

- Long-term effects on physical measurements. *Scand J Rehabil Med* 1990;22:189-94.
- 25 Basler H, Jakle C, Kroner-Herwig B. Incorporation of cognitive-behavioral treatment into the medical care of chronic low back patients: A controlled randomized study in German pain treatment centers. *Patient Education & Counseling* 1997;31:113-24.
- 26 Jüchel WH, Cziške R, Gerdes N, Jacobi E. [Assessment of the effectiveness of inpatient rehabilitation measures in patients with chronic low back pain: a prospective, randomized, controlled study.] (In German.) *Rehabilitation (Stuttg)* 1990;29:129-33.
- 27 Nicholas MK, Wilson PH, Goyen J. Operant-behavioural and cognitive-behavioural treatment for chronic low back pain. *Behav Res Ther* 1991;29:225-38.
- 28 Nicholas MK, Wilson PH, Goyen J. Comparison of cognitive-behavioral group treatment and an alternative non-psychological treatment for chronic low back pain. *Pain* 1992;48:339-47.
- 29 Mitchell RI, Carmen GM. The functional restoration approach to the treatment of chronic pain in patients with soft tissue and back injuries. *Spine* 1994;19:633-42.
- 30 Corey DT, Koepfler LE, Edin D, Day HI. A limited functional restoration program for injured workers: a randomized trial. *J Occup Rehabil* 1996;6:239-49.
- 31 Mayer TG, Gatchel RJ, Mayer H, Kishino ND, Keeley J, Mooney V. A prospective two-year study of functional restoration in industrial low back injury. An objective assessment procedure [correction appears in *JAMA* 1988;259:220]. *JAMA* 1987;258:1763-7.
- 32 Van Tulder MW, Koes BW, Bouter LM. A cost-of-illness study of back pain in the Netherlands. *Pain* 1995;62:233-40.
- 33 Bailar JC. The promise and problems of meta-analysis. *N Engl J Med* 1997;337:559-61.
- 34 Deyo RA, Battie M, Beurskens AJ, Bombardier C, Croft P, Koes B, et al. Outcome measures for low back pain research. A proposal for standardized use [correction appears in *Spine* 1999;24:418]. *Spine* 1998;23:2003-13.
- 35 Jumi P, Witschi A, Block R, Egger M. The hazards of scoring the quality of clinical trials for meta-analysis. *JAMA* 1999;282:1054-60.
- 36 Hutubessy RC, van Tulder MW, Vondeling H, Bouter LM. Indirect costs of back pain in the Netherlands: a comparison of the human capital method with the friction cost method. *Pain* 1999;80:201-7.

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Population based intervention to change back pain beliefs and disability: three part evaluation

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Abstract

Objective To evaluate the effectiveness of a population based, state-wide public health intervention designed to alter beliefs about back pain, influence medical management, and reduce disability and costs of compensation.

Design Quasi-experimental, non-randomised, non-equivalent, before and after telephone surveys of the general population and postal surveys of general practitioners with an adjacent state as control group and descriptive analysis of claims database.

Setting Two states in Australia.

Participants 4730 members of general population before and two and two and a half years after campaign started, in a ratio of 2:1:1; 2556 general practitioners before and two years after campaign onset.

Main outcome measures Back beliefs questionnaire, knowledge and attitude statements about back pain, incidence of workers' financial compensation claims for back problems, rate of days compensated, and medical payments for claims related to back pain and other claims.

Results In the intervention state beliefs about back pain became more positive between successive surveys (mean improvement in questionnaire score 1.9 (95% confidence interval 1.3 to 2.5), $P < 0.001$ and 3.2 (2.6 to 3.9), $P < 0.001$, between baseline and the second and third survey, respectively). Beliefs about back pain also improved among doctors. There was a clear decline in number of claims for back pain, rates of days compensated, and medical payments for claims for back pain over the duration of the campaign.

Conclusions A population based strategy of provision of positive messages about back pain improves population and general practitioner beliefs about back pain and seems to influence medical management and reduce disability and workers' compensation costs related to back pain.

