

Factors that influence practice nurses to promote physical activity

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Abstract

Objective—To investigate what factors may influence practice nurses to promote physical activity.

Methods—Postal questionnaires were sent to all practice nurses in the county of Avon, UK in 1994. Specifically, the questionnaire survey explored whether patient, provider, and practice factors influenced practice nurses promotion behaviour. In addition, the stages of change model was used to measure current levels of promoting behaviour.

Results—A response rate of 80.9% was achieved. Over 80% of the sample reported currently promoting physical activity to some degree. "Promoting" nurses more frequently followed up all (new, established or targeted) patients' activity progress when compared with "restricted promoting" nurses ($P < 0.05$). Nurses who engaged in regular exercise were more likely to encourage physical activity as a treatment than "irregularly active" nurses ($P < 0.05$) for five of six clinical groups with the single exception of people with diabetes.

Conclusions—This study shows that the two stage measures (activity promotion and personal behaviour) of the health care professional are associated with important differences in patient and practice factors for physical activity promotion. Further investigations into the content and quality of delivery are required before planning strategies to develop physical activity in the general practice.

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Recent evidence suggests that British adults do not participate in sufficient physical activity to offset health problems.¹ The Allied Dunbar National Fitness Survey (1992) reported that seven of 10 men, and eight of 10 women are so inactive that their health is compromised. In Britain, some 300 000 men and women suffer from coronary heart disease each year, a largely preventative illness. Four major heart disease risk factors,² including a lack of regular physical activity, are at the centre of most preventative efforts. Regular participation in physical activity helps to prevent and reduce the risks associated with ischaemic heart disease. It also has beneficial effects on other health conditions

such as osteoporosis, diabetes, hypertension, and depression.³

Preventative medical care (the concept of preventing a problem/illness before it develops) is becoming increasingly important in respect of the Health of the Nation strategies.⁴ Physical inactivity is not only the most prevalent risk factor for coronary heart disease, but it carries a relative risk factor equivalent to that of hypertension.² The challenge remains to identify efficient strategies that encourage, even modest, increases of physical activity in large sections of the public.⁵

One possible means to increase levels of physical activity in the UK is the government supported concept of preventative care in which general practitioners (GPs) are encouraged to offer regular health checks to their adult patients, and health promotion services to all registered patients.^{4,6} While it is recognised that GPs do promote physical activity, they do so with an increasing workload and pressure⁷ because of higher patient expectations, healthcare consumerism, and NHS reforms.⁸ Therefore, this primary care service provision may be jeopardised before its potential can be realised.⁹ However, GPs may now reduce their workload by delegating any task to the practice nurse (PN) provided that they are appropriately trained and experienced (including health promotion)¹⁰; for example, the Family Heart Study Group provided evidence that trained PNs can identify cardiovascular risk factors.¹¹ Indeed, existing GP based physical activity promotion projects are typically delivered by the PNs. There are concerns, however, about the effectiveness and costs of these interventions.^{12,13} One way to optimise delivery is to recruit peripatetic specialists, as is currently occurring with nutrition counselling.¹⁴

Despite government policy to deliver health promotion within general practice,¹⁵ substantial variations in delivery are likely, for example, not all practices have opted for the peripatetic option, and therefore the influences on delivery need investigation. The variable effects of barriers and incentives, and the mix of practitioner and patient characteristics may all provide a basis from which to identify and facilitate behaviour change (towards a more preventative care approach rather than only secondary or tertiary care). Barriers that prevent behaviour change in patients of professionals can be either attitudinal or system based.¹⁶ Attitudinal barriers include beliefs concerning the efficacy and status of this service provision, while system barriers restrict the process of health

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Table 1 Statements relating to the stages of change for physical activity promotion

