

Psychosocial interventions for the promotion of mental health and the prevention of depression among older adults

ANNA K. FORSMAN^{1,2,3*}, JOHANNA NORDMYR^{3,4} and KRISTIAN WAHLBECK^{1,5}

¹University of Helsinki, Institute of Clinical Medicine, Helsinki, Finland ²Nordic School of Public Health, Gothenburg, Sweden ³THL National Institute for Health and Welfare, Mental Health Promotion Unit, Vaasa, Finland, Sarjakatu 2 C, 65320 Vaasa, Finland ⁴Vaasa Hospital District, Vaasa, Finland ⁵THL National Institute for Health and Welfare, Mental Health and Substance Abuse Services, Helsinki, Finland

*Corresponding author. E-mail: anna.forsman@thl.fi

SUMMARY

The aim of this review was to assess the effectiveness of psychosocial interventions for the promotion of mental health and prevention of depression among older people. A systematic review of prospective controlled trials was conducted including 69 studies. The studies were divided into physical exercise, skill training, reminiscence, social activities, group support and multicomponent interventions. Data from 44 trials contributed to a meta-analysis of effectiveness. Overall, psychosocial interventions had a positive effect on quality of life and positive mental health. The pooled interventions also

had a statistically significant effect on reduction in depressive symptoms. Social activities significantly improved positive mental health, life satisfaction and quality of life and reduced depressive symptoms. Based on the results of this study, duration of interventions is of importance, since interventions lasting for >3 months exhibited more positive effects compared with shorter interventions. Meaningful social activities, tailored to the older individual's abilities and preferences should be considered in aiming to improve mental health among older people.

Key words: mental health; older people; psychosocial interventions; systematic review

INTRODUCTION

The interdisciplinary concept of mental health promotion can be viewed from different perspectives (Cattan and Tilford, 2006; Barry and Jenkins, 2007). On one hand, it can be exclusively regarded as the promotion of positive mental health aiming to achieve positive mental health by improving the social, physical and economic environments that determine mental health. On the other hand, it is seen as primary, secondary or tertiary prevention of mental

ill-health with the main focus to decrease the occurrence, prevalence and re-occurrence of mental disorders (World Health Organization, 2004). In this case, it primarily targets risk factors for mental ill-health. Finally, the mental health promotion concept can be defined as encompassing both positive mental health promotion and disorder prevention (Jané-Llopis *et al.*, 2010), and this definition is used as the theoretical framework in this review.

Demographic changes in the EU (Giannakouris, 2008) imply that good mental

health among older people is increasingly important, enabling older adults to stay active for longer (Jané-Llopis and Gabilondo, 2008). Mental disorders are highly prevalent among older people, with depressive disorders being among the most prevalent (de Beurs *et al.*, 2005; Luijendijk *et al.*, 2008; World Health Organization, 2008). It is estimated that ~12% of adults aged 65 or older are currently affected by depressive disorders in Europe (Copeland *et al.*, 1999, 2004). Therefore, in accordance with the theoretical framework in this review prevention of depression among older adults can be viewed as an important part of the mental health promotion concept.

Individual psychological resources, such as self-esteem (Bisschop *et al.*, 2004) and mastery (de Beurs *et al.*, 2005; Steunenbergh *et al.*, 2006), are important mental health resources in old age that can prevent the onset of mental ill-health such as depressive symptoms. Another significant mental health promoting factor among older adults is the individuals' social network and perceived sense of social support and trust, which can be gathered under the umbrella term social capital (Baron *et al.*, 2000). Social capital of older adults is an essential mental health resource, but low levels of social capital should also be regarded as a risk factor for depressive disorders in older people (Van Der Horst and McLaren, 2005; Nyqvist *et al.*, 2006). Restricted social support (Lynch *et al.*, 1999; Jongenelis *et al.*, 2004), a limited social network (Steunenbergh *et al.*, 2006) and loneliness are associated with depressive symptoms and depression (Bisschop *et al.*, 2004; Jongenelis *et al.*, 2004).

Previous reviews have studied the effects of interventions addressing social isolation and loneliness (Findlay, 2003; Cattan *et al.*, 2005; Masi *et al.*, 2010), and have shown reduced loneliness among intervention participants. However, these reviews included all age groups (Masi *et al.*, 2010) or encompassed younger old people (Findlay, 2003; Cattan *et al.*, 2005) than the current review. A meta-analysis including both controlled and uncontrolled trials (Masi *et al.*, 2010) showed significant effects on loneliness with social cognitive training interventions displaying the largest effect. Another review and meta-analysis of controlled trials (randomized and non-randomized), which looked at intervention programs aiming to reduce depression, addressed all age groups (Jané-

Llopis *et al.*, 2003). This meta-analysis found social support interventions to be the most-effective among older adults.

One review (Windle *et al.*, 2007) assessed public health interventions (including both non-randomized and uncontrolled trials) that promoted mental well-being among adults aged 65 or over. This review evidenced positive effects of some types of psychosocial interventions such as exercise interventions, group-based health promotion and various psychological interventions. Like Windle *et al.*'s review (Windle *et al.*, 2007), our review looks at a variety of psychosocial interventions, but in contrast to Windle *et al.* we exclude non-controlled trials due to the risk of bias inherent in non-controlled designs. To the authors' knowledge, no meta-analyses of controlled trials of psychosocial interventions aimed at promoting mental-health and preventing depression among older people have been performed, targeting specifically people aged 65 years or older not suffering from clinical depression or other mental disorders.

OBJECTIVES

The objective was to conduct a systematic review and meta-analysis assessing the effectiveness of psychosocial interventions for mental health promotion and depression prevention among older people.

METHOD

Inclusion criteria for the trials considered in the review

Types of studies

Only studies with a controlled design (randomized controlled or non-randomized controlled trials) were considered for the systematic review.

Types of participants

Older adults (population defined as people aged 65 and older) who did not meet diagnostic criteria for any mental disorder (e.g. dementia) at the time of trial enrolment were considered for the review. This included studies targeting the general population of older adults, studies with participants who might have been at risk

of a depressive disorder, or those who suffered from sub-clinical symptoms of a depressive disorder but who did not fulfil the diagnostic criteria for the disorder (according to *The Diagnostic and Statistical Manual of Mental Disorders*, 4th edition or *The International Classification of Diseases*, 10th edition).

Studies were considered even if the participant age range began under 65, if the mean age of the participants was notably over 65 (i.e. 70 or over), or if outcome data were extractable separately for participants over the age of 65. There was no upper age limit. Studies that did not include a clear definition of participants or lacked adequate reporting of participant data at enrolment were excluded from the review.

Types of interventions

This review and meta-analysis includes psychosocial interventions for prevention of depression onset and promotion of mental health among older people. Interventions aiming at prevention of depression progression and treatment of depression were excluded.

