

## Behaviour change following a workplace health check: how much change occurs and who changes?

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### SUMMARY

An observational study, involving 1053 employees of a Glasgow factory, was conducted to determine the overall level of behaviour change and the characteristics of those who responded after attending a workplace health check. Eight hundred and sixty-eight individuals received one of four versions of a health check. Participants were deemed to have 'responded' if they made one or more of the advised behaviour changes (stopped smoking, increased exercise, reduced alcohol consumption, improved diet). Twenty-six per cent of participants were not 'at risk' on entry to the study. Those in the 'not at risk' group were characterised by having higher socio-economic status and educational attainment than those 'at risk' and were more likely to perceive themselves as being in good health and at low risk of coronary

heart disease. Forty-seven per cent of those who received the health check and returned for follow-up reported one or more of the desired behaviour changes (responders). In comparison to those who made none of the desired changes (the non-responders), responders tended to perceive their own health to be poorer and their risk of coronary heart disease to be greater and they were more likely to have perceived the health check as threatening. In future, health check interventions should take account of these two important findings: that such a large proportion (almost half) responded positively by changing behaviour and that it was those who perceived themselves to be 'at risk' who tended to comply with advised behaviour changes.

*Key words:* behaviour change; health check; workplace

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### INTRODUCTION

Health checks have become an important component of many health promotion activities including coronary heart disease prevention campaigns, workplace health promotion programmes and primary care based interventions (Bhantnager and Durrington, 1990; Shea and Basch, 1990; Williams, 1992). The usual procedure followed in a health check is that coronary risk and lifestyle are assessed to allow feedback of information to the client followed by personalised health education. The rationale is that this will encourage individuals to change their health related behaviour (in particular, smoking, alcohol consumption, exercise patterns and diet).

Despite their frequent utilisation, health checks have been criticised for several reasons.

- (i) It has been argued that health checks preferentially attract individuals from the middle classes who are at relatively low risk of ill health; the so called 'worried well' (Pill *et al.*, 1988). Because of this, health checks are seen to operate as yet another example of the 'inverse care law' (Waller *et al.*, 1990).
- (ii) Health checks do not have a large effect on measurable coronary risk. This has now been demonstrated by recent primary care

based (Family Heart Health Study Group, 1994; Imperial Cancer Research Fund OXCHECK Study Group, 1994, 1995) and workplace (Hanlon *et al.*, 1995) studies and by a number of older studies [South East London Screening Study Group, 1977; Solonen *et al.*, 1979; World Health Organization (WHO) European Collaborative Group, 1986; Multiple Risk Factor Intervention Trial Research Group, 1990].

- (iii) Health checks may impair well-being by provoking anxiety (Stoate, 1989).

Doubt has been cast on the future of health checks as a consequence of these criticisms (Toon, 1995), and economic analysis has led to the conclusion that the effects of health checks must be shown to last for at least 10 years if they are to be cost-effective (Langham *et al.*, 1996; Wonderling *et al.*, 1996a, b). Others take a more positive view of workplace health promotion. In North America, rigorous evaluations of workplace health promotion are becoming more common and the case is now being made that workplace health promotion can be shown to improve key health indices (Pelletier, 1993). In the meantime, health promotion practice has been changing. Some health checks are being used to address a broader range of issues including positive aspects of health (Greater Glasgow Health Board, 1994). Other studies have shown that worksite interventions that use more sophisticated behavioural approaches can produce lasting changes in some cardiovascular risk factors and are more effective than simple risk assessment or risk education (Gomel *et al.*, 1993). Work on stages of behaviour change (Diclemente and Prochaska, 1982) suggests that an intervention may result in a movement towards a health related behaviour change, which at that point in the individual's career of decision-making is not yet manifested in behaviour change but is instrumental in changing the individual's thinking.

If rational decisions about the future of health checks are to be made, more information is required on changes in health related behaviour. This paper principally focuses on the level of behaviour change which occurred, as opposed to changes in measurable coronary risk, and describes the characteristics of those who made the desired changes.

## METHODS

This study was established to answer the following three questions.