Statement	Stage
I don't promote physical activity and I don't intend to start	Precontemplation
I don't promote physical activity but I'm thinking of starting	Contemplation
I promote physical activity sometimes but not regularly	Preparation
I promote physical activity regularly but just started recently	Action
I promote physical activity regularly (for longer than 6 months)	Maintenance
I have promoted physical activity in the past but not now	Relapse

promotion, namely lack of time, resources, financial incentives, standard guidelines, and positive feedback from patients. The influence of each of these constraints on PNs is unclear, though variations occur between and within regions, practices, and individuals.¹⁷ Attention to these barriers is essential (as in the PACE project¹⁶) as the potential of the general practice (and the primary care team) to facilitate behaviour change though widely asserted, is rarely demonstrated. Harsha and colleagues showed that patients differ in their responsiveness to GP based physical activity promotion.¹⁸

A recent study outlined a range of factors associated with successful preventative care provision.¹⁹ Among them patient characteristics, holding health insurance cover, provider perceived seriousness of risk and associated behaviours, perceived likelihood of developing the disease, and greater frequency of clinic visits. In contrast provider characteristics were also associated with higher levels of preventative care including demographics, year of training completion / graduation, type of training, higher level of continuing education, beliefs in the efficacy of health promotion protocols and knowledge of preventive care, being in a group practice, having a smaller practice size, and better personal health habits. In semi-structured interviews with nurses and GPs in the UK, work by Gould and colleagues showed that exercise knowledge was only sketchy and that training in physical activity promotion was minimal.²⁰ Nurses were more physically active than the GPs while both reported that the major barrier to being more physically active was a lack of time. Patients with a higher education level, higher income, and patients who regularly exercise were influenced by their own GPs' weight and exercise modelling. Taken together these findings suggest that the type and quality of health promotion interventions delivered within the general practice reflect a unique interplay of patient provider characteristics and perceptions.

A way to examine the role of provider characteristics is to use the concept of stage of readiness to change behaviour that is embodied in the transtheoretical model.²¹ Prochaska and DiClemente identified a series of sequential "stages of change" through which they claim people can progress until the desired behaviour has been achieved (precontemplation—no intention to change, contemplation—thinking of changing, preparation—intention to change imminently, action—involved in change, maintenance—sustained change, relapse—made changes in the past, but not now) The process is dynamic in that a person may relapse

regarding the intended behaviour change or conversely jump one or more stages and adopt the appropriate lifestyle behaviour (see table 1). This model has provided the basis for many studies investigating behaviour change and has been successfully applied to general behaviour change (seat belt use, sunscreen use, mammography screening, contraceptive use, and exercise behaviour and specifically behaviour change in sedentary persons²² (university students, women, post-coronary patients, and worksite samples) for which it has been validated as a measuring tool.²³

Using the stages of change model this study explored the role of the PN, in promoting physical activity. The aim was twofold, firstly to measure the current level of activity promotion and secondly, to identify factors that may be positively or negatively influential. Three elements in particular were studied, patient status factors, practice factors, and personal factors that may differ between PNs relating to their physical activity promotion behaviour.

Methods

A confidential questionnaire was sent to all PNs (n=272) in the county of Avon, England, UK in 1994. Data were sought in three categories.

PERSONAL FACTORS

Age, sex, years as a PN, knowledge of risk factors, hours of physical activity promotion training, "stage of change" for own physical activity, and stage of change for physical activity promotion. "Stage of change" was identified by the choice of one of six statements, each representing a stage of the model, previously used by Marcus *et al*²³ (table 1); with relapse included as an item.

PATIENT STATUS FACTORS

Patients were referred to as new, established or targeted. Six clinical groups (as identified by GPs in the pilot study) were listed for the physical activity targeting (people with diabetes, ≥ 2 coronary heart disease risk factors, overweight, hypertensive, arthritic, depressed). Frequency for promoting physical activity was recorded using a Likert scale (1= always, 2= sometimes, 3= occasionally, 4= rarely, 5= never).

PRACTICE FACTORS

Number of practice GPs and PNs, total patient list, barriers to physical activity promotion (1= not at all limiting effect, 2= hardly, 3= somewhat, 4= quite, 5= very limiting effect).

