Article

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Exploring the Perceptions of Success in an Exercise Referral Scheme: A Mixed Method Investigation

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Abstract

Background: Exercise referral schemes feature as one of the prevalent primary care physical activity interventions in the United Kingdom, without extensive understanding of how those involved in providing and participating view success. The present research explores and reveals the constituents of "success," through comparison, contradiction, and integration of qualitative and quantitative research findings. **Method:** A population-based cohort design formed the basis for a mixed method approach to the

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research. The quantitative component used a three-stage binary logistic regression to identify patient sociodemographic characteristics and referral reasons associated with three outcomes ($n = 1{,}315$). The qualitative component ($n = 28$) comprised four focus groups with patients ($n = 17$), individual interviews with exercise providers ($n = 4$), and referring health professionals ($n = 7$). The research components were compared at discussion stage to offer insights into the concept of "success." **Results:** The integrated findings highlighted the multidimensional nature of the concept of success, containing a wide range of concepts such as empowerment, inclusion, and confidence. The traditional notions of success such as, attendance, weight loss, and blood pressure reduction featured amid a more holistic view which incorporated psychological and social aspects as both influences and outcomes. **Conclusion:** These findings can enable future development of more representative evaluations of the benefits of exercise referral. This mixed methods research approach can facilitate the development of sophisticated, tailored, evidence-based interventions in the future.

Keywords
physical activity, design, evaluation, behavioural, qualitative, healthcare, policy

Introduction

Predictions of a trend toward an increasingly obesogenic nation (Department for Business, Innovation & Skills 2007) have contributed to an increased recognition of the importance of regular physical activity within public health policy in the United Kingdom and most other developed countries (Department of Health [DOH] 2008). Primary care has widely been acknowledged as an important means of changing physical activity behavior within the community (Church and Blair 2009; Gidlow and Murphy 2009; Williams 2009). Exercise referral schemes (ERS) have arguably become the most prevalent primary care physical activity intervention in the United Kingdom (Dugdill, Graham, and McNair 2005). Such schemes also continue to be embedded into the more recent initiatives, such as the "Let's Get Moving" physical activity care pathway (DOH 2009).

In order to identify factors influencing the success or failure of a scheme, to inform best practice, one appropriate study design is a prospective longitudinal observational design (Gidlow et al. 2008; Crone et al. 2011). Within the ERS context, the observational method is growing in popularity and

providing insights regarding the characteristics of the patients that utilize the schemes, scheme factors, and the associations with outcomes (Gidlow et al. 2007; Harrison, McNair, and Dugdill 2005; James et al. 2008).

It has been recommended that those who evaluate the effectiveness of ERSs should incorporate qualitative as well as quantitative measures to contribute to the development of a comprehensive evidence base (Gidlow et al. 2008; Dugdill, Stratton, and Watson 2009). This can be particularly relevant in these nonmedical forms of health care, as they may provide alternative or additional benefits aside from those captured by more traditional clinical health indicators (e.g., weight, blood pressure; McNair et al. 2005).

Utilizing a population cohort approach, the present research aims to unpack the concept of "success" by drawing on the experiences and perceptions of participants (e.g., patients, exercise providers, and referrers) alongside the observed quantifiable measures (such as sociodemographics and traditional outcome data) in an ERS in an inner London Borough. To capture and explore the complexity of success within its context, the present research adopted a mixed method approach. The research explores and reveals the components of "success," through comparison, contradiction, and integration of qualitative and quantitative research findings. The intention of the approach was to develop valid and justifiable conclusions concerning the nature of "success" and how it is viewed, through an understanding of how participants and professionals regard the meaning of success. Such understanding can inform the design of future schemes and strengthen their subsequent evaluation.

Description of the Exercise Referral Intervention

All patients were referred by a primary health care professional to the care of an exercise professional at one of the five local leisure centers, within an inner London borough. A client-centered physical activity program was negotiated incorporating goals and exercise preferences for each individual patient. Patients were offered a range of individual and group exercise sessions for a period up to 26 weeks. Every 6 weeks feedback on progress was provided for the patient by the exercise professional, allowing collaborated modification of the patient's individual goals and program. The exercise environment included gyms, exercise studios, and swimming pools. Patients were also able to access the facilities outside of the allocated times (for more information regarding the scheme see Penfold 2012). Research data collection took place during a 3-year period of the ERS.

