Socio-demographic patterning of referral, uptake and attendance in Physical Activity Referral Schemes

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ABSTRACT

Background Inadequate monitoring and participant profiling have so far prevented a detailed examination of who Physical Activity Referral Schemes (PARS) are accessible to and appropriate for. As a result, the nature of the role for PARS within public health is unknown.

Methods Participants were all those referred to a countywide PARS during a three-year period (n = 3568). Participant age, gender and the deprivation level and rurality of their area of residence were compared with the average for the county population. Characteristics associated with referral uptake (attending ≥1 exercise session) and completion (≥80% attendance), were identified using logistic regression.

Results Compared with the county average, participants were older, more predominantly female (61.1 vs 51.4%) and lived in more deprived areas (p < 0.001). Referral uptake (n = 2864) was most likely in those aged 60–69 years, and least likely for residents of rural villages and the most deprived areas (all p < 0.001). For participants who took up referral, completion was most likely in men and the over-seventies (p < 0.001).

Conclusions The PARS format may be inappropriate for younger adults or people living in relative deprivation and rural areas. They appear most appropriate for adults of middle-to-old age who are more likely to require supervision, and should be targeted accordingly.

Keywords exercise referral, uptake, attendance, socio-demographic

Introduction

Increasing recognition of the role of physical activity in improving public health has resulted in a large amount of research and, more recently, policy aimed specifically at physical activity promotion.¹⁻³ General practice has responded with the development of Physical Activity Referral Schemes (PARS). Described in more detail elsewhere,⁴⁻⁵ PARS involve the referral of patients from primary care to undertake a programme of supervised physical activity lasting several weeks (usually 10–12 weeks).⁵ Since their conception in the early 1990s, PARS have continued to proliferate, becoming arguably the most prevalent primary care-based physical activity intervention in the UK.⁵ In the light of the recent guidance report on physical activity interventions,⁶ however, the future of schemes now looks uncertain.

The National Institute for Health and Clinical Excellence (NICE) recommended a halt to further use of PARS other than for controlled research.³ There is no doubt regarding the need to further explore the long-term effects of PARS on physical activity behaviour and health outcomes. However, scheme effectiveness is likely to be influenced by the characteristics of the individual referred and whether the PARS model is appropriate for them. As a result of

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inadequate recording of participant characteristics in PARS research, and recommendations to use the randomized controlled trial (RCT) approach for evaluation, it is not yet known which members of the population they are most appropriate for. Therefore, knowledge of who gets referred and who participates should help to maximize effectiveness through appropriate participant targeting.

Gaining insight into factors associated with scheme effectiveness is possible with the use of a population-based longitudinal study, an approach largely ignored in PARS research to date. To our knowledge, only one such study exists in the UK. Using epidemiological methods, the aim of this study was to help guide future targeting of PARS in the UK by identifying: (1) socio-demographic bias in who gets referred to PARS; (2) socio-demographic characteristics associated with uptake and participation.

Methods

Study design

The data used were collected routinely on all participants referred to a countywide PARS between May 2000 and May 2003. A more detailed description of this particular scheme can be found elsewhere. A longitudinal population-based design was used. Because all participants were monitored from the point of referral, this approach enabled comparisons between characteristics of participants and the county population, as well as exploring participant characteristics associated with uptake and attendance.

Sample

Out of 3711 participants referred during the three-year period, 3568 were known to reside within the county and were, therefore, eligible for comparison with the county population. Further exclusions were necessary to explore the differential uptake and participation (Fig. 1).

Assessment of participant uptake and participation

Details of all referred participants were sent by referring health professionals, mostly GPs (72.4%) and practice nurses (13.1%), to the PARS co-ordinator. Participants were then contacted and either assigned to a leisure provider or removed (excluded from further participation in the scheme). Removals were for ‘medical’ reasons, ‘psychosocial’ reasons, or because participants could not be contacted (‘no contacts’). For all those assigned to a leisure provider, uptake of referral (attendance of ≥1 session), and subsequent attendance levels were recorded by the supervising exercise professional, and participants were categorized accordingly (Table 1).

Assessment of socio-demographic characteristics

Data collected by health professionals at the point of referral included participant age, gender, address and postcode.