Introduction

Patients' attitudes and beliefs, particularly fear avoidance beliefs and passive coping strategies, are increasingly accepted as having an important role in disability related to back problems,¹⁻⁴ as is management based on the biopsychosocial model.⁵ Despite an increase in evidence that staying active and continuing or resuming ordinary activities is more effective than rest⁶ and that early investigation and referral to a specialist are unwarranted in most cases,⁷ surveys of physicians continue to show that only few give this advice on management.⁸⁻⁹ This may reflect physicians' knowledge and beliefs,⁸ although physicians' behaviour may also be influenced by patients' expectations and other psychosocial factors.¹⁰⁻¹¹

As previously suggested by Deyo, with such a paradigm shift from the traditional model of management of back pain it may be that the public as well as the medical profession need to be re-educated.¹² If re-education can change attitudes and beliefs and give rise to a concomitant alteration in patients' expectations and physicians' behaviour, the rising incidence of disability from low back pain may be stemmed or reversed.

In Victoria, Australia, a state of 4.3 million people,¹³ the workers' compensation system paid out \$A385 million (£142m) in claims for back pain in the 1996-7 financial year.¹⁴ This figure had tripled in one decade.¹⁴ In 1997 the Victorian WorkCover Authority, the manager of the workers' compensation system, embarked on a state-wide public health campaign aimed at altering the general population's attitudes and beliefs about back pain. We measured the effectiveness of the impact of this campaign on population beliefs about back pain and on the knowledge and attitudes of general practitioners in telephone and mailed surveys. As the campaign was ubiquitous in the state of Victoria we used a quasi-experimental, non-randomised, non-equivalent before and after study designs, with an adjacent state, New South Wales, as control. We measured the effect of

the campaign on incidence, days of compensation, and medical costs of claims for back problems.

Methods

Setting

The workers' compensation systems of Victoria and New South Wales are state based, no fault systems with limited access to common law. Both are funded through the public system structure and administered through private industry. To our knowledge, no state-wide public health intervention for back pain took place in New South Wales during the period of our study. Victoria and New South Wales have almost identical sex and age distributions, and about three quarters of both populations were born in Australia.¹³ The population of New South Wales is 6.0 million.¹³

Public health campaign intervention

The public health campaign was based on the messages in *The Back Book*, an evidence based educational booklet for patients produced in the United Kingdom by a multidisciplinary team of authors.¹⁵ In line with current guidelines both the booklet and the campaign provide sharply focused, unambiguous advice directed towards staying active and exercising, not resting for prolonged periods, and remaining at work.¹⁶

The campaign comprised television commercials that were aired in prime time slots starting in September 1997. The intensity of the campaign varied, with a concentrated campaign for three months initially followed by a low key maintenance campaign until September 1998. A further three month concentrated television campaign started in September 1999, with no further commercials being aired before completion of the evaluation. The commercials included dialogue by recognised international and national medical experts as well as Australian sporting and television personalities who had successfully managed their back pain. All advertisements concluded with a statement of endorsement by the relevant national professional bodies. The television campaign was supported by radio and printed advertisements, outdoor billboards, posters, seminars, workplace visits, and publicity articles. *The Back Book* was made widely available, with translations in 16 languages, and all doctors in Victoria received evidence based guidelines for the management of employees with low back pain who were eligible for compensation.¹⁷

Population surveys

We used a computer assisted questionnaire administered during a telephone interview of three separate cross sectional random samples of the employed population in Victoria and New South Wales before and two and two and a half years after the campaign started. The interviews were conducted at the same time of day at each time point. We used a concurrent interstate control group to adjust for any cointerventions that may have affected both states equally over the period of the study. To evaluate the effect of cointerventions that may have occurred only in the state of Victoria over the study period we administered the questionnaire after the intervention at two time points (comprising half at each time point).

We used computerised random digit dialing of telephone numbers¹⁸ to quota-sample residents of Victoria and New South Wales. Participants were aged

from 16 to 65 years and currently employed for at least four hours a week. Return calls with interpreters were offered to those for whom English was not their first language. Residents in New South Wales with postcodes bordering Victoria were excluded because of access to Victorian television.

Employees from an experienced polling company carried out the interviews after training in the use of the standard questionnaire. Both interviewers and respondents were blinded to the true purpose of the study and were informed that university researchers were exploring population attitudes and beliefs about back pain. The Monash University ethics committee approved the study.

