parkrun. Since people in many areas of the country do not currently live within easy access of an event, the parkrun population would not be expected to closely match the national socio-demographic spread on all variables. It may be that participation among hard-to-reach groups will rise in number as parkrun continues to expand geographically.

Limitations of this study

Given the cross-sectional design of the study, no causal relationships are implied by the results. The positive relationship observed between attendance regularity and reported impact may indicate that regular attendance leads to greater benefits, or conversely that those who perceive fewer positive outcomes attend less regularly. Furthermore, the use of several self-reported outcomes involves the potential for recall error and response biases to influence the results (e.g. for physical activity and perceived impact). However, the availability of prospective records of attendance and performance from the central database allowed objective data to be included in some analyses.

Although the sample is representative of the parkrun population based on gender and age, it is unclear for other characteristics. It is possible that the dominance of participants with high socioeconomic status may partly reflect the profile of people most likely to volunteer for a research study,[23] than accurately represent the mix of socio-demographic backgrounds of parkrun participants.

Running status at registration was retrospectively self-reported to ascertain whether parkrun attracts new people to running, as well as catering for existing runners or joggers. This variable does not assume that the initial non-runners

were inactive, since it is possible that they engaged in other forms of physical activity. A prospective study that assesses participants' physical activity at the time of registering for parkrun will provide clearer temporal evidence of any changes in overall physical activity and associated health and well-being outcomes.

Conclusion

Preliminary evidence suggests that parkrun is attractive to non-runners, with women, older adults and overweight people well represented. The observed fitness improvements and perceived benefits indicate the scope for investigating the effectiveness of parkrun as a cost-effective community-based intervention for improving public health.

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