Ethics. Prior ethical approval was granted by the University Research Ethics Committee and permission granted to undertake the research from the Bexley and Greenwich National Health Service Research Ethics committee.

Methodology and Design

A convergence design was implemented, and this involved the concurrent, but independent collection and analysis of quantitative and qualitative data (Creswell and Plano Clark 2007). The results were considered with equal weight from both components and were converged by comparing and contrasting the findings during interpretation. This convergence offered insights into the concept that within the boundaries of one study could otherwise not have been revealed (Creswell and Plano Clark 2007). The longitudinal design enabled a cohort to be followed and observed to determine changes over time. A subsample of patients along with a sample of exercise providers and referring health professionals were sourced for in-depth study.

Qualitative Component—Focus Groups and Interviews

The qualitative component ($n = 28$) comprised of three sections. Four focus groups were conducted, which 17 patients attended; ages ranged from 31 to 68 with a mean age of 54.7 ($SD = 12.4$). Four exercise providers were individually interviewed, with age ranging from 26 to 50, and a mean age of 33.5 ($SD = 9.63$). Seven individual telephone interviews were undertaken with referring health professionals who were chosen based on their willingness and availability to take part (one male, six females which comprised two doctors and five nurses). All interviews were recorded and transcribed verbatim. Grounded theory methodology informed the design and analysis of the qualitative component of the study. Data were collected across a period of 5 months. Data were managed and organized using NVivo qualitative software package (QSR International 2002), to facilitate the iterative process inherent in qualitative analysis grounded theory methodology (Hutchison, Johnston, and Breckon 2011). Initial analysis was undertaken from preliminary data, and there was continued engagement with subsequent information as it was obtained. To demonstrate research quality an account of the techniques employed is provided (Weed 2009).

Each transcript was read a number of times and the process of coding began, the size of coded passage varied as this allowed the coding to be natural (Bazeley 2007). In accordance with grounded theory, the coding was inductive without preconceived categories. The preliminary analysis

resulted in 34 free nodes. Theoretical sampling guided the data collection and allowed concepts to be explored more meaningfully. For example, initial analysis revealed the concept of "social acceptance," this guided the selection of participants for a subsequent focus group which comprised of a group of females who had become friends as a direct result of their involvement in the scheme.

The process of axial coding allowed the initial data to be reassembled. This allowed the simplistic labels used in open coding to be combined into more meaningful "in-depth" codes. Coding queries aided the examination of the data and helped reassemble the fractured data (Bazeley 2007; Hutchison, Johnston, and Breckon 2010). Merging also took place if two categories were considered to be essentially the same; such was the case with two free nodes (*determination* and *motivation*). The coding stripes tool was utilized to draw attention to discrepancies, refine coding, and to explore suggested relationships between codes (Bazeley 2007). A memo was attached to each node to allow broad thinking regarding properties and dimensions (Richards 2009). As remarked by Hutchinson, Johnston, and Breckon (2010), memoing facilitated the movement from description to analytical thinking surrounding the emerging concepts.

Examining links between categories initiated the development of an explanatory model, where the central phenomena, conditions, actions, and consequences were linked. This process was followed by the identification of a core category which then integrated the themes from the axial coding into a model. These methods in conjunction with the constant comparative method helped to clarify the developing theory (Gibson and Brown 2009). It became apparent that theoretical saturation had been achieved, through the level of conceptual density and as further data no longer sparked new insights (Charmaz 2006). This allowed the development of a theory regarding the perception of success within an ERS from the perspective of the participants, referrers, and exercise providers. Following analysis of each perspective in turn these were then further scrutinized collectively in order to allow for the construction of a unified account to outline the nature of "success."

Quantitative Component—Observational Design

All data routinely collected by the health and exercise professionals as part of scheme procedure were retained in order for this to be entered and associations examined. Health professionals collected data at the point of referral, including participant age, gender, ethnicity, occupation, primary referral reason. Attendance, blood pressure, and body mass information was

collected by exercise professionals as the scheme progressed in accordance with the schemes established protocols.