Table 1 Categories used to determine uptake and participation outcomes

| Category              | Description                                                  |
|-----------------------|--------------------------------------------------------------|
| Self-removal          | No contact: Not contactable by PARS co-ordinator following referral |
|                       | Psychosocial removal: Chose not to proceed with the referral |
| Assigned to a leisure provider | Assigned to a leisure provider – did not take up referral |
| Fail-to-attend        | Took up referral – attended <80% of exercise sessions          |
| Fail-to-complete      | Took up referral – attended ≥80% of exercise sessions          |
| Complete              |                                                             |
Postcodes were verified (Quick AddressTM, v2.0) and used to characterize the output areas (OA) in which participants lived. Output areas are the smallest geographical units for area-level analysis in the UK (county mean 299 residents), designed to maximize population homogeneity and minimize variation in OA size.10 Census 2001 data on car ownership, housing tenure, economic activity and household occupancy were obtained for each OA in the county and used to construct the Townsend score of material deprivation.11 The index of multiple deprivation (IMD) 200412 was also used, although data were only available at super output area (SOA) level (mean 1500 residents).

Assessment of rural–urban characteristics
As the current PARS was based in a relatively rural county, ‘rurality’ was measured using the Rural and Urban Area Classification 2004.13 Each OA was classified as urban or rural based on the population size of the settlement within which the OA resided (≥10,000 or <10,000 residents). The rural category was further subdivided, creating a four-category variable: urban, small town and fringe, village, and hamlets and isolated dwellings. Each participant’s area of residence was then classified according to their OA.

Statistical analysis
Analyses were performed using SPSS version 12 (SPSS Inc., Chicago, IL, USA). To determine bias in exposure, comparisons were made between the referred participants and the county population. Age, gender and rurality were compared using chi-squared difference tests, whereas Mann–Whitney tests were used to identify potential differences in deprivation. Logistic regression was used to identify characteristics associated with uptake and participation (four models). Four independent variables were entered into each regression model: age, gender, deprivation and rurality [age was not included in Model 1 as age data were missing for most of the ‘no contact’ group (183 out of 195)]. Analyses were repeated using different measures of deprivation and rurality, and using continuous and categorical variables for age and the Townsend score. Finally, regression analyses were repeated using each of the four Townsend z-scores in turn.

Results
Exposure to Physical Activity Referral Scheme
The proportion of PARS participants that were female was markedly higher than for the county population (Table 2). Ages ranged from 9 to 92 years (mean 50.8 ± 14.4 year).

The 40–69 year age group accounted for two-thirds of referrals (67.5%) for whom age data were available. The rural–urban and settlement type distributions within PARS participants and the county population were similar. On average PARS participants lived in areas of greater material deprivation than the county population (Townsend score). This difference was not significant for the IMD 2004 but was supported by a higher proportion of PARS participants living in areas within the most materially deprived quartile (Table 2).

Uptake and participation in Physical Activity Referral Scheme
Data from 2864 participants were included in logistic regression analysis (Fig. 1). Initial analysis was run using continuous variables for the Townsend deprivation score and age. These were subsequently replaced by deprivation quartiles and six age groups to illustrate fluctuations in the strength of age and deprivation effects across the range (Table 3). This did not alter the direction or significance of associations in any of the regression model outcomes.

The outcome from Model 1 showed that residents of more deprived and rural areas were more likely to remove themselves from the scheme at the earliest opportunity. People living in areas within the most deprived quartile had 42% reduced likelihood of being assigned to a leisure provider compared with those in the least deprived quartile. Compared with rural dwellers, those in urban areas had a 36% increased likelihood of being assigned to a leisure provider. In relation to referral uptake (Model 2), the negative influences of deprivation and rural residency were again evident, in addition to a strong age effect. Compared with the under-thirties, the odds of participants taking up referral increased in sequentially higher age groups up to 70 years, reducing thereafter. The effect was strongest in participants aged 50–69 years, whose likelihood of uptake was twice that of the youngest age group. Using only data from participants assigned to a leisure provider, outcomes in Model 3 were similar again for age and deprivation. However, the rural effect was no longer significant, which might suggest that most people removing themselves because of their rural location had done so by this stage (e.g. due to poor accessibility). Model 4 demonstrated that for all those who took up the referral the odds of completion were lower in women than men and increased with age, with a three-fold difference between the youngest and oldest age groups.

