Brief interventions delivered in GP surgeries to improve uptake of physical activity

Matrix Insight, in collaboration with Imperial College London, Kings College London and Bazian Ltd, were commissioned by Health England to undertake a research study to develop and apply a method for prioritising investments in preventative interventions for England. Seventeen preventative health interventions were included in the study. Each intervention was evaluated in terms of the following criteria: reach; inequality score; cost-effectiveness; and affordability. This report presents the results of the analysis for one of the interventions: brief interventions delivered in GP surgeries to improve uptake of physical activity. The full report of the study is available from the ***H.E.L.P.*** website.

Summary

Description of the intervention
Brief advice and one motivational interview with a health visitor, compared to just brief advice (Matrix 2006, based on Harland 1999).

Criteria	Measure	Value	Certainty
1. Reach			
Percentage of population affected by the condition and that could potentially benefit from the intervention.	Individuals 40 to 64 years old visiting a GP as a percentage of the population aged 15 and above in England (Office for National Statistics, 2009; Healthcare Commission, 2008)	33.75%	★★★
2. Inequality score			
Ratio of the percentage of disadvantaged population to the percentage of the general population that could potentially benefit from the intervention.	Assumption	1	
3. Cost-effectiveness			
Cost of the intervention per QALY gained (in £2007/08)	See cost-effectiveness	£20	★★
Net cost of the intervention per QALY gained (in £2007/08)	See cost-effectiveness	-£2,151	★★
Timing of benefits	QALY gain and cost savings are estimated to occur in the long-run (5 years or more after the intervention).		
4. Affordability			
Total cost of implementing the intervention at the national level	Multiple of eligible individuals and unit cost of the intervention	Between £100 million and £1 billion	★★

Key to certainty grading scales

★ Low quality evidence

★★ Medium quality evidence

★★★ High quality evidence

Box 1. Cost per QALY gained

A quality adjusted life year (QALY) is a simple way of combining quality of life with length of life.
One QALY is equivalent to one year in full health. The cost per QALY gained is therefore the cost of achieving one extra year of full health. Its calculation is based on the following formula:

$$cost\ per\ QALY\ gained = \frac{incremental\ cost\ of\ intervention}{QALYs\ gained}$$

The net cost per QALY gained is the cost per QALY considering the incremental cost of the intervention as well as the cost saved through health treatment avoided. Its calculation is based on the following formula:

$$net\ cost\ per\ QALY\ gained = \frac{incremental\ cost\ of\ intervention - cost\ savings}{QALYs\ gained}$$

Cost effectiveness

Cost. Brief interventions delivered in GP surgeries consisting of brief advice and one motivational interview with a health visitor cost on average £31 per person more than brief advice (£2007/08).

Effect. Compared to just brief advice, brief advice and one motivational interview with a health visitor produce the following effects:

- An increase of 22 per cent in the chances of adults achieving an increase in the number of moderate (5 – 7.5 kcal/min) activity sessions.
- An increase of 6 per cent in the chances of adults achieving an increase in the number of vigorous (> 7.5 kcal/min) activity sessions.

These effects were obtained from a review undertaken to identify evidence on the effectiveness and cost-effectiveness of brief interventions delivered in GP surgeries to improve uptake of physical activity.

Benefits. The benefits of the intervention derive from achieving an increase in the number of moderate and vigorous activity sessions. Two types of benefits are considered: QALYs and health care cost savings.[1] Based on the QALYs gained and the health care cost savings associated with physical activity, increases of 22% and 6% in the chances of adults achieving an increase in the number of moderate and vigorous activity sessions are associated with the following benefits:

- An additional 1.52 QALYs per person
- Cost savings of £3,301 per person (£2007/08)

Please refer to the decision model for details on how the QALY gain and cost savings were calculated.

[1] Cost associated with increased life expectancy resulting from the intervention –such as pensions and health care costs– are not included in the analysis.

Decision model

The cost-effectiveness estimates were calculated by drawing the following parameters from the literature:

- The unit cost of the intervention (Table 1).
- The effect of the intervention on the chances of adults' becoming physically active (Table 1).
- The benefits associated with becoming physically active, in terms of quality of life and health care cost savings (Matrix, 2006).

