



# COOL FACTS

# HOT FEET

Photo: Caroline Littler

Dancing to health:  
a review of the evidence



How does dance...

Motivate people to increase and maintain their physical activity levels?

Contribute to better physical health?

Enhance mental health and wellbeing?

Support social inclusion?

Relieve the symptoms of specific medical conditions and aid recovery?

Read on to find out...

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## Foreword

People dance for fun, recreation, social reasons and increasingly for their health. There is something unique about dance in how it inspires and motivates.

Its unrivalled media profile these days, particularly on TV, makes people who don't dance more aware than ever of what they are missing.

Public health professionals are increasingly interested in using dance to promote health and wellbeing. For example, the dance campaign we instigated in the South West during 2010 reached over 20,000 people.

But the dance sector has faced challenges to convince the health sector that dance can offer genuine health benefits. Evidence has been difficult to obtain and academic studies are not always easy to interpret. Therefore, understanding of the health potential is lower than it could be.

This report is our contribution. We have critically reviewed all the evidence we could find about the health benefits of dance for children, adults, older people and those with specific medical conditions.

We very much hope you can use the contents of this report to encourage more dance opportunities for all those thousands of people who would benefit.



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# Contents

Introduction	5
Key Messages	7
Evidence Overview	8
1 Children and young people	8
2 Adults	8
3 Older people	9
4 People with specific health conditions	9
4.1 older people with neurotrauma	9
4.2 people with arthritis	10
4.3 people with cancer	10
4.4 people with chronic heart failure	10
4.5 people with dementia	10
4.6 people with depression	11
4.7 people with Parkinson's Disease	11
Evidence Source Summaries	12
1 Children and young people	12
2 Adults	18
3 Older people	19
4 People with specific health conditions	22
4.1 older people with neurotrauma	22
4.2 people with arthritis	23
4.3 people with cancer	24
4.4 people with chronic heart failure	25
4.5 people with dementia	25
4.6 people with depression	26
4.7 people with Parkinson's Disease	27
Appendices	
I Summary of key policy and advocacy publications	29
II References	31
III Additional bibliography	33

## Introduction

Dance involves the body, emotion and mind: it is both a physical activity and a means of expression and communication. Dance and health programmes form part of a growing field of arts work which delivers health and wellbeing outcomes for people. The range and value of such work has been recognised for some time and several key policy and advocacy publications have had a positive impact on how such work is developed and supported, through the qualitative material they present (see Appendix I). This review brings together a range of research that provides the quantitative evidence of the health and wellbeing benefits of dance.

### Who is this review for?

- policy makers, programme managers and practitioners working in public health
- policy makers, programme managers and practitioners in the dance and the wider arts sector

### Why is there a need for it?

While the examples and case studies in the policy and advocacy publications noted above vividly 'tell the story' about the health benefits of participation in dance, unlike some other arts practices, dance has not to date featured well within a robust research context. For instance, in Rosalia Staricoff's *Arts in health: a review of the medical literature* (2004) commissioned by Arts Council England, out of nearly 400 references given, only two relate to dance. Norma Daykin et al (2006) found no evidence of evaluated dance (or music) interventions within non-clinical settings in *The effects of participation in performing arts for health on young people: a systematic review of the published literature 1994-2004*: all the relevant projects identified focused on drama. It is also noticeable that none of the research and evidence detailed in the Arts Council England and Department of Health publication *A prospectus for arts and health* (2007) is dance based.

However, in the US there is a strong interest among academics to ensure arts in healthcare is recognised as an academic discipline and that a systematic approach to research that distinguishes particular practices, settings, participants and medical conditions is taken (Dileo and Bradt, 2009). Here in the UK, specific dance science and dance and health research projects are increasing in number.

For instance, the Centre for Exercise, Nutrition & Health Sciences at the University of Bristol is running a Bristol Girls Dance Project funded by the National Prevention Research Initiative. Academics at the University of Strathclyde are exploring the health benefits of Scottish Country Dancing. Researchers from the Leeds Primary Care Trust and the Institute of Health Studies at the University of Leeds have undertaken a literature review on dance work with children and young people, currently awaiting publication: 'The effects of recreational or non-elite dance interventions on the health & wellbeing of children and young people: A systematic review' (Burkhardt and Brennan, 2011). The Dance Science Department at Trinity Laban is undertaking a comprehensive review of previous research undertaken relating to the impact of dance on elderly populations. The University of Salford is establishing a National Arts and Public Health Library (NA&PHL), supported by the Royal Society of Public Health, which aims to enhance the profile of arts and public health ([www.artsandpublichealthlibrary.co.uk](http://www.artsandpublichealthlibrary.co.uk)). Policy makers and practitioners alike are also aware of the need for an evidence-based approach to dance and health. In the South West, Dance South West has established a Dance and Health Regional Lead post with support from the Department of Health South West. This has led the Department of Health to commission this review to identify quality research and evidence on dance delivering specific health and wellbeing outcomes in different population groups – and make a contribution to 'plugging the evidence gap'.

### What does this review cover?

This review is inclusive of age groups, dance styles, settings and medical conditions within the context of research into non-elite dance and dancers. It focuses on research papers and evaluation reports where a scientifically rigorous approach has been taken to collecting and analysing data. This includes, for example, the use of randomised controlled trials, validated physical activity or mental health measurement tools and standard statistical procedures. The review also includes examples of journal articles by practitioners where research methodologies may not be as robust, but the articulation and reflection on practice is set within a theoretical context.

We recognise that there is also a wealth of other materials in the form of programme descriptions, project evaluations, case studies and advocacy

documents, which are valuable in raising the awareness of this work. While these are not within the remit of this review, we recognise their role in demonstrating dance and health project models and good practice, along with new publications such as the Foundation for Community Dance's *Dance, health and wellbeing: a pathway to practice handbook* (Miranda Tufnell, 2011). We include a selection of such publications in the **Additional bibliography**, where other research articles are also listed as, given resource constraints, our review is not exhaustive of all the relevant material available.

### Overall, the review aims to:

- provide a sense of the breadth of dance and health research across a range of population groups
- highlight key evidence findings
- help increase understanding of the particular and significant health impacts of dance.

### How can it be used?

- to support the case for dance in delivering health and wellbeing outcomes
- to inform practice
- to encourage further robust research and evaluation.

### Format of the review

The review offers different levels of information, from **Evidence overviews** to **Evidence source summaries**, with **References** that can be followed up where the research detail is required.

**Key messages** are presented, followed by an **Evidence overview** for the following groups:

- children and young people
- adults
- older people
- people with specific health conditions
  - older people with neurotrauma
  - people with arthritis
  - people with cancer
  - people with chronic heart failure
  - people with dementia
  - people with depression
  - people with Parkinson's Disease.

Each piece of evidence is coded to the reference sources, which are summarised in the **Evidence source summaries**, which are presented under the following headings:

- author, title, date and publisher
- type of publication
- participants
- dance style
- intervention
- methodologies and measures
- physical health outcomes
- mental health and wellbeing outcomes
- social outcomes
- evidence quality.

These are arranged alphabetically by author within the population groups noted above, according to the focus of the research/projects.

The **Appendices** comprise:

- a **Summary of key policy and advocacy publications**
- a full alphabetical list of **References** cited in the review
- an **Additional bibliography** which includes project evaluations, seminar and conference reports, qualitative accounts, literature reviews and other research of interest not cited in the main text

## Key Messages

Dance can:

- increase people's motivation to participate in physical activity and maintain that participation, because they see dance as fun, expressive, non-competitive and sociable
- increase people's physical fitness, strength and abilities, often more effectively than other forms of exercise
- assist recovery from illness, reduce pain and the perception of pain
- build self-esteem and elevate mood
- support people to develop positive social interactions and encourage them to engage in new social, leisure and physical activities
- improve quality of life.