Psychosocial interventions were defined as any intervention that emphasizes psychological or social factors rather than biological factors (Ruddy and House, 2005). This definition allows for the inclusion of psychological interventions and health education, as well as interventions with a focus on social aspects, such as social support. Interventions with a physiological component in addition to a psychosocial component (e.g. physical exercise groups) were also considered. The psychosocial interventions could appear in any format, e.g. in groups or individually, as long as they were described in the study and allowed for replication. Interventions with organization of care as the main focus were not considered for this review.

To be considered for this review, trials needed to report a general positive mental health indicator, depressive symptoms or depression as a measured outcome. Furthermore, to be eligible trials had to encompass a control condition: either care as usual, waiting list, no intervention or a comparison intervention control group. Intervention comparisons were eligible if the compared interventions were not too similar. The trial settings considered were both institutions and community settings.

Types of outcome measures

The outcome measures considered in the review were as follows:

- (i) Functional level: e.g. various Activities of Daily Living measures and Barthel Index (Mahoney and Barthel, 1965).
- (ii) Quality of life: e.g. Short Form-36 Health Survey (Hays *et al.*, 1993).
- (iii) Life satisfaction: e.g. Satisfaction with Life Scale (Diener *et al.*, 1985), Life Satisfaction Index-A (Neugarten *et al.*, 1961).
- (iv) Cost-effectiveness of the interventions: e.g. financial cost comparisons.
- (v) Acceptability of intervention: total attrition rates or attrition due to adverse effects.
- (vi) Risk factors of depressive symptoms and depressive disorders and mental health promoting factors:
 - (a) Positive mental health, e.g. the Philadelphia Geriatric Morale Scale (Lawton, 1975), including self-esteem, e.g. Rosenberg Self Esteem Scale (Rosenberg, 1965) and self-efficacy, measured by the General Self-efficacy Scale (Schwarzer and Jerusalem, 1995).
 - (b) Social capital: social network, e.g. UCLA Loneliness Scale (Russell, 1996) and social support, e.g. Social Support Questionnaire (Sarason *et al.*, 1983).
- (vii) The occurrence of depressive symptoms, as measured by depression rating scales, such as the Geriatric Depression Scale (Brink *et al.*, 1982) and Zung Self-Rating Depression Scale (Zung, 1965).
- (viii) Incidence of major depression as defined by DSM-IV or ICD-10, or diagnostic cut-off points on depression rating scales.

The outcomes were recorded immediately after the intervention or at end of follow-up.

Searches

Eleven electronic databases were searched (AgeLine, ASSIA, CENTRAL, Cinahl, Embase, Medline, OpenSIGLE, Sociological Abstracts, Social Services Abstracts, PsycINFO, and Web of Science, see Supplementary data and Appendix for detailed search strategies) for eligible studies. No language or time-frame limitations were applied. With guidance from informatics experts, search strategies were

constructed for each of the electronic databases and applied in September 2010. Hand-searching of two journals (*the Gerontologist* and *Journal of the American Geriatrics Society*) that provided most articles during searches of electronic databases was conducted, covering issues published from 2006 to 2010.

Data abstraction and assessment of methodological quality

All abstracts of the publications retrieved from the databases were screened for inclusion by the first and second author independently. Full text versions of the publications were screened if needed. If there was disagreement between the reviewers, a third reviewer assessed the study and consensus was reached by discussion. Available data were extracted and coded independently by the first and the second author according to information on study design and origin, study participants, intervention content and outcomes measured.

The methodological quality of the included intervention studies was assessed and rated according to the Cochrane Collaboration Handbook. The studies were rated by taking six individual domains into consideration (sequence generation; allocation concealment; blinding of participants, personnel and outcome assessors; incomplete outcome data; selective outcome reporting; other sources of bias) and giving them a quality rating of 'low risk of bias', 'unclear' or 'high risk of bias'.

Calculation of effect sizes and statistical analyses

The effect sizes of the trials were calculated by Review Manager 5.0 software (Nordic Cochrane Centre, 2008) for the studied outcomes. Data from all the publications providing eligible post-test or follow-up data were entered into the Review Manager by the principal reviewer and duplicated by the second author separately. For binary efficacy outcomes (e.g. cases of depression), the Mantel-Haenszel random effects model for calculating odds ratio (OR) was applied. For continuously distributed outcomes, the weighted mean difference (WMD) or standardized mean difference (SMD) were calculated as appropriate using a random effects model. SMD was calculated when outcomes had been measured using different scoring

systems. Where intention-to-treat (ITT) data were not available, endpoint continuous data for trial completers were used. If measures of variance of outcomes could not be found in the publications, through calculations or by contacting the authors, the outcome was excluded from the meta-analysis. Substantially skewed data (where the standard deviation was greater than double the mean value) were not entered in the meta-analysis.

The impact of statistical heterogeneity on the meta-analysis was assessed by quantifying inconsistency among the studies with the I^2 Index test (Higgins and Green, 2008). Between-group effect size heterogeneity in outcome measures was examined using the Q statistics of the meta-analytic analogue to analysis of variance (ANOVA) (Lipsey and Wilson, 2001). The power of all subgroup analyses was determined. Sample size and effect size data were entered into the G*Power 3.1.2 software (Faul et al., 2007), where *post hoc* analyses of achieved power were calculated (Ellis, 2010). Underpowered comparisons (i.e. power below 0.80) were not performed.

Trials where one intervention was compared with another were only included in the meta-analysis if the control intervention fitted into one of the intervention categories considered.

Sensitivity analyses were conducted for randomized trials only.

RESULTS

Trial flow

The searches yielded 5023 hits (including duplicates from different databases). By screening the retrieved titles and abstracts according to the inclusion criteria, the number of publications was reduced to 949 and following a thorough examination, the final number of included studies was narrowed to 69 (Figure 1). The main reasons for exclusion of the retrieved publications were that trial participants already suffered from a mental disorder at baseline or that the participants' age did not meet the inclusion criteria. Forty-four trials contributed with data to efficacy estimates in the meta-analysis.