STATISTICAL ANALYSIS

Questionnaires were excluded from analysis where stage data were incomplete. Medians are reported for all Likert scales because of unequal distributions of the nurses responses for all items. As the stages of change (stages) and frequency responses were ordinal data, non-parametric statistical analyses were used to investigate differences between groups (Mann-Whitney tests). All reported differences were at the $P < 0.05$ level unless otherwise stated.

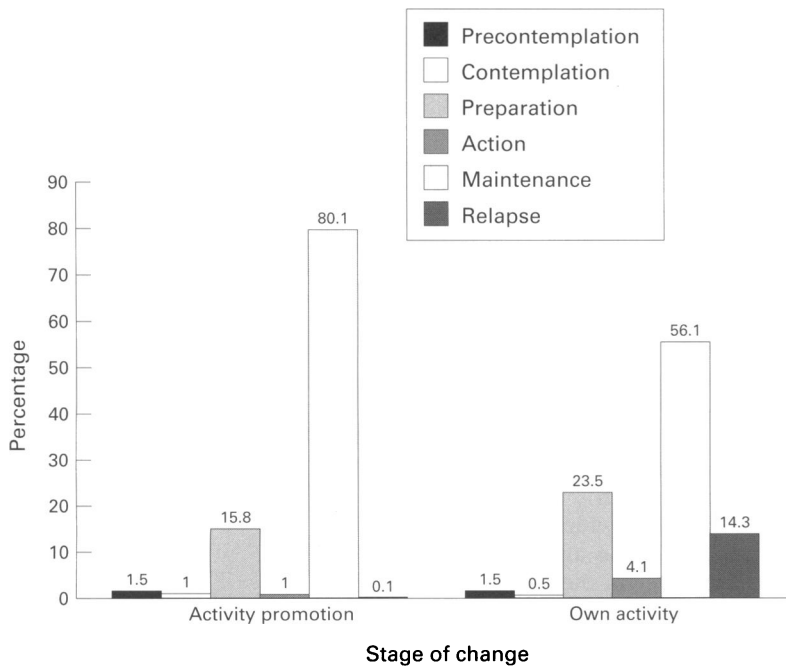


Figure 1 Per cent distribution of PN's stage for professional and personal physical activity.

Results

DEMOGRAPHICS

Questionnaires were returned by 220 PNs (80.9% response rate, 109 GP units represented); after exclusion, 196 questionnaires (72.1%) were analysed. All respondents were female, with a mean (SD) age of 43.6 (7.9). The mean (SD) years working as a PN was 22.5 (8.4). The median number of PNs per practice was two (range 1–11) and for GPs it was four per practice (range 1–12).

STAGES OF CHANGE

Physical activity promotion and own activity

Most of the sample reported being in the "maintenance" stage of change for physical activity promotion (80.1%) and for their own activity participation (56.1%) respectively, as illustrated in figure 1.

Because of the uneven distribution for both stage measures, each were dichotomised (see figure 2) and recoded into the restricted promoting or irregularly active groups (both including precontemplation, contemplation, preparation, and relapse stages) and promoting or active (including action and maintenance stages). All further analysis was performed using the dichotomised stages.

Figure 2 shows that over 80% (n=159) of the sample reported currently promoting physical

	Promotion behaviour	Own activity
Precontemplation	Restricted promoting 18.9% (n = 37)	Irregularly active 39.8% (n = 78)
Contemplation		
Preparation		
Relapse		
Action	Promoting 81.1% (n = 159)	Active 60.2% (n = 118)
Maintenance		

Figure 2 Dichotomised stages for activity promotion and own activity behaviour.

activity (those PNs either in action or maintenance stages). Of this group, 65% (n=103) were physically active themselves (or 87% of those PNs in the active group were promoting PNs). The correlation between the respective stage responses was $r=0.26$, $P<0.001$.

PATIENT FACTORS

Table 2 shows the responses for clinical groups (diabetes, etc). No differences were noted for the responses (frequency of asking these patients about their physical activity habits) according to stage for physical activity promotion. In contrast, all of the responses differed by PNs own activity stage (irregularly active>active), with the exception of "diabetes".

