



**Public health interventions to promote mental well-being
in people aged 65 and over: systematic review
of effectiveness and cost-effectiveness**

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Summary

1. Aims of the review

- To identify and review all relevant evidence about public health interventions to promote mental well-being in older people aged 65 and over.
- To identify and review data on the costs and cost-effectiveness of public health interventions to promote mental well-being in older people aged 65 and over.
- To highlight gaps in the evidence base and make recommendations for further research.

2. Summary of effectiveness review

A systematic search of 21 data bases and 11 websites sought evidence, published between January 1993 and February 2007, of the effectiveness or cost-effectiveness of interventions to promote mental well-being in later life. The search was restricted to the English language. In principle all study designs were considered for inclusion. In total 15,388 citation titles and abstracts were screened for relevance. By this process 248 articles were identified for further appraisal for inclusion in either review – 218 for effectiveness and 30 for cost-effectiveness. Application of inclusion criteria selected 96 papers for the review – 94 for effectiveness and two for cost-effectiveness. The 94 effectiveness papers described four meta-analyses, 13 trials of good quality (one of which generated two papers), 68 quantitative studies of poor quality (one of which generated two papers) and seven qualitative papers (including five of good quality).

Thus most included studies were of poor quality. Many used small samples that may not represent the population of interest, and certainly lack statistical power. Many recruited participants through advertisements, probably recruiting more motivated individuals, and again making findings less representative. The frequent use of self selection means that women predominate. Few included studies focused on frail older people or people over 80. Few interventions were targeted at alleviating poverty, and none at

older people from ethnic or sexual minorities. Few studies answered sub-questions in full, including who delivered the intervention and where.

We divided the 94 studies into 15 categories – six concerned with different types of exercise, three with different types of health promotion, one each with psychological interventions, computer use, gardening, support groups and volunteering, and one residual category. Three of these categories generated useful evidence statements from meta-analyses, and another three from single rigorous trials. Unfortunately two categories, each with three rigorous trials, did not generate a useful evidence statement because the evidence from these trials was conflicting. Another six categories generated no rigorous evidence. While the four good qualitative studies in the final category – mixed health promotion – are helpful, they cannot estimate strength of evidence. Hence the review has generated six robust positive evidence statements – nos. 1 to 4 relating to exercise, no. 7 relating to health promotion and no. 10 relating to psychological interventions (pp. 9 to 11). Of the two identified cost-effectiveness papers, one added to the evidence on exercise and the other to the evidence on health promotion. To address the lack of economic papers, this review also shows how economic modelling can extend studies concerned solely with effectiveness so as to throw light on cost-effectiveness.

In summary there is a shortage of robust evidence for the effectiveness and cost-effectiveness of interventions to improve the mental well-being of older people. Better research is needed to estimate the value of most interventions. Research into cost-effectiveness is especially sparse, with little economic research even into programmes with evidence of effectiveness. Nevertheless this review has generated six useful positive evidence statements.

Evidence statements

<p>1</p>	<p>Mixed exercise</p> <p>Two meta-analyses (Arent et al., 2000, MA+; Netz et al., 2005, MA+), together comprising 68 controlled trials from many developed countries, since augmented by four other rigorous trials in the Netherlands (2), Norway and the US, together provide strong evidence that mixed exercise programmes generally have small-to-moderate effects on mental well-being. As the reported exercise programmes cover a range of types, settings and countries, firm conclusions about the duration of programmes and the frequency of sessions are difficult. It is clear, however, that exercise of moderate intensity (not well defined in the meta-analyses) has beneficial effects on physical symptoms and psychological well-being.</p> <p>The programmes evaluated were generally community-based, well organised and run by trained instructors. The findings apply to similar populations (relatively healthy and independent, and motivated to take exercise) in similar community settings in the UK. The sole qualitative study (Hardcastle & Taylor, 2001; Q+) highlights the importance of appropriate facilities and good supervision.</p>
<p>2</p>	<p>Strength & resistance exercise</p> <p>Meta-analysis of four US trials that included a total of 1733 independent frail older people and used four of the SF-36 scales to evaluate similar resistance exercise interventions found a significant small-to-moderate improvement in emotional health (Schechtman & Ory, 2001; MA+). The findings are likely to be broadly applicable to frail older people in a range of settings in the UK.</p> <p>Of six smaller controlled studies evaluating the benefit of resistance exercise for older people in general, five reported significant positive effects, mostly on the POMS measure (a self-reported measure of general mood over the past week). As all six were of poor quality, this</p>