Table 1. Intervention costs and effects (monetary values in £2007/08)

Description	Value	Calculation and source
Cost of intervention	£30.6	Based on the cost of one motivational interview with a health visitor. Resources required include: nurse time, phone follow-ups, phone interviewer's time, and the cost of mailers and brochures (Matrix, 2006 based on Harland, 1999).
P(if intervention, becoming physically active)	0.22 (moderate) 0.06 (vigorous)	These probabilities are based on the percentages of individual achieving an increase in the number of moderate (5 - 7.5 kcal/min) and vigorous (>7.5 kcal/min) activity sessions (Matrix 2006 based on Harland, 1999). See evidence review.
P(if no intervention, becoming physically active)	0.000	This is assumed zero given that there is no data available on baseline probabilities of becoming active.

The benefits of the intervention were drawn from an economic model built by Matrix (2006). The model developed by Matrix (2006) estimated the QALY gain and cost savings associated with the intervention, as described below:

- Individuals receiving the intervention were assumed to be 45 years old on average.
- The effect of the intervention is given by a change in adults' chances of achieving an increase in the number of moderate and vigorous activity sessions.
- The model assumes a 50 per cent drop off in the number of people increasing their physical activity levels as result of the intervention, and then assumes that the resulting increase in physical activity is maintained long enough to obtain health benefits of that physical activity level.
- Physical activity was assumed to be associated with reduced probabilities of experiencing the following four diseases: type II diabetes; stroke: coronary heart diseases (CHD); and colon cancer.
- The four diseases have impacts in terms of quality of life and health care costs.
- The impacts on quality of life were estimated by comparing the EQ-5D scores for individuals experiencing the diseases of different age groups and genders, with average quality of life scores for different age groups and genders. The impact on quality of life of experiencing colon cancer was assumed to be the same as the average for all cancers.
- The impacts on health care costs were estimated based on the costs of treating type II diabetes, stroke and CHD. The costs of colon cancer were not included in the estimates given that no reliable annual cost for the treatment colon cancer could be identified.

Unless stated otherwise, the analysis was undertaken in accordance with H.M. Treasury's Green Book (HM Treasury, 2003). Specifically:

- Any costs and effects incurred more than one year after the intervention were discounted at 3.5%.

- Where necessary monetary values were converted in 2007/8 prices using Gross Domestic Product (GDP) deflators (HM Treasury, 2008).

Effectiveness evidence

A literature review was undertaken by Bazian to identify evidence on the effectiveness and cost-effectiveness of brief interventions delivered in GP surgeries to improve uptake of physical activity. Further details are available on the evidence methods page of the ***H.E.L.P.*** website.

The review of the evidence on the effectiveness of brief interventions delivered in GP surgeries identified five randomised controlled studies and one non-randomised controlled study. Table 2 provides the following details of the studies identified:

- Population
- Intervention
- Results

The review of the evidence on the cost-effectiveness of brief interventions delivered in GP surgeries identified one economic study. Table 3 provides the following details of the studies identified:

- Population, intervention and model
- Perspective, discounting, inflation, cost year
- Utility/benefit
- Unit costs
- Efficiency

Table 4 and Table 5 provide a quality assessment of the studies. Further details are available on the quality appraisal methods page.

The following criteria were applied to select effectiveness evidence for undertaking the economic analysis:

- Location. Studies from the UK were preferred over studies from other locations.
- Population. Studies applied to the general population were preferred over studies applied to restricted population groups (e.g. pregnant women; individuals from specific communities/nationalities).
- Counterfactual. Studies for which the counterfactual intervention was ‘usual care’ or ‘do nothing’ in a UK setting were preferred over studies for which the counterfactual was different from ‘usual care’ or ‘do nothing’.
- Method. Studies using more rigorous design methods (e.g. randomised controlled trials or quasi experimental designs with regression models controlling for confounders) were preferred over studies using less rigorous design methods (e.g. before-after studies or simple correlation analysis).

Table 2. Effectiveness of brief interventions delivered in GP surgeries to improve uptake of physical activity

