Snoezelen for dementia (Review)

Chung JCC, Lai CKY

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[Intervention Review]

Snoezelen for dementia

Jenny CC Chung[1], Claudia KY Lai[2]

[1]Dept of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hung Hom, Kowloon, China. [2]School of Nursing, The Hong Kong Polytechnic University, Hung Hom, Hong Kong

Contact address: Jenny CC Chung, Dept of Rehabilitation Sciences, The Hong Kong Polytechnic University, Hung Hom, Kowloon, HONG KONG, China. rsjchung@polyu.edu.hk.

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ABSTRACT

Background

Snoezelen, multi-sensory stimulation, provides sensory stimuli to stimulate the primary senses of sight, hearing, touch, taste and smell, through the use of lighting effects, tactile surfaces, meditative music and the odour of relaxing essential oils. The rationale for this lies in the proposition that the provision of a sensory environment for people with dementia places fewer demands on their intellectual abilities but capitalizes on their residual sensorimotor abilities. The clinical application of snoezelen often varies in form, nature, principles and procedures. Such variations not only make the examination of the therapeutic values of snoezelen difficult, but also impede the clinical development of snoezelen in dementia care. A systematic review of evidence for the efficacy of snoezelen in the care of people with dementia is therefore needed to inform future clinical applications and research directions.

Objectives

To examine the clinical efficacy of snoezelen (or multisensory stimulation) for older people with dementia and their caregivers.

Search methods

The Specialized Register of the Cochrane Dementia and Cognitive Improvement Group (CDCIG), *The Cochrane Library*, MEDLINE, EMBASE, PsycINFO, CINAHL and LILACS were searched on 23 March 2008 using the terms: snoezelen OR "multi-sensory*". The CDCIG Specialized Register contains records from all major health care databases (*The Cochrane Library*, MEDLINE, EMBASE, PsycINFO, CINAHL, LILACS) as well as from many trials databases and grey literature sources.

The reviewers hand-searched PubMed and the ISI Web of Science.

Selection criteria

Randomized controlled trials and quasi-randomized controlled trials in which snoezelen or multi-sensory programmes was used as an intervention for older people suffering from any forms of dementia.

Data collection and analysis

The two reviewers independently reviewed and assessed the quality of the trials.

Main results

Two new trials were included in this update. Baker 2003 was an expanded study of Baker 2001 reported in the previous version. Both Baker 2003 and van Weert 2005 examined the short-term and longer-term effects of snoezelen on behaviour, mood, and communication of people with moderate to severe dementia. The format of implementation was different in the two trials: one was session-based snoezelen programme (Baker 2003), whilst the other was a 24-hour integrated snoezelen care (van Weert 2005). Owing to the differences in study methodology, the results of the two trials were not pooled for analysis. The session-based snoezelen programme (Baker 2003) did not show any effects on behaviour, mood, cognition and communication / interaction in the short term (during or immediately after sessions) or longer term (at post-intervention or 1-month post-intervention follow-up). Likewise, the 24-hour integrated snoezelen care (van Weert 2005) failed to demonstrate any significant short-term and longer term effects on behaviour, mood and interaction.

Authors' conclusions

A more vigorous review methodology was adopted in this update. The study of Kragt 1997, reported in the previous version, was excluded because the snoezelen programme only consisted of three sessions, which was considered too brief for a therapeutic intervention. Two new trials were reviewed. Meta-analyses could not be performed because of the limited number of trials and different study methods of the available trials. Overall, there is no evidence showing the efficacy of snoezelen for dementia. There is a need for more reliable and sound research-based evidence to inform and justify the use of snoezelen in dementia care.

PLAIN LANGUAGE SUMMARY

No evidence of the efficacy of snoezelen or multi-sensory stimulation programmes for people with dementia

Snoezelen (or multi-sensory stimulation) has become a commonly used intervention to manage maladaptive behaviours and to promote positive mood of older people with dementia. Originally, two randomised clinical trials were available for this review. Some short-term benefits were documented in promoting adaptive behaviours in people with dementia during and immediately after their participation in the sessions. In this update, two new trials were included and revealed two different forms of applying snoezelen to dementia care. One is a session-based snoezelen programme while the other is a 24-hour integrated snoezelen care programme. Both trials did not show any significant effects on behaviour, interaction, and mood of people with dementia.

BACKGROUND

Derived from two Dutch verbs, 'sniffen' and 'doezelen', snoezelen was first introduced in the 1970s as an intervention for people with learning disabilities, based on the rationale of reducing the adverse effects of sensory deprivation. Owing to their reduced cognitive abilities, people with learning disabilities are less ready to explore their environments for sensory inputs, and consequently they are likely to be deprived of adequate sensory stimulation. The expression of negative emotions and behaviours, such as vocally disruptive, self-stimulating, and apathetic behaviours, has been found to be associated with sensory deprivation (Cariaga 1991; Cohen-Mansfield 1997; Hallberg 1993). Adopting a non-directive and enabling approach, snoezelen encourages people with reduced cognitive functions to engage with sensory stimuli in a positive and non-stressful environment (Baker 2001; Hope 1998; Hutchinson 1994).

Snoezelen has been described as a 'sensory cafeteria' or 'multi-sensory environment' because of its use of a variety of sensory-based materials and equipment. Pinkney 1997 describes snoezelen as a medium of providing sensory stimuli to the primary senses of sight, hearing, touch, taste and smell, through the use of lighting effects, tactile surfaces, meditative music and the odour of relaxing essential oils. Some researchers regard snoezelen as a 'multi-sensory therapy' in which people with dementia are encouraged to engage in a cognitively less demanding sensory environment (e.g. Burns 2000). The goals of such therapy are to promote positive behaviours and to reduce maladaptive behaviours (Baker 2001; Slevin 1999). Whether snoezelen is considered simply as a multi-sensory environment or as a therapeutic medium has attracted significant debate. Proponents of the former school of thought have pointed out that the value of snoezelen lies in its aesthetic quality, and its use as a therapy undermines this characteristic (e.g. Hutchinson 1994). Supporters of the therapeutic value of snoezelen are keen to explore its benefits for individuals with cognitive

impairments (e.g. Hulsegge 1987; Kewin 1994). In this review, snoezelen is regarded as a multi-sensory based intervention with embedded therapeutic values.

Over the past decade, the clinical application of snoezelen has been extended from the field of learning disabilities to the care of people with dementia. To a certain extent, these two groups of individuals share some common characteristics such as reduced cognitive functions and diminished communicative ability. However, people with dementia generally experience a gradual deterioration in all aspects of cognitive functions as the disease progresses. This progressive loss of cognitive abilities makes this group less suitable to participate in interventions that demand cognitive functions and communication ability. In addition, people with dementia are less competent and have a lower stress threshold for coping with environmental demands (Hall 1987, Lawton 1986). Maladaptive behaviours and affect occur when environmental stimulation exceeds an individual's adaptive level. On the other hand, too little sensory stimulation may lead to a decline in both cognition and function, and an increase in behavioural symptoms (Kitwood 1992; Kovach 1997). Based on these two hypothesis of sensory overload and sensory deprivation, Kovach 2000 put forward the model of sensoristasis, in which an equilibrium of the sensory state can be attained by balancing the pacing of sensory stimulating or sensory-calming activity.

The value of snoezelen (multi-sensory interventions) has been documented in promoting relaxation and positive behavioural changes (Deakin 1995; Hutchinson 1994). Through the provision of non-sequential and unpatterned sensory stimuli, snoezelen capitalize on the residual sensorimotor abilities of dementia sufferers and present few attentional and intellectual demands (e.g. Baker 2001; Beatty 1998; Buettner 1999; Hope 1998). Moffat and colleagues (Moffat 1993) pioneered the use of snoezelen for people with moderate to severe dementia and found that they enjoyed the sensory stimuli and remained calm during the sessions. These encouraging results promote the use of multi-sensory interventions in dementia care, and have provoked waves of clinical research on the examination of therapeutic values of snoezelen for people with dementia.

A review of the literature shows that snoezelen is commonly employed as a therapeutic modality in dementia care in four areas:

(1) reducing maladaptive behaviours and increasing positive behaviours (e.g. Baker 2001; van Diepen 2002; Hope 1998; Long 1992),

(2) promoting positive mood and affect (e.g. Baker 2001; Cox 2004; Pinkney 1997),

(3) facilitating interaction and communication (Spaull 1998), and

(4) promoting a caregiving relationship and reducing caregiving stress (e.g. McKenzie 1995; Savage 1996).

Although snoezelen has become a popular clinical intervention for people with dementia, its application often varies in form, principles, duration, and subject groups. For instance, some researchers apply snoezelen in the form of structured procedures and sensory stimuli to groups of individuals with dementia (e.g., Baillon 2005), whereas others encourage dementia sufferers to explore sensory stimuli based on personal preferences (e.g., van Weert 2005). Some studies integrated the principles of snoezelen in daily care (van Weert 2004; van Weert 2005) and exercise programmes (Heyn 2003). In the past few years, researchers and clinicians started integrating multi-sensory principles into leisure activity programmes such as gardening for people with dementia in nursing homes (Cox 2004). Such variations in application make the assessment of the therapeutic value of snoezelen difficult, which in turn undermines the clinical development of snoezelen in dementia care.

While most studies used conventional assessment tools for behavior assessment such as the Behaviour Rating Scale (e.g., Baker 2003), some of them started using physiological parameters such as heart rate monitors to gauge subjects' responses prior to, during, and after snoezelen sessions (e.g., Baillon 2005). A systematic review of evidence for the efficacy of Snoezelen in the care of people with dementia is deemed necessary to inform clinical application and research direction.

OBJECTIVES

This review aims to examine the efficacy of snoezelen as a therapeutic intervention for older people with dementia.

METHODS

Criteria for considering studies for this review

Types of studies

Randomized controlled trials (RCTs) in which snoezelen or multi-sensory stimulation programmes were used as an intervention for people with dementia.

Types of participants

People aged over 60 years, suffering from any types of dementia (e.g. Alzheimer's disease, vascular dementia) and of any degree of severity. The operational definition of dementia is based on the criteria used in DSM-IV (APA 1994), ICD-10 (WHO 1993), or NINCDS-ADRDA (National Institute of Neurological and Communicative Disorders and Stroke - Alzheimer's Disease and Related Disorders Association, McKhann 1984).

Types of interventions

Interventions included in this review must be structured based on the practice principles of snoezelen and/or multi-sensory stimulation. Both group and individual formats of implementation were considered, as were interventions using a session-based format or an integrated daily care format. The intervention should also be implemented by professionals and/or workers/carers who received training. Control interventions considered for this review include other types of activity that did not have a multiple sensory component or a no treatment condition. Comparison with any other form of therapeutic activity was not considered.

Types of outcome measures

Outcome measures considered in this review include behaviour, mood, cognition, physiological indices, and client-carer communication (see Table 1). Short-term effects as measured during session and post-session, and longer-term benefits as measured at post-intervention and follow-up were examined.

Search methods for identification of studies

Electronic searches

The Specialized Register of the Cochrane Dementia and Cognitive Improvement Group (CDCIG) was searched on 23 March 2008 for all years up to December 2005. This register contains records from the following major healthcare databases *The Cochrane Library*, MEDLINE, EMBASE, PsycINFO, CINAHL and LILACS, and many ongoing trial databases and other grey literature sources. The following search terms were used: snoezelen OR "multi-sensory*".

The Cochrane Library, MEDLINE, EMBASE, PsycINFO, CINAHL and LILACS were searched separately on 23 March 2008 for records added to these databases after December 2005 to March 2008. The search terms used to identify relevant controlled trials on dementia, Alzheimer's disease and mild cognitive impairment for the Group's Specialized Register can be found in the Group's module on *The Cochrane Library*. These search terms were combined with the following search terms and adapted for each database, where appropriate: snoezelen OR "multi-sensory*". On 23 March 2008, the Specialized Register consisted of records from the following databases:

Healthcare databases:

- *The Cochrane Library*: (2006, Issue 1);
- MEDLINE (1966 to 2006/07, week 5);
- EMBASE (1980 to 2006/07);
- PsycINFO (1887 to 2006/08, week 1);
- CINAHL (1982 to 2006/06);
- SIGLE (Grey Literature in Europe) (1980 to 2005/03);
- LILACS: Latin American and Caribbean Health Science Literature (http://bases.bireme.br/cgi-bin/wxislind.exe/iah/online/?IsisScript=iah/iah.xis&base=LILACS&lang=i&form=F) (last searched 29 August 2006).

Conference proceedings:

- ISTP (http://portal.isiknowledge.com/portal.cgi) (Index to Scientific and Technical Proceedings) (to 29 August 2006);
- INSIDE (BL database of Conference Proceedings and Journals) (to June 2000);.