	finding should not be considered robust.
3	Aerobic exercise A medium-sized RCT in the US showed that both interventions – supervised aerobic brisk walking and ‘toning & stretching’ – generated similar trajectories of MUNSH and SWLS scores over 12 months in sedentary adults aged 60 to 75; these trajectories showed significant growth in happiness and satisfaction over the six-month exercise period, followed by a significant decrease at 12 months (McAuley et al., 2000, RCT+). The findings are likely to be broadly applicable to similar populations in the UK.
4	Walking interventions A walking programme delivered to older people in 28 heterogeneous neighbourhoods in Portland, Oregon by trained leaders three times a week over six months improved SF-12 mental health and SWLS life satisfaction scores relative to control neighbourhoods (Fisher & Li, 2004, Cluster RCT+). This cluster randomised trial recruited 279 people to the intervention group (of whom 156 completed the intervention) and compared them with 303 controls who received education only. Though recruitment and retention of participants is important for such programmes, the results are likely to be broadly applicable to similar populations in the UK.
5	Tai Chi Two out of three rigorous evaluations in the US showed that 3 to 6-month community-based Tai Chi programmes delivered by professionals improve differing mental health measures in older people (Li et al., 2002 & 2004; RCT+ but not Kutner et al. 1997; NCT+). However there was little difference between Tai Chi and less specific exercise programmes. Hence there is no evidence that the distinctive element of Tai Chi confers any benefit.
6	Other exercise A US pilot study (Williams et al CBAS-) found that home-based balance-training for 13 older females had no effect on the self-reported SWLS. Another very small study (Tanaka et al., 2002, UBAS-) tested a four-week programme of exercise and short naps on 11 older people in Japan. As only these weak studies were found in this category, the conclusion is that there is no robust evidence that these forms of exercise improve mental well-being.

7	<p>Group-based health promotion There is evidence from one well-designed longitudinal trial (Clark et al., 1997, RCT++; Clark et al., 2001, RCT++) that weekly educational sessions led by occupational therapists promoted and maintained positive changes in the SF-36 mental health score in participants recruited from two federally-subsidised apartment complexes for older adults in the US. Though the findings are likely to be broadly applicable to a similar population in the UK, the findings may not generalise to those in other circumstances (e.g. owner-occupiers & nursing home residents).</p>
8	<p>Mixed health promotion programmes There is no quantitative evidence on the effectiveness of mixed health promotion in improving mental well-being. Four qualitative studies suggest that comprehensive health promotion programmes delivered by professionals to homeless, poor or socially isolated older people are acceptable to users and perceived to improve mental wellbeing markedly (Buijs et al., 2003, Q+; Greaves & Farbus, 2006, MM+; Wilcock, 2006a & 2006b, Q+). As three of these studies are British and the fourth Canadian, they are applicable to the UK.</p>
9	<p>Individually targeted health promotion</p> <p>There is conflicting evidence from four randomised trials (Halbert et al., 2000, RCT+; Kerse, 2005, RCT+; Frieswijk et al., 2006, RCT-; Markle-Reid et al., 2006, RCT++) on the effects on mental well being.of differing health promotion interventions delivered to individuals by professionals</p> <p>In Canada Markle-Reid et al. found that monthly home visits of 1 hour by health promotion nurses significantly improved SF-36 mental health summary scores in the intervention group compared with usual care. The intervention also significantly reduced the costs of prescription drugs in the health promotion group, by enough to offset the costs of the scheme.</p>