Age was retained as a continuous variable. Ethnicity was grouped into five broad categories to allow adequate group sizes for analysis. Categories were based on ethnic groupings provided by the primary care trusts, in accordance with the published guide for the collection and classification of ethnic data (DOH 2003). As a measure of socioeconomic position, patients were placed into one of the eight social classes based on occupation. The reasons for referral were grouped into eight broad categories which incorporated related conditions, similar to those chosen by James et al. (2008; cardiovascular, pulmonary, metabolic, orthopedic, neuromuscular, sensory, mental health, miscellaneous). This categorization was assisted by the International Classification of Disease (Madden, Sykes, and Ustun 2000) and was consistent with approaches in policy documents (DOH 2004). The selection of each independent variable was based on evidence from prior research, and therefore all variables were entered simultaneously into each regression stage.

Exercise professionals conducted routine assessments of patients' body mass and blood pressure. Body mass (kg) was measured using standard scales with a resolution of 0.1 kg. Blood pressure (mmHg) was determined through automated sphygmomanometry over the brachial artery at heart level after being seated for a period of 5 min. Completion reflected those that attended their final scheduled session at the end of the 26-week period. Change in body mass was determined as the difference between initial and final mass recorded at the last scheduled. Similarly, change in blood pressure was determined as the difference between initial and final mean arterial pressure (MAP). Patient data ($n = 1{,}315$) were entered into the binary logistic regression.

A three-stage binary logistic regression (Bagley, White, and Golomb 2001; Kirkwood and Sterne 2003; Field 2009) was then used to identify participant sociodemographic characteristics and referral reasons associated with the three binary outcomes of completion, weight loss, and MAP reduction. This enabled comprehension of those characteristics that were associated with these traditionally collected and reported health indicators. All goodness-of-fit tests (Hosmer and Lemeshow; Cox and Snell; Nagelkerke) suggested that the three models were good fits of the data. The predicted outcomes agreed well with actual outcomes (56–68%) in every model. Residuals were examined in an attempt to isolate any points where the model may have fit the data poorly. No cases were seen to fall outside those values deemed to cause concern (Field 2009; if further details of the quantitative phase are sought, see James et al. 2009).

Results

Qualitative Findings

Stemming from the qualitative research component (focus groups and interviews), Figure 1 depicts a construction of success resulting from the incorporation of patients, exercise providers, and referring health professionals' views. Table 1 supplements Figure 1 by providing information on theme relationships and provides examples to illustrate. The model presented centers on the core category of "Empowerment." "Empowerment" integrates concepts relating to taking part; not only referring to attending the scheme but to the patients' engagement with what the scheme has to offer. Empowerment involves connecting with both the scheme protocols and the people. This core category refers to both the desire and the ability to take part; "Kate ... I feel proud of myself and that to me is my success" (FG2, 94).

As can be seen from Figure 1, the concepts of "patient characteristics," "scheme qualities," "inclusion," and "exercise provider impact" act as the conditions that impact on the core category. Whereas "attendance" reflects an action strategy and indicates the extent to which the participants take part and utilize the scheme. Participants use this action strategy to manage the challenges/barriers that may obstruct success. When faced with problems such as low levels of confidence or environmental barriers, the action strategy may be to avoid and drop out of the scheme. The dimension of the strategy allows a gradient of responses. For example, the participant may only attend the minimum required of the scheme protocol when faced with a barrier. In practice, this could result in a participant attending the initial appointment, reassessments, and the minimum of exercise sessions. However, if the participant has sufficient levels of confidence and motivation they can respond with attendance to all that the scheme has to offer for them; Hanna: "I find this is my level now I can come to aqua twice a week I find I am comfortable with this" (FG4, 260). The consequences of the scheme are shown (Figure 1 and Table 1) as the "physical and psychological outcomes," alongside "scheme development," such as the expansion and refinement of the schemes protocols and objectives.

The model details that success is not a static concept; rather experiences can change how success is perceived through the course of engagement with the scheme. The complex nature of the experience results in potential interaction among the themes. The perceptions of success therefore have the ability to adapt over time through this interaction. The feedback pathways within the model depict this flexibility and fluid nature, (e.g., outcomes can feedback into the prerequisite conditions).