All patients who asked about physical activity were reported to receive advice. No promotion stage differences were found. However, differences (irregularly active >active) were found according to the nurses own physical activity stage (table 2).

Nurses reported that most new patients were asked about their activity habits (median=1). Differences were found in the number of established patients who were asked about their activity habits (promoting = 60% asking "all" or "most" patients, restricted promoting = 30% asking "all" or "most" patients).

Frequency of follow up was similar (median=2) for new, established, and targeted patients. Differences were only found for PNs physical activity promotion stage (restricted promoting >promoting). Handing pamphlets to these patient groups achieved the same median score, but only targeted patient groups differed by PNs stage for physical activity promotion (restricted promoting >promoting). Follow up by telephone (median=5) was no different for any PN grouping in this study.

PERSONAL FACTORS

PN personal characteristics (age, years as a PN, knowledge of coronary heart disease risk factors) did not differ by stage of physical activity promotion. Smoking was the most recognised (98%) of the four main independent risk factors for coronary heart disease,² followed by physical inactivity (75%). Only 10% of both groups correctly identified the main four factors from the choice of six (obesity, diabetes, physical inactivity, smoking, hypertension, and raised cholesterol values).

There was a significant difference in the hours of training that the promoting and restricted promoting PNs had received in the past five years. The mean (SD) hours of physical activity promotion training for the whole sample was 5.2 (15.1), with 37% (n=66) of the whole sample having not received any formal training. Promoting PNs received more hours of physical activity promotion training than restricted promoting PNs (mean=6.18 hours compared with mean=1.51 hours). Sixty per cent of restricted promoting PNs reported to have "0" hours of training compared with 30% of the promoting PNs.

Irrespective of stage groupings PNs seemed to favour the use of specific methods to

promote physical activity. "Verbal" advice was the most common form (mean=95%) followed by giving out "pamphlets" (mean=73%).

PRACTICE FACTORS

The number of patients in the practice, number of GPs, and number of PNs in the practice did not differ significantly by either of the stage measures. Table 2 shows that barriers were either ranked as having a "somewhat limiting" effect or a "hardly limiting" effect. Two clusters of barriers can be seen (lack of time, lack of measurable success and resources have the greatest effect, compared with lack of protocols and incentives). Only the lack of protocols differed for restricted promoting versus promoting PNs (table 2). Active PNs rated the lack of resources, protocols, and success as having a less limiting effect on their physical activity promotion efforts compared with irregularly active PNs. Of the 196 respondents only four reported that all the barriers had an effect greater than "hardly limiting" — two in each of the promotion stages.

Discussion

This study describes elements of PNs physical activity promotion behaviour in light of the "stages of change" theory.²¹ It must be highlighted that the results of this study were collected in 1994 and illustrate behaviours and perceptions related to that time period. Subsequent NHS reforms may influence today's

practice. The results of this study are not intended to judge the methods of health promotion delivery. It is important that no inferences about the quality or effectiveness of delivery are based on these results. Instead, it was intended to help understand what activity promotion was occurring, with whom, and under what circumstances. In this way existing workloads were acknowledged. The results hinge around differences between PNs who regularly promote physical activity and those who occasionally do so.

The median responses in this study identified that a large proportion of PNs in a single administrative catchment are currently promoting physical activity and this supports the notion that PNs are taking the responsibility for the role of health promotion in the practice environment.⁹ Of the PNs who reported not promoting activity, two thirds had received no formal training in this field in the past five years; significantly fewer than in the promoting PNs. It may be logically speculated that the provision of training may increase the numbers of promoting PNs thereby increasing the potential range for public "contact", however funding and human resource management (that is, leave for training) need consideration, although the paybacks may well be justified. Outcome measures of this training (that is, content and quality of promotion delivery) would require analysis.