	<p>In the Netherlands Frieswijk et al.. found that a five-part bibliotherapy correspondence course to aid self management in slightly to moderately frail older volunteers living at home, resulted in significant improvements on the Sense of Mastery Scale in the short term, but not at six months..</p> <p>In New Zealand Kerse found that a primary care intervention in which independent sedentary older patients received monthly phone calls from exercise specialists improved SF-36 vitality subscale scores, but had no effect on the mental health scores.</p> <p>In contrast in Australia Halbert et al found that both the provision of 20 minutes of advice on physical activity by an exercise specialist to older patients, and no treatment for controls, in two general practices significantly reduced mental well-being in two SF-36 dimensions – vitality and emotional limitations on role.</p>
10	<p>Psychological interventions</p> <p>A meta-analysis (Pinquart & Sörensen, 2001; MA+) covering a total of 84 studies from many developed countries provides strong evidence for the effectiveness of cognitive training, control-enhancing interventions, psycho-education, relaxation and supportive interventions in improving the subjective well-being of older people. Their findings apply to similar populations – relatively healthy and independent – in similar community settings in the UK.</p> <p>There is no robust evidence on the effectiveness of more specific psychological interventions – notably dream telling, memory tapping, mental fitness training, resourcefulness training and visual stimulation.</p>
11	<p>Computer use Four trials examined the effect of computer training or use (Shrerer et al., 1996, NCT-; White et al., 1999, NCT-; Billipp et al., 2001, NCT-; White et al, 2002, RCT-). As all were of poor quality, there is no robust evidence on the effectiveness of computer use in improving mental well-being.</p>

12	<p>Gardening interventions Three studies examined the role of gardening in the mental wellbeing of older people (Barnicle & Midden 2003, CBAS-, Milligan et al, 2004, MM-, Heliker et al., 2000; UBAS-). As there were critical flaws in each study, there is no robust evidence on the effectiveness of gardening interventions in improving mental well-being.</p>
13	<p>Support groups Three studies reported the effect of support groups on mental well-being (Barnes & Bennett; 1998, Q-; Stewart et al., 2001, UBAS-; Powers & Wisocki, 2006, UBAS-). As each was of poor quality, there is no robust evidence that support groups improve mental well-being.</p>
14	<p>Volunteering interventions Three studies reported the effect of volunteering interventions on older people (Wheeler et al., 1998, MA-; Rabiner et al., 2003, CBAS-; Butler, 2006, MM-). As all were of poor quality, there is no robust evidence on the effectiveness of volunteering in improving the mental well-being of older volunteers or older clients.</p>
15	<p>Other interventions A range of other interventions have been evaluated in poor quality studies. It is concluded that there is no robust evidence on the effectiveness of altruistic activity, art therapy, catering redesign in long-term care, home massage, occupational therapy, pet therapy, sleep management, video games and wheelchair modification.</p>

3. Summary of cost effectiveness review

Two published economic evaluations based on RCTs were identified for inclusion in the review. Fortunately for comparability both economic analyses were based on the SF-36 component scores, not the specific SF-36 mental health score.

One study was an RCT of a community-based mixed exercise programme for older people conducted in the UK (Munro et al 2004; RCT+). The intervention consisted of twice-weekly exercise classes of 75 minutes duration delivered by an exercise professional for 2 years. The mean net QALY gain of 0.011 per

person in the intervention group population yielded an incremental cost per QALY of €17,172 (95% CI = €8,300 to €87,115) i.e. £12,103 (95% CI = £5850 to £61,399). The intervention was effective and probably cost effective despite low levels of adherence.

The other study was an RCT of a health education programme conducted in the US. The trial evaluated the cost-effectiveness of a 9-month preventive occupational therapy program in Well-Elderly Study (Hay et al 2002; RCT+). The intervention was delivered by an occupational therapist. The incremental QALY gained in the whole intervention group over the combined control group, based on the average HUI-adjusted score was 4.5 (p<0.01). The incremental cost per QALY gained with occupational therapy was US\$10,666 (95% CI: US\$6,747 - US\$25,430) over the combined controls. The program was found to be cost-effective in the US. As no cost year was given, it has not been possible accurately to convert the costs into UK£.