Study reference	Population	Intervention	Results
Elley, 2003 ▪ randomised controlled trial	878 male and female patients aged 40 to 79 years attending participating practices over a 5-day period in eastern Waikato region of NZ.	*Intervention* ▪ Brief oral and written advice (based on motivational interviewing) prompted by patient, delivered by GP or practice nurse; 3 follow-up calls from exercise specialist *Control* ● Usual care	▪ Change in physical activity (12 months): 14.6% with intervention vs. 4.9% with control ▪ Proportion of intervention group undertaking 2.5 hours of exercise/week increased by 9.72% more than in the control group (p=0.003)
Harland et al, 1999; UK ▪ randomised controlled trial	523 adults aged 40 to 64 years recruited through one urban general practice in the UK between 1995 and 1997. Follow-up at 12 weeks and 1 year.	*Intervention* ▪ All participants received information pack, recommended activity levels and 19 leaflets on locally available leisure facilities and activities as well as brief advice ▪ Four intervention groups: interventions 1 & 2 received brief advice and were offered 1 motivational interview within 2 weeks of their baseline assessment. Those in intervention group 2 received 30 vouchers at the interview ▪ Interventions 3 &4 received intensive intervention – 6 motivational interviews over 12 weeks with those in intervention 4 also receiving 30 vouchers at the first interview	Differences were not significant between the groups at 1 year Difference between intervention and control in proportion reporting increased physical activity scores at 12 weeks: 22% (95% CI 13% to 32%) Difference between intervention and control in proportion reporting increased physical activity scores at 1 year: 3% (not significant) [Result from Matrix publication] ▪ Intensive interviews: – Increase in number of vigorous activity session (>7.5 kcal/min): 0.0% – Increase in the number of moderate activity sessions (5-7.5 kcal/min): 6.0% ▪ Interviews and vouchers: – Achieved an increase in the

Study reference	Population	Intervention	Results
		Control ▪ All participants received information pack, recommended activity levels and 19 leaflets on locally available leisure facilities and activities as well as brief advice ▪ Control group received no further interventions	number of vigorous activity session (>7.5 kcal/min): 3.0% – Achieved an increase in the number of moderate activity sessions (5-7.5 kcal/min): 10.0% ▪ Intensive interviews and vouchers: – Achieved increase in number of vigorous activity session (>7.5kcal/min): 4.0% – Achieved an increase in the number of moderate activity sessions (5-7.5 kcal/min): 6.0%
Hillsdon et al, 2002; UK ▪ randomised controlled trial	1,658 males and females aged 45 to 64 years registered with two medical centres in Wellingborough, UK who did not undertake regular exercise to improve/maintain their health and/or fitness and had done less than 4 occasions of moderate intensity physical activity in the last 4 weeks. People with long-standing illness, disability or infirmity and/or who were permanently sick or disabled and not able to work were excluded.	*Intervention* ▪ One of two active interventions: 30 minute session delivered by health promotion specialist delivering either brief health negotiation based on motivational interviewing or direct advice; 6 follow-up phone calls up between 2 weeks and 34 weeks *Control* ▪ Usual GP care as appropriate	▪ Mean percentage change in physical activity at 12 months follow up: 124% (95% CI 110 to 137) with intervention vs. 113% (95% CI 95 to 133) with control ▪ Between-group difference: 3.7% (95% CI -4.7 to 12.5); p=0.39
Petrella et al, 2003 ▪ randomised controlled trial	284 healthy community-dwelling patients (72 per clinic) aged >65 years, recruited in 1998 to 1999 through four academic family medicine clinics in London, Ontario.	*Intervention* ▪ STEP included exercise counselling and prescription of an exercise training heart rate. Primary outcome measure was aerobic fitness (VO2max)	▪ VO2max at 6 months: increase from baseline: 11% with STEP intervention v. 4% in control group; p<0.001 ▪ VO2max at 12 months: increase from baseline: 14% with STEP v. 3% with control; p<0.001

Study reference	Population	Intervention	Results
		Control ▪ No intervention	
Smith et al, 2000; ▪ non-randomised controlled trial	Active and inactive 25 to 65 year olds recruited sequentially by research assistants in practice waiting rooms in 27 volunteer general practices in Sydney.	*Intervention* ▪ Exercise prescription vs. exercise prescription plus supplementary booklet; intervention group received a written prescription for exercise and a random half of these were also sent additional booklets *Control* ▪ No intervention; control group was recruited 2 to 3 weeks before the intervention group	▪ No difference between groups in average changes in minutes of total physical activity ▪ Increase in physical activity by at least 60 minutes/week after 6 to 10 weeks; prescription plus supplementary booklet group vs. controls: OR 1.58, 95% CI 1.06 to 2.35 ▪ No improvement in physical activity in the prescription only group compared with control
Swinburn et al, 1998; NZ ▪ randomised controlled trial	491 males and females with mean age 49 years (SD 15) recruited through 37 general practitioners	*Intervention* ▪ All participants received brief verbal advice during a consultation with a GP ▪ Intervention group received a written exercise prescription *Control* ▪ All participants received brief verbal advice during a consultation with a GP ▪ Control group – no further intervention	[Result from Matrix publication] Proportion becoming 'active' as a result of the intervention: 23.2%