## Evidence Overview

### 1. Children and young people

Dance interventions have been shown to:

- develop social competence in pre-school children eg
  - participants made significant gains in their social skills and significant reductions in their behaviour problems (Lobo and Winsler, 2006) (see CYP 1.6 in Evidence Source Summaries)
- develop positive behaviour and family interactions eg
  - dance activities encouraged parent child interactions, parent understanding of child behaviour improved and communication behaviours changed outside of the dance intervention setting (Ells et al, 2009) (CYP 1.2)
- develop social relationships eg
  - girls in a dance group felt significantly more related than the girls doing PE (Hampshire Dance and Laban, 2007) (CYP 1.4)
- motivate young people to participate, and maintain that participation, in physical activity eg
  - girls demonstrated a positive attitude to dance at an age when they often drop out of participation in physical activity (NKLA and Laban, 2009) (CYP 1.8)
  - girls in the intervention group increased their after-school physical activity (Robinson et al, 2003) (CYP 1.9)
  - girls in the intervention group reduced their sedentary screen-based activities (TV, videos and video games) by nearly 5 hours per week (Robinson et al, 2003) (CYP 1.9)
- increase self esteem eg
  - there was a significant improvement in Physical Self-Worth for the intervention group but not the control group (Daley and Buchanan, 1997) (CYP 1.1)
  - there was a statistically significant increase in self-esteem in a girls dance group pre- to post-test ((NKLA and Laban, 2009) (CYP 1.8)
  - there was a statistically significant decrease in weight concerns and a trend towards decreased body dissatisfaction in the intervention group (Robinson et al, 2003) (CYP 1.9)
- increase lung capacity eg
  - FEC (Forced Expiratory Volume) per one second increased by 11% and FVC (Functional Vital Capacity) increased by 5% in participating girls (Hampshire Dance and Laban, 2007) (CYP 1.4)
- increase aerobic capacity eg
  - girls in a dance group increased their aerobic capacity by 10.5% (NKLA and Laban, 2009) (CYP 1.8)
  - girls in a dance group increased their aerobic capacity by just under 16% (Hampshire Dance and Laban, 2010) (CYP 1.4)
- increase upper body strength eg
  - girls in a dance group increased their overall hand grip strength by 6% (NKLA and Laban, 2009) (CYP 1.8)
- increase flexibility eg
  - girls in a dance group increased their hamstring flexibility by just under 8% (Hampshire Dance and Laban, 2010) (CYP 1.4)
- increase bone mineral content (BMC) eg
  - non-elite female ballet dancers increased their BMC by 0.6 to 1.3% greater than controls, with 4% greater BMC at the femoral neck (Matthews et al, 2007) (CYP 1.7)
- decrease Body Mass Index (BMI) eg
  - intervention group girls decreased BMI by - 0.8 compared with an 0.3 increase in a control group (Flores, 1995) (CYP 1.3)
- decrease heart rate eg
  - intervention group girls decreased heart rate by -10.9 beats per minute compared with -0.2 beats per minute in a control group (Flores, 1995) (CYP 1.3)

### 2. Adults

Dance interventions have been shown to:

- improve balance and bodily awareness eg
  - the highest level of 'strong agreement' on a five point scale of perceived benefits was 'Dancing improves my balance and bodily awareness' (71% of participants) (Murcia et al, 2010) (see A 2.1 in Evidence Source Summaries)
- have a meaningful influence on mood eg
  - the second highest level of 'strong agreement' was 'Improves mood' (64% of participants) with 'Feel highly pleased', 'Look forward to', 'Improve my mind' and 'Improve mental well-being' all scored by 60% of participants; 'emotional benefits' from dancing were identified by just under 56% of participants, while 'physical benefits' were identified by 34% (Murcia et al, 2010) (A 2.1)
- reduce pain eg
  - 61% of 131 participants reporting chronic pain reported that their complaints were lessened after dancing in comparison to days when they did not

- dance (Murcia et al, 2010) (A 2.1)
- aid stress reduction eg
  - items loading highest on a five point scale related to relaxation, enjoyment and mood management (Kreutz, 2008) (A 2.2)
- provide self-esteem and social benefits eg
  - just under 30% of participants referred to 'social benefits' such as a feeling of togetherness and getting to know more people and just over 24% identified self-esteem benefits (Murcia et al, 2010) (A 2.1)
- contribute to quality of life eg
  - in terms of Positive and Negative Affect (PANAS), 70% of participants reported feeling more active, enthusiastic, inspired, excited, alert and attentive, as well as less irritable, distressed, nervous and upset, after dancing (Murcia et al, 2010) (A 2.1)

### 3. Older people

Dance interventions have been shown to:

- improve balance and gait, decrease frequency of falls eg
  - older social dancers had better balance, walked faster and had a longer mean stride with a more stable pattern during walking with reduced stance time, longer swing time and shorter double support time than older non-dancers (Verghese, 2006) (see OP 3.4 in Evidence Source Summaries)
  - participants in the Turkish folk dance intervention group showed statistically significant improvements in balance in the Berg Balance Scale (BBS) score over the control group (Eygiör et al, 2007) (OP 3.2)
  - participants in a senior jazz dance class that exposed the visual, vestibular and somatosensory systems (ie multiple types of sensation from the body) to new challenges was effective in improving functional balance in elderly women aged 50 or older (Wallman et al, 2009) (OP 3.5)
  - participants in the Turkish folk dance intervention group showed a statistically significant difference in the frequency of falls before and after the exercise while no significant difference was found in the control group (Eygiör et al, 2007) (OP 3.2)
- improve general physical fitness and ability eg
  - there were statistically significant improvements in favour of the intervention group in six minute walk, chair rise and stair climbing, and physical functioning (Eygiör et al, 2007) (OP 3.2)

- enable people to achieve more eg
  - older people transcended their physical, intellectual and emotional limitations (Lima and Vieira, 2007) (OP 3.3)
- support mental health and wellbeing eg
  - social dancing was identified as supporting efforts to mitigate psychological deterioration (Cooper and Thomas, 2002) (OP 3.1)
  - there was a statistically significant improvement for intervention group in mental health scores (Eygiör et al, 2007) (OP 3.2)
  - the dance music helped participants overcome introversion and self-consciousness (Lima and Vieira, 2007) (OP 3.3)
- provide a sense of social and cultural identity and connections eg
  - participants engaging in ballroom dancing experienced a re-affirmation of social identity and re-connection to Brazilian culture, with social interaction and formation of friendships integrated with the physical benefits from the exercise (Lima and Vieira, 2007) (OP 3.3)
  - participants experienced a strong sense of sociability and 'communitas' or community spirit (Cooper and Thomas, 2002) (OP 3.1)
- enhance quality of life eg
  - participants in the Turkish folk dance intervention group showed statistically significant improvements in some Quality of Life measures over the control group (Eygiör et al, 2007) (OP 3.2)

### 4. People with specific health conditions

#### 4.1 Older people with neurotrauma

Dance interventions have been shown to:

- encourage and enable physical activity eg
  - some initially non-ambulatory patients began walking during the sessions, and for longer and longer periods (Berrol, 2007) (see OPN 4.4.1 in Evidence Source Summaries)
- improve dynamic balance, eg
  - participants' walking forwards, backwards and sideways improved over that of the control group (Berrol, 2007) (see OPN 4.4.1)
- elevate mood, eg
  - 85.5% of participants said the dance/movement therapy 'made them happy' (Berrol, 2007) (OPN 4.1.1)

- improve cognitive performance, eg
  - patients were able to remember and repeat increasingly complex movement sequences and engage well in other memory related activities (Berrol, 2007) (OPN 4.1.1)
- develop social interaction, eg
  - older people experienced group attachment and increased participation in other social activities (Berrol, 2007) (OPN 4.1.1)