Table 2 Summary of patient, personal, and practice factors by dichotomised stage measures

	Response (1-5)	Median response	Physical activity promotion	Own activity participation
Patient factors				
Ask about patient PA habits:	Always-never			
Diabetic		1	NS	NS
≥ 2 CHD risks		1	NS	U=3145.5, P<0.01
Overweight		1	NS	U=3289.5, P<0.01
Hypertension		1	NS	U=2779.5, P<0.01
Arthritic		2	NS	U=2542.5, P<0.05
Depressed		3	NS	U=2431.5, P<0.05
Those who ask, who get PA advice	All-none	1	NS	U=3584.0, P<0.01
Ask patients about PA habits:	All-none			
New		1	NS	NS
Established		2	U=1439.0, P<0.01	NS
Frequency of follow up of:	Always-never			
New		2	U=1515.0, P<0.05	NS
Established		2	U=1334.0, P<0.01	NS
Targeted		2	U=1041.5, P<0.01	NS
Frequency of handing pamphlets to:	Always-never			
New		2	NS	NS
Established		2	NS	NS
Targeted		2	U=1211.0, P<0.05	NS
Follow up patients using the phone:	Always-never			
New		5	NS	NS
Established		5	NS	NS
Targeted		5	NS	NS
Personal factors				
Age (y)		44	NS	NS
Years as a PN		22	NS	NS
Knowledge of risk factors		NA	NS	NS
Hours of exercise promotion training		2	U=1584.5, P<0.01	NS
Practice factors				
Barriers:	Not at all-very limiting			
Time		3	NS	NS
Lack of success		3	NS	U=2128.5, P<0.01
Lack of resources		3	NS	U=2032.5, P<0.05
Lack of protocols		2	U=993.0, P<0.05	U=1728.5, P<0.01
Lack of incentives		2	NS	NS
Number of GPs		4	NS	NS
Number of PNs		2	NS	NS
Total patient list		7300	NS	NS
Recording patient information	All-none	2	U=1664.5, P<0.01	NS

* In all cases stage differences were in line with those predicted by the model.
PA = physical activity, CHD = coronary heart disease.

Perhaps the most important finding is that distinct differences exist between responses according to the two stage conceptualisations (promotion versus personal activity).

The data suggest that PNs who are active themselves perceive system barriers as having less limiting effects on their level of physical activity promotion. They also report promoting physical activity more often with different patient groups. Additionally, promoting PNs seem to differ in their delivery according to patient variables. In particular new, established, and targeted patients are more likely to be followed up. Such PNs also report having had more physical activity promotion training and presumably this has a bearing on their attitude and confidence. It is perhaps surprising that this difference has not yet translated to the specific clinical groups in view that these patients do not receive more or less physical activity treatment by promoting or restricted promoting PNs.

Although there was no difference in the rating of four of the five system barriers according to stage for activity promotion, lack of time was an important limiting factor for over 40% of all PNs (scoring 4 or 5 on this scale). Regardless of whether they were active or not, lack of time was a limiting factor for all PNs possibly reflecting their increased workload noted by Hirst and colleagues.⁹ The main barrier highlighted as more limiting according to stage for activity promotion (restricted promoting versus promoting PNs) was the lack of protocols. With many routine tasks already based on formal protocols and procedures, the perceived lack of evidence based practice or policies in this area may limit promotion behaviour. However, it remains problematic to interpret these data. For example, individual PNs will cope differently in the face of the same barriers. Furthermore, respective GPs may be more or less responsive to the same problem solving strategies used by the PNs.

Nearly two thirds of the sample reported that they were physically active. These active PNs gave more advice to patients who asked for information on physical activity than the irregularly active PNs. By examining the distributions of barrier responses it is clear that individual barriers have different effects. For example, in lack of success 26.9% of the active PNs reported that this was either "not at all limiting" or "hardly limiting". In contrast, lack of protocols was rated in the same way by 49.3% of the active PNs. One response to this might be to consider the ways in which PNs look for and recognise "success" in physical activity promotion. It is probable that the stage of change model will permit considerable progress here. The model offers a refinement of "all or nothing" conceptions of behaviour change that PNs may be currently using.