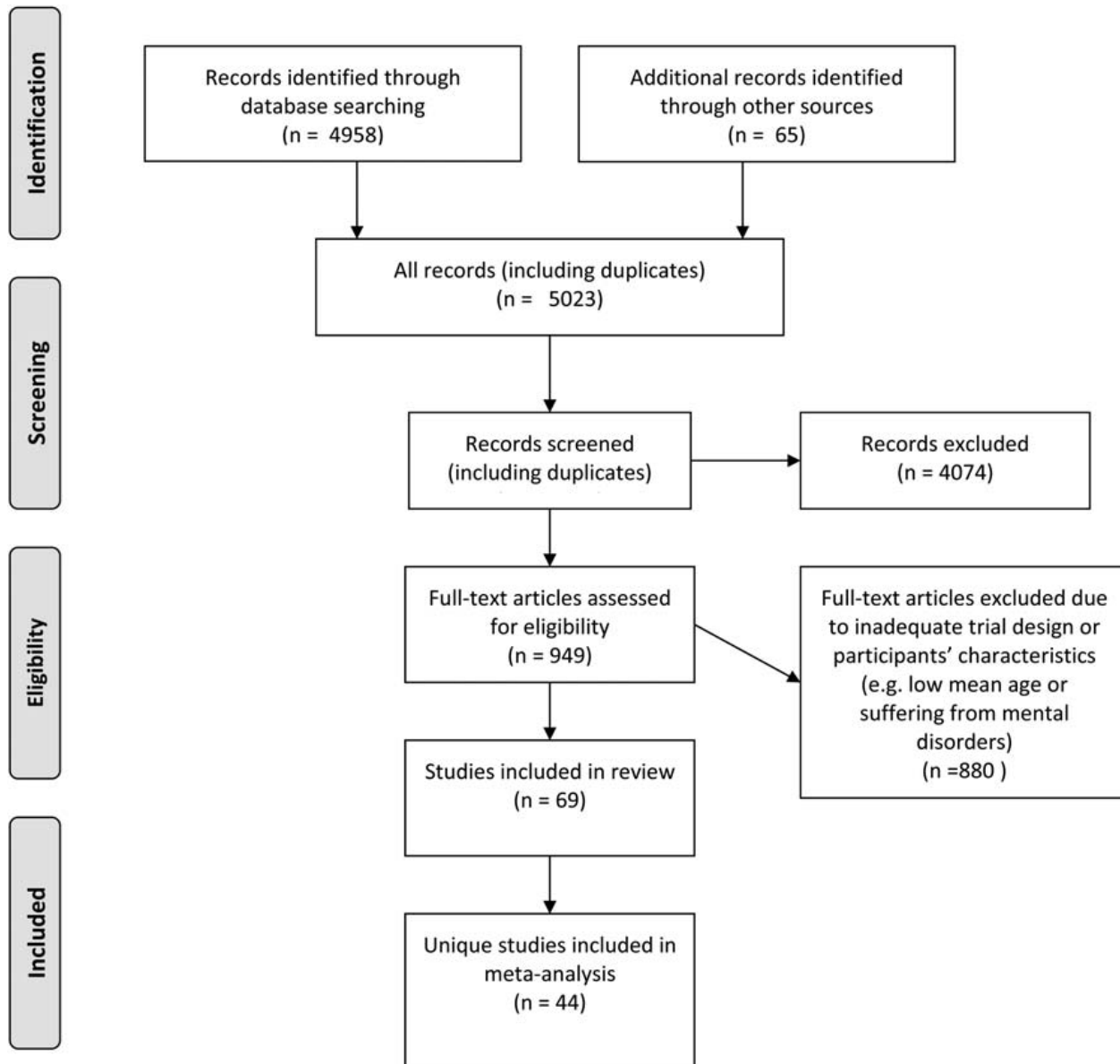


Fig. 1: PRISMA 2009 flow diagram. Source: Moher, Liberati, Tetzlaff, Altman, and The PRISMA Group (2009).

Study characteristics

The mean age of the pooled trial participants was 78 years. In studies reporting gender proportions the majority of participants were women. The participants of 15 trials lived in nursing homes or other institutions and 32 trials included older adults who lived independently, in senior communities or who received home health services. Twenty-two of the studies did not clearly state the living situation of the participants.

Out of the 69 included studies, 13 were non-randomized controlled studies. The other 56

studies had a randomized controlled design. Seventeen of the trials were implemented in Europe and the 52 remaining trials were non-European, the majority being studies from the USA.

Three types of intervention approaches (World Health Organization, 2004) were distinguished among the trials: mental health promotion or universal prevention (e.g. general health education) targeting healthy older adults and aiming to enhance mental health and active aging (34 trials); selective prevention, targeting older people in high-risk groups not suffering

from depression or other mental disorders (32 trials) and indicated prevention directed at people with sub-clinical symptoms of depression (3 trials).

With the exception of one trial (Yuen *et al.*, 2008) all interventions were provided by health or social care professionals or other trained personnel. In Yuen *et al.*'s 2008 study the intervention involved the older participants themselves participating in a volunteer activity (mentoring English conversational skills to English-as-a-second-language students). Besides this intervention study, none of the interventions was reportedly provided by lay people alone.

The interventions included were categorized into one of the following six groups (Table 1):

Physical exercise

The group of physical exercise interventions involved individual or group physical exercise of various kinds. Twenty-one of the trials were categorized into this group and nine out of these were included in the meta-analysis measuring the effect size of physical exercise compared with no-intervention controls. Six exercise interventions were compared with another intervention; three of these trials compared an exercise intervention to a skill training intervention and were included in the meta-analysis (Wolf *et al.*, 1996; Stiggebout *et al.*, 2004; MacFarlane *et al.*, 2005).

Skill training

The skill training category contained interventions with educational components or with the aim of developing cognitive skills or everyday life management strategies. This category consisted of 12 trials, out of which 10 were included in the meta-analysis, all comparing skill training with no intervention control conditions.

Group support

Social support in groups was considered within the group support category and only one trial was included in this category (Andersson, 1984). This trial compared the social support intervention to a no-intervention control group but no eligible data were available for other outcomes than attrition rate.

Table 1: Effect sizes (95% CI) for psychosocial interventions compared with no intervention

Type of intervention	Number of participants in comparison (depression/quality of life/functional level/positive mental health/life satisfaction)	Depression	Quality of life	Functional level	Positive mental health	Life satisfaction
Physical exercise	237/296/53/185/0	-0.10 (-0.36 to 0.16)	-0.33 (-0.83 to 0.17)	-2.40 (-8.16 to 3.36)	0.03 (-0.67 to 0.73)	Not estimable
Skill training	318/72/0/64/0	-0.12 (-0.56 to 0.32)	-0.28 (-0.76 to 0.20)	Not estimable	-0.55 (-1.07 to -0.04)	Not estimable
Reminiscence	145/18/55/44/126	-0.24 (-0.62 to 0.13)	-0.01 (-7.50 to 7.48)	0.03 (-5.35 to 5.41)	-0.47 (-1.34 to 0.40)	-1.08 (-2.70 to 0.53)
Social activities	167/178/0/141/26	-0.41 (-0.72 to -0.10)	-6.40 (-10.38 to -2.42)	Not estimable	-1.02 (-2.02 to -0.02)	-5.30 (-10.34 to -0.26)
Multicomponent	387/756/62/120/124	-0.16 (-0.41 to 0.10)	-0.09 (-0.24 to 0.06)	-1.30 (-2.86 to 0.26)	-0.12 (-0.75 to 0.51)	-1.40 (-1.65 to -1.15)
Heterogeneity (Q_b)		$Q_b = 5.50, p > 0.05$	$Q_b = 5.94, p > 0.05$	$Q_b = 0.89, p > 0.05$	$Q_b = 3.43, p > 0.05$	$Q_b = 39.51, p < 0.001$
Any type of psychosocial intervention	1254/1320/150/554/276	-0.17 (-0.31 to -0.03)	-0.19 (-0.34 to -0.05)	-0.26 (-0.60 to 0.07)	-0.24 (-0.47 to -0.00)	-0.64 (-1.52 to 0.23)

The effect sizes for social capital and cost outcomes were not estimable for most of the intervention categories and are therefore not presented in the table. A significant Q_b indicates that differences in effect between intervention categories are significant. Statistically significant estimates are marked in bold.