#### 4.2 People with arthritis

Dance interventions have been shown to:

- provide a significant improvement in cardio-respiratory fitness eg
  - participants with arthritis demonstrated a mean improvement of 13% in aerobic power (with the highest value being 40%) and decreased the mean time to walk 50 feet from 6.37 to 5.81 seconds (Noreau et al, 1995) (see PA 4.2.1 in Evidence Source Summaries)
- develop muscle strength eg
  - hamstring muscle strength improved significantly (Noreau et al, 1995) (PA 4.2.1)
- improve general physical fitness and abilities eg
  - walking speed increased by 13% ((Noreau et al, 1997) (PA 4.2.2)
- reduce pain and the perception of pain eg
  - participants decreased their painful joint count and their Arthritic Impact Measurement Scale (AIMS) score (for perception of pain) changed from 4.37 to 3.47 (Noreau et al, 1995); there was an absence of pain worsening in the group as a whole (22 baseline, 21 post-test) with six subjects having a decreased AIMS score (from 5% to 37%) (Noreau et al, 1997) (PA 4.2.2)
- enhance mental health and well being eg
  - Profile of Mood State (POMS) showed significant decreases for depression (14.2 to 8.8), anger and tension symptoms (Noreau et al, 1997) (PA 4.2.2)
- support social inclusion eg
  - participants reported an increased motivation toward exercise because of being with peers and social activities on an AIMS subscale showed significant improvement (4.9 to 4.3) (Noreau et al, 1997) (PA 4.2.2)

#### 4.3 People with cancer

Dance interventions have been shown to:

- improve quality of life significantly eg
  - breast cancer patients increased their Quality of Life Functional Assessment of Cancer Therapy (FACT- B) score by 14.7 points during a 13 week dance programme (against 'no change' in a wait group) and maintained this for a further 13 weeks (Sandel et al, 2005) (see PC 4.3.1 in Evidence Source Summaries)
- assist physical recovery eg
  - breast cancer patients increased their ROM (range of motion) in their involved shoulder by 15% during a 13 week dance programme and at 26 weeks had increased this by 26% (Sandel et al, 2005) (PC 4.3.1)

#### 4.4 People with chronic heart failure

Dance interventions have been shown to:

- support maintained participation in physical activity eg
  - adherence to the dance protocol was higher than that in the exercise training (Belardinelli, 2009) (see PCHF 4.5.1 in Evidence Source Summaries)
- improve functional capacity eg
  - peak Vo<sub>2</sub> increased by 19% compared with 16% in an exercise group, although the duration of the dance intervention was 43% shorter (Belardinelli, 2009) (PCHF 4.5.1)
- enhance mental health and wellbeing eg
  - there was a more marked improvement in participants in the emotional dimension measures of the Minnesota Living with Heart Failure Questionnaire (MHLFQ) than in participants in the exercise group (Belardinelli, 2009) (PCHF 4.5.1)

#### 4.5 People with dementia

Dance interventions have been shown to:

- support identity eg
  - participants' personal and cultural identity was supported and they had the opportunity to keep up skills previously learnt (Palo-Bengtsson and Ekman, 1999) (see PD 4.6.2 in Evidence Source Summaries)

- promote physical health eg
  - physical activity increased and participants preserved motor functions with protection from being confronted with diminished capabilities and negative feelings (Palo-Bengtsson and Ekman, 1999) (PD 4.6.2)
- provide a significant social context and connections, eg
  - 'interacting with others, verbally or non-verbally', 'being passively socially involved' and 'participating in a game' represented 35.2% of activities observed (Howarth and Ketteringham, 1995) (PD 4.6.1)
  - stimulating communication with others, supporting the ability to share experience and to make, maintain and end meaningful contact with others (Palo-Bengtsson and Ekman, 1999) (PD 4.6.2)

#### 4.6 People with depression

Dance interventions have been shown to:

- reduce symptoms of depression eg
  - there was a significant positive improvement in Becks Depression Inventory (BDI) scores at each assessment stage (Birks, 2007) (see PDN 4.7.1 in Evidence Source Summaries)
- be well received as enjoyable activity that can reduce depression, even when not designed to specifically address this eg
  - ballroom dancing produced a moderate effect on depression (Haboush et al, 2006) (PDN 4.7.2)

#### 4.7 People with Parkinson's Disease

Dance interventions have been shown to:

- improve balance and enhance falls prevention eg
  - Argentine Tango classes provided more benefits in this respect than exercise classes (Hackney et al, 2007) (see PPD 4.8.1 in Evidence Source Summaries)
- provide variety, contact and motivation for involvement eg
  - the tango class provided variety, touch and greater interest in continuing to attend classes (seven people compared to none from the exercise class) (Hackney et al, 2007) (see PPD 4.8.1)

## Evidence Source Summaries

### 1. Children and young people (CYP)

#### CYP 1.1

Daley, A. J. and Buchanan, J. (1999) 'Aerobic Dance and Physical Self-Perceptions in Female Adolescents: Some implications for Physical Education'. Research Quarterly for Exercise and Sport Vol 70 No 2 pp 196-200	
Type of publication	Journal article
Participants	113 females aged 15-16 from a single sex school in the South East
Dance style	Aerobic dance
Intervention	After school aerobics class once a week for five weeks, in addition to one hour of PE in school time, as undertaken by the control group
Methodologies and measures	- Physical Self-Perception Profile (PSPP) (Fox and Corbin, 1989) - Physical Activity Questionnaire (PPAQ) (Daley & Parfitt, 1996) - Assessments prior to and on completion of programme
Physical health outcomes	Significant improvement in strength competence over time for the intervention group, but not for the PE-only group
Mental health and wellbeing outcomes	Significant improvement in Physical Self-Worth and body attractiveness for the intervention group but not the PE-only group. The intervention group had the higher pre-and post-score for body attractiveness
Social outcomes	n/a
Evidence quality	Medium: use of validated measurement tools; standard statistical procedures; but non-randomised controlled trial.

#### CYP 1.2

Ells, L., Ogilvie, J, Kurtz, R., Temply, J., Moore, H., McLure, S., McNaughton, R. and Shucksmith, J. (2009) North East Dance & Health Project: an evaluation of a creative dance programme in preschool children: findings from a 10 week pilot controlled trial examining physical activity and mental well being outcomes. Stockton on Tees: North East Public Health Authority	
Type of publication	Evaluation/research report
Participants	Intervention group initially of 11 pre-school children aged 2-6 with two control groups (active play and non-directed play) of initially 10 participants matched for socio-economic status, age and ethnicity
Dance style	Creative dance
Intervention	10 week programme of 60 minutes creative dance intervention delivered by a specialist professional dance company in children's centres
Methodologies and measures	- Wellbeing outcomes assessed through completion of a modified Strengths and Difficulties Questionnaire (SDQ) completed by parent/carer at weeks 0 and 10 - Anthropometric measures (height, weight and waist circumference) recorded at weeks 0 and 10 - Physical activity objectively measured using the Actigraph accelerometer - Focus groups and one-to-one interviews (using two researchers) with parents and centre staff re intervention group
Physical health outcomes	- Anthropometrics: no significant changes pre- and post-intervention - Physical activity outcomes: not possible to show a significant difference between the intervention and control groups - Physical activity behaviours changed outside of intervention setting
Mental health and wellbeing outcomes	Improved wellbeing and happiness through enjoyment of the dance session
Social outcomes	- Parent child interaction encouraged - Parent understanding of child behaviour improved - Communication behaviours changed outside of intervention setting

Evidence quality	Low to medium: use of validated measurement tools; very small sample size; lack of statistical significance analysis; short timescale for the intervention; and high attrition rates.
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**CYP 1.3**