Theses:

- Index to Theses (formerly ASLIB) (http://www.theses.com/) (UK and Ireland theses) (1716 to 11 August 2006);
- Australian Digital Theses Program (http://adt.caul.edu.au/): (last update 24 March 2006);
- Canadian Theses and Dissertations (http://www.collectionscanada.ca/thesescanada/index-e.html): 1989 to 28 August 2006);
- DATAD - Database of African Theses and Dissertations (http://www.aau.org/datad/backgrd.htm);
- Dissertation Abstract Online (USA) (http://wwwlib.umi.com/dissertations/gateway) (1861 to 28 August 2006).

Ongoing trials:

UK

- National Research Register (http://www.update-software.com/projects/nrr/) (last searched issue 3/2006);
- ReFeR (http://www.refer.nhs.uk/ViewWebPage.asp?Page=Home) (last searched 30 August 2006);
- Current Controlled trials: Meta Register of Controlled trials (mRCT) (http://www.controlled-trials.com/) (last searched 30 August 2006) :
- ISRCTN Register - trials registered with a unique identifier
- Action medical research
- Kings College London
- Laxdale Ltd
- Medical Research Council (UK)
- NHS Trusts Clinical Trials Register
- National Health Service Research and Development Health Technology Assessment Programme (HTA)
- National Health Service Research and Development Programme 'Time-Limited' National Programmes
- National Health Service Research and Development Regional Programmes
- The Wellcome Trust
- Stroke Trials Registry (http://www.strokecenter.org/trials/index.aspx) (last searched 31 August 2006);

Netherlands

- Nederlands Trial Register (http://www.trialregister.nl/trialreg/index.asp) (last searched 31 August 2006);

USA/International

- ClinicalTrials.gov (http://www.ClinicalTrials.gov) (last searched 31 August 2006) (contains all records from http://clinicalstudies.info.nih.gov/);
- IPFMA Clinical trials Register: www.ifpma.org/clinicaltrials.html. The Ongoing Trials database within this Register searches http://www.controlled-trials.com/isrctn, http://www.ClinicalTrials.gov and http://www.centerwatch.com/. The ISRCTN register and Clinicaltrials.gov are searched separately. Centerwatch is very difficult to search for our purposes and no update searches have been done since 2003.
- The IFPMA Trial Results databases searches a wide variety of sources among which are:
  - http://www.astrazenecaclinicaltrials.com (seroquel, statins)
  - http://www.centerwatch.com
  - http://www.clinicalstudyresults.org
  - http://clinicaltrials.gov
  - http://www.controlled-trials.com
  - http://ctr.gsk.co.uk
  - http://www.lillytrials.com (zyprexa)
  - http://www.roche-trials.com (anti-abeta antibody)
  - http://www.organon.com
  - http://www.novartisclinicaltrials.com (rivastigmine)
  - http://www.bayerhealthcare.com
  - http://trials.boehringer-ingelheim.com
  - http://www.cmrinteract.com
  - http://www.esteve.es
  - http://www.clinicaltrials.jp

This part of the IPFMA database is searched and was last updated on 4 September 2006;
- Lundbeck Clinical Trial Registry (http://www.lundbecktrials.com) (last searched 15 August 2006);
- Forest Clinical trial Registry (http://www.forestclinicaltrials.com/) (last searched 15 August 2006).

The search strategies used to identify relevant records in MEDLINE, EMBASE, PsycINFO, CINAHL and LILACS can be found in the Group's module on *The Cochrane Library.*

Searching other resources

In addition, the reviewers hand-searched the PubMed and ISI Web of Science using the terms "snoezelen", "multi-sensory", "dement*", and "Alzheimer*". Research papers related to snoezelen/multi-sensory and Alzheimer/dementia were selected for further screening.

Data collection and analysis

Selection of studies

In the original review (2002) and the subsequent update (2004), a total of 16 research papers were identified. The two reviewers independently studied the abstracts and full text of these papers, and selected those trials that met the inclusion criteria. Any disagreements were discussed and resolved between the reviewers. Twelve papers were screened out: one examined non-dementia clients, six were review or discussion papers, one did not employ snoezelen or multi-sensory programme, one reported an observational study, and three were case studies with no randomizations. Based on the current selection criteria of trials, the study of Kragt 1997 that was included in the original review was excluded because the snoezelen intervention only consisted of three sessions. In view of the fact that snoezelen programmes reported in many studies were on a twice weekly basis (some even thrice weekly) for a duration of six to eight weeks, snoezelen sessions that lasted only three sessions are considered inadequate in designing the dose of the intervention.
In this update, seven new trial references were identified. The two reviewers independently reviewed the trial reports and selected those that fulfilled the inclusion criteria. The reviewers deliberated on the issues that arouse until a consensus was reached. Four trials were excluded: the study of Cox 2004 was not randomized and consisted only three 16-minute sessions of intervention; the study of Heyn 2003 was not randomized and had no comparison group; the study of van Diepen 2002 was a pilot one that aimed at assessing the feasibility and usefulness of the outcome measures; and the study conducted by Baillon (Baillon 2004 and Baillon 2005) compared a three-session snoezelen intervention with a three-session reminiscence intervention and had no other control condition. The study of Sacks 2005 is a doctoral dissertation but was not available up to the time of this review. This study will hopefully be included in the next update. The two new trials included in this review are Baker 2003 and van Weert 2005. Indeed, Baker 2003 is an extension of Baker 2001.
The search of 2008 retrieved two studies, both of which have been excluded from the review.

Quality assessment of included studies

The trials were examined to identify any potential sources of systematic bias. The criteria used in quality assessment are outlined in the Cochrane Reviewers' Handbook (Clarke 2000), including randomization, allocation concealment, blinding, and level of dropout at follow-up stage. Unlike pharmacological studies, blinding of psychosocial interventions is not always possible as subjects are generally aware of the nature of the intervention they are receiving. Studies in which an assessor is blind to the intervention were considered of having higher quality than those in which the same person performed both intervention and assessment. Blinding of group allocation was considered as far as possible, despite the fact that subjects were generally aware of the nature of intervention they were receiving. Trials were also examined to determine whether "intention-to-treat" analysis was used when performing

statistical analyses.

Other quality assessment criteria include

(a) The number and characteristics (e.g. level of cognitive functioning) of subjects involved in the study.
(b) The format and duration of intervention and control conditions.
(c) The levels of data utilized.

Data extraction

Data were mainly extracted from the published papers. Researchers of the trials would be contacted requesting essential information not contained in the published papers. The types of summary statistics extracted depended on the nature of the outcome data. When outcome data are dichotomous, the number in each of the two categories at baseline and post-interventions, and/or other measurement time points are collected. The odds ratio or risk ratio are extracted for effect estimates. When outcomes were continuous data, mean values and standard deviations at baseline, post-interventions, and/or other time points are extracted. Mean differences or standard mean differences were calculated for effect estimates. When outcomes were ordinal data, the type of data extracted depended on whether the analysis was of dichotomized data, continuous data, or ordinal data.

RESULTS

Description of studies

See: Characteristics of included studies; Characteristics of excluded studies.

Adopting a parallel group experimental design, Baker 2001 investigated
(1) the immediate effects of snoezelen (multi-sensory stimulation; intervention) on the behaviours of older people with dementia,
(2) the carry-over effects of snoezelen on mood and behaviour to day hospitals and home environments, and
(3) the maintenance effects of snoezelen on mood, behaviour, and cognition over time.

Fifty day-hospital subjects diagnosed with dementia, with a mean age of 78 years, were recruited to the study. The subjects were at the moderate to advanced stages of dementia (mean MMSE of intervention group = 10.96, SD = 6.5; mean MMSE of control condition = 6.08, SD = 5.07). Using a computer-generated randomization system, the subjects were randomly allocated to the intervention group (one-to-one snoezelen) or the control group. All subjects attended eight 30-minute sessions of their assigned programme twice a week over a four-week period. Both intervention and control programmes were designed with a similar structure, except that the former (multi-sensory stimulation) adopted a non-directed and enabling approach. Subjects in the intervention group explored and received unpatterned and non-sequential sensory stimuli in a multi-sensory environment that placed no intellectual or physical demands on them. The control condition was a one-to-one activity programme that was developed based on individual subjects' preferences and abilities with no provision of obvious sensory inputs. Seven outcome measures were used. The immediate effects of snoezelen on behaviours, including within sessions and immediately after sessions, were measured by INTERACT (22-item) and INTERACT (12-item) respectively (Baker 1995). The generalization effects were measured by three outcome measures: the General Behaviour and Community Skills sub-scales of REHAB (Baker 1988) measured the carryover effect to day hospitals; the Behaviour and Mood Disturbance Scale (BMD) and the Behaviour Rating Scale (BRS) of the Clifton Assessment Procedures for the Elderly (CAPE) measured the carry-over effect to home, at mid- and post-intervention. The maintenance effect (at the one-month post-intervention follow-up) on behaviours and cognition were measured by REHAB, BMD, the Cognitive Assessment Scale (CAS) of CAPE and MMSE.

Baker 2003 is considered an expanded study of Baker 2001 because data of the latter were included in the former for analysis. Using a randomized controlled trial design, Baker 2003 enrolled subjects from three European countries (UK, Netherlands, Sweden) to examine the effects of snoezelen on the behaviour, mood, and cognition of older people with dementia. One hundred and thirty-six subjects with moderate to severe dementia were included: 94 from the UK, 26 from the Netherlands, and 16 from Sweden. Subjects in the UK attended day hospitals, whilst those in the Netherlands and Sweden were inpatients of psychogeriatric wards. The mean ages of snoezelen group and control group were 81 and 83 years respectively. There was significant group difference in mean MMSE scores (data from the UK and the Netherlands only) between the snoezelen group (9.4) and the control group (6.7) (p=.01). Subjects were randomized assigned, using PEPI epidemiology software package, to the snoezelen or control group. All subjects attended eight 30-minute sessions on a one-to-one basis according to their group assignment. The sessions were conducted by the same key workers throughout the study period. Similar to the design of Baker 2001, the snoezelen group focused on sensory experience with no intellectual and physical demands and used a non-directed and enabling approach, whilst the controls attended activity sessions involving intellectual and/or physical demands and adopted a directive approach.

Three outcome measures were used to examine the short-term effects of snoezelen on behaviours:
(1) INTERACT (22-item) measured behaviours during the sessions,
(2) INTERACT (12-item) measured behaviours 10 minutes be-

fore and 10 minutes after the sessions, and
(3) Behaviour Observation Scale for intra-mural psycho-geriatrics (GIP) measured behaviours that were videotaped during the sessions for the Netherlands sample.
The longer term effects of snoezelen were measured by five outcome measures:
(1) Mini-Mental State Examination (MMSE) evaluated cognitive function,
(2) the Behaviour Rating Scale (BRS) of Clifton Assessment Procedures of Elderly evaluated changes in behaviours at home (UK sample) or in the wards (Netherlands and Sweden samples),
(3) the Rehabilitation Evaluation Hall and Baker tool (REHAB) evaluated behaviours during the normal regime of a day hospital (UK sample),
(4) the GIP evaluated behaviours on wards (Netherlands sample), and
(5) the Behaviour and Mood Disturabance Scale (BMD) evaluated subjects' mood at home (UK sample). The MMSE, BRS, and GIP were administered at pre-and post-intervention; whilst REHAB and BMD were administered at pre-, mid-, post-intervention, and one-month post-intervention follow up.
van Weert 2005 reported the same trial in two papers. Her trial aimed at investigating the effects of snoezelen when integrated into 24-hour daily care on nursing home residents with dementia. One of the papers reported the effects of the 24-hour snoezelen care programme on mood and behaviours, whilst the other reported the effects of the programme on communication of older people with dementia. Twelve psychogeriatric wards in six nursing homes (out of 19 homes) were recruited to the study. A cluster randomized design was used to assign the wards to either experimental (integrated snoezelen care programme) or control (usual activity) condition. However, two wards were not randomized assigned because of some practical considerations such as the presence of a snoezelen room in the ward. Residents of these wards were selected when they fulfilled the criteria of having moderate to severe dementia and with moderate to severe level of nursing care dependency.
At baseline, 125 subjects were recruited and were assigned to experimental condition or control condition according to the ward in which they stayed. The mean age of experimental group was 84 years whilst that of control group was 83 years. The proportions of females in experimental and control groups were 79% and 83% respectively (the number of subjects participated in the tests and analysis). For the experimental group, subjects were given a stimulus-preference screening in 10 weekly one-hour sessions to identify their favoured sensory stimuli. Thereafter, individual snoezelen care plans were developed for each participant based on their life history, stimulus preference, and discussions from multidisciplinary conferences. Certified nursing assistants (CNAs) used multi-sensory stimuli in the 24-hour care of the experimental subjects. Subjects in the control group were provided with usual care on an individual basis. A minimum period of three months was used for both experimental and control conditions.
The short-term effects of integrated snoezelen care programme on behaviors were measured using a modified version of INTERACT, in which six items were deleted and eight new items were added, during morning care sessions.
The long-term effects of integrated snoezelen care programmes on behaviors, mood, and interaction were evaluated at the 18-month follow-up using the following outcome measures:
(1) eight items of GIP measured the occurrence of maladaptive behaviors such as apathetic, anxious, and disoriented behaviours,
(2) the Dutch version of CMAI measured the frequency of three categories of agitated behaviours, including aggressive, physically non-aggressive, and verbally agitated behaviours,
(3) the Cornell Scale for Depression measured depressive symptoms such as mood-related signs, and
(4) a three-face diagram (FACE) rated three types of mood (happy, neutral, sad).