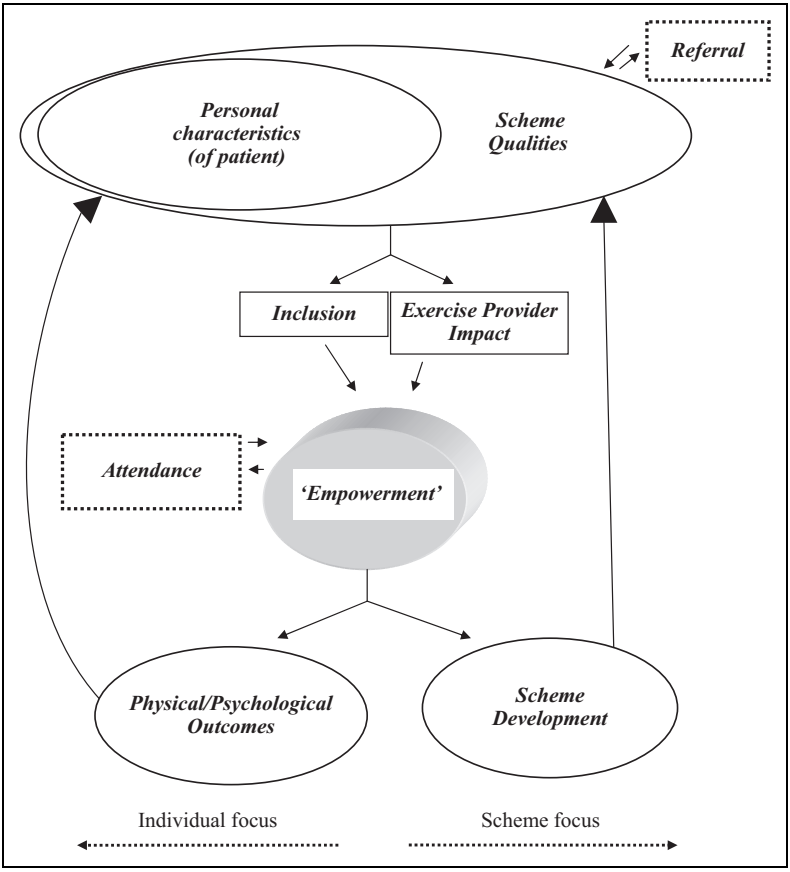

Figure 1. Conceptual framework (from qualitative research component) outlining the themes embedded in the concept "Success" (developed from the combination of patients, exercise providers, and referrers' views).

Furthermore, both sides of the model (indicated by individual and scheme focus arrows in Figure 1) also do not act independently, but serve to influence each other.

Quantitative Findings

Overall outcome results from the patients showed that 57% completed their exercise program, 33.3% achieved a weight loss, and 49.2% reduced

Table 1. Theme Explanations and Examples to Supplement (Figure 1) Qualitative Model.

Types of Themes	Explanation of Type	Theme Name in Research	Research Example	Properties of Theme
Core category	Represents what is central to the research	Empowerment	"*Kate* . . . I feel proud of myself and that to me is my success" (FG2, 94).	Engagement
Conditions—3 types: 1. Causal	Events/happenings which influence the concept	Personal characteristics	*Kate:* "I only live across the road and it's not that physical distance, it was the mental, getting out of the door, getting across there, it was losing the confidence in myself" (FG2, 162)	Confidence Motivation Knowledge Readiness to change
2. Contextual	Set of conditions that intersect, which people respond to through actions	Scheme qualities	*John:* "It's the flexibility that we can come together" (with partner; FG1, 193).	Environment Flexibility Safety
3. Intervening	Conditions that alter the impact of the causal conditions on the concept	Exercise provider impact	*John:* "They are dealing on mass but it's personal, which is fantastic" (FG1, 35).	Personalized
		Inclusion	*Rachel:* "There are all shapes and sizes here, basically you don't feel uncomfortable" (FG1, 133).	Social acceptance
Action	Purposeful acts that are undertaken to solve a problem and in doing so shape the concept	Attendance	*Lydia:* "should I turn up? should I go? that's what you think" (FG1, 61).	
		Referral	Dr. Harrison: "Increasing feedback would be a help, because it's irritating to find we have referred people inappropriately" (35).	