Flores, R. (1995) 'Dance for Health: Improving Fitness in African American and Hispanic Adolescents'. Public Health Report Vol 110 No 2 pp189-193	
Type of publication	Journal article
Participants	43 boys and girls aged 10-13 from four seventh grade physical education classes at a school in Palo Alto with a control group of 38 students
Dance style	Aerobic dance including hip hop (ie creative and culturally appropriate-sensitive)
Intervention	Three dance sessions per week (replacing a regular physical activity programme) plus two health education sessions per week for 12 weeks
Methodologies and measures	<ul style="list-style-type: none"> <li>- Timed mile run</li> <li>- Resting heart rate</li> <li>- Body mass index (BMI) adjusted for sexual maturation and age</li> <li>- Questionnaire to measure attitude towards physical activity</li> <li>- Data collected pre- and post intervention</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- Significant decrease in BMI (- 0.8) in girls in intervention group compared with control group, which increased by 0.3</li> <li>- Significant decrease in heart rate (beats per minute) (- 10.9) for girls in intervention group compared with control group (- 0.2)</li> <li>- Favourable decrease in timed mile run (minutes) (- 0.9) for girls in intervention group compared with control group (- 0.5)</li> <li>- Favourable changes in attitudes about physical activity on a scale of 6 to 1 ranging from unhappy to happy (- 0.2) compared with the control group (- 0.1)</li> <li>- The results for boys also favoured the intervention group, but the differences were not significantly different between intervention and control groups:</li> <li>- BMI was -.20 in the intervention group compared with 0.06 in the control group</li> <li>- Heart rate decreased by 0.7 beats per minute in the intervention group compared with 3.6 in the control group</li> <li>- The time of the timed mile run was reduced by 1.1 minutes in the intervention group compared with 0.6 minutes in the control group</li> <li>- There was a worse attitude to physical activity in the intervention group compared with the control group</li> </ul>
Mental health and wellbeing outcomes	n/a
Social outcomes	n/a
Evidence quality	Medium: use of validated measurement tools; standard statistical procedures; randomised controlled trial; but intervention group small and they also experienced health education support in addition to the dance intervention.

**CYP 1.4**

Hampshire Dance and Laban (2007) <i>NRG Youth Dance and Health Project 2005-06 Evaluation Report</i>	
Quin, E., Redding, E. and Frazer, L. (2007). <i>Dance Science Research Report: The effects of an eight-week creative dance programme on the physiological and psychological status of 11-14 year old adolescents: An experimental study</i> . Hampshire Dance and Laban	
Type of publication	Evaluation report and Research report
Participants	348 school children aged 11-14 from nine schools across seven local authority areas in the SHIPS region (Southampton, Hampshire, Isle of Wight and Portsmouth) resulting in 226 sets of complete data
Dance style	Creative dance
Intervention	Ten week programme of hour-long sessions for groups of no more than 30

Methodologies and measures	<ul style="list-style-type: none"> <li>- Lung Spirometer to assess lung capacity (Micro Medical, UK)</li> <li>- Sit-and-Reach (SR) test for flexibility (Cranlea, UK)</li> <li>- Shuttle Run test for aerobic capacity/cardiovascular endurance (Sports Coach UK &amp; University of Loughborough)</li> <li>- Standardised Self Esteem Scale (SES)</li> <li>- Intrinsic Motivation Inventory (IMI)</li> <li>- Data collected at beginning and end of the programme</li> </ul>
Physical health outcomes	<p>Overall increased lung capacity, flexibility and aerobic capacity:</p> <ul style="list-style-type: none"> <li>• Males and females both increased their lung capacity, with the females showing statistically significant improvements: FEV (Forced Expiratory Volume per one second) increased by 0.7 litres of air (11% increase) and FVC (Functional Vital Capacity) increased by 0.12 litres of air (5% increase)</li> <li>• Females statistically improved their flexibility more than the males, with the hamstring test showing an increase in over 2cm (12% increase)</li> <li>• There was a statistically significant increase in females' aerobic capacity with an increase in average shuttle runs of 7 (44%)</li> </ul>
Mental health and wellbeing outcomes	<p>Overall enhanced psychological wellbeing with changes being positive but not always statistically significant:</p> <ul style="list-style-type: none"> <li>• positive improvements in self-esteem in both males and females but not statistically significant</li> <li>• females experienced significantly higher levels of interest-enjoyment and effort-importance than the males (6 and 4 points respectively)</li> <li>• 67% of the group reported positively to open questions about attitudes towards the dance programme, with females responding more positively than the males.</li> </ul>
Social outcomes	n/a
Evidence quality	Medium: use of validated measurement tools, although SES is a global measurement of self-esteem, not dance or activity specific, and was administered by the dance artists rather than the primary researcher; no control group.

### CYP 1.5

Hampshire Dance and Laban (2010) <i>NRG2 Youth Dance &amp; Health</i>	
Type of publication	Evaluation report
Participants	158 school children aged 11-13 from three schools in Local Neighbourhood Improvement Areas in Sussex with a control group of 79 undertaking PE
Dance style	Experimental creative dance
Intervention	One 50 minute session of creative dance per week over a 10 week period
Methodologies and measures	<ul style="list-style-type: none"> <li>- 20m Shuttle Run Test for aerobic capacity</li> <li>- Sit and Reach Test (Micro Medical, UK) to assess hamstring flexibility</li> <li>- Handgrip Test (Takei, Japan) for upper body strength</li> <li>- Intrinsic Motivation Inventory (McAuley et al, 1989)</li> <li>- Need for Relatedness Scale (Richer &amp; Vallerand, 1996)</li> <li>- Autonomy measure (Sheldon et al, 2001)</li> <li>- Children's Attitude to Physical Activity questionnaire (CAPTA) (Shulz et al, 1985)</li> <li>- Laban devised questionnaire</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- Girls doing the creative dance classes and PE classes significantly improved their aerobic capacity after the 10-week period (evidenced by an increase in average shuttle runs of 2) and no significant differences were found in the boy participants</li> <li>- They also significantly increased their hamstring flexibility, with no difference in the boys' control group and the boys in the experimental groups significantly decreasing their flexibility</li> <li>- There were no statistically significant differences before and after the intervention on upper body strength in either group, but a trend suggesting a more positive impact on upper body strength in creative dance as opposed to PE. Boys doing the intervention did not significantly change their upper body strength whereas boys in the control group decreased their strength over the period</li> </ul>

	Overall, there was just under a 16% positive change in aerobic capacity in the experimental girls group, just under an 8% change in flexibility and less than 2% change in upper body strength
Mental health and wellbeing outcomes	Basic needs satisfaction scores showed that the girls in the creative dance group felt significantly more competent than the girls in the PE group. They felt significantly more competent than the boys doing dance but there was no difference between the two control groups
Social outcomes	The girls in the dance group felt significantly more related than the girls doing PE. There was no significance difference between the boys in either group or between the girls and boys in the control group
Evidence quality	Medium to high: validated measurement tools; standard statistical procedures; control group used but still undertaking physical activity.