Reminiscence

Eight trials contained various forms of life reviewing and recalling past events and were classified as reminiscence interventions. Seven trials were included in the meta-analysis, all of which featured intervention versus no-intervention control category.

Social activities

Different types of social activities providing the participants with an active role were allocated to the group of social activity interventions. Out of six trials, four were included in the meta-analysis, all comparing social activities to no intervention.

Multicomponent interventions

Twenty-one of the trials contained components from several intervention categories and these were classified as multicomponent interventions. Ten of these studies were included in the meta-analysis for multicomponent interventions versus no-intervention comparisons.

Methodological quality of the intervention studies

In most cases, several domains of the trials' methodological quality were rated as unclear, due to scarce reporting. Eleven of the studies were rated as having low risk of bias in relation to the sequence generation domain. Fourteen studies had a low risk of bias in blinding. However, eight of the included trials evidenced clear cases of selective reporting. Thirty-six studies were rated as having a high risk of bias related to other domains.

Efficacy: psychosocial interventions compared with no-intervention controls

Compared with no-intervention controls, an overall small statistically significant improvement was found for quality of life (14 trials, SMD: -0.19 , 95% CI: -0.34 to -0.05) (Figure 2) and the overall heterogeneity was at an acceptable level ($I^2 = 36\%$). Positive mental health also showed a small statistically significant improvement (nine trials, -0.24 , 95% CI: -0.47 to -0.00) (Figure 3), and the overall inconsistency was at an acceptable level ($I^2 = 40\%$). In the pooled analysis comparing to no-intervention controls, psychosocial interventions had a weak but

statistically significant effect on depressive symptoms (17 trials, SMD: -0.17 , 95% CI: -0.31 to -0.03) (Figure 4). The overall heterogeneity for effects on depressive symptoms was low ($I^2 = 25\%$).

The pooled results for the dichotomous depression outcome indicated no statistically significant reduction in new depression cases (three trials, OR: 0.69, 95% CI: 0.41–1.17). The overall functional ability outcome showed no statistically significant improvement (three trials, SMD: -0.26 , 95% CI: -0.60 to 0.07) and no statistically significant effect was found for the social capital outcome (two trials, SMD: -0.16 , 95% CI: -1.00 to 0.68), the cost-effectiveness outcome (one trial, mean difference €532.00, 95% CI: -0.53 to 1064.53) or the life satisfaction outcome (five trials, SMD: -0.64 , 95% CI: -1.52 to 0.23).

When analysing types of interventions separately, physical exercise interventions showed no statistically significant pooled effects on the depression outcome (three trials, SMD: -0.10 , 95% CI: -0.36 to 0.16), quality of life (four trials, SMD: -0.33 , 95% CI: -0.83 to 0.17) or functional level (one trial, mean difference: -2.40 , 95% CI: -8.16 to 3.36). The achieved power in the positive mental health outcome analysis was inadequate (power = 0.09) for effect analysis. No eligible data were available for life satisfaction, costs and dichotomous depression outcomes. In a single trial, a statistically significant social capital benefit, i.e. improved social support network, was reported (one trial, mean difference: -0.22 , 95% CI: -0.34 to -0.10). The intervention in this trial (Lee *et al.*, 2009) consisted of a 26-week Tai Chi program with 1-hour sessions three times a week.

Among the skill training interventions, a statistically significant effect could be found on the positive mental health outcome (two trials, SMD: -0.55 , 95% CI: -1.07 to -0.04). One of these trials (Goldstein *et al.*, 1997) consisted of playing video games, five or more hours per week for 5 weeks. The other trial (Winocur *et al.*, 2007) reported improved locus of control in a 14-week cognitive rehabilitation program involving memory skills training, goal management training, psychosocial training and individual discussions. Skill training interventions had no statistically significant effect on quality of life (two trials, SMD: -0.28 , 95% CI: -0.76 to 0.20) or depressive symptoms (four trials, SMD: -0.12 ,

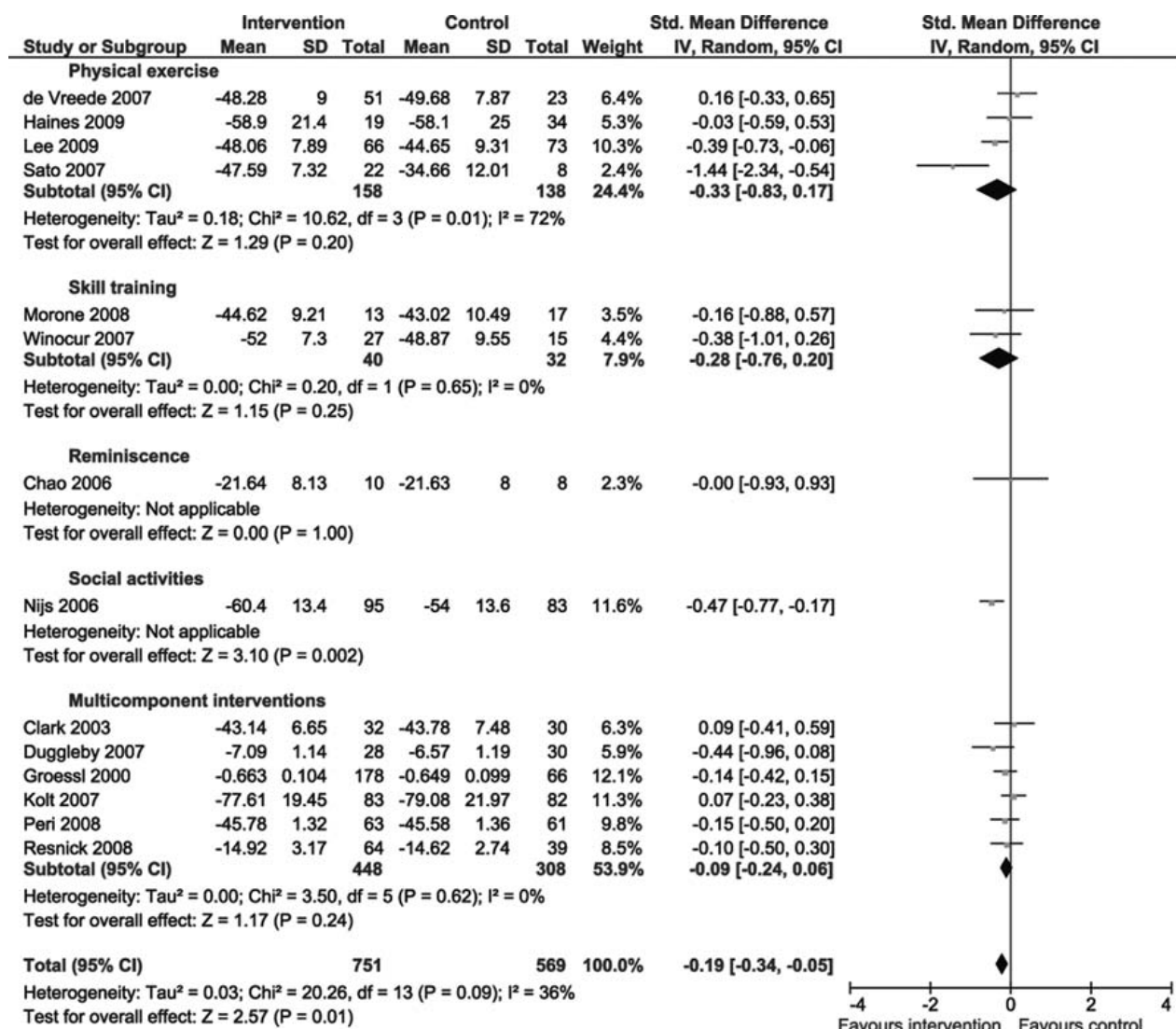


Fig. 2: Effect of psychosocial interventions versus no-intervention controls on quality of life (continuous data).