Risk of bias in included studies

Selection bias

Baker 2001: A computer-generated randomization system was used to assign subjects to the experimental group (multi-sensory stimulation sessions) or the control group (activity sessions).
Baker 2003: As in the 2001 study, a computer-generated randomization system was used in subject assignment. The study had specific inclusion criteria for its sample. However, subjects in the United Kingdom (UK) were patients of a day hospital, while in the Netherlands and Sweden, the subjects were residents of a psychogeriatric ward, which could mean potential differences between these two groups forming the sample. In addition, only 136 out of 156 subjects were randomized, compromising the randomization process. Twenty subjects from the Netherlands were not randomized because eight of them were transferred to another ward, five died, three did not give consent, and the carers of four of the subjects did not respond to the invitation to participate. The whole area is problematic because Baker and team should not have randomized those who had not given consent (including those not responding to invitations) in the first place. It is not clear whether those who were transferred and those who died had given consent.
van Weert 2005: A study with a quasi-experimental pre- and post-test design. The six nursing homes that participated in the study were selected out of 19 potentially eligible sites. It is not clear whether these six participating nursing homes were randomly selected. A cluster randomization method was used to allocate two wards of each nursing home to either the experimental group or the control group. No information was given as to how the two wards were selected. The wards of two nursing homes did not undergo the randomization process. Such arrangements could have

confounded subject recruitment. Reportedly, subjects in the experimental group were found to have more behavioural problems at baseline.

Performance bias

Baker 2001: All staff, including key workers, hospital staff, research assistants, and carers, were aware that a study was being carried out in which two equally valid therapies were being implemented for comparison. All key workers involved were asked to implement the programmes (both treatment and control) based on the written guidelines and standardized procedures. The subjects were not blind to the study because of their participation in the programmes.

Baker 2003: The same key workers (who delivered the intervention or control conditions) were assigned whenever possible. All key workers received equivalent training. They were not blind to the study despite the intervention and the control (activity sessions) were presented as two equally valid care approaches.

van Weert 2005: Each subject was matched with a certified nursing assistant (CNA), who had to be familiar with the resident. The CNAs of the experimental and control group did not differ significantly in terms of their background characteristics but it is not clear whether they were randomized to the two groups. The CNAs of the experimental group received professional training on the implementation of snoezelen but those of the control group did not. The former group also had the support of a study group and follow-up meetings for guidance on implementation of the intervention. No information was given as to whether these CNAs were informed of the study. It was likely that they were aware of the study as they were told about the videotaped morning care sessions and the two groups of CNAs were prepared in a very different manner.

Attrition bias

Baker 2001: There were two dropouts in the experimental group but no explanation was given.

Baker 2003: Subjects lost to the study were being accounted for. The authors stated that they used the "intention-to-treat" principle for data analysis. However, only 127 subjects' data were included in the final analysis although the number of subjects in the randomized sample was 136.

van Weert 2005: Substantial dropouts were noted for both subjects and CNAs. Thirty-seven CNAs (19 in the experimental group and 18 in the control group) of 117 were lost to follow-up, mainly because they changed jobs. They were replaced by new CNAs. Only 61 subjects out of 125 subjects completed the study. Information about drop-outs among patients/residents in both experimental and control groups was provided. To compensate for the dropouts occurring during the study period, a second cohort of subjects were recruited to replace the dropouts from the first cohort so as to have a sufficient sample size for a more reliable statistical analysis. According to the researchers, the analysis were conducted in conformity with "intention-to- treat" principle. Multilevel analysis using MLwiN-software was used for analyzing the data. By using multilevel analysis, the authors maintained that the statistical analyses were carried out following the "intention-to-treat" principle: all data available were included in the analysis. However, there were subjects in both experimental and control groups excluded from pre- and post-intervention analysis because of missing values and being non-completers, and were not included in the 'intention-to-treat" analysis. Moreover, the authors did not include the attrition rate (e.g. 20 - 30%) when calculating the sample size prior to the study.

Detection bias

Baker 2001: INTERACT was rated by the key workers. INTERACT (12-item) and REHAB were rated by day hospital staff. The BMD was rated by family carers at home with the aid of a research assistant; the BRS, MMSE, and the CAS of CAPE were also rated by three research assistants. All raters were aware of the study, and both programmes were presented as two equally valid therapies for comparison.

Baker 2003: The subjects were mostly unaware of the intervention or control conditions. The INTERACT (22-item) were administered by the key worker who delivered the intervention, thus possibly leading to detection bias. The INTERACT (12-item), used to record behaviour prior to and immediately post-session was not performed by the key worker but by a member of the nursing staff, therefore possibly minimizing detection bias. The detection of outcomes in this study was further complicated by the use of different instruments in different participating countries. For example, the REHAB was used only in the UK, and the GIP was used only in the Netherlands. The two members of nursing staff that completed the REHAB was trained, but there was no information on the GIP between the two nurses. Such a difference in instrumentation across the participating centres may have led to confusing result interpretation and limited generalization.

van Weert 2005: The outcomes was studied by observing residents on the wards and video recordings of morning care. The matched CNAs assessed the subjects of their behaviour in the ward environment. The raters were therefore not blinded, but the researcher reported that their ratings did not indicate deviations from those of the independent assessors for a 15% of the study sample.. The video assessment of behaviour during morning care, however, was performed by research assistants blinded to group assignment.

Effects of interventions

As Baker 2003 included the data (n = 50) of Baker 2001, and therefore only two trials (Baker 2003 and van Weert 2005) were included in the analysis. A total of 246 subjects was included,

122 in the experimental (snoezelen) group and 126 in the control group. The data of the two trials were not pooled for meta-analyses for two reasons. Firstly, the nature and structure of snoezelen in Baker 2003 and van Weert 2005 were not the same. The former structured snoezelen in form of sessions whilst the latter integrated snoezelen into 24-hour care. Secondly, only two trials were available for this review. The authors therefore conducted a systematic analysis instead of a meta-analysis. Most data were derived from sub scales of the outcome measures.

The data presented in the following sections were derived from sub scales / items of the outcome measures, thus limiting the result interpretation for the efficacy of snoezelen on the overall behaviours and performance of subjects with dementia even though significant effects on individual sub scales / items were obtained.

Effects on behavior

In comparison with the controls (activity session), the session-based snoezelen (Baker 2003) did not show any significant effect on behaviours during sessions, immediately after sessions, at mid-, post-, or one-month post-intervention follow-up. The 24-hour integrated snoezelen-care programme (van Weert 2005) showed significant effect on two behavioural items of INTERACT during sessions: enjoying self (MD = -0.74; 95% CI (-1.29, -0.19); z = 2.62, P = 0.01) and bored/inactive (MD = -0.56; 95% CI (-1.11, -0.01); z = 1.99, P = 0.05). The results favoured the treatment. There were no longer-term treatment effects of the integrated snoezelen-care programme on behaviour.

Effects on mood

When compared with the controls (activity session), the session-based snoezelen (Baker 2003) show no significant effect on mood during sessions or at post-intervention. The 24-hour integrated snoezelen care programme (van Weert 2005) showed significant improvements in one mood item of INTREACT during sessions: the snoezelen group was happier and more content (MD = -0.84; 95% CI (-1.39, -0.29); z = 2.98, P = 0.003) and rated more positively on FACE (MD = -0.33; 95% CI (-0.61, -0.05); z = 2.33, P = 0.02). There were no significant effects of the 24-hour integrated snoezelen at post-intervention.

Effects on cognition

When compared with the control group, there were no significant effects of the session-based snoezelen (Baker 2003) on cognition. The effect of the integrated snoezelen care programme on cognition was not examined in van Weert 2005.

Effects on communication/interaction

When compared with the control group, no significant effects of the session-based snoezelen (Baker 2003) on communication/interaction were evident during or immediately after sessions. Although the results of 'recalled memories' favoured the snoezelen group (MD = 0.42, 95% CI (0.11, 0.73), z = 2.67, P = 0.008), it was reported in Baker 2003 that this effect disappeared when the baseline MMSE scores of the two groups were taken into account. As for the integrated snoezelen care programme (van Weert 2005), there were improvements during sessions for three interaction items of INTERACT: 'related well' (MD = 0.52; 95% CI (0.24, 0.80); z = 3.68, P = 0.0002), 'normal-length sentence' (MD = 0.31, 95% CI (0.03, 0.59), z = 2.19, P = 0.03), and 'responding to speaking' (MD = 0.30; 95% CI (0.02, 0.58); z = 2.12, P = 0.03). No longer-term effects on communication/interaction were suggested.

DISCUSSION

A more vigorous review methodology has been adopted in this update. The study of Kragt 1997, reported in the original review, is now excluded because the snoezelen programme only consisted of three sessions, which was considered too brief for a therapeutic intervention. Three new trials were identified, but one of them (Sacks 2005) was not available at the time of this review. Therefore, only two trials were added. Since the study of Baker 2003 included the data from Baker 2001, these two studies were considered as one. All in all, only two trials were included for the final analysis.

Overall, there is no evidence showing the efficacy of snoezelen for dementia.

Despite the fact that Baker 2003 adopted a larger-scale multi-centre study design (n = 136 vs. n = 50 in Baker 2001) to examine the clinical effects of snoezelen on dementia, its study methodology had a major limitation. It included data of the 50 subjects of Baker 2001, which implies that the investigators had already known the study outcomes when implementing the second half of the study in collaboration with the centres of two other countries. Moreover, the study was limited by the variation of subject characteristics, outcome measures, and unequal sample size in the three centres. With regard to subject characteristics, day patients were recruited for the UK centre, whilst residents of psychogeriatric wards were recruited for the Netherlands and Sweden. As for outcome measures, the three centres did not use the same set of outcome measures. For instance, the UK centres used REHAB to measure the carry-over effect of behaviour to ward, whilst the Netherlands centre used GIP. The differences in outcome measures as used in different centres weakened the data interpretation as well as reducing the power of the analyses. Baker 2003 did not include the relatively small sample size in Sweden (n =10) for statistical analysis, thus further reducing the power to detect statistical differences.

Although the study of van Weert 2005 suggested that the application of the principles of snoezelen (multi-sensory stimulation) into daily care activities seemed to be beneficial in reducing maladaptive behaviors, promoting mood, and encouraging interaction, the benefits were considered non-significant because they were indicated for individual symptoms rather than overall performance. Moreover, these benefits were only seen briefly during the sessions and were lost immediately afterwards. No benefits of integrated snoezelen care were shown in the daily ward routines. There were two major limitations in this trial. First, new residents who fulfilled the selection criteria and new nursing assistants were recruited to replace a substantial number of dropouts (both subjects and CNAs) in the middle of the study. This arrangement not only resulted in unequal treatment duration of subjects of the original group and the replacement group but also violated the 'intention to treat' principle. The investigators should have included the attrition rate in the sample size calculation prior to the study. Second, owing to the inclusion of a new cohort of subjects, the subjects included for analysis might not have received the same degree of treatment. Those subjects who were recruited at the beginning and completed the whole trial had a longer exposure to treatment (up to 15 months) than those who recruited at a later phase of the study (a minimum of three months as clarified by van Weert). Although the researchers said that the inter grated snoezelen programme would be effective at the residents' level within three months (personal email communication, 20 December 2006), there is a concern that the subjects included for analyses were unequal in terms of the dosage of the intervention received. It is not clear whether the results would be any different if all subjects received a similar intensity of integrated snoezelen care, but it is clear that the data credibility would be enhanced with improvements in the design of the research work.

To sum up, the methodological quality of the two trials were considered as inadequate for three reasons. First, both trials did not start with a sound research plan and were conducted in stages with an attempt to achieve the optimal sample size. The investigators should have included the attrition rate in the sample size calculation prior to the study. Second, the two trials lacked methodological rigor especially in aspects of subject recruitment, the randomization process, and a non-uniform use of instruments across participating centres. Third, both trials reported results of the sub scales/items of the outcome measures, thus orienting towards individual symptoms rather than the overall performance of behaviours and mood.

AUTHORS' CONCLUSIONS

Implications for practice

From the practice perspective, snoezelen is mainly used as a psychosocial intervention for the management of maladaptive behaviours and promoting mood and communication in people with dementia. In this update, there were no evidences showing the efficacy of snoezelen on behaviours, mood, and interaction of people with dementia. substantive review, a session-based snoezelen program (Baker 2003) did not suggest any positive effects on behaviour, mood, and interaction either in the immediate or longer-term. Although the integrated snoezelen care approach (van Weert 2005) suggests immediate effects of snoezelen on behaviour and mood, the results were inconclusive because the outcomes were oriented towards individual symptoms rather than overall performance.