Data in Table 3 demonstrate that the magnitude and direction of relationships described were similar regardless of which deprivation or rurality variables were included. Moreover, repeated analyses with each Townsend z-score
revealed that none of the four constituent variables were dominant (data not presented).

**Discussion**

**Main findings of this study**

A prospective population-based longitudinal design allowed us to determine the suitability of the PARS model for different socio-demographic groups. Suitability was determined from differential exposure (referral) and the uptake, participation and completion of those referred. Age, gender and deprivation characteristics of PARS participants differed significantly from the county population as a whole, with over-referral of older adults (40–69 years), women and those residing in more deprived areas. Socio-demographic factors were also associated with referral uptake and scheme completion; uptake was less likely in younger adults and those from more deprived and rural areas, whereas completion was less likely in younger adults and women.

**What is already known on this topic**

Previous UK PARS evaluations have reported similar age and gender patterns in physical activity referrals. Only two published studies have considered participant socioeconomic position, but neither made comparisons with the population from which the sample was selected.

Inadequate participant profiling and tracking of participants’ progression within schemes has yielded insufficient and inconsistent evidence for socio-demographic influences on outcomes. The only published study to report data on those lost from PARS immediately following referral (Model 1) involved a subgroup of participants from the present study.8

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**Table 2** Characteristics of PARS participants compared with the County population

| Variable | PARS participants | County | Test statistic | p |
|----------|-------------------|--------|---------------|---|
| Total    | 3568 (100%)       | 497,266 (100%) |               |   |
| Gendera  |                   |        | 136.3         | <0.001 |
| Men      | 1386 (39.9%)      | 241,133 (48.6%) |               |   |
| Women    | 2182 (61.1%)      | 256,133 (51.4%) |               |   |
| Age (years)a |           |        | 1305.1        | <0.001 |
| ≤29      | 234 (6.6%)        | 168,076 (33.8%) |               |   |
| 30–39    | 476 (13.3%)       | 69,617 (14.0%)  |               |   |
| 40–49    | 571 (16.0%)       | 66,136 (13.3%)  |               |   |
| 50–59    | 810 (22.7%)       | 70,115 (14.1%)  |               |   |
| 60–69    | 636 (17.8%)       | 51,716 (10.4%)  |               |   |
| ≥70      | 265 (7.4%)        | 71,606 (14.4%)  |               |   |
| Unknown  | 576 (16.1%)       | –       |               |   |
| Ruralitya |                   |        | 43.1          | <0.001 |
| Urban    | 1773 (49.7%)      | 240,677 (48.4%) |               |   |
| Rural (total) |           |        |               |   |
| Small town and fringe |     |        |               |   |
| Villages | 690 (19.3%)       | 111,388 (22.4%) |               |   |
| Hamlets/isolated dwellings | |        | 48,235 (9.7%)  |   |
| Townsend score – mean |   |        | 0.3           | −3.6    | <0.001 |
| IMD 2004 – mean |     |        | 16.5          | −1.8    | 0.077 |
| Townsend score quartiles |       |        |               |   |
| Q1       | 1062 (29.8%)      | 124,398 (25.0%) |               |   |
| Q2       | 883 (24.7%)       | 124,370 (25.0%) |               |   |
| Q3       | 867 (24.3%)       | 124,176 (25.0%) |               |   |
| Q4       | 756 (21.2%)       | 124,322 (25.0%) |               |   |

*aChi-squared difference test used to compare PARS and County populations (χ² test statistic).

bMann–Whitney difference test used to compare PARS and County populations (Mann–Whitney z-score test statistic).

Townsend quartiles: Q1 = most deprived; Q4 = least deprived.
Rates of referral uptake have been reported in RCT-style PARS evaluations (23–49%; calculated as a proportion of the total sample of respondents to invitations to participate)\(^6\) and prospective longitudinal evaluations (43–79%),\(^6,7\) with which the 65% reported here compares favourably. However, age and gender patterns for uptake have been inconsistent and socio-economic factors largely ignored,\(^6\) with few exceptions.\(^7,14\) Rates of completion have been reported in some PARS research and, again, that reported here (31.1%) compares favourably. However, completion in longitudinal studies (12–56%)\(^6\) has often been defined as attendance at the final assessment, thus taking no account of attendance levels. Only the RCT by Taylor \etal\(^14\) defined success on the basis of sessions attended, employing a slightly less stringent 75% attendance criterion that just 16% of respondents to initial invitations achieved. The history of poor participant profiling and tracking means that there is no evidence to challenge the positive influences on completion of increasing age and male gender observed in the present study. Only Taylor \etal\(^14\) explored the influence of socio-economic characteristics, and similarly found no association.