Questionnaire—The primary measure of beliefs about back pain was the back beliefs questionnaire, which is designed to measure beliefs about the inevitable consequences of future life with low back problems.¹⁹ Respondents indicated their degree of agreement with each of 14 statements on a 5 point scale (1=agree to 5=disagree). A higher score indicates a more positive belief about low back trouble, suggesting better ability to cope with low back pain. We collected demographic data, and respondents were asked about their previous experience of back pain (ever, in the past year, and in the past week). At each time point they were also asked about their awareness of any advertising campaigns about back pain and whether any awareness had influenced their attitudes and beliefs about back pain.

General practitioner surveys

We carried out a postal survey of a random sample of general practitioners before and two years after the campaign started. The design was similar to the population surveys.

Questionnaire—We modified the questionnaire from one developed in Ontario, Canada.²⁰ It included a set of questions to determine what the doctors knew about the management of acute low back pain and attitudes towards the patients. The questions were phrased as statements and responses were on a 5 point Likert scale that ranged from strongly agree to strongly disagree. We also collected information on demographic details and practice characteristics.

Claims database

To map changes in number and duration of claims and medical pay out for claims over the time period of the campaign we abstracted information from the Victorian WorkCover Authority claims database at monthly intervals from May 1997 to November 1999. We calculated the total number of days compensated and medical payments across all continuing claims for each month from August 1997 to November 1999. Totals for each month were divided by the number of days in the month and by the total number of claims in the database contributing to the total. Thus the numbers reported can be interpreted as rates (of days compensated and of total and medical payments, respectively) per claim day.

Results

Population surveys

There were 4730 surveys completed, with equal numbers in each state, and a ratio of 2:1:1 across the three time periods (table 1). Demographic characteris-

Table 1 Population surveys: demographic details, back pain history, awareness of campaign, and self reported change in attitudes according to state (Victoria, New South Wales) and survey (1–August 1997, 2–August 1999, 3–February 2000). Figures are percentages unless stated otherwise

	Victoria			New South Wales		
	1	2	3	1	2	3
Response rate	55.3	43.7	44.2	42.8	38.1	35.2
No of completed interviews	1185	590	592	1185	590	588
Residence in metropolitan area	72.2	75.1	74.8	72.2	75.1	75.0
Men (%)	50	48	50	50	52	50
Age (mean)	39.7	40.2	39.5	39.1	40.9	39.8
Born in Australia	78.0	78.8	76.7	74.3	71.4	73.3
Education level:						
Secondary not completed	26.5	22.5	20.3	17.0	16.1	13.4
Completed secondary	26.5	26.6	28.6	31.5	32.0	30.2
Tertiary qualification	46.6	50.2	50.3	51.2	51.7	55.1
Annual household income:						
≤\$40 000 (£14 705)	37.3	33.1	28.2	33.5	23.7	21.8
\$40 001–\$80 000 (£14 706–£36 363)	35.7	28.6	31.9	31.4	32.4	33.5
>\$80 000 (£36 364)	8.9	14.8	13.9	15.6	18.1	17.4
Did not answer	18.1	23.6	26.0	19.5	25.8	27.4
Self employed	10.5	11.4	11.7	12.3	12.7	10.2
Type of work:						
Heavy manual work	20.6	20.3	16.6	18.2	18.0	14.3
Some manual work	74.2	73.2	71.5	75.6	73.2	75.7
No manual work	5.2	6.4	12.0	6.2	12.0	10.0
Ever had back pain	74.5	80.3	71.1	74.5	79.7	70.8
Back pain in past year	54.0	58.3	52.0	54.4	53.7	46.6
Back pain in past week	27.3	31.5	22.5	27.9	27.8	23.3
Seen back pain advertising in past year*	47.1	73.9	85.5	51.5	48.5	48.0
Changed attitudes, beliefs as a result*	23.1	38.8	48.0	22.1	21.0	22.7

*Significant differences between surveys in Victoria, $P < 0.001$.

tics and previous experience of back pain were similar at each time point both within and between states (table 1). At baseline about half of the respondents in both states had been aware of back pain advertising in the previous year. While this did not change over time in New South Wales, there was a significant increase in awareness of back pain advertising in Victoria (from 47% at baseline to 74% at survey 2 and 86% at survey 3, $P < 0.001$). This was accompanied by a self reported change in beliefs about back pain as a consequence of advertising (23% at survey 1, 39% at survey 2, and 48% at survey 3, $P < 0.001$).