Trials included or not included in this review suggest that there are two forms of snoezelen in dementia care:

(1) the conventional session-based programme, and

(2) integrated snoezelen care. Each form of implementation has its strengths and limitations.

The session-based snoezelen programme is easier to structure as a therapeutic intervention and makes lower demands on manpower. However, this format of programme is limited by frequency, intensity and duration. The strength of 24-hour integrated snoezelen care is that it cultivates a care culture by fostering24-hour practice of the principles of multi-sensory stimulation for people with dementia. Supposedly, the philosophy and values of integrated snoezelen care will be internalized by all staff in the care facilities, ensuring the application of snoezelen principles during their daily care. Once a 'snoezelen care culture' is established, its implementation is continuous and ongoing. Nonetheless, there is a high demand on manpower, resources for staff training, and ongoing monitoring and reinforcement during continual implementation. To date, no studies have compared the clinical effects of the two forms of snoezelen practice. Clinicians are suggested to implement the form of snoezelen practice that matches with the existing resources and constraints. Most importantly, a systematic collection of scientific evidence about the snoezelen practice will further the understanding of the efficacy of snoezelen for people dementia.

Implications for research

From the research perspective, the major work ahead is to conduct more empirical and scientific studies of snoezelen for people with dementia. First of all, the methodological rigour of snoezelen studies should be further enhanced. There are now a few more clinical trials reported in the literature, a couple of which were randomized controlled trials. Yet in these reported studies, the randomization processes were compromised, pointing to the need for randomization processes to be better controlled before there can be valid comparisons. Second, the natures of both interventions and controls were different in the RCTs examined in this review, thus making the comparison and generalization of results less feasible. It is difficult to compare snoezelen programmes that were session-based with those integrated into daily 24-hour care. Some

snoezelen programmes were very short (e.g., three sessions in two weeks in Baillon 2005) while other studies introduced an intervention package of a longer duration (e.g., eight sessions within four weeks in Baker 2003). One study (van Weert 2005) adopted regular care as the control condition, whereas another (Baillon 2005) employed a reminiscence program as the control condition. Further research should focus more on the design of snoezelen programmes (e.g. nature, frequency and duration) that are comparable to the existing RCTs, as well as the control conditions that are comparable with the intervention. Third, more multi-center trials have been reported, but unfortunately these trials did not always adopt the same protocol. Recruitment criteria, as well as the use of assessment tools, were not always the same in these studies. Better coordinated efforts are needed among collaborative partners. Fourth, although existing research provides little information regarding at which stage of dementia (or level of cognitive impairment) clients can benefit most from snoezelen programmes, we are beginning to see reports on the impact of the severity of dementia upon outcomes (e.g., Baker 2003). The information is still limited in this respect. Thus it would be worth examining this aspect in future research. Fifth, there have been only limited studies examining the carry-over and long-term effects of snoezelen for people with dementia, so further research should be performed to examine these areas. The relationship between the "dose" of the intervention and its outcomes need to be more closely examined. Sixth, there is a need to investigate not just the effects of the two forms of snoezelen practice (session-based or integrated approach), but also to examine their similarities and differences as well as comparing their outcomes. Finally, the literature suggests that snoezelen might promote therapeutic relationships and quality of care. Further research could be done to examine whether snoezelen promotes a therapeutic relationship between clients and staff, as well as looking at the quality of care. Researchers would need to look for or develop instruments that are sensitive enough to capture changes in therapeutic relationship between care recipients and care providers, which can be quite a daunting task.

The clinical application of snoezelen needs to be adequately supported by scientific evidence, despite its popular use in dementia care. Without a well-developed evidence-based practice, snoezelen will merely be used as a general programme to occupy people with dementia without a meaningful purpose. In addition, resources such as the manpower and the costs of setting up a snoezelen environment cannot be justified without such evidence. In conclusion, there is a need for more reliable and sound research-based evidences to inform and justify the use of snoezelen in dementia care.

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* *Indicates the major publication for the study*

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Baker 2001

Methods	Randomized controlled trial for a period of 4 weeks. Concealment of treatment was not reported. Two dropouts with no reasons given.
Participants	50 subjects (25M, 25F) with separate diagnoses of Alzheimer's disease (N=33; N=15 MSS); N=18 Activity) , vascular dementia (N=7; N=5 MSS; N=2 Activity) or a mixed diagnosis (N=10; N=5 MSS; N=5 Activity) . The subjects had moderate to severe levels of cognitive impairment (MMSE: 0-17). Mean age was 78 but one was aged below 60 years. Informed consent was obtained from carers. Blinding of subject allocation was not discussed in the paper. Two dropped out of the experimental group, but no reason was given
Interventions	Eight standardized multi-sensory programmes. Eight standardized activity sessions. Both programmes were implemented on an one-to-one basis, twice a week, with each session lasted for 30 minutes. The two programs were different in keyworker approach, multisensory experience, nature of stimuli, and demands on clients
Outcomes	Immediate effect: Behavioral: INTERACT (22-item) INTERACT (12-item) Carry-over and long-term effect Behavioural: REHAB (general behaviour subscale and deviant behaviour subscale) Behaviour Rating Scale (BRS) of CAPE Mood: Behaviour and Mood Disturbance Scale (BMD) Cognition: MMSE Assessments were done at four points: pre-trial, mid-trial, post-trial, and follow-up one month later
Notes	

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	No	

Baker 2003

Methods	Randomized controlled trial.
Participants	136 subjects diagnosed with Alzheimer's, vascular or mixed dementia. UK sample = 94 day patients. The Netherlands sample = 26 in-patients Swedish sample = 16 in-patients.
Interventions	Eight multi-sensory programmes. Eight activity sessions. Both programmes were implemented on an one-to-one basis, twice a week, with each session lasted for 30 minutes
Outcomes	Short-term effect: Behavioural: INTERACT (22-item) INTERACT (12-item) GIP (The Netherlands sample only) Long-term effects Cognition: Mini-Mental State Examination (MMSE) Behaviorual: Behavioural Rating Scale (BRS) REHAB (UK) GIP (The Netherlands) Mood: Behavioural and Mood Disturbance (BMD) scale (UK sample) BRS and GIP were adminstered at pretrial and post-trial. REHAB, BMD, and MMSE were adminstered at pretrial, mid-trial, post-trial, and one-month follow up
Notes	

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	No	

van Weert 2005

Methods	Quasi experimental pre- and post-test design. Randomization done at ward level.
Participants	125 patients with moderate or severe dementia adn care dependency were recruited from 6 psychogeriatric wards for pre-test. 128 subjects were evaluated at post-test. 61 were completers (included in both pre-test and post-test). Mean age: 84 (experiemental); 82.6 (control).
Interventions	15-month 24-hour individualized care plan that was intergrated with snoezelen. 15-month usual care.

van Weert 2005 (*Continued*)

Outcomes	Behavioural: INTERACT (modified) GIP Cohen-Manfield Agitated Inventory (Dutch version) Mood: Cornell Scale for Depression in Dementia. Three-face diagram.
Notes	

Risk of bias

Item	Authors' judgement	Description
Allocation concealment?	No	

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Baillon 2004	Three sessions of snoezlen only. Comparison with a reminiscence program, with no other control comparison
Baillon 2005	Reported the same study as in Baillon 2004. Three sessions of snozelen only. Reminiscence was used as comparison, with no other control comparison
Baillon 2006	This study compared snoezelen with other forms of therapeutic activities (reminiscence therapy in this case)
Cox 2004	Non-randomzied methodological quality. Three sessions of snoezelen only.
Heyn 2003	Non-randomized methodological quality with an absence of comparative data. Only pre- and post-data of one group were available
Kragt 1997	Too brief an intervention programme that consisted of only three sessions
Pinkney 1997	Non-randomized methodological quality. Absence of comparative data.
van Diepen 2002	Pilot study, and the primary objective was to examine the feasibility of outcome measures. Reminiscence was used as the comparison. No other control group
van Weert 2006	This study examined the effects of snoezelen on the behaviours of nursing assistants

DATA AND ANALYSES

Comparison 1. Session-based snoezelen versus control (activity session)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Behavior during sessions	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
1.1 Confused of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.29 [-0.59, 0.01]
1.2 Wandering / restless of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.08 [-0.12, 0.28]
1.3 Alert of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.34 [-0.01, 0.69]
1.4 Inactive / sleeping of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	Not estimable
1.5 Relaxed of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.13 [-0.22, 0.48]
1.6 Initiative of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.06 [-0.39, 0.27]
2 Behavior immediate after sessions	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
2.1 Confused of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.14 [-0.44, 0.16]
2.2 Initiative of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.17 [-0.17, 0.51]
2.3 Wandering / restless of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.12 [-0.37, 0.13]
2.4 Alert of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.06 [-0.39, 0.27]
2.5 Inactive / sleeping of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.04 [-0.19, 0.11]
2.6 Relaxed of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.08 [-0.37, 0.21]
3 Behavior at mid-trial	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
3.1 BMD (total score)	1	93	Mean Difference (IV, Fixed, 95% CI)	-2.5 [-9.47, 4.47]
3.2 Active/disturbed subscale of BMD	1	93	Mean Difference (IV, Fixed, 95% CI)	-1.0 [-4.66, 2.66]
3.3 General behavior subscale of REHAB	1	87	Mean Difference (IV, Fixed, 95% CI)	-5.70 [-17.30, 5.90]
3.4 Deviant behaviour subscore of REHAB	1	87	Mean Difference (IV, Fixed, 95% CI)	-0.10 [-1.00, 0.80]
4 Behavior as generalized to home/ward at 1-month follow up	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
4.1 BMD (total score)	1	93	Mean Difference (IV, Fixed, 95% CI)	-0.20 [-7.23, 6.83]
4.2 Active/disturbed subscale of BMD	1	93	Mean Difference (IV, Fixed, 95% CI)	-0.20 [-3.77, 3.37]
4.3 General behavior subscale of REHAB	1	87	Mean Difference (IV, Fixed, 95% CI)	-7.10 [-19.34, 5.14]
4.4 Deviant behaviour subscore of REHAB	1	87	Mean Difference (IV, Fixed, 95% CI)	0.30 [-0.74, 1.34]
5 Behavior as generalized to home/ward at post-trial	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
5.1 BMD (total score)	1	93	Mean Difference (IV, Fixed, 95% CI)	-1.80 [-8.77, 5.17]
5.2 Active/disturbed subscale of BMD	1	93	Mean Difference (IV, Fixed, 95% CI)	-0.40 [-3.78, 2.98]

5.3 Behavioural Rating Scale (total score)	1	111	Mean Difference (IV, Fixed, 95% CI)	-2.02 [-3.94, -0.10]
5.4 General behavior subscale of REHAB	1	87	Mean Difference (IV, Fixed, 95% CI)	-8.70 [-20.55, 3.15]
5.5 Deviant behaviour subscale of REHAB	1	87	Mean Difference (IV, Fixed, 95% CI)	-0.20 [-1.08, 0.68]
6 Cognition at post-trial	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
6.1 MMSE	1	106	Mean Difference (IV, Fixed, 95% CI)	2.37 [0.04, 4.70]
7 Mood during sessions	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
7.1 Tearful / sad of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	Not estimable
7.2 Happy / content of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.17 [-0.50, 0.16]
7.3 Fearful / anxious of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	Not estimable
8 Mood immediatly after sessions	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
8.1 Tearful / sad of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.04 [-0.08, 0.16]
8.2 Happy / content of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.06 [-0.34, 0.22]
8.3 Fearful / anxious of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.08 [-0.12, 0.28]
9 Speech / interaction during sessions	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
9.1 Talked spontaneously of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.32 [-0.03, 0.67]
9.2 Spoke clearly of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.32 [-0.09, 0.73]
9.3 Spoke sensibly of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.26 [-0.16, 0.68]
9.4 Normal-length sentence of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.36 [-0.08, 0.80]
9.5 Recalled memories of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.42 [0.11, 0.73]
9.6 Appropriate eye contact of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.08 [-0.41, 0.25]
9.7 Related well of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	Not estimable
9.8 Cooperated of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.08 [-0.42, 0.26]
9.9 Tracked observable stimuli of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.40 [-0.73, -0.07]
9.10 Touched objects appropriately of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.86 [-1.24, -0.48]
9.11 Attentive / focused on environment of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.56 [-0.86, -0.26]
9.12 Comments / questions about activities of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.06 [-0.24, 0.36]
10 Speech / interaction immediately after sessions	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only

10.1 Talked spontaneously of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.08 [-0.23, 0.39]
10.2 Related well of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	0.14 [-0.19, 0.47]
10.3 Attentive / focused on environment of INTERACT	1	117	Mean Difference (IV, Fixed, 95% CI)	-0.5 [-0.82, -0.18]