- (i) What are the characteristics of those defined to be at low risk (that is, those who have no need to make changes in smoking behaviour, alcohol consumption or exercise patterns on entry to the study)?
- (ii) What proportion of participants in a health check respond to the health counsellor's advice by making one or more of the advised behaviour changes?
- (iii) What are the characteristics of those who 'respond' by making one or more of the advised behaviour changes?

### Location, study population and data collection

The study took place in a large Glasgow engineering factory that employed just over 2600 people in 1991 when the study started. This study complements a randomised controlled trial of a workplace based health check which has been reported elsewhere (Hanlon *et al.*, 1995). The workforce was predominantly male, comprising blue-collar workers in their middle years. One thousand six hundred subjects were randomly selected (those on permanent night shift were excluded because of practical difficulties). A total of 1371 subjects accepted the invitation to the health check and were fully eligible for the study (Hanlon *et al.*, 1995). These individuals were randomly allocated to one of five groups. Each of the five groups received different information and feedback, as follows.

- (i) Health education without feedback on cholesterol level or risk score.
- (ii) Health education with feedback on cholesterol level but without feedback on risk score.
- (iii) Health education with feedback on risk score but not on cholesterol level.
- (iv) Full health check: health education with feedback on cholesterol level and on risk score.
- (v) Internal control group—delayed intervention.

All groups were seen at enrolment (Stage I), after 6 months (Stage II) and after 12 months at the completion of the study (Stage III). A common data set (see Table 1) was collected from participants at each visit (Hanlon *et al.*, 1995).

**Table 1:** Data collected from participants

Variables	
<i>Health related behaviour</i>	
1	Smoking status (to establish current smokers)
2	Alcohol consumption (to establish those who drink above the then recommended weekly limits of 21 units for males and 14 units for females)
3	Exercise habits (to establish those exercising vigorously >20 min, three times per week)
4	Diet (to establish frequency of consumption of: (1) fresh fruit; (2) green vegetables; (3) wholemeal bread; (4) cakes/biscuits/ chocolates; (5) meat pies/sausage; (6) chips)
<i>Socio-economic data</i>	
5	Age group
6	Gender
7	Educational status: highest qualification gained
8	Occupation (from which socio-economic group was derived)
9	Marital status
<i>Health check related information</i>	
10	Self-perception of health status over the past year
11	Self-perceived health status for age
12	Personal history of heart disease
13	Family history of heart disease
14	Self-perceived risk of heart disease
15	Whether on drug treatment for heart disease
16	Intervention group
17	Anxiety (measured on a ten-point scale, self-assessment following intervention)
18	Whether threatened by health check information
19	Counsellor conducting first health check
<i>Psychological tests</i>	
20	Sense of coherence (dimensions: meaning, manage, control)
21	Health locus of control (dimensions: internal, chance, powerful others)

A standardised package of face-to-face health education was employed, supported by relevant leaflets. Each component of the health education package and the feedback on risk score and cholesterol was scripted and rehearsed by the counsellors to ensure consistency of advice. However, issues of most relevance to the individual subjects were stressed by the counsellors. Members of the control group (group 5) were assessed at Stage I but received no health education, feedback or written information at this stage. In this way, group 5 acted as control group (Hanlon *et al.*, 1995).

Only those individuals who attended all three stages of the study have been included in the analysis for this paper. This leaves a total of 1053 out of the original 1371 recruits, of whom 868 received a version of the health check at Stage I (i.e. were in groups 1–4). Although analysis of the data has been conducted including those who were lost to follow-up, in this paper results are presented for those within groups 1–4 who returned for follow-up. This is because the efficacy of the health check, analysed on the basis of intention to treat, has already been assessed (Hanlon *et al.*, 1995). An important issue now is what characterised those

who made one or more positive behaviour changes. This is best established by studying those who returned for follow-up because the behavioural changes and some of the personal characteristics of individuals who did not return for follow-up are not known in the same detail. For the purposes of this analysis, the four groups that received one version of the health check are considered together as a single group of 868 participants. This is because the randomised controlled trial did not detect major differences in outcome arising from different versions of the health check and because ‘intervention group’ is one of the variables that is considered in this analysis as one of the potential predictors of outcome. Therefore, any behavioural or psychological response arising from differences in the original controlled trial intervention group will be detected through the current analysis.