There were significant improvements in population beliefs about back pain in Victoria between successive surveys, with a mean improvement in score on the back

Table 2 Back beliefs questionnaire. Mean scores* and changes in score from first survey by state (Victoria, New South Wales) and survey (1–August 1997, 2–August 1999, 3–February 2000)

Survey	No	Mean score (95% CI)	Difference in mean score from survey 1 (95% CI)	P value
Victoria				
1	1185	26.5 (26.1 to 26.8)		
2	590	28.4 (27.9 to 28.8)	1.9 (1.3 to 2.5)	<0.001
3	592	29.7 (29.2 to 30.3)	3.2 (2.6 to 3.9)	<0.001
New South Wales				
1	1185	26.3 (25.9 to 26.6)		
2	590	26.2 (25.7 to 26.7)	-0.04 (-0.7 to 0.6)	0.9
3	588	26.3 (25.7 to 26.8)	0.02 (-0.6 to 0.7)	1.0
Difference between states				
1	2370	0.24 (-0.27 to 0.76)		
2	1180	2.14 (1.44 to 2.83)	1.9 (1.0 to 2.8)	<0.001
3	1180	3.46 (2.70 to 4.22)	3.2 (2.3 to 4.1)	<0.001

*Possible range of scores 9–45.

beliefs questionnaire of 1.9 (95% confidence interval 1.3 to 2.5) between baseline and survey 2 ($P < 0.001$) and 3.2 (2.6 to 3.9) between baseline and survey 3 ($P < 0.001$) (table 2). There was no change in mean score on the back beliefs questionnaire in New South Wales.

General practitioner surveys

There were 2556 surveys completed. As for the population surveys, the number of doctors who were aware of a back pain media campaign rose significantly in Victoria between successive surveys (from 16% at survey 1 to 89% at survey 2; $P < 0.001$). This was accompanied by a rise in the proportion of doctors who reported that the campaign had changed their beliefs about back pain (from 3% to 32%, $P < 0.001$).

Over time, doctors in Victoria were 3.6 (2.4 to 5.6) times as likely as doctors in New South Wales to know that patients with low back pain do not need to wait until they are almost pain free to return to work (table 3). They were also 2.9 (1.6 to 5.2) times as likely to know that such patients should not be prescribed complete bed rest until the pain goes away and 1.6 (1.2 to 2.3) times as likely to know that x ray pictures of the lumbar spine are not useful in the investigation of acute low back pain. Doctors in Victoria also indicated that they would be less likely to order tests for low back pain either because patients expect them to (odds ratio 1.6; 1.1 to 2.3) or to conform with the normal practice patterns of their peer group (1.5; 1.1 to 2.0).

Claims database

Figure 1 shows the relative number of claims, indexed to the year before the campaign started (1996–7) for claims for back problems and other claims. In contrast with other claims, there was a clear decline in number of claims for back problems, representing a reduction of over 15% in absolute numbers over the duration of the campaign. The interaction between type of claim and a quadratic polynomial function of year, which tested the difference in curvature between the two series, was significant ($P = 0.013$).

Figure 2 shows the trends in the rate of days compensated per 1000 claim days and the trends in rates of medical payments for back claims and other claims. The decline in the rate of days compensated for back claims is considerably steeper than for other claims. As we had no data from before the campaign, however, we could not attribute any decline specifically to the campaign. The rate of medical payments for back claims also declined strongly during the first half of the 30 month period, with a lesser rate of decline seen for other claims during the same period of time. Over the duration of the campaign this represents an absolute reduction in medical costs of 20% per claim. The interaction terms between type of claim and year were fitted with linear models for both days compensated and medical payments. The interaction terms were significant in both cases ($P = 0.0003$ and $P = 0.0218$, respectively), indicating differing rates of change over time between the two types of claim, for both series.

Discussion

Positive shift in beliefs about back pain

Our results indicate that a population based intervention of provision of explicit advice about back pain can positively alter beliefs about back pain in the general

Table 3 Responses to statements about back pain according to state (Victoria, New South Wales) and survey (1–August 1997, 2–February 2000) and ratio of odds ratios for change between survey waves, Victoria versus New South Wales. Figures are percentage unless stated otherwise