### CYP 1.6

Lobo, Y.B. and Winsler, A. (2006) 'The effects of a Creative Dance and Movement Program on the Social Competence of Head Start Preschoolers'. <i>Social Development Vol 15 No 3</i>	
Type of publication	Journal article
Participants	19 low-income preschool children aged 3-5 with a control group of 21
Dance style	Creative dance/movement
Intervention	Twice a week, eight week long dance programme
Methodologies and measures	Social Competence Behavior Evaluation: Pre-school Edition (SCBE) (LaFreniere and Dumas, 1995) – completed by parent and teacher
Physical health outcomes	n/a
Mental health and wellbeing outcomes	n/a
Social outcomes	<ul style="list-style-type: none"> <li>- Children in the intervention group made significantly greater gains from pre to post test on all three outcomes of social competence, internalising behaviour and externalising behaviour compared with the control group children</li> <li>- Informal observations showed an increase in self-confidence, self-image and self-esteem with children getting to know each other better, take greater social risks and be more creative</li> </ul>
Evidence quality	High: randomised controlled trial; use of validated measurement tools; multiple and independent raters blind to children's group contexts

### CYP 1.7

Matthews, B.L., Bennell, K.L., McKay, H.A., Khan, K.M., Baxter-Jones, A.D. G., Mirwald, R.L. and Wark, J.D. (2007). 'Dancing for bone health: a 3-year longitudinal study of bone mineral accrual across puberty in female non-elite dancers and controls'. <i>Osteoporos Int Vol 17 pp 1043-1054</i>	
Type of publication	Journal article
Participants	82 non-elite ballet dancers age 8-11 years at baseline from classical ballet schools in Melbourne with 61 controls age 8-11 years at baseline from Melbourne primary schools and recruited through advertising
Dance style	Ballet
Intervention	n/a – research related to dancers' existing/ongoing classes
Methodologies and measures	<ul style="list-style-type: none"> <li>- Annual assessment of BMC (bone mineral content) at the total body (TB) including upper and lower limb regions. Biannual assessment of BMC at the proximal femur and lumbar spine (LS) using dual x-ray absorptiometry (DXA). TB lean mass and fat mass derived from DXA TB scans. Anthropometry, exercise levels and calcium intake measures biannually. Maturational age determined by age at peak height velocity (PHV)</li> <li>- Physical activity measured by questionnaire</li> </ul>

Physical health outcomes	<ul style="list-style-type: none"> <li>- Given adjustments for growth and maturation, dancers had significantly greater BMC at the TB, lower limbs, femoral neck (FN) and LS than controls</li> <li>- Apart from the FN region, these differences became apparent at 1 year post-PHV, or the peripubertal years, and by 2 years post-PHV the differences represented a cumulative difference in dancers of 0.6 – 1.3% greater BMC than controls. Dancers had 4% greater BMC than controls at the FN in prepuberty and maintained this through the pubertal years</li> </ul>
Mental health and wellbeing outcomes	n/a
Social outcomes	n/a
Evidence quality	High: longitudinal randomised controlled trial with good sample size; use of validated measurement tools; standard statistical procedures. Control group active so magnitude of differences between groups possibly reduced.

### CYP 1.8

NKLA and Laban (2009) <i>Dance4yourlife</i>	
Type of publication	Evaluation report
Participants	55 female Year 10 students from five schools in North Kent
Dance style	Dynamic dance class with an emphasis on strength building
Intervention	Six or 10-week programme of 1 x 60 minute or 1 x 90 minute dance class per week
Methodologies and measures	<ul style="list-style-type: none"> <li>- Assessments carried out on first and last days of the programme</li> <li>- Sit and Reach Box (Micro Medical, UK) for hamstring flexibility</li> <li>- Portable hand grip dynamometer (Takei, Japan) to measure dynamic upper body strength</li> <li>- 20 m Shuttle Run to measure aerobic capacity</li> <li>- Children's Effort Rating Test (CERT)</li> <li>- Rosenberg Self Esteem Scale</li> <li>- Intrinsic Motivation Inventory</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- No statistically significant change in flexibility pre- to post-test (2% increase)</li> <li>- Statistically significant increase in overall hand grip strength, indicating increased overall upper body strength pre- to post-test (6% increase)</li> <li>- Statistically significant increase in aerobic capacity (10.5%) with a decrease in perceived effort pre- to post-test</li> <li>- Intrinsic motivation was higher than average at both pre- and post-test stages indicating students were already intrinsically motivated to dance as an activity and this level was not affected by the dance classes</li> </ul>
Mental health and wellbeing outcomes	Statistically significant increase in global self esteem pre- to post-test
Social outcomes	n/a
Evidence quality	Medium: use of validated measurement tools and standard statistical procedures; no control group.

## CYP 1.9

Robinson, T. N., Killen, J. D., Kraemer, H. C., Wilson, D.M., Matheson, D. M., Haskell, W. L., Pruitt, L. A., Powell, T. M., Owens, A. S., Thompson, N. S., Flint-Moore, N.M., Davis, G.J., Emig, K.A., Brown, R.T., Rochon, J., Green, S. and Varady, A. (2003) 'Dance and Reducing Television Viewing to Prevent Weight Gain in African-American Girls: The Stanford GEMS Pilot Study'. <i>Ethnicity &amp; Disease</i> Vol 13 Winter)	
Type of publication	Journal article
Participants	28 African-American or Black girls aged 8–10 identified at higher risk of subsequent obesity with an Active control group of 33 girls receiving information-based health education programme (lectures and newsletters)
Dance style	Traditional African dance, Hip-Hop and Step
Intervention	After school dance classes five days a week at three community centres (Oakland and East Palo Alto) for 12 weeks and a five lesson intervention delivered in participants' homes designed to reduce TV, video and video game use
Methodologies and measures	<ul style="list-style-type: none"> <li>- Assessments performed at baseline just before randomisation and again at 12 weeks at participants' homes.</li> <li>- Measures included: Body Mass Index (BMI)</li> <li>- Waist circumference measured with non-elastic tape measure to standard methods</li> <li>- Sexual Maturation measured by self-assessment using drawings and descriptions</li> <li>- Blood samples collected after 8 hour fast and standard conditions and tests applied</li> <li>- Reported media use behaviours assessed with validated instruments and girls self-reported on TV, video and video games use and eating while watching TV</li> <li>- Minnesota Nutrition Data System for Research (NDS-R)</li> <li>- Computer Sciences and Applications (CSA) accelerometer</li> <li>- GEMS activity questionnaire re physical activity</li> <li>- Overconcerns with Weight and Shape subscale of the McKnight Risk Factor Survey</li> <li>- Rosenberg self-esteem scales (RSE)</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- Trends towards lower BMI (adjusted difference of <math>-.32 \text{ kg/m}^2</math>) giving an effect size of <math>.38</math> and waist circumference (adjusted difference of <math>-.63 \text{ cm}</math>) with an effect size of <math>.25</math></li> <li>- Increased after-school physical activity (adjusted difference <math>55.1 \text{ counts/minute}</math>)</li> </ul>
Mental health and wellbeing outcomes	Statistically significant decrease in weight concerns and a trend towards decreased body dissatisfaction
Social outcomes	Reduced TV, video and video game use (adjusted difference – 4.96 hours per week); fewer dinners eaten watching TV (40%); a trend towards improved school grades
Evidence quality	Medium to high: use of validated measurement tools and standard statistical procedures; sample size had 80% power to detect a magnitude difference between groups commonly considered a large effect; only 45% power to detect a medium effect; and only 12% power to detect a small effect.
Note	<p><i>Phase 2 design and baseline characteristics are described in:</i></p> <p>Robinson, T. N., Kraemer, H. C., Matheson, D. M., Obarzanek, E., Wilson, D.M. , Haskell, W. L. , Pruitt, L. A., Thompson, N. S., Farish Haydel, K., Fujimoto, M., Varady, A., McCarthy, S., Watanabe, C. and Killen, J. D. (2008) 'Stanford GEMS Phase 2 Obesity Prevention Trial for Low-Income African-American Girls: Design and Sample Baseline Characteristics'. <i>National Institute of Health Contemporary Clin Trials</i> Vol 29 Issue 1 pp 56-69</p>