(continued)

Table 1. (continued)

Types of Themes	Explanation of Type	Theme Name in Research	Research Example	Properties of Theme
Consequences	Range of outcomes	Development	Emma (EP): "Just getting a bit more out in the community to help people know we are here. Yes we are very very busy but ultimately the idea is to expand" (76).	Scheme recognition
		Physical/psychological outcomes	*Hanna:* "It's rather slow mind you, with the exercise programme I find weight wise, but I have toned up beautifully' (FG4, 11) Joanne: 'I remember thinking originally that I would expect to come out of the gym feeling completely knackered, but you don't, you come out feeling you can conquer the world, that is a surprise" (FG2, 138).	Health Functionality Knowledge Confidence Appearance

Note. Adapted and Extended from Strauss and Corbin (1998).

their blood pressure. The three-stage regression analysis highlighted the associations between independent variables and the three indicators of success (captured by the quantitative data); completion, weight loss, and MAP. The findings from logistic regression Stage 1 (model 1) revealed that increasing age was associated with the likelihood of patients completing, Exp(β) = 1.019; 1.008–1.030; $p = .001$; for every increase in decade of age, there was a 19% increase in the likelihood of completing. Ethnicity was associated with the likelihood of completion, with patients in the mixed category being more likely to complete, Exp(β) = 6.310; 1.388–28.695; $p < .05$. Patients with a pulmonary condition were less likely to complete, Exp(β) = 0.546; 0.346–0.860; $p < .01$, than those referred for cardiovascular conditions. Model 2 revealed that, in comparison to the White category, patients in the mixed category are significantly more likely to achieve a reduction in body mass, Exp(β) = 3.991; 1.191–13.373; $p < .05$. Those who complete are more likely to achieve a reduction in body mass, Exp(β) = 3.541; 2.721–4.608; $p < .001$. Model 3 indicated that, compared to those in the unemployed category, patients in skilled manual occupations had an increased likelihood of achieving a reduction in blood pressure, Exp(β) = 1.875; 1.044–3.227; $p < .05$. Patients who attended also demonstrated an increased likelihood of a reduction in blood pressure, Exp(β) = 1.680; 1.250–2.003; $p < .001$, than noncompleters. Those who achieved a reduction in body mass had an increased likelihood of blood pressure reductions, Exp(β) = 1.292; 1.008–1.641; $p < .05$. All the significant results yielded from the three stages (resulting models) of regression analysis are depicted in Figure 2. For full binary logistic outcomes results, see Appendix.

Discussion

This mixed method research allowed an examination of the interaction and corroboration in the findings from both presented research components (quantitative and qualitative). Rather than taking each finding from both phases one at a time, this discussion provides an examination of the key findings of the research by considering the combination of both the qualitative and the quantitative findings. Through a process of comparing and contrasting, justifiable conclusions regarding the phenomenon of success are revealed. This integration of results is illustrated through the discussion of the key findings gained from the mixed methods study.

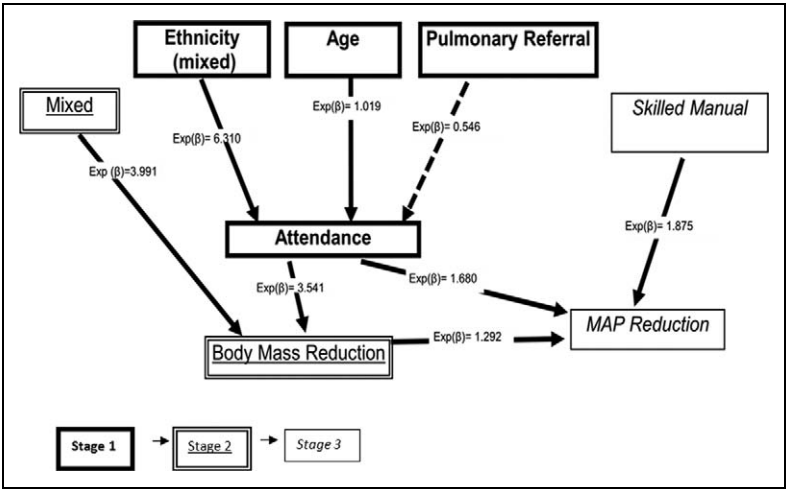

Figure 2. Variables which yielded significant findings from all three stages of the binary logistic regression analysis.