95% CI: -0.56 to 0.32). Two trials within this intervention type reported incidence of depressive disorders (dichotomous data). No statistically significant effect could be evidenced (OR: 0.84, 95% CI: 0.53 to 1.33). No useable data were available for social capital, functional level, costs or life satisfaction outcomes.

Reminiscence showed no statistically significant pooled effects in positive mental health (two trials, SMD: -0.47, 95% CI: -1.34 to 0.40) or life satisfaction (three trials, WMD: -1.08, 95% CI: -2.70 to 0.53). Reminiscence showed a statistically non-significant effect (five trials, SMD: -0.24, 95% CI: -0.62 to 0.13) on depressive symptoms. The power in the quality of life and functional level analyses (power =

0.05) was insufficient for effect analysis. The trials did not report any useable data for occurrence of depressive disorder, social capital or costs.

Compared with no intervention, social activities significantly reduced depressive symptoms among the participants (two trials, SMD: -0.41, 95% CI: -0.72 to -0.10). One study in a nursing home setting (Nijs *et al.*, 2006) where the intervention consisted of arranging family style mealtimes (e.g. mealtimes begin when everyone is seated, residents serve themselves) and the control group received the usual pre-plated service, resulted in a large improvement in quality of life outcome for the intervention group. The quality of life was measured with a

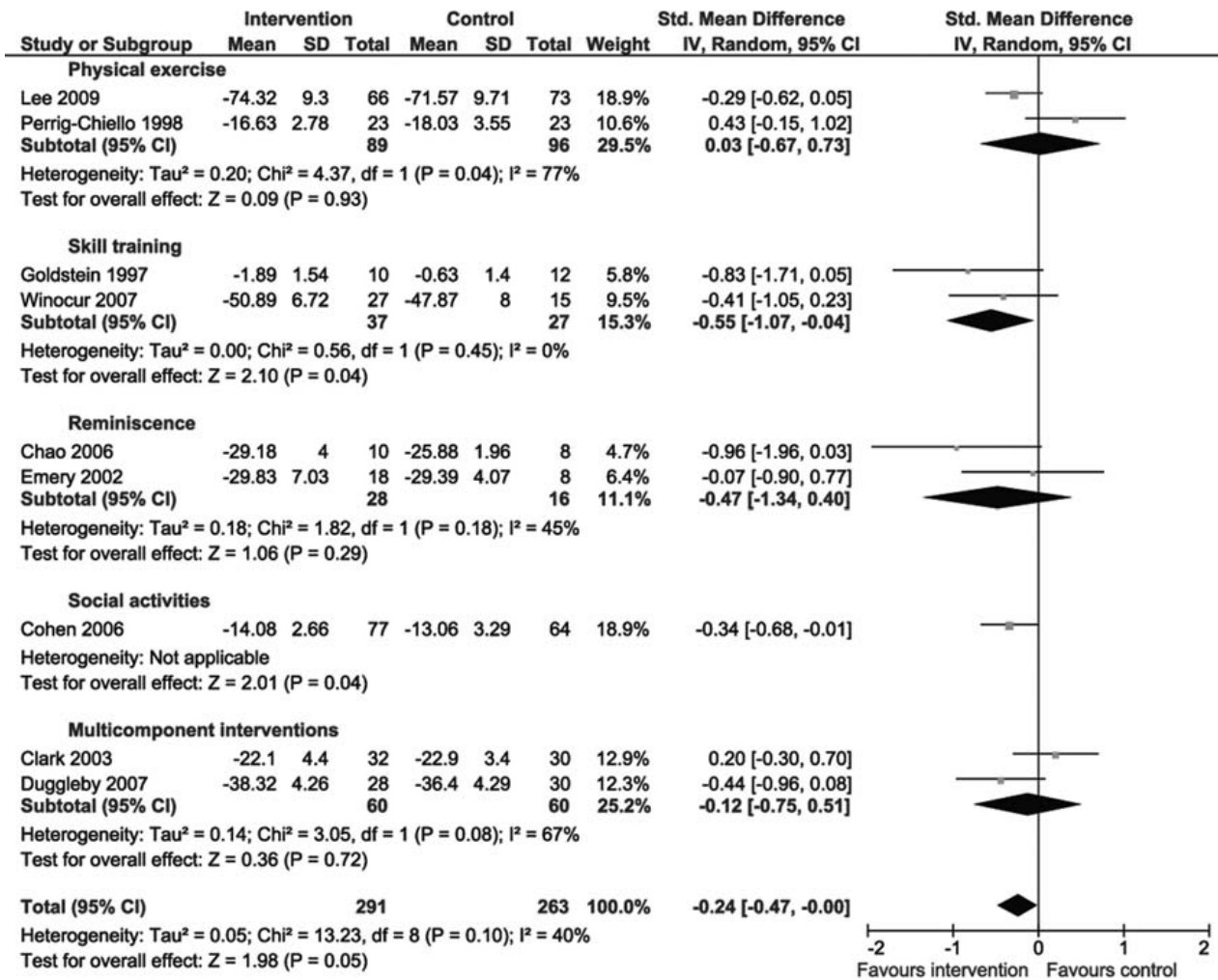


Fig. 3: Effect of psychosocial interventions versus no-intervention controls on positive mental health (continuous data).

less used scale, the Dutch Quality of Life of Somatic Nursing Home Residents Questionnaire and the finding was statistically significant (mean difference: -6.40, 95% CI: -10.38 to -2.42). One small trial (Yuen *et al.*, 2008) reporting life satisfaction showed a large statistically significant improvement in the Life Satisfaction Index-A among participants with a role as voluntary language training mentors (mean difference: -5.30, 95% CI: -10.34 to -0.26). The participants in this psychosocial intervention tutored conversational skills to students with English as a second language. Statistically significant positive mental health benefits (mean difference: -1.02, 95% CI: -2.02 to -0.02) were reported based on the Philadelphia Geriatric Morale Scale score in a single social activity trial (Cohen *et al.*, 2006). This intervention consisted of weekly singing

rehearsals and several public performances in a chorale with a professional leader during the 30-week intervention period. The effect size for social capital (one trial, mean difference: 2.42, 95% CI: -0.66 to 5.50) was statistically non-significant. Functional level, occurrence of depressive disorder and costs were not measurable due to lack of eligible data.