Comparison 2. 24 hr snoezelen versus control (usual care)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Behavior during sessions	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
1.1 Restless of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.21 [-0.49, 0.07]
1.2 Enjoying self of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.74 [-1.29, -0.19]
1.3 Bored of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.56 [-1.11, -0.01]
1.4 Alert of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.05 [-0.60, 0.50]
1.5 Verbal anger of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.19 [-0.47, 0.09]
1.6 Aggressiveness of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.08 [-0.36, 0.20]
1.7 Negativism of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.17 [-0.45, 0.11]
1.8 Reluntance of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.27 [-0.55, 0.01]
1.9 Repetitious mannerisim of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.25 [-0.03, 0.53]
1.10 Initiative of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.04 [-0.32, 0.24]
2 Behaviour as generalized to ward	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
2.1 Aggressive behavior of CMAI	1	128	Mean Difference (IV, Fixed, 95% CI)	-1.4 [-3.34, 0.54]
2.2 Physically non-aggressive behavior of CMAI	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.11 [-1.50, 1.28]
2.3 Verbally agitated behavior of CMAI	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.20 [-1.86, 1.46]
2.4 Nonsocial behavior of GIP	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.5 [-1.61, 0.61]
2.5 Apathetic behavior of GIP	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.75 [-1.58, 0.08]
2.6 Loss of consciousness of GIP	1	128	Mean Difference (IV, Fixed, 95% CI)	0.29 [-0.82, 1.40]
2.7 Rebellious behavior of GIP	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.37 [-1.20, 0.46]
2.8 Restless behavior of GIP	1	128	Mean Difference (IV, Fixed, 95% CI)	0.10 [-0.73, 0.93]
2.9 Anxious behavior of GIP	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.33 [-1.72, 1.06]
3 Mood during session	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
3.1 Tearful/sad of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.25 [-0.53, 0.03]
3.2 Happy/content of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.84 [-1.39, -0.29]

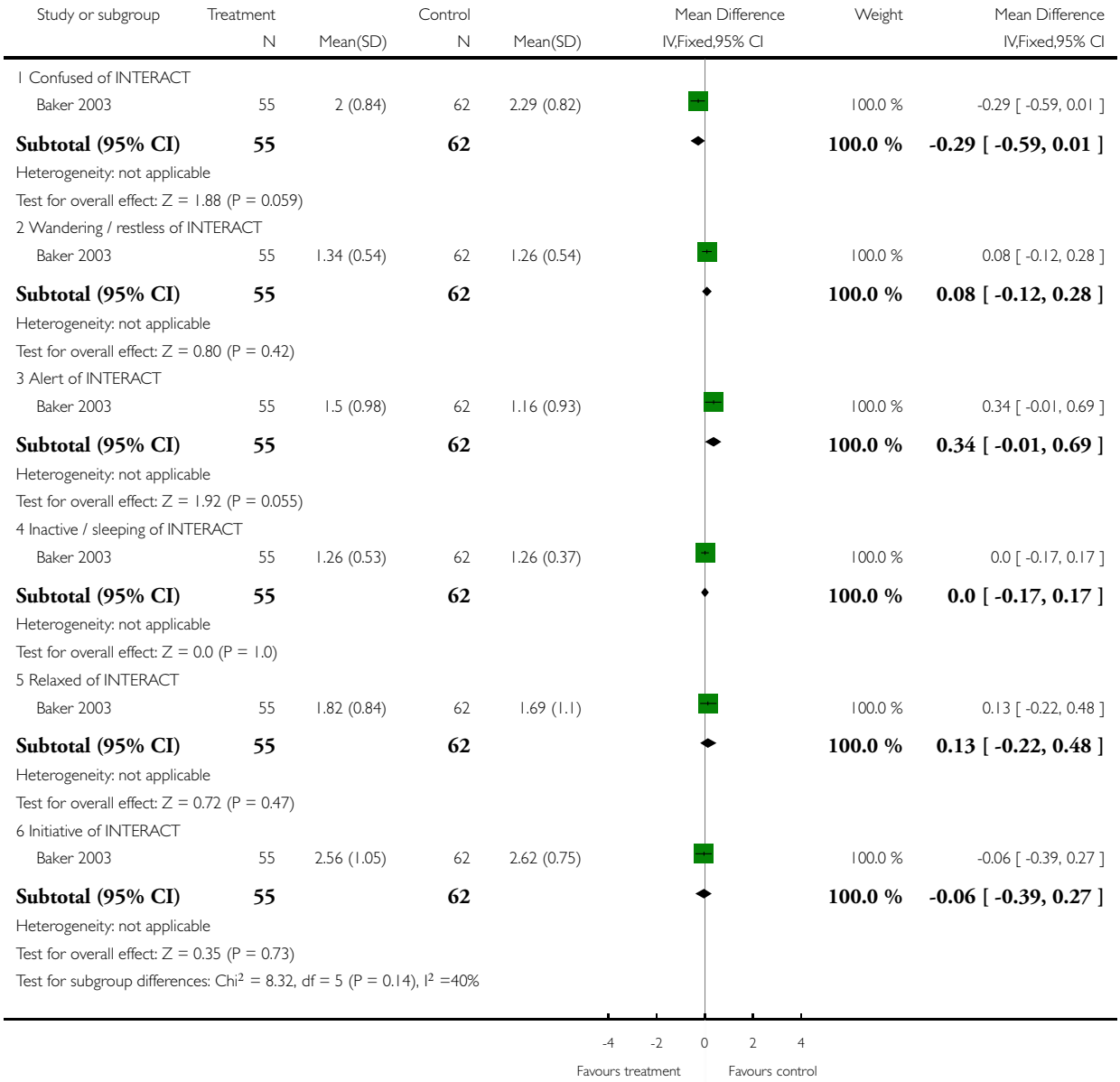
3.3 Fearful/anxious of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.04 [-0.24, 0.32]
3.4 Face	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.33 [-0.61, -0.05]
4 Mood as generalized to ward	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.44 [-1.83, 0.95]
4.1 Cornell Scale for Depression in Dementia	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.44 [-1.83, 0.95]
5 Speech and interaction during sessions	1		Mean Difference (IV, Fixed, 95% CI)	Subtotals only
5.1 Talked spontaneously of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.07 [-0.48, 0.62]
5.2 Recalled memories of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.03 [-0.31, 0.25]
5.3 Spoke clearly of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.21 [-0.76, 0.34]
5.4 Spoke sensibly of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.25 [-0.30, 0.80]
5.5 Normal-length sentence of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.31 [0.03, 0.59]
5.6 Appropriate eye contact of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.11 [-0.17, 0.39]
5.7 Related well of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.52 [0.24, 0.80]
5.8 Listened to voice of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.20 [-0.08, 0.48]
5.9 Responded to speaking of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.30 [0.02, 0.58]
5.10 Tracked observable stimuli of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	-0.20 [-0.75, 0.35]
5.11 Touched objects of INTERACT	1	128	Mean Difference (IV, Fixed, 95% CI)	0.04 [-0.24, 0.32]

Analysis 1.1. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 1 Behavior during sessions.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 1 Behavior during sessions

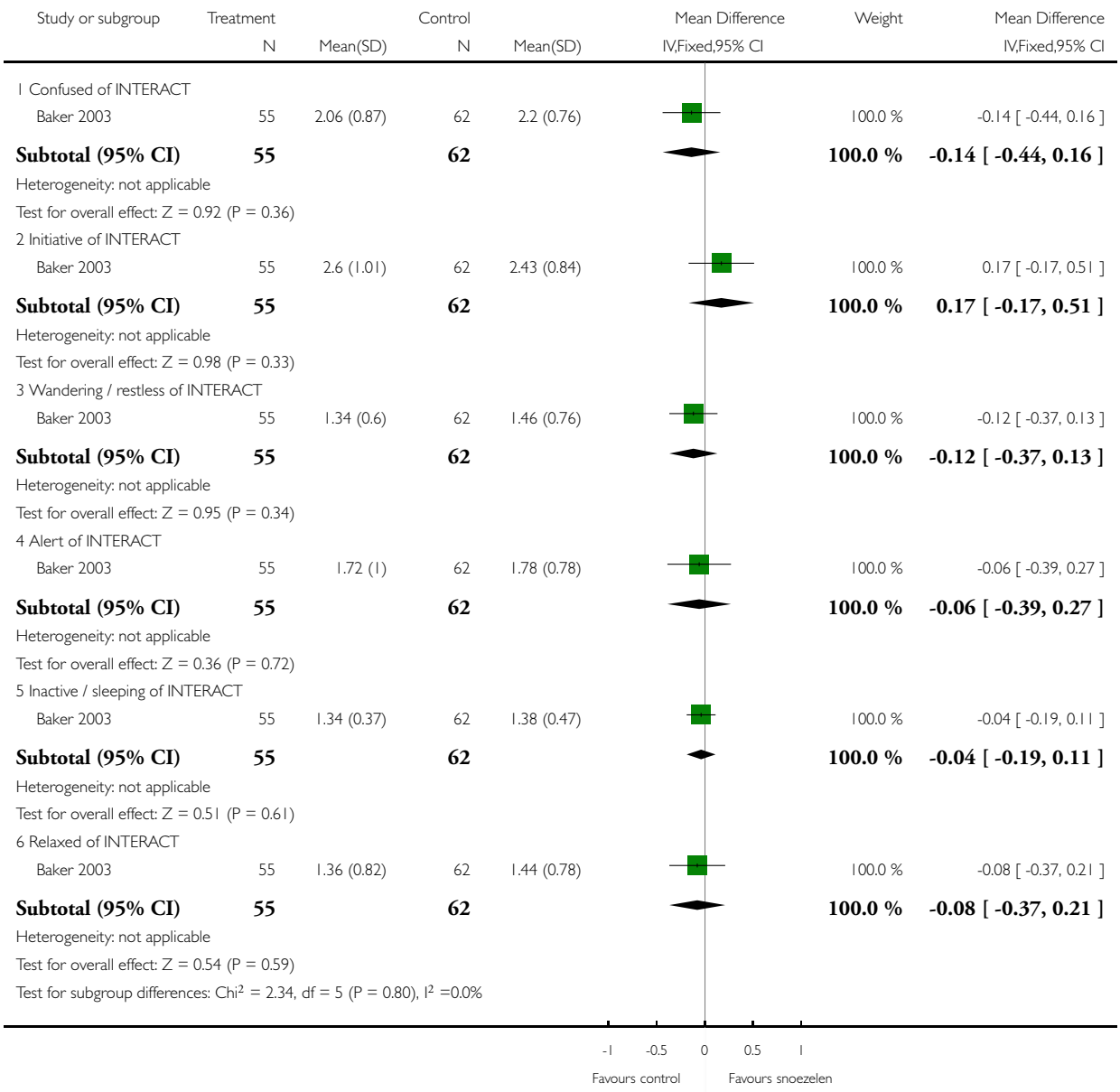


Analysis 1.2. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 2 Behavior immediate after sessions.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 2 Behavior immediate after sessions

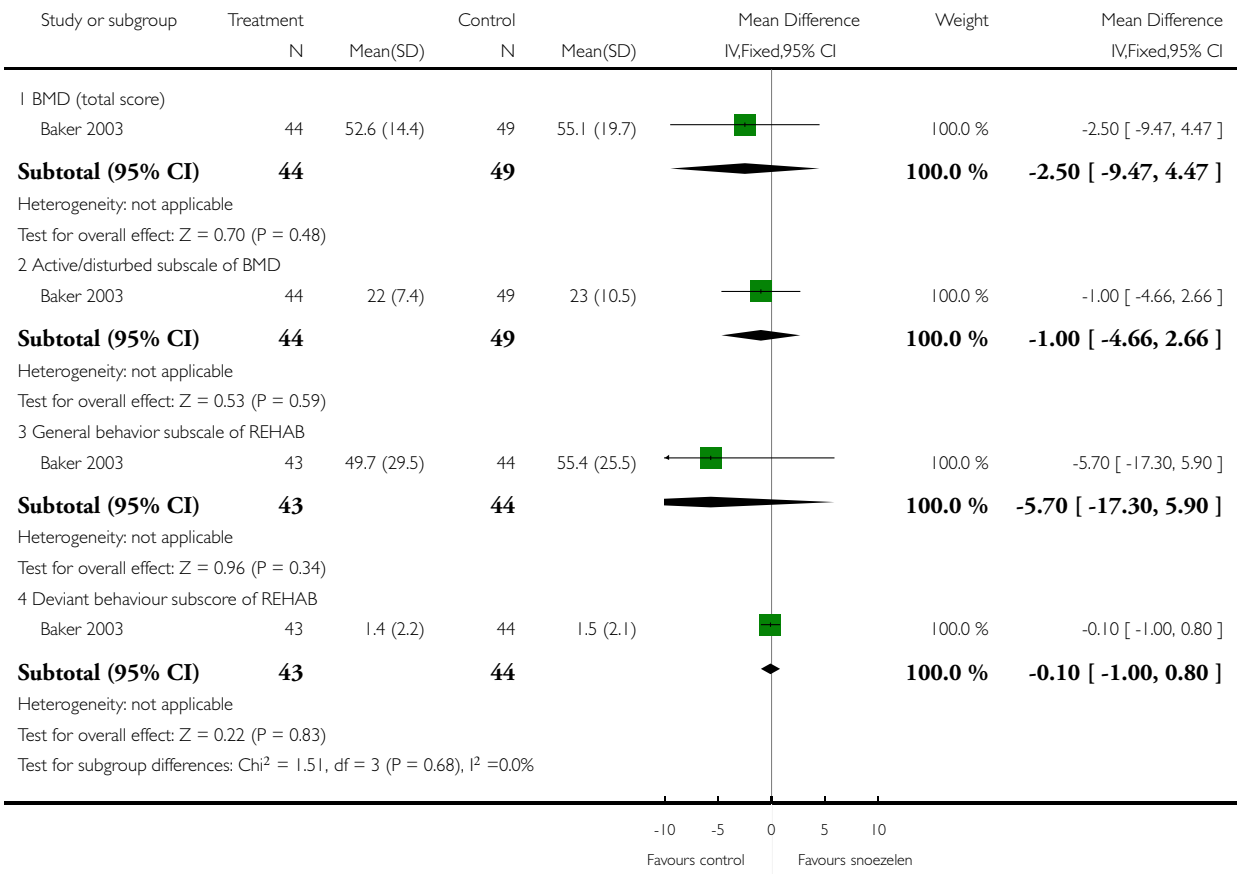


Analysis 1.3. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 3 Behavior at mid-trial.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 3 Behavior at mid-trial