## Analysis

### *Question 1*

On entry to the study, individuals were defined as being ‘not at risk’ if their reported behaviour met all the following criteria:

- (i) non-smokers;
- (ii) weekly consumption of alcohol <21 units for men or <14 units for women;
- (iii) exercised for >20 min (aerobically) three times per week.

Therefore, throughout this paper the terms 'at risk' and 'not at risk' relate to a limited list of health related behaviours. Those who failed to meet one or more of the above criteria were defined as being 'at risk'. Those who were 'not at risk' were compared with those 'at risk'. Each of variables 5–21 in Table 1 was tested separately for association with risk status using chi-square tests.

#### Question 2

The number of 'responders' was counted at Stage II and Stage III. Individuals were categorised as 'responders' if their changes in self-reported behaviour since Stage I met one or more of the following criteria:

- (i) changed from being a 'current smoker' to a 'non-smoker';
- (ii) changed from above the then recommended safe levels of weekly alcohol consumption (21 units for men, 14 units for women) to below these levels;
- (iii) changed from taking less than '20 min of aerobic exercise three times per week' to at least this level;
- (iv) complied with dietary advice given during the health check.

Six categories of food consumption were analysed: (1) fresh fruit; (2) green vegetables; (3) cakes, biscuits and chocolates; (4) meat pies and sausages; (5) chips; and (6) wholemeal bread. Based on reported food frequencies, analysis of change in reported food frequencies led to the allocation of one positive score for each category of food showing changes that had been advised in the health check, and one negative score for each change that was against the advice of the health check. This created a range of potential scores for each individual from -6 to +6. Subjects with a net positive score of two or more were defined as having made a health enhancing dietary change. It was considered that this arbitrary choice possessed face validity. Individuals achieving a score of two or more were reporting several dietary changes that had been advised during the health check. All participants had the potential to make some dietary improvements and, as such, were

defined as potential responders even if they were not 'at risk' with respect to smoking, alcohol consumption or exercise.

Data on smoking, drinking, exercise and dietary intake were collected separately at each stage and replies analysed later for change (rather than asking the subjects for self-reported changes). This was done to minimise bias arising from the respondent's desire to please the counsellor.

#### Question 3

Those who were 'responders' were compared with the 'non-responders'. Each of variables 5–21 in Table 1 was tested separately for association with response status using chi-square tests. Thereafter a stepwise logistic regression analysis was carried out to establish the best combination of variables for predicting membership of the 'responder' or 'non-responder' subgroups. These analyses were carried out separately for changes between Stages I and II (6 months) and Stages I and III (1 year).

## RESULTS

#### Question 1

Table 2 shows the proportion of full attenders who were 'at risk' for each of the relevant behaviours and the proportion 'not at risk' for any of them. The latter were 275 individuals (26% of all full attenders) who were 'not at risk' in terms of smoking, alcohol or exercise behaviour at baseline. These individuals formed the 'not at risk' subgroup. Table 3 presents the variables that showed statistically significant associations with membership of this subgroup. Members of the 'not at risk' subgroup were more likely to perceive their health over the previous year as 'good' (as opposed to 'fairly good' or 'poor'). Self-

**Table 2:** Percentages of full attenders in groups 1–5 ( $n = 1053$ ) showing risk behaviours on entry to the study and the percentages of those who were defined as 'not at risk' by virtue of their smoking, alcohol and exercise behaviours

'At risk' status	Percentage of trial participants 'at risk'
'At risk' for smoking	32
'At risk' for alcohol	30
'At risk' for exercise	50
'Not at risk'	26

**Table 3:** Variables showing a statistically significant association with membership of the 'at risk' or 'not at risk' subgroups at Stage I (full attenders, groups 1–5,  $n = 1053$ )