## 2. Adults (A)

### A 2.1

Murcia, C., Kreutz, G., Clift, S. and Bongard, S. (2010) 'Shall we dance? An exploration of the perceived benefits of dancing on well-being'. <i>Arts &amp; Health</i> Vol 2 No 2 pp 149-163	
Type of publication	Journal Article
Participants	475 non-professional dancers aged 18 to 74
Dance style	Various (with folk, standard and disco the three most popular)
Intervention	n/a – research related to participants' existing/ongoing dancing
Methodologies and measures	<ul style="list-style-type: none"> <li>- Online survey including 29-item scale evaluating the perceived benefits of dancing (based on Clift and Hancox, 2001 who assessed benefits of singing in members of a choral society); perceived physical benefits; self-reported chronic pain; and question re well being</li> <li>- Content analysis of self-reported benefits, which identified six dimensions (emotional, physical, self-esteem, social benefits, coping strategy and spiritual benefit) in relation to dancing influencing people's wellbeing</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- The highest level of 'strong agreement' on a five point scale of perceived benefits was 'Dancing improves my balance and bodily awareness' with 71% participants responding</li> <li>- For the 'Physical benefits' dimension, 55 participants referred to 'Helps to keep in shape' and 46 to 'Increases bodily control/awareness'</li> <li>- 61% of the 131 participants reporting chronic pain reported that their complaints were lessened after dancing in comparison to days when they did not dance, with 18% not finding any difference and 19% reporting their complaints were stronger</li> </ul>
Mental health and wellbeing outcomes	<ul style="list-style-type: none"> <li>- The second highest level of 'strong agreement' on the scale was 'Improves mood' (64%) with 'Feel highly pleased', 'Look forward to', 'Improve my mind' and 'Improve mental well-being' all scoring at 60% of participants</li> <li>- For the 'Emotional benefits', 138 referred to 'Makes me feel happy/elated/pleased/proud/inspired/euphoric/in trance' and 42 to 'Helps me to feel released/relaxed/refresh/calm/more balanced'</li> <li>- For 'Self-esteem' 43 referred to 'Improves self-confidence/self-consciousness/security' and 25 to 'Helps to be in harmony with oneself'</li> <li>- For 'Coping Strategy' 41 referred to 'Helps to relax/rest the mind' and 37 to 'Helps me to forget worries/problems/negative thoughts'</li> <li>- In terms of Positive and Negative Affect (PANAS), 70% of participants reported feeling more active, enthusiastic, inspired, excited, alert and attentive; as well as less irritable, distressed, nervous and upset</li> </ul>
Social outcomes	For 'Social benefits' 62 referred to 'Gives me a great feeling of togetherness/affiliation' and 44 to 'An opportunity to meet my friends/foster personal contacts/know more people'
Evidence quality	Medium: standard statistical procedures; adapted survey; no control group

## A 2.2

Kreutz, G. (2008) 'Does partnered dance promote health? The case of tango Argentino'. <i>The Journal of The Royal Society for the Promotion of Health</i> Vol 128 no 2 pp79-84	
Type of publication	Journal Article
Participants	110 recreational dancers of tango Argentino in Nijmegen (Netherlands) and Frankfurt am Main (Germany)
Dance style	Tango Argentino
Intervention	n/a – research related to participants' existing/ongoing dancing
Methodologies and measures	Researcher's self-developed questionnaire, in part based on interviews and observations as participant observer, addressing educational, musical and socio-economic background, motivation for and investment in dancing tango and other leisure activities
Physical health outcomes	n/a
Mental health and wellbeing outcomes	The most important motivation factor for participation was 'stress reduction', with items loading highest on a five point scale related to relaxation, enjoyment and mood management.
Social outcomes	The second and third most important factors reflect 'social fitness' and 'social feelings'
Evidence quality	Medium: self-developed questionnaire but results subject to standard statistical procedures.

## 3. Older people (OP)

### OP 3.1

Cooper, L. and Thomas, H. (2002) 'Growing old gracefully: social dance in the third age'. <i>Ageing and Society</i> Vol 22 pp 689-708	
Type of publication	Journal paper
Participants	Older people over 60
Dance style	Social dance (modern sequence)
Intervention	n/a – research related to dancers' existing/ongoing participation
Methodologies and measures	Exploratory ethnographic longitudinal study including interviews, participant observation and filming of dance
Physical health outcomes	Supported efforts to mitigate physical deterioration
Mental health and wellbeing outcomes	<ul style="list-style-type: none"> <li>- Supported efforts to mitigate psychological deterioration</li> <li>- Provided sense of continuity and a vehicle for changes needed because of ageing</li> <li>- Provided strong sense of enjoyment</li> </ul>
Social outcomes	<ul style="list-style-type: none"> <li>- Provided strong sense of sociability and 'communitas' or community spirit</li> <li>- Enabled participants to demonstrate their 'cultural capital'</li> </ul>
Evidence quality	Medium to low: qualitative narrative study without specific articulated or referenced research method.

## OP 3.2

Eyigor, S., Karaplot, H., Durmaz, B. Ibisoglu, U. And Cakir, S. (2007) 'A randomized controlled trial of Turkish folklore dance on the physical performance, balance, depression and quality of life in older women'. <i>Archives of Gerontology and Geriatrics</i> Vol 48 pp 84-88	
Type of publication	Journal article
Participants	40 healthy adult older females over the age of 65, with 19 in intervention group and 18 in control group completing.
Dance style	Turkish folk dance
Intervention	Eight week programme of one hour sessions
Methodologies and measures	<ul style="list-style-type: none"> <li>- 20m walk</li> <li>- Six minute walk</li> <li>- Stair climbing</li> <li>- Chair rise</li> <li>- SF-36 questionnaire</li> <li>- Geriatric Depression Scale (GDS)</li> <li>- Berg Balance Scale (BBS)</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- Statistically significant difference before and after the exercise in the intervention group for frequency of falls</li> <li>- Statistically significant improvements in favour of the intervention group in six minute walk, chair rise and stair climbing, BBS score and physical functioning sub-scale of SF-36</li> </ul>
Mental health and wellbeing outcomes	Statistically significant improvement for intervention group in the mental health sub-scale of SF-36 and no significant improvement noted in the GDS score.
Social outcomes	n/a
Evidence quality	Medium to high: randomised controlled trial but small study group; validated measurement tools; standard statistical procedures; lack of longer term follow up re falls frequency

## OP 3.3

Lima, M. M. S. and Vieira, A. P. (2007) 'Ballroom Dance as Therapy for the Elderly in Brazil'. <i>American Journal of Dance Therapy</i> Vol 29 No 2 December	
Type of publication	Journal article
Participants	60 elderly Brazilians (54 women and 6 men)
Dance style	Ballroom including swing, bolero, fox-trot, waltz, salsa, tango etc
Intervention	Ballroom dance classes undertaken over a year at a Third Age Club
Methodologies and measures	<ul style="list-style-type: none"> <li>- Participant observation</li> <li>- Questionnaire composed of 30 subjective questions</li> <li>- Analysis through phenomenological hermeneutics</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- Augmented skills such as flexibility, balance and co-ordination</li> <li>- Improved posture and control of movements</li> </ul>
Mental health and wellbeing outcomes	<ul style="list-style-type: none"> <li>- 'Some expressed their sensation of being transported to a world of happiness and having only good thoughts during the classes, which allowed them to forget their problems, resulting in a feeling of peace and youthfulness'</li> <li>- Music helped them overcome introversion and self-consciousness</li> <li>- Development of self-esteem, capacity for leadership and creativity</li> </ul>
Social outcomes	<ul style="list-style-type: none"> <li>- Re-affirmation of social identity and re-connection to Brazilian culture</li> <li>- Social interaction and formation of friendships integrated with physical benefits from exercise</li> <li>- Culture of inclusion</li> </ul>
Evidence quality	Medium: inquiry outcome not submitted to statistical treatment, but analysed under the qualitative approach of phenomenological hermeneutics, which is descriptive (questioning the nature of a specific phenomenon through the descriptive study of lived experience) and interpretative (studying questionnaire answers to identify the meanings embodied in them). Article does not give breakdown of questionnaire results.