Key Findings

A key finding from the quantitative data was the positive association between increased age and the likelihood of successful attendance (Figure 2). The qualitative findings from patients incorporate a contextual theme termed *scheme qualities*; a property of this theme is labeled "safety" (Table 1). It would seem that scheme "safety" facilitated attendance among older patients because they value a safe and secure environment in order to have the confidence to take part in exercise behavior; John: "To be honest, once you have been lying there with your heart in your hands, you don't know what you should be doing actually. These guys (the exercise providers) are saying, very clearly 'it's fine, it's safe and I will do it with you" (FG1, 43). Older patients have previously reported issues relating to safety as reasons for not exercising, such as the fear of falling and aggravating medical conditions (Lim and Taylor 2005; Stathi and Simey 2007). Once these issues are dealt with in the scheme environment (such as qualified staff with knowledge of medical conditions with appropriate exercise equipment and support), it is plausible that the older generation then feel able to commit to completion of the scheme. Whether this process results in a dependency on this specific exercise environment remains to be seen. A reduction in confidence regarding exercising alone or outside of the

scheme could be a potential consequence of the ''safety'' theme. This ought to be examined in the future when attempting to fully understand the long-term implications of ERSs.

The quantitative results showed those with pulmonary conditions (when compared to those referred for cardiovascular conditions) were significantly less likely to attend. The qualitative results provide personal insight into how people with these conditions experience exercise. One patient (referred with a pulmonary condition) felt he was restricted by his breathing; Geoff: ''I mean the exercise I am doing is limited entirely by my breathing'' (FG3, 159), this then led to reduced attendance by the individual because he felt he could not progress as much with his exercise as other patients. Previous research may partly explain this association, as it has been shown that reduced physical activity may occur as a result of the chronic breathlessness and fatigue (Reardon et al. 2005). A statement on pulmonary rehabilitation suggests that consideration should be given within an intervention to facilitate the pulmonary patients' adjustment process (Nici et al. 2006), whereby patients need to be given help to diminish negative emotions and be provided with a socially supportive environment. Success for these patients therefore may be conceptualized slightly differently as the improvement they can experience in function is potentially limited by the unstable and restricted nature of these conditions.

The social features involved within the scheme were not explicitly captured by the quantitative data (due to it being challenging to measure a social construct in that manner). Furthermore, it has not been traditionally regarded as an important health indicator and is therefore not routinely included in the monitoring of physical activity programs standard evaluation protocol. However, the qualitative data indicate that inclusion on a social level can in fact either facilitate or hamper the attendance levels of a patient; Yvonne (exercise provider): ''They come for the interaction a little more than they come for the exercise'' (132). The regression analysis showed that the overall prediction from the variables included explained 59.7% of the variance leaving 40.3% of the variance in attendance that cannot be explained by the variables captured. Salient aspects from the qualitative research such as inclusion and the impact of the exercise provider may begin to offer a tentative explanation for the variance that was not accounted for. In fact, a previous meta-analysis concluded that the amount of contact and social support available (from other exercisers, health professionals, etc.) was crucial (Burke et al. 2006). The research by Burke et al. (2006) stated that as the amount

of social support increased so did the beneficial effects of the intervention. A supportive and positive social environment for exercise participation is encouraged (Nici et al. 2006), and these findings indicate that the social aspects of the scheme may be critical for optimum perception of success.