Variable	Category	Percentage in category		d.o.f.	<i>p</i> -value <sup>a</sup>
		Not at risk	At risk		
Self-perceived health over past year	Good	73	60	2	<0.001
	Fairly good	23	38		
	Not good	4	2		
Self-perceived health for age	Excellent/good	80	63	1	<0.001
	Fair/poor	20	37		
Perception of being 'at risk' for CHD	Yes/possibly	21	38	1	<0.001
	No	79	62		
Socio-economic group	Professional/ managerial/ intermediate non-manual	22	14	2	0.004
	Junior non-manual/ foremen/skilled manual	59	60		
	Semi-skilled/unskilled/ manual	19	26		
Education: highest qualification	None/school leaving age	29	38	2	0.002
	Post-school-leaving-age	57	54		
	HNC/HND/degree	14	8		
Sense of coherence: meaning	Low score	32	47	2	<0.001
	High score	68	53		
Sense of coherence: control	Low score	37	46	1	0.01
	High score	63	54		

<sup>a</sup>On chi-square test.

perceived 'health for age' was more likely to be 'excellent' or 'good' rather than 'fair' or 'poor', and they tended not to perceive themselves to be 'at risk' of coronary heart disease. There is some evidence to suggest this is an accurate perception. When the Dundee Risk Score (Tunstall-Pedoe, 1991), which is a summary score of reversible coronary risk, was compared, the 'at risk' group had significantly higher mean score (Mean Dundee Risk Score: 'at risk' = 28.08; 'not at risk' = 17.2,  $p < 0.001$ ).

The 'not at risk' group had a higher representation from the professional, managerial and intermediate non-manual categories, and tended to have obtained qualifications at post-school-leaving age or later. There were also significant associations between being in the 'not at risk' group and two of the dimensions in the sense of coherence psychological assessment (Antonovsky, 1984). For each dimension of the sense of coherence assessment, scales were dichotomised to produce two groups: those who fell above and those who fell below the median for the study participants as a whole. The group defined as not being at risk were associated

with scores suggesting they held a belief that life has meaning and felt a sense of control over their life circumstances.

## Question 2

Of the 868 full attenders who received one version of the health check and returned for follow up at Stages II and III, 409 (47%) reported that they had made one or more of the advised changes—stopped smoking, reduced their alcohol consumption from above recommended weekly limits to below, increased their level of physical activity to recommended amounts, or changed defined aspects of their diet. Increase in exercise was the most commonly reported change, followed by dietary change, reduced alcohol consumption and then smoking cessation (Table 4). By Stage III (after 12 months of follow-up and a repetition of the intervention at 6 months), 56% of the 868 full attenders reported one or more positive behaviour changes (i.e. were defined as 'responders'). If the proportion of responders is recalculated on the basis of intention to treat (that is on the assumption that those who did not return for follow-up made no changes), the

**Table 4:** Percentages of full attenders in groups 1–4 ( $n = 868$ ) showing risk behaviours on entry to the study and the percentages of those who favourably changed their behaviour by 6 months after a health check

'At risk' status	Percentage of all full attenders in groups 1–4 who were 'at risk' at Stage I	Percentage of full attenders who were 'at risk' and made desired change after a health check
'At risk' for smoking	31	7
'At risk' for alcohol	29	20
'At risk' for exercise	51	38
'At risk' for diet	100	29

denominator includes all individuals allocated to groups 1–4 at Stage I ( $n = 1138$ ). Using this denominator, the proportion of responders is 36% at Stage II and 43% at Stage III.

### Question 3

Table 5 shows the variables that were statistically significant in their association with being a 'responder' at Stage II, 6 months after a health check. 'Responders' tended to perceive themselves to be 'at risk' of coronary heart disease (CHD) and were more likely to perceive their own health as 'fair or poor' (rather than 'excellent or good'). 'Responders' were also more likely to perceive the health check as threatening and, therefore, a cause of anxiety. Although responders were more likely to be married or living as married, none of the other sociodemographic variables was significantly associated with behavioural change. The identity of the counsellor who carried out the intervention showed a significant association with response, but the intervention group did not. When a forward stepwise logistic regression analysis was employed, self-perception of being 'at risk' of CHD and the identity of the counsellor were the only variables in the best model for discriminating between responders and non-responders. After these two variables were entered into the model, none of the other variables made a significant additional contribution (Table 6). The model that incorporated these variables successfully predicted 43% of responders and 74% of non-responders (overall 60% prediction).