Analysis 1.4. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 4 Behavior as generalized to home/ward at 1-month follow up.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 4 Behavior as generalized to home/ward at 1-month follow up

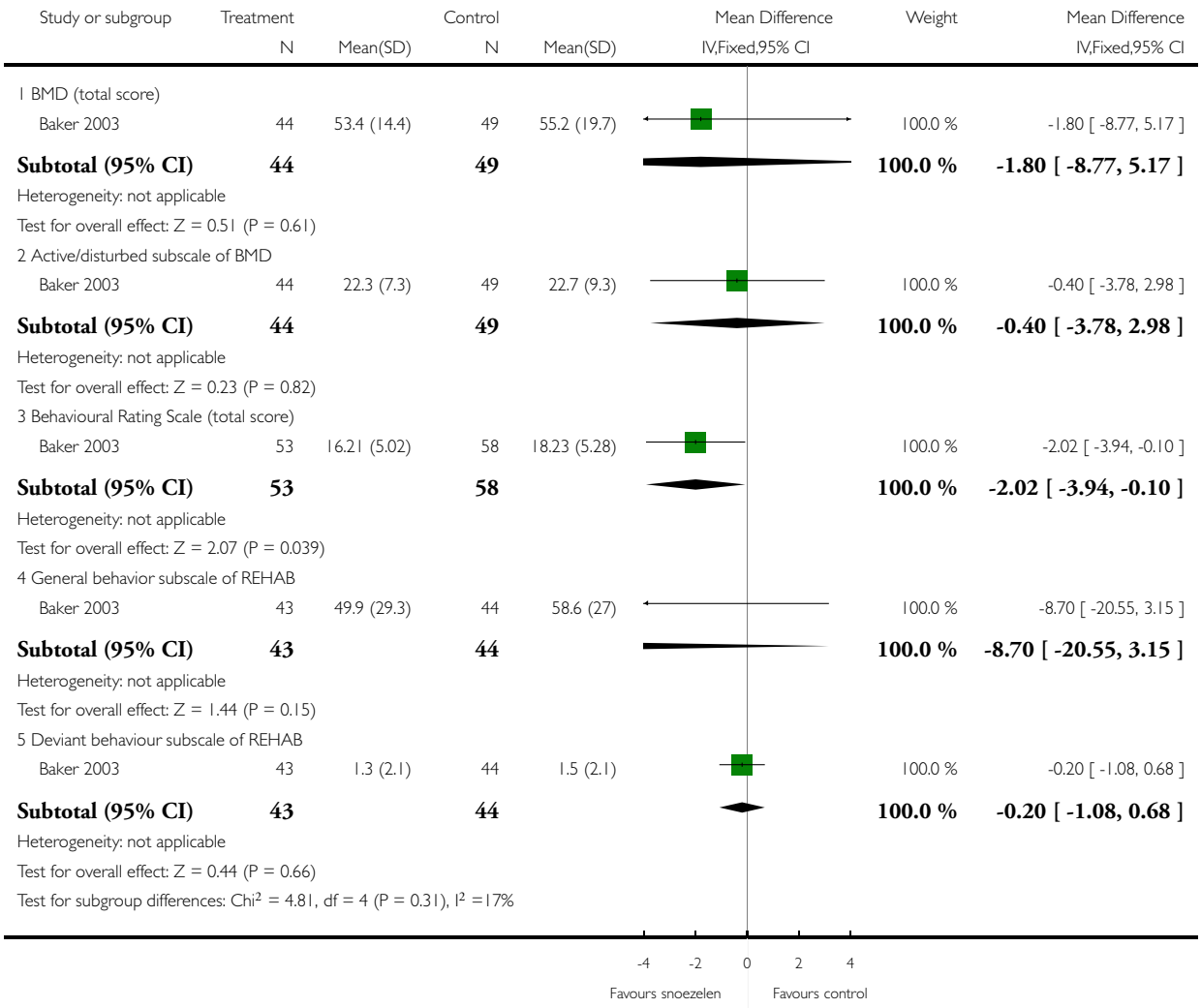
Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 BMD (total score)							
Baker 2003	44	55.3 (16.4)	49	55.5 (18.2)		100.0 %	-0.20 [-7.23, 6.83]
Subtotal (95% CI)	**44**		**49**			**100.0 %**	**-0.20 [-7.23, 6.83]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.06 (P = 0.96)							
2 Active/disturbed subscale of BMD							
Baker 2003	44	23.9 (8.9)	49	24.1 (8.6)		100.0 %	-0.20 [-3.77, 3.37]
Subtotal (95% CI)	**44**		**49**			**100.0 %**	**-0.20 [-3.77, 3.37]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.11 (P = 0.91)							
3 General behavior subscale of REHAB							
Baker 2003	43	54.2 (30)	44	61.3 (28.2)		100.0 %	-7.10 [-19.34, 5.14]
Subtotal (95% CI)	**43**		**44**			**100.0 %**	**-7.10 [-19.34, 5.14]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.14 (P = 0.26)							
4 Deviant behaviour subscore of REHAB							
Baker 2003	43	2 (2.8)	44	1.7 (2.1)		100.0 %	0.30 [-0.74, 1.34]
Subtotal (95% CI)	**43**		**44**			**100.0 %**	**0.30 [-0.74, 1.34]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.56 (P = 0.57)							
Test for subgroup differences: Chi^2 = 1.46, df = 3 (P = 0.69), I^2 =0.0%							

Analysis 1.5. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 5 Behavior as generalized to home/ward at post-trial.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 5 Behavior as generalized to home/ward at post-trial

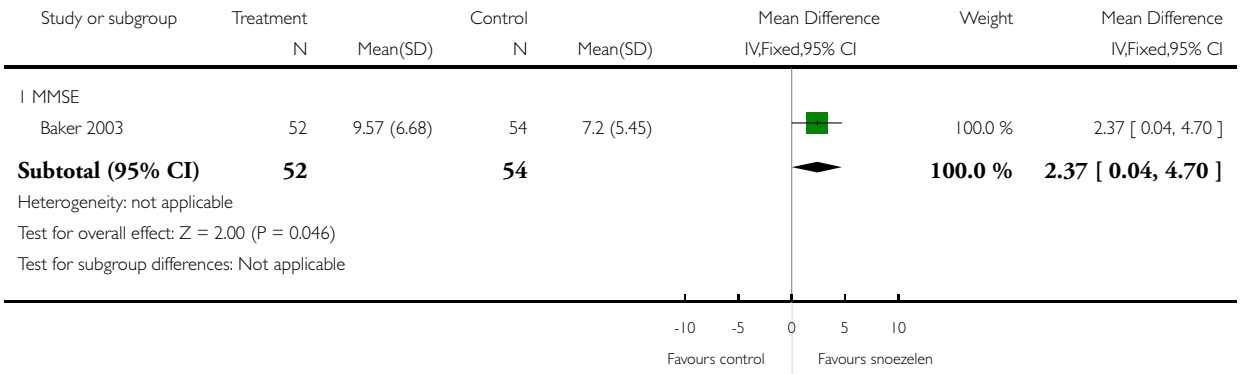


Analysis 1.6. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 6 Cognition at post-trial.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 6 Cognition at post-trial

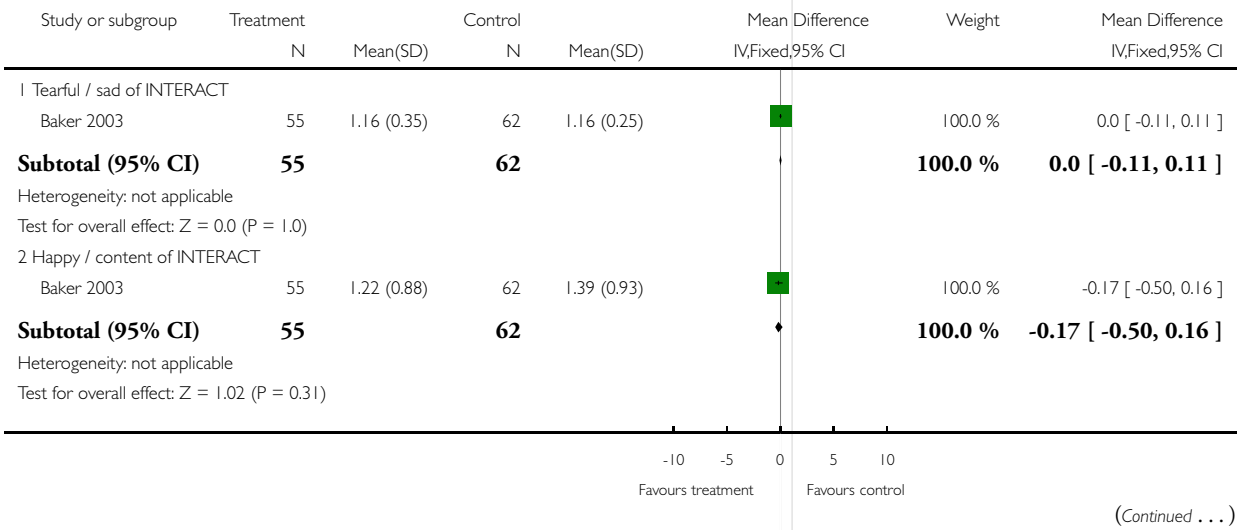


Analysis 1.7. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 7 Mood during sessions.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 7 Mood during sessions



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Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
3 Fearful / anxious of INTERACT							
Baker 2003	55	1.34 (0.47)	62	1.34 (0.45)		100.0 %	0.0 [-0.17, 0.17]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.0 [-0.17, 0.17]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.0 (P = 1.0)							
Test for subgroup differences: Chi^2 = 0.95, df = 2 (P = 0.62), I^2 =0.0%							

-10 -5 0 5 10

Favours treatment Favours control

Analysis 1.8. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 8 Mood immediatly after sessions.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 8 Mood immediatly after sessions

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Tearful / sad of INTERACT							
Baker 2003	55	1.16 (0.35)	62	1.12 (0.28)		100.0 %	0.04 [-0.08, 0.16]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.04 [-0.08, 0.16]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.68 (P = 0.50)							
2 Happy / content of INTERACT							
Baker 2003	55	1.28 (0.78)	62	1.34 (0.78)		100.0 %	-0.06 [-0.34, 0.22]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**-0.06 [-0.34, 0.22]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.42 (P = 0.68)							
3 Fearful / anxious of INTERACT							
Baker 2003	55	1.42 (0.63)	62	1.34 (0.46)		100.0 %	0.08 [-0.12, 0.28]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.08 [-0.12, 0.28]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.78 (P = 0.44)							
Test for subgroup differences: Chi^2 = 0.63, df = 2 (P = 0.73), I^2 =0.0%							

-10 -5 0 5 10

Favours treatment Favours control

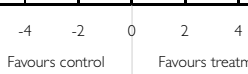
Analysis 1.9. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 9 Speech / interaction during sessions.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 9 Speech / interaction during sessions