**What this study adds**

Priority groups who tend to experience the poorest health, or be least active, include women, younger people, older

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**Table 3** Factors which predict the uptake and participation in Physical Activity Referral Scheme with corresponding Odds Ratios & 95% Confidence Intervals

|                        | Model 1: Self-Removal vs. Assigned to leisure provider | Model 2: Did not take up Referral vs. Took up Referral | Model 3: Assigned to leisure provider, did not take up referral vs. Took up referral | Model 4: Took up referral, failed to complete vs. completed programme |
|------------------------|-------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------|
| **OR (95%CI)**         | p                                                     | OR (95%CI)                                             | p                                                                                    | OR (95%CI)                                                    |
| **Gender (male vs. female)** | 1.19 (0.95–1.48)                                       | 0.124                                                 | 0.94 (0.79–1.12)                                                                  | 0.496                                                        |
| **Age:**               |                                                       |                                                       |                                                                                     |                                                              |
| Continuous             | N/A                                                   | N/A                                                   | 1.0                                                                                 | 1.0                                                          |
| ≤29 yr                 | N/A                                                   | N/A                                                   | 1.0                                                                                 | 1.0                                                          |
| 30–39 yr               | 1.35 (0.96–1.90)                                       | 0.085                                                 | 1.41 (0.98–2.03)                                                                  | 0.061                                                        |
| 40–49 yr               | 1.48 (1.06–2.07)                                       | 0.021                                                 | 1.57 (1.10–2.24)                                                                  | 0.013                                                        |
| 50–59 yr               | 2.00 (1.45–2.78)                                       | <0.001                                                | 2.04 (1.44–2.90)                                                                  | 0.001                                                        |
| 60–69 yr               | 2.41 (1.70–3.42)                                       | <0.001                                                | 2.59 (1.78–3.78)                                                                  | 0.001                                                        |
| ≥70 yr                 | 1.57 (1.05–2.36)                                       | 0.029                                                 | 1.91 (1.22–2.98)                                                                  | 0.005                                                        |
| **Depredion:**         |                                                       |                                                       |                                                                                     |                                                              |
| Townsend score (cont)  | 0.95 (0.92–0.98)                                       | 0.002                                                 | 0.94 (0.91–0.96)                                                                  | 0.000                                                        |
| Townsend score (quartiles) | 0.006                                               | 0.000                                                 | 0.93 (0.90–0.96)                                                                  | 0.000                                                        |
| Q4 (least deprived)    | 1.0                                                   | 1.0                                                   | 1.0                                                                                 | 1.0                                                          |
| Q3                     | 0.72 (0.52–0.99)                                       | 0.047                                                 | 0.85 (0.66–1.10)                                                                  | 0.211                                                        |
| Q2                     | 0.62 (0.45–0.85)                                       | 0.003                                                 | 0.75 (0.59–0.97)                                                                  | 0.026                                                        |
| Q1 (most deprived)     | 0.58 (0.42–0.80)                                       | 0.001                                                 | 0.57 (0.45–0.74)                                                                  | 0.001                                                        |
| IMD 2004               | 0.98 (0.96–0.99)                                       | <0.001                                                | 0.97 (0.96–0.99)                                                                  | 0.001                                                        |
| **Rurality:**          |                                                       |                                                       |                                                                                     |                                                              |
| Rural vs urban         | 1.36 (1.09–1.70)                                       | 0.006                                                 | 1.30 (1.09–1.55)                                                                  | 0.004                                                        |
| Settlement type        | 0.030                                                 | 0.008                                                 | 0.18 (0.97–1.43)                                                                  | 0.092                                                        |
| Urban                  | 1.0                                                   | 1.0                                                   | 1.0                                                                                 | 1.0                                                          |
| Hamlet/isolated dwelling  | 0.62 (0.41–0.91)                                       | 0.016                                                 | 0.84 (0.60–1.18)                                                                  | 0.323                                                        |
| Village                | 0.72 (0.53–0.97)                                       | 0.031                                                 | 0.67 (0.53–0.85)                                                                  | 0.001                                                        |
| Small town and fringe  | 0.79 (0.60–1.04)                                       | 0.092                                                 | 0.81 (0.65–1.01)                                                                  | 0.060                                                        |

Odds Ratios (OR) & 95% Confidence Intervals were estimated using logistic regression.