A similar analysis was carried out on the data obtained at Stage III (after 12 months), by which time individuals had experienced two health checks: at baseline and again after 6 months. The overall pattern of variables associated with being a responder was similar to that at Stage II.

### DISCUSSION

One of the most striking findings from this analysis is the large proportion of the full attenders (47%) who, 6 months after receiving a version of the health check, reported one or more of the behaviour changes which had been advised (stopped smoking, reduced alcohol consumption to below the recommended maximum, improved diet or increased exercise to meet the prescribed level). At 12 months, 6 months after the second health check intervention, this figure had risen to 56% which suggests an additional benefit from repetition. Even if these figures are re-analysed on the basis of intention to treat and all defaulters from the study are deemed to have made no behaviour changes, the proportion making one or more of the recommended behaviour changes is still high (36% at 6 months and 43% at 12 months). It might, of course, be argued that this level of behaviour change was due to reporting bias brought about by a desire on the part of subjects to give the answers they imagined were being sought by the researchers. To minimise this type of bias, however, data on smoking, drinking, exercise and dietary intake were collected separately at each stage and replies analysed later for change (rather than asking the subjects for self-reported changes). Therefore, while desire to please cannot be discounted, steps were taken to minimise this form of bias.

Yet, despite the large amount of change in self-reported behaviour, the randomised controlled trial that formed the principal part of this study demonstrated only a small effect on measurable coronary heart disease risk (Hanlon *et al.*, 1995). This result is consistent with other workplace and primary care trials (Pelletier, 1993; Barratt *et al.*, 1994; Sorensen *et al.*, 1996), as was emphasised by a recent systematic review of randomised controlled trials of multiple risk factor interventions for preventing CHD which concluded that this form of intervention has limited impact on

**Table 5:** Variables showing a statistically significant association with membership of the 'responders' subgroup at Stage II (full attenders, groups 1–4,  $n = 868$ )

Variable	Category	Percentage in category		d.o.f.	<i>p</i> -value <sup>a</sup>
		Responders ( $n = 409$ )	Non-responders ( $n = 459$ )		
Perception of being 'at risk' of CHD	Yes/possibly	43	26	1	<0.001
	No	57	74		
Self-perceived health for age	Excellent/good	62	71	1	0.007
	Fair/poor	38	29		
Whether perceived health check information to be threatening	Threatening	14	9	2	0.018
	Neutral	13	11		
	Not threatening	72	80		
Marital status	Married/as married	84	78	2	0.043
	Divorced/separated/widowed	6	6		
	Single	10	16		
Health check counsellor	1	47	54	1	0.05
	2	53	46		

<sup>a</sup>On chi-square test.

CHD risk factors (Ebrahim and Davey Smith, 1997).

As a consequence, the results from this study raise several questions. Are changes in health related behaviour (alcohol consumption, exercise, smoking and diet) which have a small effect on measurable CHD risk worthwhile? Are these behavioural measures appropriate outcome indicators for a health check? Part of the answer may come from examining the client's perspective. When an individual attends a health check, he or she is given advice. The advice may cover a number of behaviours. However, if the individual adopts even one of the suggested changes, he or she may well feel that they have 'complied', even if they have not made all the suggested changes. Consequently, the adoption of one or more of the suggested behaviour changes is a highly appropriate outcome measure for a health check because, from the client's point of view, it measures compliance with behaviour changes that were explained to them as the purpose of the intervention.

Furthermore, it can be argued that changes in health related behaviour are worthwhile even if they do not result, in the short term, in changes that manifest themselves as reduction in the classical CHD risk factors. These potential benefits relate to positive health (encompassing well-being and fitness), to reduced risks of other categories of ill health and perhaps even to continuing change into the future that ultimately reduces CHD risk.