The only multicomponent intervention reporting a life satisfaction outcome resulted in a statistically significant increase of life satisfaction for the intervention group (mean difference: -1.40, 95% CI: -1.65 to -1.15). This intervention (Peri *et al.*, 2008) consisted of an individualized activity intervention based on activities of daily living over a 6-month period. One trial within this intervention category (van't Veer-Tazelaar *et al.*, 2009) reported incidence of depressive disorders (dichotomous

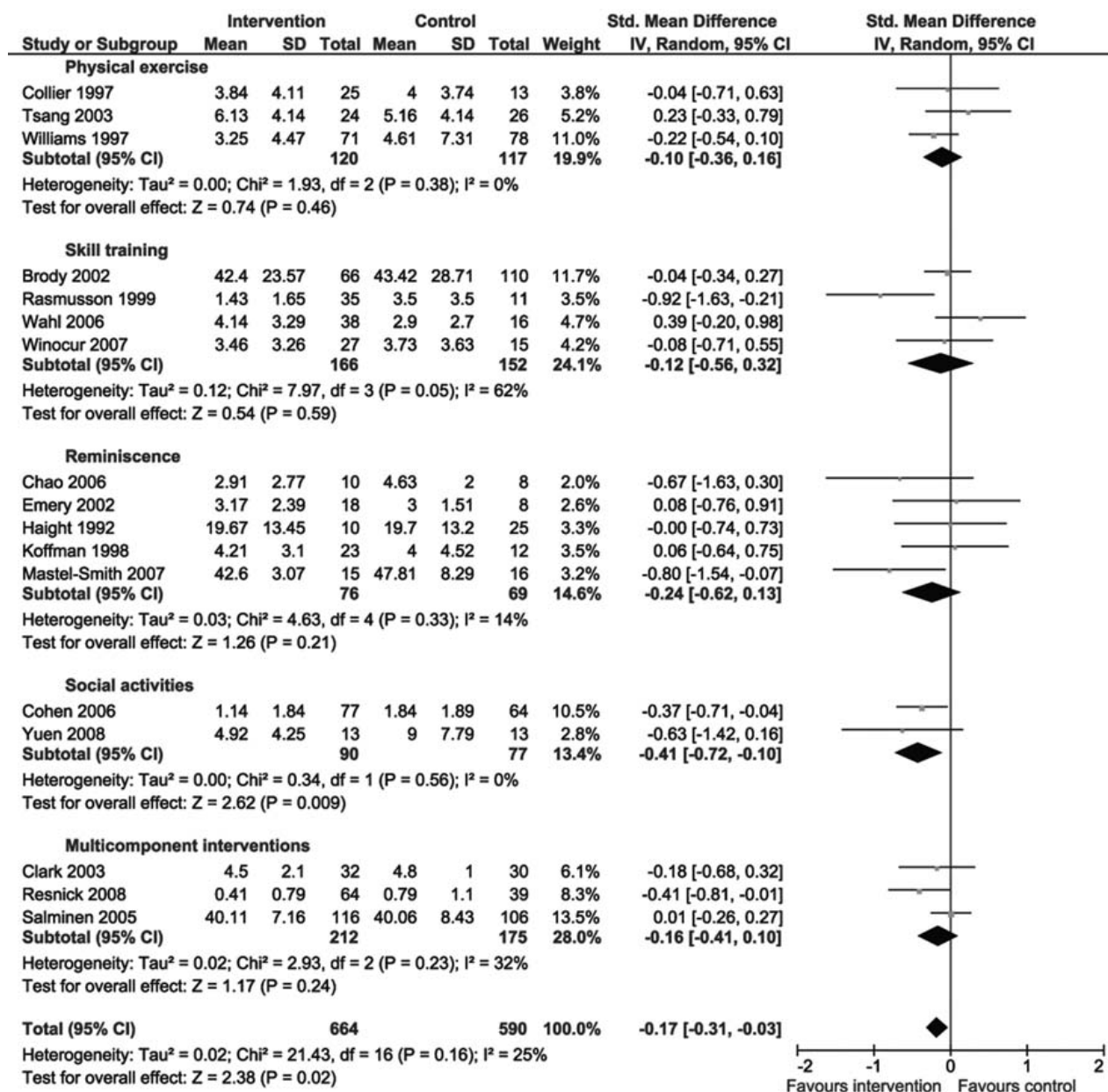


Fig. 4: Effect of psychosocial interventions versus no-intervention controls on depressive symptoms (continuous data).

data) and showed a statistically significant effect (OR: 0.34, 95% CI: 0.13 to 0.94). No statistically significant effect on positive mental health was found (two trials, SMD: -0.12, 95% CI: -0.75 to 0.51), neither on quality of life (six trials, SMD: -0.09, 95% CI: -0.24 to 0.06) or functional level (one trial, mean difference -1.30, 95% CI: -2.86 to 0.26). Multicomponent interventions showed a statistically non-significant weak effect on depressive symptoms (three trials, SMD: -0.16, 95% CI: -0.41 to 0.10).

One trial (van't Veer-Tazelaar *et al.*, 2009) within the multicomponent intervention group provided eligible data on cost-effectiveness (mean difference: €532.00, 95% CI: -0.53 to 1064.53).

For the single group support trial, we were unable to retrieve any eligible data except for acceptability (OR: 0.97, 95% CI: 0.38 to 2.49). This intervention (Andersson, 1984) consisted of social support groups for older adults living alone and experiencing loneliness.

For the acceptability outcome no statistically significant pooled effects emerged for any of the intervention groups.

Efficacy: psychosocial interventions compared with other-intervention control trials

Two trials provided useable data for adequate comparisons between different psychosocial interventions. These trials compared exercise versus skill training. The pooled effect size for the two exercise interventions (Stiggelbout *et al.*, 2004; MacFarlane *et al.*, 2005) showed a statistically significant positive effect on functional level from participating in exercise (two trials, SMD: -0.33 , 95% CI: -0.55 to -0.10). The one trial reporting a depressive symptoms outcome showed no statistically significant difference between exercise and skill training interventions (mean difference: 1.44, 95% CI: -1.19 to 4.07). Physical exercise interventions showed no effect on the positive mental health outcome (two trials, WMD: -2.38 , 95% CI: -6.61 to 1.86), quality of life outcome (two trials, SMD: -0.26 , 95% CI: -0.88 to 0.35), social capital outcome (one trial, mean difference: -1.57 , 95% CI: -3.34 to 0.20) or life satisfaction outcome (one trial, mean difference: -0.40 , 95% CI: -3.69 to 2.89), when compared with skill training interventions.

No eligible data could be retrieved for the costs or dichotomous depression outcomes.

Comparing the effectiveness of the interventions based on their approach and duration

In order to investigate the most effective approaches, further analysis was carried out for those intervention trials that were categorized as having a universal, selective or indicated prevention approach.