Quantitative analysis showed the explaining variables account for 67.4% of the variance in the outcome of weight loss. Although weight loss was captured as a measure of success within the routine data collection, it was rarely central to the perceptions of success. Weight loss may in fact not be perceived by the exercise providers and referrers as a decisive marker for success for all individuals, due to the differing aims and abilities of each referred patient. Some of the patients acknowledge that without the scheme they would have actually put on weight, due to their low energy levels prior to involvement and how increased age can result in weight gain (Williams and Wood 2006); Hanna: "But I know at the end of two years where if I hadn't been coming to these classes I would be worse off as I would be more overweight" (FG4 113). Weight maintenance over time, rather than weight loss, may therefore be important in the evaluation of initiatives to attenuate the increasing levels of obesity evident in society (DOH 2008).

The quantitative results demonstrate that successful attendance was significantly associated with weight loss (Figure 2) and MAP reduction, reinforcing previous research that completers significantly improve physical outcomes (Abildso et al. 2010). Attendance was perceived as an action strategy (Table 1; Figure 1). Patients were seemingly using attendance or nonattendance as a way of handling the challenges and barriers faced while participating; Lydia: "should I turn up? should I go? that's what you think" (FG1, 61). When faced with problems (such as a severely low level of confidence), some patients would only attend the minimum the scheme had to offer, or drop out entirely. Intervening conditions such as "Exercise provider impact" and "inclusion" may lead the patient to attend more opportunities offered, due to the feelings of acceptance associated with these themes; John: "If it's supported by a pleasant and friendly environment then you get a pleasant experience, why wouldn't people come back" (FG1, 122).

If the patient had managed to successfully attend, and therefore cope with the challenges, the quantitative results indicate that these patients can expect an improved chance of achieving weight loss and a reduction in MAP. These findings show the possible implication of schemes that are utilized effectively, for key public health contemporary concerns such as

obesity and hypertension (National Institute for Health and Clinical Excellence [NICE] 2006a, 2006b; Department for Business, Innovation & Skills 2007; Marmot 2010).

Limitations of This Study

The insights gained from the integration and interpretation of quantitative and qualitative data within one study are valuable. However, a potential limitation to consider, which is inevitable in this type of applied research, is the nature of the sample. The sample used in the qualitative component was opportunistic and may reflect those who have had a compelling experience. In turn however, the sample for the quantitative data was drawn from a broader sample which included all those (with complete records) recruited during the 3-year period and is therefore representative of the ERS. The large sample for the quantitative analysis was drawn from the population of a London district characterized as sociodemographically diverse. Direct comparison of findings to ERS research in other areas (e.g., Gidlow et al. 2007, 2008) must therefore be done with caution. Finally, the short duration of follow-up has been a substantive criticism of much of the research in this area. Within the constraints of the present study, it was not plausible to investigate the participants' outcomes extending beyond the scheduled exercise opportunities. It has been acknowledged that the facilitation and evaluation of long-term change remains a major challenge for health professionals and researchers alike (McKay et al. 2003).

Conclusion

Consideration of the integrated findings highlights the multidimensional nature of the concept of success. Success embraces a wide range of concepts (i.e., inclusion, weight loss, and confidence). The predefined markers of success (such as levels of attendance, weight loss, and blood pressure) are in keeping with traditional conceptions of success according to those commissioning, developing, and evaluating ERSs (McNair et al. 2005). In practice, the schemes' impact was appreciated in a more holistic manner which incorporated psychological and social aspects as outcomes, influences, and constituents of success. Broadening the focus beyond physical outcomes to psychosocial factors associated with behavior change has provided a better understanding of success (Abildso et al. 2010). The present research has provided evidence on the value of ERSs in primary care, which is additional to the evidence from alternative controlled approaches.

Findings from the present research have implications that can translate beyond the setting of this particular scheme, especially given recent initiatives such as the Let's Get Moving physical activity care pathway (DOH 2009). Identifying the aspects of success from a range of perspectives can support practitioners to enhance provision and may assist evaluators in the development of indicators for what might be achievable through similar interventions (Gidlow and Murphy 2009). There is also a need to develop alternative indicators (e.g., social benefits) for inclusion in controlled research. These findings can enable future development of more representative evaluations of the benefits of exercise referral. This mixed method research approach can facilitate the development of sophisticated, tailored, evidence-based interventions in the future (Nastasi et al. 2007). These context-specific findings should assist exercise practitioners, researchers, and evaluators.

Appendix

Binary Logistic Regression Outcomes.