The results in this paper also give some insight into the role of the so called 'worried well' in health checks. Those identified on entry to the study as being at 'low risk' (that is, non-smokers, moderate drinkers and regular exercisers) tended to be the better educated members of the workforce who had higher status jobs. As such, they have a similar profile to a group often called the 'worried well' who have been identified in other studies to be more easily recruited for health checks (Pill *et al.*, 1988; Waller *et al.*, 1990). This low risk group has, however, a very different profile from the group that is found to have benefited from the health check. Those whose reported behaviour did change, perceived themselves to have poor general health and to be 'at risk' of CHD. They also tended to perceive the health check as anxiety provoking and threatening. In other words, it tended to be those who perceived themselves to be in need of healthy change and who worried about the information given to them who made the changes. There is

**Table 6:** Significant variables for predicting response in logistic regression analysis; Stage II (full attenders, groups 1–4,  $n = 868$ )

Variable	Category	Odds ratio
Perception of being 'at risk' of CHD	No	1.0
	Yes/possibly	2.18 (1.63–2.90)
Health check counsellor	1	1.0
	2	1.33 (1.01–1.74)

also some evidence to suggest that their self-perception of risk was objectively accurate. This implies that, if health check recruitment mechanisms and the health check itself could be designed to identify this type of individual, even more help and support could be offered to them. The role of support from others at home and in the workplace may also be important. Those who changed behaviours tended to be married or live as married. Also, the research team perceived that the high profile given to health in the whole workplace during the study seemed to legitimise and support the changes in behaviour made by individuals.

The fact that those who made changes tended to find the health check threatening is also of interest, as it gives a different slant to the role of anxiety and threat than that reported in previous studies (Stoate, 1989). As will be reported elsewhere, the overall level of anxiety caused by the health check was low, but those who found it more threatening were those who went on to make the recommended behaviour changes. This suggests that the provision of information that causes mild anxiety during a health check can be a motivating factor for behaviour change. The context is important. At the time individuals were given information about their personal risk that may have caused anxiety, they were provided with advice and support that could lead to a positive behavioural response and a reduction in anxiety.

Given that models of behaviour change which describe behaviour resulting from health promotion interventions suggest a complex cycle of change, affected by a wide variety of factors, frequently resulting in compliance but often ending in relapse (Becker, 1974; Tones, 1987), several practical lessons for the practice of health promotion emerge from this study. First, interpretation of the results of a series of randomised controlled trials of health checks may underestimate the importance of behavioural benefits if outcomes are judged exclusively in terms of coronary risk. Second, the level of behaviour change should be judged both in terms of changes in particular behaviours and the proportion of individuals who made one or more of the desired changes: both measurements provide a valuable insight, but the latter is less frequently quoted. Third, it would be logical to target those who perceive themselves to be in need of healthy change and who worry about the information given to them. Fourth, anxiety can have a posi-

tive effect provided clients are given information and support. Fifth, there may be merit in planning simple but repeated interventions, as repetition seems to enhance response.

Health promotion interventions should be founded on a solid evidence base. However, given that health is a wider concept than disease, health promotion requires a wide range of evidence that deals with behavioural and biological outcomes supplemented by an understanding of the processes involved in healthy change.

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## REFERENCES

- Antonovsky, A. (1984) The sense of coherence as a determinant of health. In Matarazzo, J., Weiss, S., Herd, J. and Miller, N. (eds) *Behavioural Health: Hand Book of Health Enhancement and Disease Prevention*. Wiley, New York.
- Barratt, A., Reznik, R., Irwig, L., et al. (1994) Work site-based cholesterol screening and dietary intervention: the Staff Healthy Heart Project. *American Journal of Public Health*, **84**, 779-782.
- Becker, H. M. (ed.) (1974) *The Health Belief Model and Personal Health Behaviour*. Slack, Thorofare, NJ.
- Bhantnager, D. and Durrington, P. N. (1990) Coronary risk factors: value of screening and preventive strategies in general practice. *Family Practice*, **7**, 295-300.
- Diclemente, C. C. and Prochaska, J. O. (1982) Self change and therapy change of smoking behaviour: a comparison of processes of change in cessation and maintenance. *Addictive Behaviours*, **7**, 133-142.
- Ebrahim, S. and Davey-Smith, G. (1997) Systematic review of randomised controlled trial of multiple risk factor interventions for preventing coronary heart disease. *British Medical Journal*, **314**, 1666-1674.