Fourteen studies reported a quality of life outcome in the meta-analysis, of which 11 were categorized as using the selective prevention approach (targeting risk groups for mental ill-health) while three studies represented the universal approach. The universal prevention category showed a statistically significant effect on quality of life (SMD: -0.26 , 95% CI: -0.49 to -0.02), while the selective interventions had at most a small effect (SMD: -0.19 , 95% CI: -0.37 to 0.00). Among the 17 studies reporting a depressive symptoms outcome, the

interventions with a universal preventive approach (10 studies) evidenced a statistically significant pooled reduction in depressive symptoms (SMD: -0.32 , 95% CI: -0.50 to -0.14). Among the six studies where the interventions were targeted to certain risk groups, e.g. older adults with physical limitations, no statistically significant pooled effect could be found for the depressive symptoms outcome (SMD: -0.04 , 95% CI: -0.25 to 0.17). The only study with an indicated approach where the study participants suffered from sub-clinical symptoms of depression generated a power of 0.38 and effect was therefore not analysed.

Of the nine studies reporting a positive mental health outcome, five had a universal and four a selected approach. Although the pooled effect of these trials was statistically significant, neither of the approaches alone showed statistically significant improvement in the positive mental health outcome; universal trials (five trials, SMD: -0.21 , 95% CI: -0.53 to 0.12), and selective trials (four trials, SMD: -0.30 , 95% CI -0.71 to 0.12).

The three studies reporting a statistically non-significant dichotomous depression outcome (OR: 0.69, 95% CI: 0.41 to 1.17) all had an indicative approach. Two of the studies measuring functional level had a selective approach and their effect was statistically non-significant (SMD: -0.34 , 95% CI: -0.71 to 0.04). The one study with a universal approach reporting on the functional level outcome lacked adequate power for the analysis (power = 0.05). The two studies reporting a social capital outcome both had a universal approach and the effect of these interventions was statistically non-significant (mean difference: -0.16 , 95% CI: -1.00 to 0.68). The one study reporting a cost-effectiveness outcome had an indicated approach and the results of the intervention were statistically non-significant (mean difference: €532.00, 95% CI: -0.53 to 1064.53). The five studies in the meta-analysis reporting life satisfaction outcome all had a universal approach and their effect was statistically non-significant (SMD: -0.64 , 95% CI: -1.52 to 0.23). Even though universal trials evidenced significant effects on several outcomes compared with the other intervention approaches, no significant variances between the three approaches could be found when comparing their effect sizes ($Q_b = 4.77$, $P > 0.05$ for depressive symptoms outcome including all three approaches).

The psychosocial interventions comparing intervention participants with no-intervention participants were also compared according to length of intervention (where data on duration was available). The 20 interventions with duration of up to 3 months (12 weeks) were compared with the 12 interventions with a longer duration period of up to 16 months.

Interventions with a duration of >3 months had a statistically significant positive effect on quality of life outcome (eight trials, SMD: -0.28 , 95% CI: -0.47 to -0.08), while shorter interventions evidenced an inadequate power (0.66). The study with the longer intervention (Peri *et al.*, 2008) that reported data on life satisfaction had a statistically significant positive effect (mean difference: -1.40 , 95% CI: -1.65 to -1.15) while the shorter interventions had no statistically significant pooled effect on life satisfaction (four trials, SMD: -0.28 , 95% CI: -0.62 to 0.06). The interventions with a longer duration period had a statistically significant positive effect on depressive symptoms outcome (six trials, SMD: -0.19 , 95% CI: -0.34 to -0.05) compared with shorter interventions (11 trials, SMD: -0.15 , 95% CI: -0.40 to 0.10). Longer interventions enhanced positive mental health among intervention participants (four trials, SMD: -0.23 , 95% CI: -0.46 to -0.00). The effect of the shorter interventions on this outcome was statistically non-significant (five trials, SMD: -0.31 , 95% CI: -0.81 to 0.20). The effect of the one long intervention (OR: 0.34 , 95% CI: 0.13 to 0.94) on dichotomous depression was statistically significant, while the two short interventions had no statistically significant effect on this outcome (OR: 0.84 , 95% CI: 0.53 to 1.33).

The two trials measuring social capital outcome both had a longer intervention duration period their effect was statistically non-significant (SMD: -0.16 , 95% CI: -1.00 to 0.68). The long intervention study reported a functional level outcome and showed no statistically significant effect: (one trial, mean difference: -1.30 , 95% CI: -2.86 to 0.26) the two trials with a shorter intervention duration lacked adequate power for effect analysis (0.78). The one trial reporting cost outcome was a long intervention, showing no statistically significant effect on costs (mean difference: $\text{€}532.00$, 95% CI: -0.53 to 1064.53). The differences in effect between long and short interventions were statistically significant on life satisfaction ($Q_b =$

28.20 , $P < 0.001$) and quality of life ($Q_b = 3.87$, $P \leq 0.05$) outcomes.

Sensitivity analyses

To investigate the robustness of our findings, sensitivity analyses were performed, for randomized controlled trials only. We found our results to be robust in spite of inclusion of non-randomized controlled trials. Considering the randomized controlled trials only, the overall effect of psychosocial interventions on depressive symptoms remained virtually unchanged (14 trials, SMD: -0.17 , 95% CI: -0.32 to -0.02). Among the 14 trials measuring quality of life, which showed a statistically significant pooled effect, there were two non-randomized trials and statistical significance was retained even after removing these trials (SMD: -0.18 , 95% CI: -0.34 to -0.01). However, removing three non-randomized trials from the group of studies measuring positive mental health resulted in loss of the significance of the effect (SMD: -0.14 , 95% CI: -0.50 to 0.22). The overall pooled effect for life satisfaction was based on five randomized trials.

The analog to ANOVA showed that differences in effect between randomized and non-randomized trials were non-significant ($Q_b = 0.92$ to 1.89 , $P > 0.05$).

DISCUSSION

Our findings show that the gathered effect of psychosocial interventions focusing on enhancing the mental health of older adults displays a small but statistically significant improvement on quality of life and positive mental health among intervention participants. The interventions also had a weak but statistically significant effect on reducing depressive symptoms among the intervention participants. The statistically significant pooled effects of these outcomes were based on data from between 9 and 17 trials.

When analysing the interventions according to their promoting or preventive approach, trials with a universal approach evidenced a small, statistically significant improvement of quality of life as well as also significantly reducing depressive symptoms. A similar effect of universal interventions was found in an earlier review investigating effects on depression

among all age groups (Jané-Llopis *et al.*, 2003). However, neither in this previous review nor in the current one was the difference between intervention approaches statistically significant.

When looking at the efficiency of interventions according to duration, two-thirds of the interventions in this review were shorter interventions (under 3 months). This group of trials exhibited no pooled statistically significant effects for any outcomes. Interventions with a longer duration displayed a positive effect on quality of life and positive mental health compared with shorter interventions. Longer interventions also displayed a statistically significant effect on depressive symptoms and dichotomous depression outcomes compared with shorter interventions. A previous review of community-based multicomponent interventions aiming to retain physical function (analysing outcomes such as physical function and activities of daily living) among older people evidenced no statistically significant difference in effect for different duration periods (Beswick *et al.*, 2008). Likewise, an earlier meta-analysis of psychosocial interventions to reduce loneliness (Masi *et al.*, 2010) evidenced no impact of intervention duration on effect size.