Statements about patients with low back pain	Correct* or positive response	Victoria		New South Wales		Interaction odds ratios (95% CI)†	P value
		1 (n=691)	2 (n=562)	1 (n=791)	2 (n=512)		
Knowledge							
Patients should not return to work until they are almost pain free	Disagree	68.5	90.2	77.8	80.2	3.6 (2.4 to 5.6)	<0.001
Patients should be prescribed complete bed rest until pain goes away	Disagree	77.1	96.0	80.9	91.3	2.9 (1.6 to 5.2)	<0.001
x Ray pictures of lumbar spine are useful in investigation of acute (<1 month) pain	Disagree	60.4	72.3	64.2	65.4	1.6 (1.2 to 2.3)	0.004
Encouragement of physical activity is important in recovery	Agree	91.0	98.7	92.0	97.6	2.2 (0.8 to 6.0)	0.131
Attitudes							
I am likely to order x ray pictures because patients expect me to do so	Disagree	69.0	79.2	72.1	73.1	1.6 (1.1 to 2.3)	0.010
Many investigations for my patients are ordered to conform with normal practice patterns of my peer group	Disagree	52.7	60.1	57.0	55.1	1.5 (1.1 to 2.0)	0.020
I often have negative feelings about treating these people	Disagree	58.5	64.4	54.9	57.3	1.2 (0.8 to 1.6)	0.131
Well motivated patients are unlikely to have long term problems	Agree	60.2	69.7	58.9	66.7	1.1 (0.8 to 1.5)	0.621

*Correct response based on authors' interpretation of latest evidence.

†Interaction between state of practice and survey wave; odds ratio >1 implies change over time differs between states.

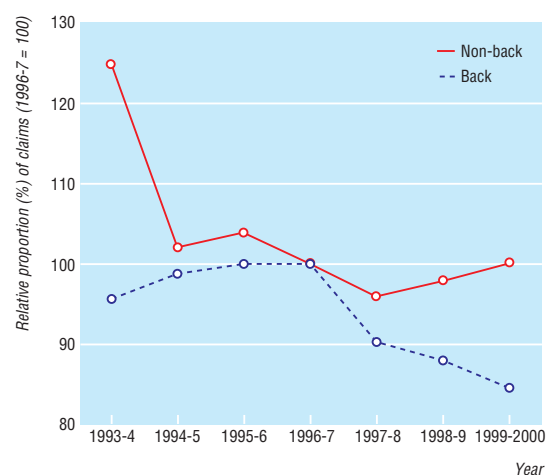


Fig 1 Change in numbers of claims over time by type of claim, Victorian WorkCover database, 1993-4 to 1999-2000. Both series indexed to number of claims in 1996-7

population and positively influence knowledge and attitudes among doctors. We have also shown that this may be an effective strategy for reducing disability and costs related to back pain. Previous attempts to reduce disability related to low back pain have largely been directed towards limiting the problem once it has developed or modifying occupational risk factors to reduce occurrence of back pain in the workplace.^{21, 22} One population based primary prevention strategy that has been studied was a nationwide back school programme that was started in Switzerland in 1990.²³ However, participation was voluntary and was found to be significantly associated with the presence of previous back pain problems. To our knowledge, the Victoria WorkCover Authority public health campaign is the first true population based primary prevention intervention to be performed and rigorously evaluated.

Provision of advice to back pain sufferers is known to be beneficial.^{6, 16, 19, 24} A randomised controlled trial of *The Back Book* given to people with low back pain who were seeking treatment in primary care showed improvement in beliefs as well as in self reported disability in activities of daily living.¹⁶

In those already on sick leave from work, an informative approach designed to reduce fear and give

reason to resume light activity has also been shown to be more effective than conventional medical care in reducing sick leave in both the short and the longer term.²⁴

Population strategy of prevention

The positive shift in population beliefs about back pain in Victoria was seen across the whole distribution