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Talked spontaneously of INTERACT							
Baker 2003	55	3.44 (0.98)	62	3.12 (0.92)		100.0 %	0.32 [-0.03, 0.67]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.32 [-0.03, 0.67]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.81 (P = 0.070)							
2 Spoke clearly of INTERACT							
Baker 2003	55	3.74 (1.02)	62	3.42 (1.25)		100.0 %	0.32 [-0.09, 0.73]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.32 [-0.09, 0.73]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.52 (P = 0.13)							
3 Spoke sensibly of INTERACT							
Baker 2003	55	3.36 (1.15)	62	3.1 (1.15)		100.0 %	0.26 [-0.16, 0.68]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.26 [-0.16, 0.68]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.22 (P = 0.22)							
4 Normal-length sentence of INTERACT							
Baker 2003	55	3.54 (1.25)	62	3.18 (1.15)		100.0 %	0.36 [-0.08, 0.80]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.36 [-0.08, 0.80]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.61 (P = 0.11)							
5 Recalled memories of INTERACT							
Baker 2003	55	2.3 (0.95)	62	1.88 (0.72)		100.0 %	0.42 [0.11, 0.73]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.42 [0.11, 0.73]**
Heterogeneity: not applicable							
Test for overall effect: Z = 2.67 (P = 0.0076)							
6 Appropriate eye contact of INTERACT							
Baker 2003	55	3.52 (0.92)	62	3.6 (0.92)		100.0 %	-0.08 [-0.41, 0.25]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**-0.08 [-0.41, 0.25]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.47 (P = 0.64)							
7 Related well of INTERACT							



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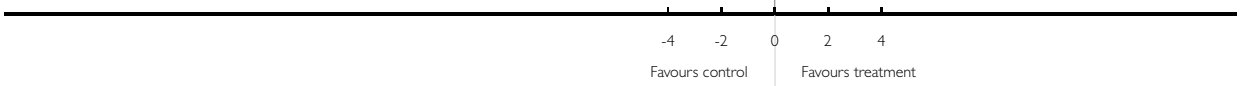
Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Baker 2003	55	4 (1.02)	62	4 (0.92)		100.0 %	0.0 [-0.35, 0.35]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.0 [-0.35, 0.35]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.0 (P = 1.0)							
8 Cooperated of INTERACT							
Baker 2003	55	4 (0.97)	62	4.08 (0.91)		100.0 %	-0.08 [-0.42, 0.26]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**-0.08 [-0.42, 0.26]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.46 (P = 0.65)							
9 Tracked observable stimuli of INTERACT							
Baker 2003	55	3.4 (0.89)	62	3.8 (0.93)		100.0 %	-0.40 [-0.73, -0.07]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**-0.40 [-0.73, -0.07]**
Heterogeneity: not applicable							
Test for overall effect: Z = 2.38 (P = 0.018)							
10 Touched objects appropriately of INTERACT							
Baker 2003	55	2.9 (1.07)	62	3.76 (1.02)		100.0 %	-0.86 [-1.24, -0.48]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**-0.86 [-1.24, -0.48]**
Heterogeneity: not applicable							
Test for overall effect: Z = 4.44 (P < 0.00001)							
11 Attentive / focused on environment of INTERACT							
Baker 2003	55	3.4 (0.82)	62	3.96 (0.84)		100.0 %	-0.56 [-0.86, -0.26]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**-0.56 [-0.86, -0.26]**
Heterogeneity: not applicable							
Test for overall effect: Z = 3.64 (P = 0.00027)							
12 Comments / questions about activities of INTERACT							
Baker 2003	55	2.52 (0.8)	62	2.46 (0.84)		100.0 %	0.06 [-0.24, 0.36]
Subtotal (95% CI)	**55**		**62**			**100.0 %**	**0.06 [-0.24, 0.36]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.40 (P = 0.69)							
Test for subgroup differences: Chi^2 = 55.35, df = 11 (P = 0.00), I^2 =80%							

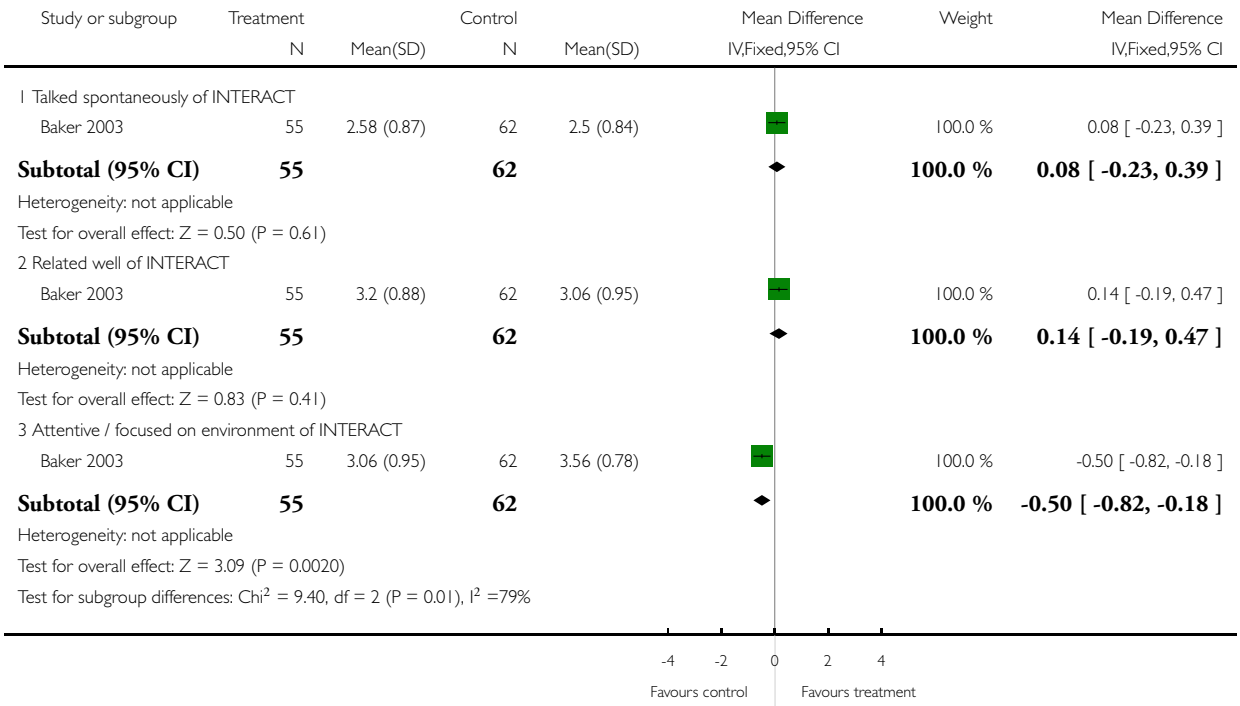


Analysis 1.10. Comparison 1 Session-based snoezelen versus control (activity session), Outcome 10 Speech / interaction immediately after sessions.

Review: Snoezelen for dementia

Comparison: 1 Session-based snoezelen versus control (activity session)

Outcome: 10 Speech / interaction immediately after sessions



Analysis 2.1. Comparison 2 24 hr snoezelen versus control (usual care), Outcome 1 Behavior during sessions.

Review: Snoezelen for dementia

Comparison: 2 24 hr snoezelen versus control (usual care)

Outcome: 1 Behavior during sessions

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Restless of INTERACT							
van Weert 2005	66	1.46 (0.81)	62	1.67 (0.79)		100.0 %	-0.21 [-0.49, 0.07]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.21 [-0.49, 0.07]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.48 (P = 0.14)							
2 Enjoying self of INTERACT							
van Weert 2005	66	1.83 (1.62)	62	2.57 (1.57)		100.0 %	-0.74 [-1.29, -0.19]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.74 [-1.29, -0.19]**
Heterogeneity: not applicable							
Test for overall effect: Z = 2.62 (P = 0.0087)							
3 Bored of INTERACT							
van Weert 2005	66	1.69 (1.62)	62	2.25 (1.57)		100.0 %	-0.56 [-1.11, -0.01]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.56 [-1.11, -0.01]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.99 (P = 0.047)							
4 Alert of INTERACT							
van Weert 2005	66	1.26 (1.62)	62	1.31 (1.57)		100.0 %	-0.05 [-0.60, 0.50]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.05 [-0.60, 0.50]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.18 (P = 0.86)							
5 Verbal anger of INTERACT							
van Weert 2005	66	1.07 (0.81)	62	1.26 (0.79)		100.0 %	-0.19 [-0.47, 0.09]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.19 [-0.47, 0.09]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.34 (P = 0.18)							
6 Aggressiveness of INTERACT							
van Weert 2005	66	1.05 (0.81)	62	1.13 (0.79)		100.0 %	-0.08 [-0.36, 0.20]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.08 [-0.36, 0.20]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.57 (P = 0.57)							
7 Negativism of INTERACT							
van Weert 2005	66	1.48 (0.81)	62	1.65 (0.79)		100.0 %	-0.17 [-0.45, 0.11]

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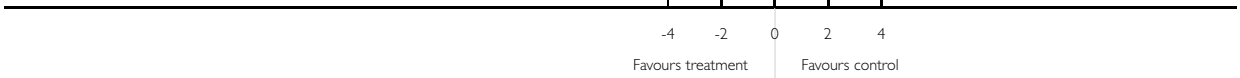
Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.17 [-0.45, 0.11]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.20 (P = 0.23)							
8 Reluntance of INTERACT							
van Weert 2005	66	1.11 (0.81)	62	1.38 (0.79)		100.0 %	-0.27 [-0.55, 0.01]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.27 [-0.55, 0.01]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.91 (P = 0.056)							
9 Repetitious mannerisim of INTERACT							
van Weert 2005	66	1.55 (0.81)	62	1.3 (0.79)		100.0 %	0.25 [-0.03, 0.53]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**0.25 [-0.03, 0.53]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.77 (P = 0.077)							
10 Initiative of INTERACT							
van Weert 2005	66	1.8 (0.81)	62	1.84 (0.79)		100.0 %	-0.04 [-0.32, 0.24]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.04 [-0.32, 0.24]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.28 (P = 0.78)							
Test for subgroup differences: Chi^2 = 16.38, df = 9 (P = 0.06), I^2 =45%							



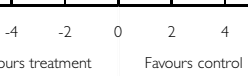
Analysis 2.2. Comparison 2 24 hr snoezelen versus control (usual care), Outcome 2 Behaviour as generalized to ward.

Review: Snoezelen for dementia

Comparison: 2 24 hr snoezelen versus control (usual care)

Outcome: 2 Behaviour as generalized to ward

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Aggressive behavior of CMAI							
van Weert 2005	66	3.53 (5.69)	62	4.93 (5.51)		100.0 %	-1.40 [-3.34, 0.54]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-1.40 [-3.34, 0.54]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.41 (P = 0.16)							
2 Physically non-aggressive behavior of CMAI							
van Weert 2005	66	3.53 (4.06)	62	3.64 (3.94)		100.0 %	-0.11 [-1.50, 1.28]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.11 [-1.50, 1.28]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.16 (P = 0.88)							
3 Verbally agitated behavior of CMAI							
van Weert 2005	66	5.06 (4.87)	62	5.26 (4.72)		100.0 %	-0.20 [-1.86, 1.46]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.20 [-1.86, 1.46]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.24 (P = 0.81)							
4 Nonsocial behavior of GIP							
van Weert 2005	66	13.31 (3.25)	62	13.81 (3.15)		100.0 %	-0.50 [-1.61, 0.61]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.50 [-1.61, 0.61]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.88 (P = 0.38)							
5 Apathetic behavior of GIP							
van Weert 2005	66	9.87 (2.44)	62	10.62 (2.36)		100.0 %	-0.75 [-1.58, 0.08]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.75 [-1.58, 0.08]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.77 (P = 0.077)							
6 Loss of consciousness of GIP							
van Weert 2005	66	7.89 (3.25)	62	7.6 (3.15)		100.0 %	0.29 [-0.82, 1.40]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**0.29 [-0.82, 1.40]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.51 (P = 0.61)							
7 Rebellious behavior of GIP							
van Weert 2005	66	5.23 (2.44)	62	5.6 (2.36)		100.0 %	-0.37 [-1.20, 0.46]



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Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.37 [-1.20, 0.46]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.87 (P = 0.38)							
8 Restless behavior of GIP							
van Weert 2005	66	4.11 (2.44)	62	4.01 (2.36)		100.0 %	0.10 [-0.73, 0.93]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**0.10 [-0.73, 0.93]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.24 (P = 0.81)							
9 Anxious behavior of GIP							
van Weert 2005	66	4.03 (4.06)	62	4.36 (3.94)		100.0 %	-0.33 [-1.72, 1.06]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.33 [-1.72, 1.06]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.47 (P = 0.64)							
Test for subgroup differences: Chi^2 = 4.58, df = 8 (P = 0.80), I^2 =0.0%							

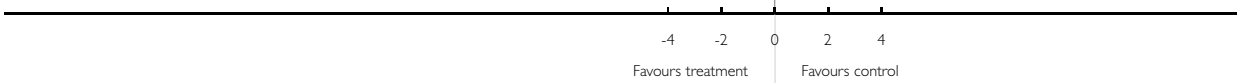
Analysis 2.3. Comparison 2 24 hr snoezelen versus control (usual care), Outcome 3 Mood during session.