Analysing the effects of interventions with regards to length of follow-up would be of interest. However, many studies merely reported pre- and post-intervention data preventing a sufficient analysis of this aspect of efficacy.

In this review, the three social activity interventions in the meta-analysis significantly improved the four outcomes with available data: positive mental health (Cohen *et al.*, 2006), quality of life (Nijs *et al.*, 2006) and life satisfaction (Yuen *et al.*, 2008) were improved and depressive symptoms reduced (Cohen *et al.*, 2006; Yuen *et al.*, 2008). However, these promising findings are based on few trials and thus need replication. In addition to the trials in this category, several of the studies in other intervention groups contained different forms of social contact and support that could have contributed to the results. The improvement of life satisfaction in the multicomponent group could be partly due to interventions encompassing social components. Systematic reviews (Cattan *et al.*, 2005) and meta-analysis (Masi *et al.*, 2010) of psychosocial interventions aiming to increase social contacts and reduce loneliness have previously evidenced reduced levels of

loneliness and improved mental health among intervention participants.

In this review, the skill training interventions with educational and/or behavioural components had a statistically significant effect on positive mental health outcome. In an earlier review (Cattan *et al.*, 2005), educational interventions proved to be effective in mental health promotion through reduction in loneliness and social isolation among older adults. With regards to behavioural components, another review and meta-analysis focusing on depression prevention has previously indicated that interventions with behavioural components appeared to be harmful for older adults (Jané-Llopis *et al.*, 2003). It should, however, be noted that inclusion criteria of these reviews differed from the current review, both in respect of participant characteristics and in intervention content.

The effects of other categories of psychosocial interventions on mental health were small or non-significant. The physical exercise and reminiscence interventions had no statistically significant pooled effects on any outcomes with available data when compared with no intervention. Contrary to our negative findings regarding promotion and prevention, an earlier review of reminiscence and life review interventions showed a large statistically significant treatment effect on depressive symptoms in older adults (Bohlmeijer *et al.*, 2003). That review included a wider age range of participants suffering from mild to severe depression.

Group support, such as discussions and exchanges of experiences in groups, has been previously applied in psychosocial interventions (Birk *et al.*, 2004). The single group support trial (Andersson, 1982) did not provide other data on outcomes than acceptability data. According to the published report of that study, social support groups designed to strengthen social networks may decrease loneliness among older adults as well as help to increase social contacts and social activities of older people. An existing review of prevention programmes covering all ages highlighted social support as the most effective intervention type (Jané-Llopis *et al.*, 2003). Clearly, there is a need for trials exploring the effect of social support in older adults.

The lack of statistical significance in some of the findings is probably the result of a combination of a small effect size and lack of statistical power due to the low number of studies,

many of which included small samples. One factor that could explain the relative lack of effect is the duration of the interventions and the frequency of the intervention sessions. One of the social activity interventions that gave statistically significant results (Cohen *et al.*, 2006) lasted for 30 weeks and contained a high frequency of sessions. Another important ingredient in this particular intervention was visibility; the participants got to display the creative product of the intervention via public performances. The other social activity intervention (Yuen, 2002; Yuen *et al.*, 2008) considered in the meta-analysis gave the participants in the intervention group a social role and an important task that reportedly made them feel useful and needed. These social elements might have an important impact on the outcomes of the interventions.

A major limitation of the review is the lack of comprehensive reporting of trials, often lacking information essential for the meta-analysis (e.g. trial adherence, means and standard deviation values from each of the trial arms and measurement points). Owing to lack of detailed descriptions of study design and procedures, there were also difficulties in assessing methodological quality and risk of bias. Additionally, the file-drawer effect should always be taken into account when interpreting meta-analysis results. Furthermore, because of the wide range of outcome measurement scales in the trials included in the review, it was for the most part only possible to calculate the SMD.

Another limitation is the heterogeneity of trials. The trials are very different from each other in regard to intervention content, leading to challenges in categorizing the interventions based on their content. The reported heterogeneity levels were, however, acceptable, ranging from 25 to 40% on statistically significant outcomes in the overall analyses of effectiveness of any psychosocial intervention versus no intervention. Analyses of differences in effect between types of psychosocial interventions did not evince a statistically significant variability by the intervention group, with the exception of life satisfaction and thus overall analyses of the effect of any type of psychosocial measures were feasible. Furthermore, to avoid losing sight of an effective type of intervention by performing an overall meta-analysis only, we also analysed effectiveness for each type of psychosocial intervention separately.

Some of the limitations of this review may be due to the broad approach applied when selecting interventions. To compensate this, strict inclusion criteria regarding study design and participant characteristics were applied.

Implications for research and practice

From a public health perspective the overall effect of psychosocial interventions in the promotion of mental health found in this review is small but promising. Mental health promotion and depression prevention through psychosocial interventions are beneficial, but further evidence of effectiveness and cost-effectiveness is needed before large scale implementation.

The findings point out social activities for proven efficacy among the psychosocial interventions to prevent depression and improve mental well-being. Based on our results, meaningful social activities, tailored to the older individual's abilities, preferences and needs should be considered when aiming to improve mental health among older people. Duration of interventions should also be considered in practice, because longer interventions, lasting for >3 months, exhibited positive effects on mental well-being and depressive symptoms. These findings should be taken into account and applied in the design and replication of interventions with evidenced positive effects. The heterogeneity within the older population should not only be considered in intervention planning and implementation, but also in the description of the study sample in research reports.

Our results highlight the potential for effective actions to promote mental health and prevent depression in older people, but it also accentuates the sparseness of research evidence. Investing in evaluation of measures to promote mental health and prevent depression is a necessity, taking into consideration the magnitude of the problem and the potential benefits to be reached by effective interventions. At this stage, development and evaluation of psychosocial interventions to support mental health of older people needs to be a research priority. Policy makers need to be aware of the limitations of the current evidence base and any large-scale implemented programme should be carefully evaluated to enrich our common knowledge base on good practice for promotion

of mental health and prevention of depression among older people.

CONTRIBUTORS

The search strategies were designed by A.K.F. and K.W. with guidance from Pia Pörtfors and Eeva-Liisa Aatola. A.K.F. screened the literature, selected the studies, and extracted and coded the data with assistance from K.W., J.N. and Anette Engsbo. A.K.F., J.N., and K.W. analysed and interpreted the findings and drafted the manuscript. All authors (A.K.F., J.N., K.W.) contributed to the revision of the manuscript and approved the final version. A.K.F. is guarantor.

SUPPLEMENTARY DATA

Supplementary data are available at *HEAPRO* online.

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APPENDIX: REFERENCES TO STUDIES INCLUDED IN THE REVIEW

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