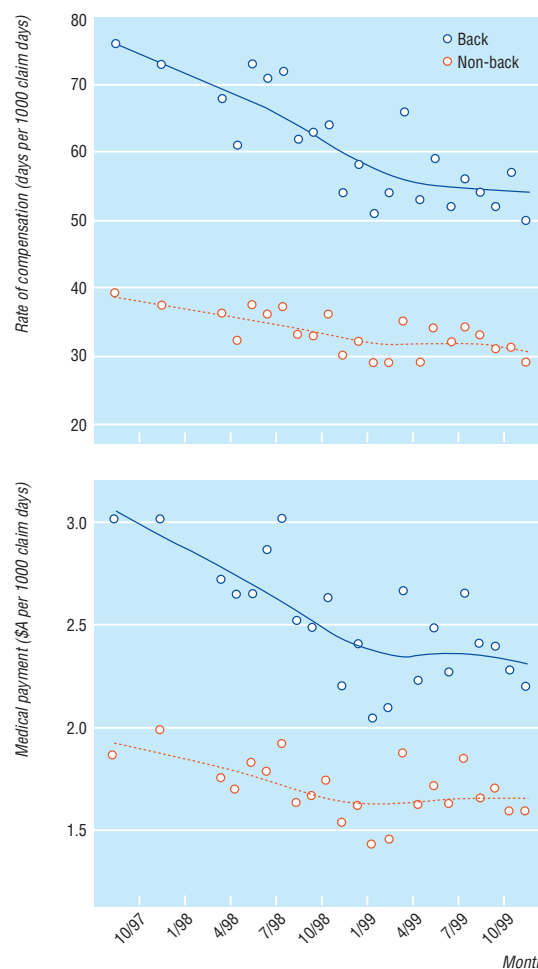


Fig 2 Change over time in rates per 1000 claim days of days compensated and medical payment, by type of claim, Victorian WorkCover Authority database, Victoria, August 1997 to December 1999. Smoothed local regression lines fitted with loess procedure

What is already known on this topic

The number of people with disability from back pain has risen rapidly in the past 50 years

Most attempts to limit this disability include modification of occupational risk factors or dealing with the problem once it has developed

Patients' attitudes and beliefs play an important part in the development of such chronic disability

What this study adds

A population based primary prevention intervention that provided explicit advice about back pain improved beliefs about back pain in the general population and knowledge and attitudes in general practitioners

The number of workers' compensation claims for back pain decreased and the rate of days compensated and medical payments for back claims were reduced

of back beliefs at baseline (data not shown). This is in keeping with the "population strategy" of prevention, which attempts to control the determinants of incidence in the population by shifting the whole distribution of exposure in a favourable direction.²⁵ With good evidence that negative attitudes and beliefs are important in contributing to disability due to low back pain, the altering of societal views is an appropriate and potentially highly effective strategy to adopt. Not only may it be effective in altering beliefs among high risk groups that may be hard to identify, in the context of such a common disorder as back pain, even altering the beliefs of low and medium risk groups is likely to confer a large benefit.²⁶ In addition, if these views are commonly accepted then it will be easier to persuade individuals to adopt them.

Mass media campaign

This is the first description of a mass media campaign directed towards reducing disability due to back pain. However, media campaigns are an established strategy for delivering preventive health messages.^{27, 28} They have been used to alter a wide variety of health related behaviours, including smoking,²⁹ exposure to sun,³⁰ and physical activity,³¹ and have also been used to promote preventive asthma therapy, cancer and HIV screening, immunisation programmes, and emergency services for suspected myocardial infarction.²⁸

Conclusion

Our study provides empirical evidence for the value of a population based strategy of provision of positive messages about back pain in reducing disability and workers' compensation costs related to back pain. Further research should be directed towards measuring whether the effect of the campaign is sustained over time. The results of our study should also encourage others to adapt the campaign for use and evaluation in other settings.