Review: Snoezelen for dementia

Comparison: 2 24 hr snoezelen versus control (usual care)

Outcome: 3 Mood during session

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Tearful/sad of INTERACT							
van Weert 2005	66	1.29 (0.81)	62	1.54 (0.79)		100.0 %	-0.25 [-0.53, 0.03]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.25 [-0.53, 0.03]**
Heterogeneity: not applicable							
Test for overall effect: Z = 1.77 (P = 0.077)							
2 Happy/content of INTERACT							
van Weert 2005	66	1.53 (1.62)	62	2.37 (1.57)		100.0 %	-0.84 [-1.39, -0.29]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.84 [-1.39, -0.29]**
Heterogeneity: not applicable							
Test for overall effect: Z = 2.98 (P = 0.0029)							
3 Fearful/anxious of INTERACT							
van Weert 2005	66	1.32 (0.81)	62	1.28 (0.79)		100.0 %	0.04 [-0.24, 0.32]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**0.04 [-0.24, 0.32]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.28 (P = 0.78)							
4 Face							
van Weert 2005	66	0.51 (0.81)	62	0.84 (0.79)		100.0 %	-0.33 [-0.61, -0.05]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.33 [-0.61, -0.05]**
Heterogeneity: not applicable							
Test for overall effect: Z = 2.33 (P = 0.020)							
Test for subgroup differences: Chi^2 = 8.84, df = 3 (P = 0.03), I^2 =66%							



Analysis 2.4. Comparison 2 24 hr snoezelen versus control (usual care), Outcome 4 Mood as generalized to ward.

Review: Snoezelen for dementia

Comparison: 2 24 hr snoezelen versus control (usual care)

Outcome: 4 Mood as generalized to ward

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Cornell Scale for Depression in Dementia							
van Weert 2005	66	7.44 (4.06)	62	7.88 (3.94)		100.0 %	-0.44 [-1.83, 0.95]
Total (95% CI)	**66**		**62**			**100.0 %**	**-0.44 [-1.83, 0.95]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.62 (P = 0.53)							
Test for subgroup differences: Not applicable							

Analysis 2.5. Comparison 2 24 hr snoezelen versus control (usual care), Outcome 5 Speech and interaction during sessions.

Review: Snoezelen for dementia

Comparison: 2 24 hr snoezelen versus control (usual care)

Outcome: 5 Speech and interaction during sessions

Study or subgroup	Treatment N	Mean(SD)	Control N	Mean(SD)	Mean Difference IV,Fixed,95% CI	Weight	Mean Difference IV,Fixed,95% CI
1 Talked spontaneously of INTERACT							
van Weert 2005	66	2.64 (1.62)	62	2.57 (1.57)		100.0 %	0.07 [-0.48, 0.62]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**0.07 [-0.48, 0.62]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.25 (P = 0.80)							
2 Recalled memories of INTERACT							
van Weert 2005	66	1.27 (0.81)	62	1.3 (0.79)		100.0 %	-0.03 [-0.31, 0.25]
Subtotal (95% CI)	**66**		**62**			**100.0 %**	**-0.03 [-0.31, 0.25]**
Heterogeneity: not applicable							
Test for overall effect: Z = 0.21 (P = 0.83)							

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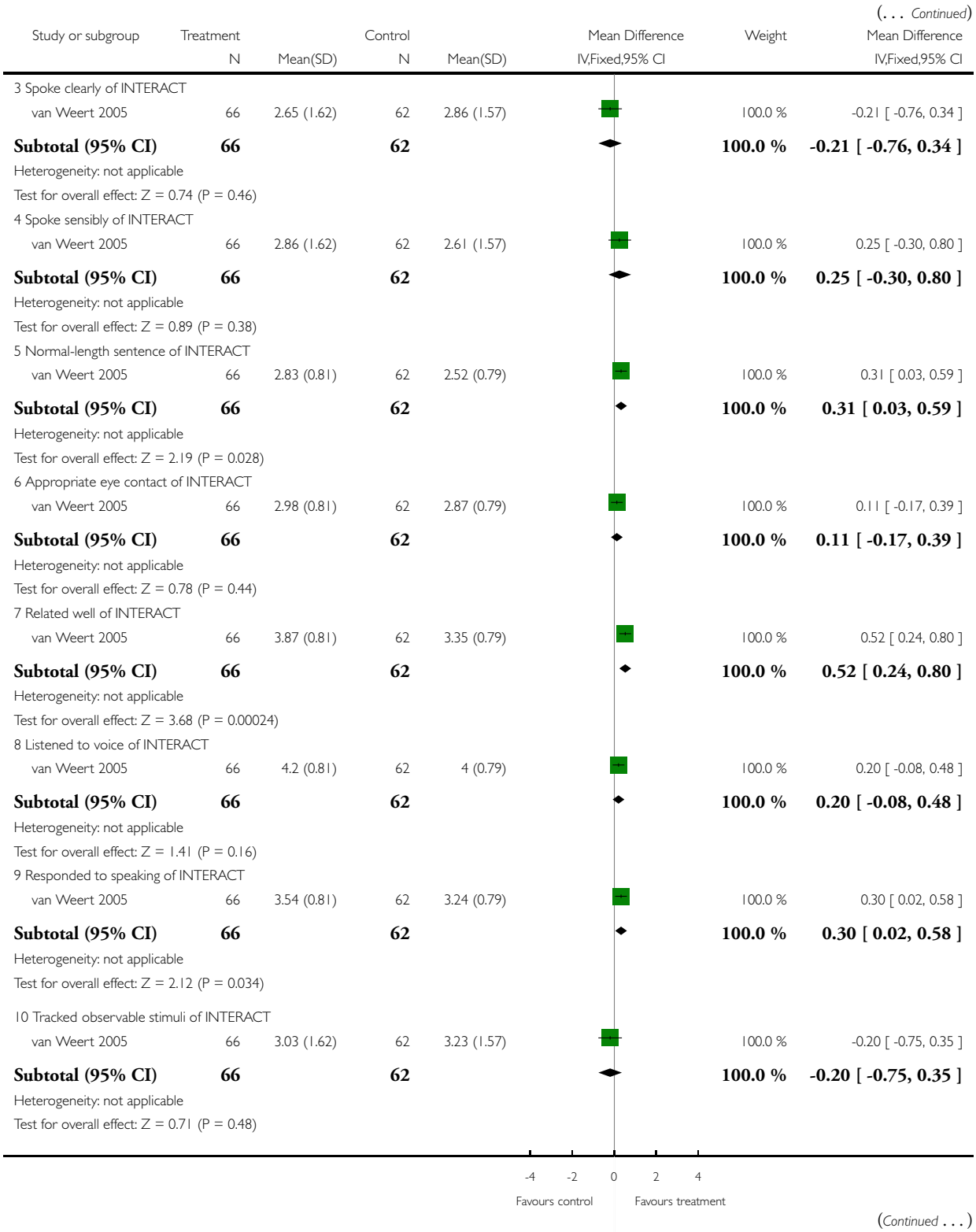

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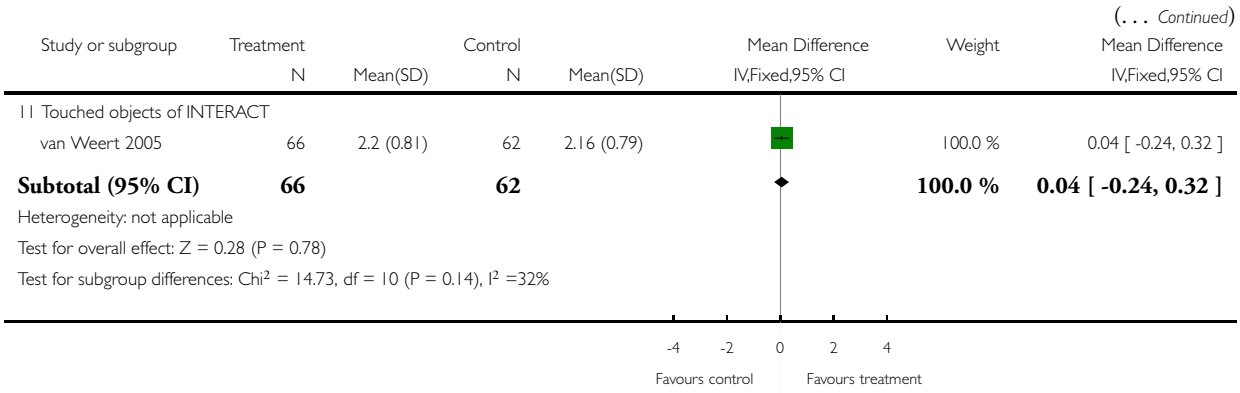

ADDITIONAL TABLES

Table 1. Outcome measures

Name of measure	Source	Description	Way to administer	Scoring method
Interact	Baker & Dowling 1995	Consist of 22 behavioural items to evaluate the frequency of occurrence of the behaviours	Observational measurement. Rated by key-workers	Each item is rated on a 5-point scale. The higher the score, the higher the frequency of occurrence
Interact - Short	Baker & Dowling 1995	A short version of Interact. It consists of 12 behavioural items to evaluate the occurrence of behaviours immediately after sessions	Observational measurement. Rated by nursing staff	Each item is rated on a 5-point scale
Behavior Rating Scale (CAPE)	Pattie & Gilleard 1979	Part of CAPE. Consists of four subscales including physical disabilities, apathy, communication difficulties, and social disturbances	Observational measurement. Rated by carers.	Score range from 0-36.
REHAB	Baker & Hall 1988	Consists of four subscales including general behavior, deviant behavior, communication skills, and community skills	Observational measurement	Score ranges of 'general behavior' subscale, 'deviant behavior ' subscale are 0 - 126, and 0 - 21 respectively

Table 1. Outcome measures (*Continued*)

GIP	Verstraten & van Edkelen 1988	Consists of five subscales including apathetic behaviours, agitated behaviours, and disoriented behaviours	Observational measurement	Score ranging from 0 - 196
Cohen-Mansfiedl Agitated Inventory (Dutch version) (CMAI-D)	De Jonghe & Kat 1996	Consists of 29 items to evaluate thee types of agitation including aggressive behaviours, physically nonaggressive behaviours, and verbally agitated behaviours	Observationa measurement by caregivers on the frequency level of occurrence	Each item is rated on a 7-point scale. Range of 'aggressive behavior' subscale, 'physically nonaggressive behaviour' subscale, and 'verbally agitated behaviour' subscale are 0-60, 0-36, and 0-30 respectively
Cognitive Assessment Scale (CAS)	Pattie & Gilleard 1979	Part of CAPE to measure cognition	Performance rating	
Mini-Mental State Examination (MMSE)	Folstein et al., 1975	Consists of 11 items to measure general mental state including aspects of orientation, memory, calculation, attention, and comprehension	Performance rating.	Score ranging from 0-30
Behavioral and Mood Disturbance Scale (M+BMD)	Greene et al 1982)	Consists of three subscales to measure apathetic/withdrawn, and active/disturbed behaviours, and mood disturbance	Observational measurement by caregivers	Score ranging from 0-124.
Cornell Scale for Depression in Dementia (Dutch version) (CSDD-D)	Droes 1996	Consists of 15 items to measure depressive symptoms.	Observation measurement in terms of level of severity of depressive symptoms	Score ranging from 0 -30

WHAT'S NEW

Last assessed as up-to-date: 21 April 2008.

Date	Event	Description
22 April 2008	New search has been performed	The update search of March 2008 retrieved two studies for consideration; both were excluded as they did not meet the inclusion criteria for the review

HISTORY

Protocol first published: Issue 3, 2001

Review first published: Issue 4, 2002

Date	Event	Description
21 February 2007	New search has been performed	February 2007: minor update. A more vigorous review methodology was adopted. One of the reviews (Kragt 1997) included in the original review was excluded because of a relatively brief intervention programme that consisted of only three sessions Three new trials were identified for this review, but one was not available at the time of this review, and another one (Baker 2003) was considered an expanded study of a trial review (Baker 2001) of the original review. Hence, results of two trials were included for data analysis in this review. The conclusions have not changed
17 August 2004	New search has been performed	Minor update August 2004. In this update, three new references were identified. Two did not fulfil the criteria for RCTs (Cox 2004, Heyn 2003). The study of Van Diepen 2002 adopted a RCT design but its primary aim was to assess the feasibility and usefulness of the measurement instruments, and therefore, only preliminary results were available
24 June 2002	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

Dr. Jenny Chung's main contributions to this review include selecting trials for inclusion/exclusion, extracting and interpreting data for review, drafting and updating review versions. Dr. Chung is responsible for all correspondence as related to this review.

Dr. Claudia Lai contributes in selecting trials to be included for reivew, extracting and interpreting data, and assist in drafting the reivew.

Contact Editors: Mario Fioravanti, Lon Schneider.

DECLARATIONS OF INTEREST

None known.

SOURCES OF SUPPORT

Internal sources

- The Hong Kong Polytechnic University, Hong Kong.

External sources

- No sources of support supplied

INDEX TERMS

Medical Subject Headings (MeSH)

*Sensory Art Therapies; Complementary Therapies [methods]; Dementia [*therapy]; Randomized Controlled Trials as Topic

MeSH check words

Aged; Humans; Middle Aged