	Model 1		Model 2		Model 3	
	Odds ratio (OR) [95% CI]	*p*	OR [95% CI]	*p*	OR [95% CI]	*p*
Gender						
Male	1.000 [ref]	.526	1.000 [ref]	.593	1.000 [ref]	.515
Female	0.923 [0.721, 1.182]		1.075 [0.825, 1.401]		0.923 [0.724, 1.176]	
Age (continuous)	1.019 [1.008, 1.030]	.001	0.998 [0.986, 1.009]	.670	0.999 [0.989, 1.009]	.698
Ethnicity		.038		.111		.539
White	1.000 [ref]		1.000 [ref]		1.000 [ref]	
Asian	1.383 [0.946 to 2.202]	.094	1.330 [0.904, 1.955]	.148	1.080 [0.750, 1.558]	.677
Black	0.866 [0.640, 1.172]	.352	1.185 [0.855, 1.641]	.307	0.987 [0.724, 1.321]	.884
Chinese	0.795 [0.224, 2.825]	.723	1.555 [0.395, 6.121]	.528	2.458 [0.602, 9.792]	.212
Mixed	6.310 [1.388, 28.695]	.017	3.991 [1.191, 13.373]	.025	2.214 [0.624, 6.709]	.237
Occupation		.408		.451		.166
Unemployed	1.000		1.000 [ref]		1.00 [ref]	
Retired	1.300 [0.889, 1.901]	.176	0.811 [0.541, 1.216]	.311	0.832 [0.576, 1.211]	.343
Unskilled	0.874 [0.529, 1.444]	.600	0.900 [0.514, 1.575]	.712	0.734 [0.441, 1.217]	.239
Partly skilled	1.238 [0.786, 1.952]	.375	0.648 [0.387, 1.085]	.099	0.892 [0.577, 1.422]	.667
Skilled manual	1.018 [0.591, 1.725]	.950	1.373 [0.770, 2.449]	.282	1.875 [1.044, 3.227]	.035
Skilled nonmanual	1.324 [0.935, 1.875]	.114	0.930 [0.641, 1.350]	.704	1.228 [0.868, 1.732]	.248
Managerial	1.610 [0.950, 2.729]	.077	0.661 [0.371, 1.732]	.160	0.884 [0.536, 1.501]	.679
Professional	1.328 [0.762, 2.317]	.317	0.963 [0.535, 1.732]	.899	1.046 [0.603, 1.800]	.884

(continued)

Appendix (continued)

	Model 1		Model 2		Model 3	
	Odds ratio (OR) [95% CI]	*p*	OR [95% CI]	*p*	OR [95% CI]	*p*
Referral reason		.065		.587		.698
Cardiovascular	1.000 [ref]		1.000 [ref]		1.000 [ref]	
Pulmonary	0.546 [0.346, 0.860]	.009	0.951 [0.580, 1.558]	.842	0.863 [0.552, 1.353]	.523
Metabolic	0.755 [0.537, 1.061]	.106	1.146 [0.803, 1.637]	.453	1.156 [0.829, 1.604]	.396
Orthopedic	0.724 [0.505, 1.040]	.081	0.892 [0.609, 1.307]	.558	0.918 [0.650, 1.310]	.653
Neuromuscular	2.670 [0.709, 10.055]	.147	0.622 [0.183, 2.110]	.446	0.918 [0.315, 2.807]	.912
Mental	0.919 [0.571, 1.479]	.728	0.835 [0.499, 1.397]	.492	0.879 [0.555, 1.412]	.609
Miscellaneous	0.635 [0.217, 1.854]	.406	1.550 [0.504, 4.772]	.445	0.945 [0.318, 2.671]	.880
Completion						
Noncompletion	N/I	N/I	1.000 [ref]	<.001	1.000 [ref]	<.001
Completion	N/I		3.541 [2.721, 4.608]		1.680 [1.250, 2.003]	
Body mass						
Nonreduction	N/I	N/I	N/I	N/I	1.000 [ref]	.043
Reduction	N/I		N/I		1.292 [1.008, 1.641]	

Note. CI = confidence interval; N/I indicates that data were not included.
Source. James et al. 2009.

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