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- 1 Linton S. A review of psychological risk factors in back and neck pain. In: Nachemson A, Jonsson E, ed. *Neck and back pain: the scientific evidence of causes, diagnosis, and treatment*. Philadelphia: Lippincott Williams & Wilkins, 2000.
- 2 Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A fear-avoidance beliefs questionnaire (FABQ) and the role of fear avoidance beliefs in chronic low back pain and disability. *Pain* 1993;52:157-68.
- 3 Burton AK, Tillotson KM, Main CJ, Hollis S. Psychosocial predictors of outcome in acute and subchronic low back trouble. *Spine* 1995;20:722-8.
- 4 Symonds TL, Burton AK, Tillotson KM, Main CJ. Do attitudes and beliefs influence work loss due to low back trouble? *Occup Med* 1996;46:25-32.
- 5 Waddell G. A new clinical model for the treatment of low-back pain. *Spine* 1987;12:632-44.
- 6 Waddell G, Feder G, Lewis M. Systematic reviews of bed rest and advice to stay active for acute low back pain. *Br J Gen Pract* 1997;47:647-52.
- 7 Deyo RA, Phillips WR. Low back pain. A primary care challenge. *Spine* 1996;21:2826-32.
- 8 Cherkin DC, Deyo RA, Wheeler K, Ciol MA. Physician views about treating low back pain. The results of a national survey. *Spine* 1995;20:1-10.
- 9 Little P, Smith L, Cantrell T, Chapman J, Langridge J, Pickering R. General practitioners' management of acute back pain: a survey of reported practice compared with clinical guidelines. *BMJ* 1996;312:485-8.
- 10 Chew-Graham C, May C. Chronic low back pain in general practice: the challenge of the consultation. *Fam Pract* 1999;16:46-9.
- 11 Little P, Cantrell T, Roberts L, Chapman J, Langridge J, Pickering R. Why do GPs perform investigations? The medical and social agendas in arranging back x rays. *Fam Pract* 1998;15:264-5.
- 12 Deyo RA. Acute low back pain: a new paradigm for management. *BMJ* 1996;1343-4.
- 13 Australian Bureau of Statistics. *1996 census of population and housing*. Canberra, Australia: ABS, 1996.
- 14 Victorian WorkCover Authority. *Statistical report 1998-1999*. Melbourne: Victorian WorkCover Authority, 2000.
- 15 Roland M, Waddell G, Moffat J, Burton A, Main C, Cantrell T. *The back book*. London: Stationery Office, 1996.
- 16 Burton AK, Waddell G, Tillotson KM, Summerton N. Information and advice to patients with back pain can have a positive effect. A randomised controlled trial of a novel educational booklet in primary care. *Spine* 1999;24:2484-91.
- 17 Victorian WorkCover Authority. *Guidelines for the management of employees with compensable low back pain*. Melbourne: Victorian WorkCover Authority, 1996.
- 18 Desk Top Marketing Systems. *Marketing Pro*. Melbourne: DtMS Pty, 1997.
- 19 Symonds TL, Burton AK, Tillotson KM, Main CJ. Absence resulting from low back trouble can be reduced by psychosocial intervention at the work place. *Spine* 1995;20:2738-45.
- 20 Bombardier C, Jansz G, Maetzel A, and the Primary Care Collaborative Group. Primary care physicians' knowledge, confidence and attitude in the management of acute low back pain (ALBP). *Arthritis Rheum* 1995;38(suppl 9):385.
- 21 Frank JW, Kerr MS, Brooker AS, DeMaio SE, Maetzel A, Shannon HS, et al. Disability resulting from occupational low back pain. Part I: What do we know about primary prevention? A review of the scientific evidence on prevention before disability begins. *Spine* 1996;21:2908-17.
- 22 van Poppel MN, Koes BW, Smid T, Bouter LM. A systematic review of controlled clinical trials on the prevention of back pain in industry. *Occup Environ Med* 1997;54:841-7.
- 23 Weber M, Cedraschi C, Roux E, Kissling R, Von Känel S, Dalvit G. A prospective controlled study of low back school in the general population. *Br J Rheumatol* 1996;35:178-83.
- 24 Indahl A, Haldorsen EH, Holm S, Reikeras O, Ursin H. Five year follow-up study of a controlled clinical trial using light mobilization and an informative approach to low back pain. *Spine* 1998;23:2625-30.
- 25 Rose G. Sick individuals and sick populations. *Int J Epidemiol* 1985;14:32-8.
- 26 Rose G. *The strategy of preventive medicine*. Oxford: Oxford University Press, 1992.
- 27 Redman S, Spencer E, Sanson-Fisher RW. The role of mass media in changing health-related behaviour: a critical appraisal of two methods. *Health Promot Int* 1990;5:85-101.
- 28 Grilli R, Freemantle N, Minozzi S, Domenighetti G, Finer D. Mass media interventions: effects on health services utilisation. *Cochrane Database Syst Rev* 2001;(2):CD000389.
- 29 Sly D, Heald G, Ray S. The Florida "truth" anti-tobacco media evaluation: design, first year results, and implications for planning future state media evaluations. *Tob Control* 2001;10:9-15.
- 30 Hill D, White V, Marks R, Borland R. Changes in sun-related attitudes and behaviours, and reduced sunburn prevalence in a population at high risk of melanoma. *Eur J Cancer Prev* 1993;2:447-56.
- 31 Owen N, Bauman A, Booth M, Oldenburger B, Magnus P. Serial mass-media campaigns to promote physical activity: reinforcing or redundant? *Am J Public Health* 1995;85:244-8.

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