Previous evidence¹² has shown that increased physical activity promotion is encouraged by, for example, smaller patient lists. However in this study no such differences were found. Equally, neither practice factors such as the number of GPs nor PNs in the practice influenced any stage measures used here. With

comparatively few PNs in the restricted promoting sample, the results of this study need to be interpreted with caution. For example, in the Allied Dunbar study¹ less than two of 10 female adults were exercising sufficiently to optimise their health. Yet, in this study eight of 10 PNs claimed to be physically active to some degree. While this was not necessarily regular behaviour it does suggest that exercise is perceived by PNs as an appropriate social behaviour.

All patients, except those with diabetes, were asked most frequently about their activity habits by active PNs. In the event that this finding can be generalised, strategic planning could revolve around distinguishing PNs who are physically active. This may enable both practice staff and patients the choice of referring to a particular PN. A further proposal here is the development of a professional identity encapsulated by the term "physical activity promoting PN". The group of depressed patients was the worst off for activity advice from PNs irrespective of whether the professional was active or not. It may be possible that tailor made programmes of physical activity may be less well known than the cardiovascular benefits. However, the low level of physical activity promotion in patients who are depressed or suffer from arthritis requires further examination.

The implications of these findings require expansion. Table 2 shows that patients with pre-existing clinical conditions are most likely to be encouraged to take more physical activity by PNs who themselves take regular activity. In addition, these same PNs seem to identify the barriers to physical activity promotion as being less limiting to that work compared with the irregularly active PNs. Where the stage of change for activity promotion is considered PNs seem to respond differently to the administrative status of the patient within the practice (new, established, or targeted). In particular, the follow up procedures (those most likely to initiate or maintain any changes that may have been made by the patient) are more frequently undertaken by the promoting PNs.

The "groups" of stage based differences shown in table 2 offer considerable scope for development. For example, irregularly active PNs may be best helped to develop their promotion skills by attending to the benefits of increased physical activity in respective clinical groups. Alternately, restricted promoting PNs may need more training in physical activity promotion using more formal appropriate protocols, perhaps like that used in the PACE project.¹⁶

The main strengths of this study lie in its theoretical base and the high response rate. However, the major limitation of the study is its reliance on self report, which may account for the uneven distribution of PNs between the "stages". The stages were dichotomised because of the uneven distribution, as has been performed previously by Marcus and Simkin²³ and were renamed restricted promoting (pre-contemplation, contemplation, preparation, and relapse) and promoting (action and maintenance). It is not known whether this distribu-

tion reflects the undue effects of, for example, social desirability. It is highly probable that these results reflect the effects of agents of change, other than the self, like changed working conditions and roles, imposed by external agencies. This may account for the skewed responses to the stage items. This notwithstanding, it is theoretically problematic that so few PNs report being in the early stages of change. Furthermore, the effects of grouping precontemplators with contemplators and relapsors is also problematic and likely to mask many further differences.

A further limitation is the use of vague quantifiers (1= none, 5= all, etc.). While these response options may have contributed to a high response rate they have limited value in interpretation. For example, their relevance to actual delivery of physical activity promotion is unclear.

Conclusion

This study provides a useful insight into the physical activity promotion behaviours of PNs. The time and effort of the PNs in completing and returning their questionnaires has provided invaluable responses that will aid our understanding of their behaviour. An encouragingly large percentage of PNs in Avon have self reported that they are currently promoting physical activity although the content and effectiveness of this promotion was not evaluated and may potentially be misleading. These results suggest implications for strategic planning for physical activity promotion in general practice. At least three avenues of development are suggested here; encourage more PNs to promote physical activity, develop PNs with physical activity specialism, and thirdly, target GPs to provide resources to facilitate the acquisition of skills. Each of these will need to optimise use of existing resources and be effective in building PN professional esteem and confidence while improving patient quality of care.

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1 Health Education Authority. *Allied Dunbar National Fitness Survey*. Ipswich: Ancient House, 1992.