- Family Heart Health Study Group (1994) Randomised controlled trial evaluating cardiovascular screening and intervention in general practice: principal results of British family heart study. *British Medical Journal*, **308**, 313–320.
- Gomel, M., Oldenburg, B., Simpson, J. M., *et al.* (1993) Work-site cardiovascular risk reduction: a randomised trial of health risk assessment, education, counselling, and incentives. *American Journal of Public Health*, **83**, 1231–1238.
- Greater Glasgow Health Board (1995) Health Promotion Department's Operational Plan 1995–96. Internal document.
- Hanlon, P., McEwen, J., Carey, L., *et al.* (1995) Health checks and coronary risk; further evidence from a randomised controlled trial. *British Medical Journal*, **311**, 1609–1613.
- Imperial Cancer Research Fund OXCHECK Study Group (1994) Effectiveness of health checks conducted by nurses in primary care: results of the OXCHECK study after one year. *British Medical Journal*, **308**, 308–312.
- Imperial Cancer Research Fund OXCHECK Study Group (1995) Effectiveness of health checks conducted by nurses in primary care: final results of the OXCHECK study. *British Medical Journal*, **310**, 1099–1104.
- Langham, S., Thorogood, M., Normand, C., *et al.* (1996) Cost and cost effectiveness of health checks conducted by nurses in primary care: the OXCHECK study. *British Medical Journal*, **312**, 1265–1268.
- Multiple Risk Factor Intervention Trial Research Group (1990) Mortality rates after 10.5 years for participants in the Multiple Risk Factor Intervention Trial: findings related to a *a priori* hypothesis of the trial. *Journal of the American Medical Association*, **263**, 1795–1801.
- Pelletier, K. R. (1993) A review and analysis of the health and cost-effective outcome studies of comprehensive health promotion and disease prevention programs at the work-site: 1991–1993 update. *American Journal of Health Promotion*, **8**, 50–61.
- Pill, R., French, J., Harding, K. and Scott, N. (1988) Invitation to attend a health check in a general practice setting: comparison of attenders and non-attenders. *Journal of the Royal College of General Practitioners*, **38**, 53–56.
- Shea, S. and Basch, C. (1990) A review of five major community-based cardiovascular disease prevention programs. *American Journal of Health Promotion*, **4**, 203–213.
- Solonen, J. T., Puska, P. and Mustaniemi, H. (1979) Changes in morbidity and mortality during a comprehensive programme to control cardiovascular disease during 1972–7 in North Karelia. *British Medical Journal*, **2**, 1178–1183.
- Sorensen, G., Thompson, B., Glanz, K., *et al.* (1996) Work site-based cancer prevention: primary results from the Working Well Trial. *American Journal of Public Health*, **86**, 939–947.
- South East London Screening Study Group (1977) A controlled trial of multiphasic screening in middle ages: results of the South East London screening study. *International Journal of Epidemiology*, **6**, 357–363.
- Stoate, H. G. (1989) Can health screening damage your health? *Journal of the Royal College of General Practitioners*, **39**, 193–195.
- Tones, B. K. (1987) Devising strategies for preventing drug misuse: the role of the Health Action Model. *Health Education Research*, **2**, 305–317.
- Toon, P. D. (1995) Health checks in general practice. *British Medical Journal*, **310**, 1083–1084.
- Tunstall-Pedoe, H. (1991) The Dundee risk disk for management of change in risk factors. *British Medical Journal*, **303**, 744–747.
- Waller, D., Agass, M., Mant, D., *et al.* (1990) Health checks in general practice: another example of inverse care. *British Medical Journal*, **300**, 1115–1118.
- Williams, K. (1992) *The Community Prevention of Coronary Heart Disease*. HMSO, London.
- Wonderling, D., McDermott, C., Buxton, M., *et al.* (1996a) Cost and cost effectiveness of cardiovascular screening: the British family heart study. *British Medical Journal*, **312**, 1269–1273.
- Wonderling, D., McDermott, C., Buxton, M., *et al.* (1996b) What can be concluded from the OXCHECK and British family heart studies; commentary on cost effectiveness analysis. *British Medical Journal*, **312**, 1274–1278.
- World Health Organization European Collaborative Group (1986) European collaborative trial of multifactorial prevention of coronary heart disease: final report on the six year result. *Lancet*, **i**, 869–872.

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