Evidence Statement 16

16	<p>Published studies of cost-effectiveness</p> <p>Two studies provided good evidence about the cost-effectiveness of interventions to improve the mental well-being of older people. First Hay et al. (2002; RCT+) showed that a two-hour group session of preventive advice from an occupational therapist per week is cost-effective in the US with an incremental cost per QALY of \$10,700 (95% CI \$6,700 to \$25,400). Secondly Munro et al (2004; RCT+) showed that twice-weekly exercise classes led by qualified instructors are probably cost-effective in the UK with an incremental cost per QALY of £12,100 (95% CI = £5,800 to £61,400). While both studies are sound, one cannot be confident that such sparse findings will apply to similar populations (relatively healthy, living independently, and motivated to take advice and exercise) in similar community-based settings in the UK.</p>
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4. Summary of economic modelling of cost effectiveness

Interventions identified in the effectiveness review which were without supporting economic evidence, were selected for inclusion in an economic model that was developed to assess their benefits (expressed in quality-adjusted life-years, QALYs) relative to their respective costs. The criteria for selection included whether the interventions had plausible effectiveness, and whether appropriate data were available. Four studies that described three interventions were considered; counselling programmes to promote physical activity (Halbert et al., 2000; Kerse et al., 2005), a community-based walking scheme (Fisher et al., 2004), and a proactive nursing health promotion intervention (Markle-Reid et al., 2006). The 6-month cost of each intervention ranged from £9.50 per participant, in the case of provision of advice on physical activity from an exercise specialist (Halbert et al., 2000), to £220 per participant in the case of the community-based walking programme (Fisher et al., 2004). Relative to their respective control groups, QALY gains ranged from 3.0 per 1000 individuals over 6-months (physical activity counselling intervention, Kerse et al., 2005) to 28.3 QALYs per 1000 individuals over 6-months (community-based walking programme, Fisher et al., 2004). A nursing health promotion intervention (Markle-Reid et al., 2006) improved health outcome (compared with control) by 4.3 QALYs per 1000 participants over 6-months.

At willingness to pay thresholds of £20,000 and £30,000 per QALY gained, the provision of advice from exercise specialists was not considered cost-effective, but this was based on the results of only one study (Halbert et al., 2000), and under the restrictions of the modelling assumptions. The provision of activity counselling or “Green Prescription”, by primary care practice nurses, together with follow-up telephone support –although representing a similar intervention- was associated with a 6-month cost per QALY gained of £26,177 (Kerse et al., 2005). The provision of health promotion information by community nurses was associated with a cost per QALY gained of £45,593 over 6-months. Compared with the control group, a community-based walking intervention appeared to be most cost-effective at £7,372 and £4,915 per QALY gained (at 6 and 12-months, respectively).

Evidence Statement 17

17	<p>Economic modelling of cost-effectiveness</p> <p>There are only two published economic analyses of interventions to improve the mental well-being of older people (evidence statement 16). To complement these sparse data needs economic modelling based on the integration of existing studies of effectiveness and existing sources of data about patient utilities and resource costs. The most cost-effective intervention was a thrice-weekly community-based walking programme, delivered to sedentary older people who are able to walk without assistance (Fisher & Li, 2004; Cluster RCT+). Modelling yielded an incremental cost per QALY of £7,400 after six months, which is comparable with the two published economic analyses. Modelling was also used to enhance three RCTs of advice about physical activity. Such advice had an estimated incremental cost per QALY of £26,200 when modelled from Kerse et al. (2005; NCT+), who estimated the effects of the primary care ‘green prescription’ counselling programme in New Zealand. The estimated incremental cost per QALY rose to £45,600 when modelled from Markle-Reid et al. (2006; RCT++), who evaluated proactive health promotion by nurses in Canada in addition to usual home care for people over 75. However Halbert et al. (2000; RCT+) reported decreased mental well-being in response to 20 minutes of individual advice on physical activity by an exercise specialist in general practice in Australia. Thus the advice was dominated by the control group to whom no advice was given.</p>
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