Table 3. Cost-effectiveness of brief interventions delivered in GP surgeries to improve uptake of physical activity

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
Matrix, 2006	Decision analytic model to estimate the health impact, quality of life outcome and health care system costs and savings as a result of physical activity interventions. Populations included in models were those for whom the effectiveness studies collected data. Extra resources used per participant in intervention compared with control were derived from the effectiveness studies.	▪ Public sector perspective and NHS and personal social services perspective ▪ 3.5% discounting of future costs ▪ Adjusted for inflation (2.5%) ▪ Cost year: GBP2005	Elley, 2003: - QALY gained: Exercise prescription with intensive GP training vs. advice: 0.45 - Saving/QALY gained (£): 1,617.65	Incremental cost per participant (£): Exercise prescription vs. advice (GP receives intensive training): 197.60	Cost/QALY (£): 437.11
			Harland et al, 2003: - QALY gained: Interview vs. advice: 0.34 - Interviews with exercise voucher vs. advice: 0.79 - Intensive interviews vs. advice: 1.15 - Intensive interviews with exercise voucher vs. advice: 0.63 Saving/QALY gained (£): - Interview vs. advice: 2,002.34 - Interviews with exercise voucher vs. advice: 1,585.54 - Intensive interviews vs. advice: 1,481.62 - Intensive interviews with exercise voucher vs. advice: 1,221.55	Incremental cost per participant (£): Interview vs. advice: 28.67 Intensive interview vs. advice: 122.00 Interview and exercise vouchers vs. advice: 178.67 Intensive interview and exercise voucher vs. advice: 272.00	Cost/QALY (£): Interview vs. advice 84.15 Intensive interview vs. advice: 105.99 Interviews with exercise voucher vs. advice: 227.16 Intensive interviews with exercise voucher vs. advice: 430.16
			Hillsdon et al, 2002	Incremental cost per participant (£):	

Study reference	Population, intervention and model	Perspective, discounting, inflation, cost year	Utility/benefit	Unit costs	Efficiency
				Motivational interviews vs. nothing: 16.80 Direct advice vs. nothing: 16.80	
			Petrella et al, 2003: QALY gained: 0.57 Saving/QALY gained: £746.93	Incremental cost per participant (£): Exercise prescription vs. advice: 41.95	Cost/QALY (£): £73.52
			Smith et al, 2000: QALY gained: - Exercise prescriptions vs. advice: 0.23 - Exercise prescription and exercise information vs. advice: 0.07 Saving/QALY gained: - Exercise prescriptions vs. advice: £1,877.46 - Exercise prescription with intensive GP training vs. advice: 1,610.93	Incremental cost per participant (£): Exercise prescription and further information vs. advice: 36.55	Cost/QALY (£): Exercise prescriptions vs. advice: £158.83 Exercise prescription and exercise information vs. advice: £425.36
			Swinburn et al, 1998: QALY gained: - Exercise prescriptions vs. advice: 1.01 Saving/QALY gained: £3,142.95	Incremental cost per participant (£): Exercise prescription vs. advice: 20.45	Cost/QALY (£): 20.19

Table 4. Quality assessment for effectiveness studies

Study reference	QA for trials/RCTs					Score	Grading (++ 4-5; + 3; -0-2)
	Follow-up	Intention to treat?	Attrition	Groups similar or controlled?	Randomised?		
Elley, 2003	Yes	Yes	Yes	Yes	Yes (cluster)	5	++
Harland et al, 1999	Yes	Yes	Yes	Yes	Yes	5	++
Hillsdon et al, 2002	Yes	Yes	No	Yes	Yes	4	++
Petrella et al, 2003	Yes	No	Yes	Yes	Yes	4	++
Smith et al, 2000	Yes	Yes	Yes	Yes	No	4	++
Swinburn et al, 1998	No	Yes	Yes	Yes	Yes	4	++

Table 5. Quality assessment for economic studies

Study reference	QA for economic studies						Score	Grading (++ 4-6; + 3; -0-2)
	All costs of intervention included?	Market values used for costs?	Perspective reported?	Sensitivity analysis?	Reports base year adopted?	Effectiveness data from RCT or MA?		
Matrix, 2006	Yes	Don't know	Yes	Yes	Yes	Yes	5	++

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