Note: Age was not included in Model 1 because of missing age data for a high proportion of the No Contact group.

IMD = Index of Multiple Deprivation.
people and disadvantaged groups.\textsuperscript{2,15,16} Therefore, apparent over-referral of women, middle aged-to-older adults and residents of more deprived areas, on the surface, suggests that PARS can reach those most in need. However, if differences in primary care consultation rates are considered,\textsuperscript{17,18} there is little evidence of bias at the point of referral, which could be interpreted as a lack of active targeting by referring health professionals. Indeed, others have found that apparent bias in primary care referrals in favour of the least affluent groups tends to disappear or be reversed when socio-economic differences in consultation rates are taken into account.\textsuperscript{17}

Given the interest in deprivation in the present study, and that all participants were tracked from the point of referral until the end of their involvement with the scheme, these data offer new insight into the socio-demographics of PARS participation. Only one previous study measured deprivation in a similar way and found that it was largely unrelated to referral uptake.\textsuperscript{7} In contrast we found that the likelihood of taking up referral was less in participants from more deprived areas. This could be attributable to differences in the approach to socio-economic measurement. Harrison \textit{et al.}\textsuperscript{7} measured deprivation at ward level using the original IMD,\textsuperscript{19} which combined more than 30 indicators of social and material deprivation. Social deprivation is notoriously difficult to measure and creating indices of both social and material deprivation can create conceptual confusion regarding exactly what the index represents.\textsuperscript{20} The Townsend score, favoured in the present study, has been criticized for its development in largely urban areas and for the inclusion of car ownership, which can have different implications in urban and rural areas.\textsuperscript{21,22} Consequently, rural–urban status was taken into account in the present study. Not only did independent deprivation and rurality effects prevail, but regression analyses using individual Townsend $z$-scores confirmed that car ownership was not dominant. Furthermore, using data at ward level typically involves aggregating data from 5000–6000 residents. Therefore, OA-level data in the present study, that were aggregated from approximately 300 residents, ensured greater sensitivity to areal socio-economic variation. Nevertheless, in order to make findings accessible to the broadest possible audience in both academia and practice, all analyses were repeated using the revised IMD 2004.\textsuperscript{12}

Overall, the reduced likelihood of younger people and residents of more deprived (and rural) areas being assigned to leisure providers or taking up referral, raises important issues concerning the public health role of PARS. For example, it would suggest that other types of intervention might be more appropriate for redressing inequalities in physical activity\textsuperscript{23} and health,\textsuperscript{24} and for promoting physical activity in a preventive capacity. However, this does not mean that PARS should be dismissed as indicated in the NICE guidance.\textsuperscript{5} As part of an overall physical activity promotion strategy PARS can reinforce wider national initiatives by providing a safe and supervised environment for people that require it, such as older people and those with specific medical conditions. Our findings suggest that rather than treating PARS as the primary care physical activity intervention, effective targeting of PARS represents a logical progression in physical activity promotion.

\textbf{Limitations of this study}

Several study limitations should be recognized. Firstly, the dichotomous completion outcome was less sensitive than using a continuous attendance variable but was more stringent than those previously used. Secondly, attendance alone cannot be used to make inferences about overall physical activity behaviour change. However, the intended role of PARS is to catalyse behaviour change through attendance of a physical activity programme and, therefore, attendance can be used as a reasonable marker of participant intention. Thirdly, the study might have been strengthened by retrospective collection of additional individual socio-economic data. Such plans were aborted because of the anticipated poor response rates and associated response bias. Finally, missing age data in the ‘no contact’ group prevented the inclusion of the age variable in Model 1, which highlights a need for even greater rigour in baseline data collection at the point of referral.

\textbf{Conclusion}

The PARS format may be most appropriate for adults of middle-to-old age, who are more likely to require supervision, and be less appropriate for younger adults or those living in relatively deprived and rural areas. Rather than referrers viewing PARS as the physical activity intervention, it would be wiser to treat PARS as a local addition to broader policy and environmental initiatives that should be recommended to some but not all population groups.

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**Ethical approval**

Not required.

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