## OP 3.4

Verghese, J. (2006) 'Cognitive and Mobility Profile of Older Social Dancers'. <i>Journal of the American Geriatrics Society</i> Vol 54 No 8	
Type of publication	Journal article
Participants	24 older social dancers (OSDs) (average age 80) living in Bronx County with 84 older non-dancers (ONDs) in control group (average age 80.8)
Dance style	Social dancing such as ballroom, line dancing, swing and square dancing
Intervention	None – own patterns of dancing
Methodologies and measures	<p><i>Measures included:</i></p> <ul style="list-style-type: none"> <li>- Validated leisure activity scale</li> <li>- Blessed Information Memory Concentration test</li> <li>- Free and Cued Selective Reminding test</li> <li>- Weschler Adult Intelligence Scale – revised</li> <li>- Geriatric Depression Scale</li> <li>- Computerised gait mat</li> <li>- Physical Performance Battery (PPB)</li> </ul>
Physical health outcomes	<p>OSDs had better balance, walked faster and had a longer mean stride with a more stable pattern during walking with reduced stance time, longer swing time and shorter double support time than ONDs eg:</p> <ul style="list-style-type: none"> <li>• Balance score 3.7 compared with 3.3</li> <li>• Unipedal stance 12.2 seconds compared to 7.2 seconds</li> <li>• Velocity 100.5 cm/seconds compared with 87.2 cm/seconds</li> <li>• Stride length 117.8 cm compared with 103.4 cm</li> </ul> <p>There were no differences in the frequency of participation in other cognitive and physical leisure activities, chronic illnesses, or falls between the OSDs and ONDs</p>
Mental health and wellbeing outcomes	n/a
Social outcomes	n/a
Evidence quality	Medium: validated measurement tools; standard statistical procedures; cross sectional design did not permit inferences on causality; small sample size, variable amount of dancing in the OSD group.

## OP 3.5

Wallmann, H., Gillis, C., Alpert, P. and Miller, S. (2009) 'The Effect of a Senior Jazz Dance Class on Static Balance in Healthy Women Over 50 Years of Age: A Pilot Study'. <i>Biological Research for Nursing</i> Vol 10 No 3	
Type of publication	Journal article
Participants	12 healthy women aged 54-88 years
Dance style	Jazz dance
Intervention	15 week jazz dance class, 90 minutes per class
Methodologies and measures	<ul style="list-style-type: none"> <li>- Sensory Organisation Trust (SOT) protocol administered using the NeuroCom Smart Balance Master System (Balance Master) (NeuroCom, Clackamas, OR)</li> <li>- Participants were assessed for static balance three times over the course (Weeks 1, 7 and 15)</li> </ul>
Physical health outcomes	<p>There was a statistically significant improvement in four of the six conditions in the test, suggesting that:</p> <ul style="list-style-type: none"> <li>• participants' posture control systems became more effective in using information from the three sensory systems to maintain balance over the course of the class</li> <li>• participants were able to use vision to help balance better in the second half of the dance class</li> <li>• participants were able to use vestibular and somatosensory input to help improve balance during the early part of the programme</li> </ul>

	The composite equilibrium score revealed significant improvements for each of the time intervals between pre-, mid- and post-testing suggesting that overall improvement in static balance occurred throughout the programme
Mental health and wellbeing outcomes	n/a
Social outcomes	n/a
Evidence quality	Medium: validated measurement tools; standard statistical procedures; but no control group and small sample size.

#### 4. People with specific health conditions

##### 4.1 Older people with non-progressive neurotrauma (OPN)

###### OPN 4.1.1

Berrol, C.F., Ooi, W.L. and Katz, S.S. (1997) 'Dance/Movement Therapy with Older Adults Who Have Sustained a Neurological Insult: A Demonstration Project'. <i>American Journal of Dance Therapy</i> Vol 19 No 2 Fall/Winter	
Type of publication	Journal article
Participants	70 people who had experienced non-progressive neurotrauma with an average age of 74 from diverse ethnic and cultural backgrounds. Attrition accounted for loss of 10. 64 people in control group with attrition accounting for loss of 17
Dance style	Dance/movement therapy
Intervention	Ten treatment groups of six to eight members each received two 45 minute dance/movement therapy sessions per week for a period of five months, in seven senior day care/day health centres and a nursing home in five different geographic regions in the US.
Methodologies and measures	<ul style="list-style-type: none"> <li>- Functional Assessment of Movement and Perception (FAMP) and National Institute on Aging Frailty in Injuries Cooperative Studies Intervention Techniques Battery (NIA FICSIT) for physical function</li> <li>- Cognitive Performance Scale (CPS)</li> <li>- Two social interaction scales: one with eight items from the Multi-dimensional Observation Scale for Elderly Subjects (MOSES) and one adapted from Section F of the Minimal Data Set (MDS)</li> <li>- Two mood scales: the Geriatric Depression Scale (GDS) and selected portions of an MDS-based scale measuring mood and affect</li> <li>- Patient satisfaction questionnaire</li> <li>- Video tapes</li> </ul>
Physical health outcomes	Statistically significant positive changes for the treatment group over the control group were found for three indices of dynamic balance: forward, backward and sideward walk - and the timed walking item. These quantitative outcomes were supported by therapists' qualitative observations in that standing time increased over the five months and some initially non-ambulatory patients began walking during the sessions, and for longer and longer periods
Mental health and wellbeing outcomes	<ul style="list-style-type: none"> <li>- There was a statistically significant improvement in cognitive performance over the control group, including recapitulation of increasingly complex movement sequences and other memory related activities</li> <li>- There was no statistically significant improvement in mood revealed on the GDS scale, but patients were not depressed pre-test so this was an expected outcome</li> <li>- Subjects' subjective perceptions of their mood and observations by therapists reflected elevated mood over time, with 85.5% reporting that the DMT made them happy, 0% reporting it made them sad, and 6% reporting neither happy nor sad</li> </ul>
Social outcomes	Statistically significant gains were evidenced over the control group in terms of frequency of involvement in social activities and strengthening group attachments.
Evidence quality	High to medium: validated measurement tools; standard statistical procedures; randomisation not possible on all sites.

## 4.2 People with arthritis (PA)

### PA 4.2.1

Noreau, L., Martineau, H., Roy, L. and Belzile, M. (1995) 'Effects of a modified dance-based exercise on cardiorespiratory fitness, psychological state and health status of persons with rheumatoid arthritis'. <i>American Journal of Physical Medicine &amp; Rehabilitation</i> Vol 74 No 1 January/February	
Type of publication	Journal article
Participants	19 people with rheumatoid arthritis, mean age 49.3 and control group of 10 people with rheumatoid arthritis, mean age 49.4
Dance style	Dance-based exercise
Intervention	Twice weekly dance-based exercise sessions over a 12 week programme
Methodologies and measures	<ul style="list-style-type: none"> <li>- Health status, use of medication, joint pain and swelling, physical fitness, activities of daily living and psychological state assessed at baseline, after the programme and six months later</li> <li>- Arthritis Impact Measurement Scale (AIMS)</li> <li>- Profile of Mood States (POMS)</li> <li>- Simple index of physical activity</li> <li>- Clinical examination by physician to assess use of medication, articular pain and swelling for specific joints</li> <li>- Isokinetic dynamometer</li> <li>- Electrocardiogram</li> <li>- Blood pressure readings</li> <li>- Analyzer for expired air</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- Significant improvement in cardio-respiratory fitness in the dance-based exercise group and no significant modifications in the control group</li> <li>- 13% improvement in aerobic power, with the highest values reaching 40%</li> <li>- Significant decrease in time to walk 50 feet from 6.37 to 5.81 seconds</li> <li>- Muscle strength significantly changed in hamstrings</li> <li>- No significant changes in joint status but the count of painful joints tended to decrease in the exercise group</li> <li>- Significant decrease in the perception of pain (AIMs score changed from 4.37 to 3.47). The subjects with the highest painful joint counts at baseline showed the greatest improvement after exercise training.</li> <li>- Positive changes in fatigue</li> <li>- Weight-bearing activity with limited ground impacts did not provoke short-term adverse effects on joint status</li> </ul>
Mental health and wellbeing outcomes	Positive changes in depression, anxiety and tension.
Social outcomes	n/a
Evidence quality	Medium to high: validated measurement tools; standard statistical procedures; use of control group; but no randomisation.