- 2 Fletcher GF, Blair S, Blumenthal J, Caspersen C, Chaitman B, Epstein S, *et al*. Statement on exercise. Benefits and recommendations for physical activity programs for all Americans. A statement for health professionals by the Committee on Exercise and Cardiac Rehabilitation of the Council on Clinical Cardiology, American Heart Association. *Circulation* 1992;86:340-4.
- 3 Morris JN. Exercise in the prevention of coronary heart disease; today's best buy in public health. *Med Sci Sports Exerc* 1994;26:838-43.
- 4 Department of Health. *The Health of the Nation: a Strategy for Health in England*. London: HMSO, 1992.
- 5 Hillsdon M, Thorogood M. A systematic review of physical activity promotion strategies. *Br J Sports Med* 1996;30:84-9.
- 6 General Medical Services Committee. *The New Health Promotion Package*. London: British Medical Association, 1993.
- 7 Leese B, Bosanquet N. Changes in general practice organisation: survey of general practitioners' views on the 1990 contract and fundholding. *Br J Gen Pract* 1996;46:95-9.
- 8 Rogers J. "PS Have You Thought About Locality Commissioning?" In: Bristol: Avon Health Commission, *Locality Commissioning Conference, Conference Proceedings*. 1994:5-7.
- 9 Hirst M, Atkin K, Lunt N. Variations in practice nursing: implications for family health services authorities. *Health and Social Care* 1995;3:83-97.
- 10 Calnan M, Coyle J, Williams S. Changing perceptions of general practitioner care. *European Journal of Public Health* 1994;4:108-14.
- 11 Family Heart Study Group Randomised Control Trial. Evaluating cardiovascular screening and intervention in general practice: principal results of British Family Heart Study. *BMJ* 1994;308:313-20.
- 12 Langham S, Thorogood M, Normand C, Muir J, Jones L, Fowler G. Costs and cost effectiveness of health checks conducted by nurses in primary care: the Oxcheck study. *BMJ* 1996;312:1265-8.
- 13 Wonderling D, McDermott C, Buxton M, Kinmonth A-L, Pyke S, Thompson S, *et al*. Costs and cost effectiveness of cardiovascular screening and intervention: the British Family Heart Study. *BMJ* 1996;312:1269-73.
- 14 Harrison L, Neve H. *A review of innovations in primary health care*. Bristol: The Policy Press, 1996.
- 15 Department of Health and the Welsh Office. *General practice in the National Health Service: a new contract*. London: HMSO, 1989.
- 16 Pender NJ, Sallis JF, Long BJ, Calfas KJ. Health-care provider counselling to promote physical activity. In: Dishman RK, ed. *Advances in exercise adherence*. Champaign, Ill: Human Kinetics, 1994:137-236.
- 17 Atkin K, Hirst M, Lunt N, Parker G. The role and self-perceived training needs of nurses employed in general practice: observations from a national census of practice nurses in England and Wales. *J Adv Nurs* 1994;20:46-52.
- 18 Harsha DM, Saywell RM, Thygerson S, Panozzo J. Physician factors affecting patient willingness to comply with exercise recommendation. *Clin J Sport Med* 1996;6:112-19.
- 19 Heywood A, Firman D, Math M, Sanson-Fisher R, Mudge P, Ring I. Correlates of physician counselling associated with obesity and smoking. *Prev Med* 1996;25:268-76.
- 20 Gould MM, Thorogood M, Illiffe S, Morris JN. Promoting physical activity in primary care: measuring the knowledge gap. *Health Education Journal* 1995;54:304-11.
- 21 Prochaska JO, DiClemente CC. In search of how people change: applications to addictive behaviours. *Am Psychol* 1992;47:1102-14.
- 22 Buxton K, Wyse J, Mercer T. How applicable is the stages of change model to exercise behaviour: A review. *Health Education Journal* 1996;55:239-57.
- 23 Marcus B, Simkin L. The stages of exercise behaviour. *J Sports Med Phys Fitness* 1993;33:83-8.