### PA 4.2.2

Noreau, L., Moffet, H., Drolet, M. and Parent, E. (1997) 'Dance-based exercise Program in Rheumatoid Arthritis'. <i>American Journal of Physical Medicine &amp; Rehabilitation</i> Vol 76 No 2 March/April	
Type of publication	Journal article
Participants	10 women with a mean age of 54 with rheumatoid arthritis (RA) Functional Class III
Dance style	Aerobic dancing
Intervention	Twice weekly dance exercise eight week programme
Methodologies and measures	<ul style="list-style-type: none"> <li>- Ritchie Index to evaluate pain intensity</li> <li>- Swelling Index</li> <li>- Graded exercise testing on a treadmill</li> <li>- Metabolic analyzer (Quinton, Q-PLex) to measure Oxygen and CO2</li> <li>- Arthritic Impact Measurement Scale (AIMS)</li> </ul>

	<ul style="list-style-type: none"> <li>- Arthritic Helplessness Index, Profile of Mood State (POMS)</li> <li>- Walking test</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- No statistically significant changes in Vo2 in the group as a whole but a rise of between 10 and 20% in four participants after training</li> <li>- Seven participants reached an exercise intensity higher than 90% of predicted maximum heart rate</li> <li>- Absence of pain worsening (22 baseline, 21 post-test) with six subjects having a decreased score (5 to 37%) (Ritchie score)</li> <li>- Mobility score (AIMS) tended towards a significant improvement ie decrease in symptoms (3.7 to 2.3)</li> <li>- Walking speed increased significantly (13%)</li> </ul>
Mental health and wellbeing outcomes	Profile of Mood State (POMS) showed significant decreases for depression (14.2 to 8.8), anger and tension symptoms
Social outcomes	<ul style="list-style-type: none"> <li>- Social activities on AIMS subscale showed significant improvement (4.9 to 4.3)</li> <li>- Participants reported an increased motivation toward exercise because of being with peers</li> </ul>
Evidence quality	Medium: use of validated measurement tools; standard statistical procedures; small sample and no control group.

### 4.3 People with cancer (PC)

#### PC 4.3.1

Sandel, S.L., Judge, J.O., Landry, N., Faira, L., Ouellette, R. and Majczak, M. (2005) 'Dance and Movement Program Improves Quality-of-Life Measures in Breast Cancer Survivors'. <i>Cancer Nursing</i> Vol 28 No 4	
Type of publication	Journal article
Participants	35 women aged 38 to 82 years (mean age of 61), breast cancer survivors who had had surgery within the previous five years, from two cancer centres in Connecticut, US with a wait list control and cross over at 13 weeks
Dance style	The Lebed Method with music including Celtic, American, Jazz, Afro-Cuban, Reggae, Middle-Eastern and Cajun
Intervention	12 week programme, with two sessions per week for an initial six weeks and one session per week for an additional six weeks, totalling 18 sessions
Methodologies and measures	<ul style="list-style-type: none"> <li>- Outcomes measures obtained at baseline, 13 and 26 weeks</li> <li>Functional Assessment of Cancer Therapy – Breast questionnaire (FACT-B, version 3) developed from FACT-G, a disease specific quality of life measure used in cancer research, which includes physical, social, functional and emotional domains</li> <li>- SF-36 to measure general health-related quality of life</li> <li>- Body Image Scale</li> <li>- Shoulder ROM (range of motion) and arm circumference measured</li> </ul>
Physical health outcomes	<ul style="list-style-type: none"> <li>- 14.7 increase in FACT-B score for intervention group against no change for wait list, who then increased 7.4 points when involved in the dance/movement programme while the intervention group was stable.</li> <li>- At 13 weeks, ROM in the involved shoulder increased 15° in the intervention group and 8° in the wait group and at 26 weeks, 26° and 20° respectively.</li> <li>- No differences in individual measurements or summed arm circumferences at 13 or 26 weeks in either group in either involved or uninvolved arms.</li> </ul>
Mental health and wellbeing outcomes	<ul style="list-style-type: none"> <li>- Body image improved in both groups at 13 weeks with a significant time effect, but no time X group effects. Improvement continued at 26 weeks, but there was no training order effect. The intervention group decreased from 19.4 to 14.5 points and the wait group from 19.7 to 15.5</li> <li>- The mental health summary scale (SF-36) increased slightly in the intervention group at 13 weeks (3.5 points) but not significantly different from the wait list group. The score improved further in weeks 13 to 26, while the overall time effect was significantly better and there was only a trend for training order effect.</li> </ul>
Social outcomes	n/a

Evidence quality	High to medium: randomised controlled trial; validated measurement tools; standard statistical procedures; but there was a range of delay from surgery to participation and the group size was small.
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#### 4.4 People with chronic heart failure (PCHF)

##### PCHF 4.4.1

Belardinelli, R., Lacalaprice, F., Ventrella, C., Volpe, L. and Faccenda, E. (2008) 'Waltz Dancing in Patients With Chronic Heart Failure'. <i>Circulation Heart Failure</i> Vol 1 pp 107-114	
Type of publication	Journal article
Participants	44 people with an average age of 60 in dance intervention; exercise group (supervised cycling, treadmill) of 44 people (average age 58); and control group of 42 (average age 59)
Dance style	Waltz
Intervention	Dance sessions three times a week for eight weeks at the hospital gym
Methodologies and measures	<ul style="list-style-type: none"> <li>- Measurements taken on study entry and at eight weeks</li> <li>- Cardiopulmonary exercise testing on a cycle ergometer until volitional fatigue</li> <li>- 2D-echo with Doppler</li> <li>- Endothelium-dependent dilation of the brachial artery</li> <li>- Minnesota Living with Heart Failure Questionnaire (MHFLQ)</li> </ul>
Physical health outcomes	<p>Improved functional capacity and endothelial dysfunction</p> <p><i>For instance:</i></p> <ul style="list-style-type: none"> <li>- Peak Vo<sub>2</sub> increased by 19% compared with 16% in exercise group</li> <li>- Anaerobic threshold increased by 21% compared with 20% in exercise group</li> <li>- The average heart rate during dance was similar to that recorded during traditional aerobic exercise but the duration of the waltz protocol was 43% shorter</li> <li>- Endothelium-dependent relaxation improved from 2.2 to 5.0 compared with 2.6 to 5.2 in exercise group</li> </ul>
Mental health and wellbeing outcomes	More marked improvement in emotional dimension measures of MHFLQ than the exercise group.
Social outcomes	Adherence to the dance protocol was higher than that in the exercise training
Evidence quality	Medium: patients randomised to groups; use of validated measurement tools but study not blinded to investigators or patients.

#### 4.5 People with dementia (PD)

##### PD 4.5.1

Howarth, R. and Ketteringham, R. (1995) 'Let's face the music – and dance'. <i>Journal of Dementia Care</i> Sep/Oct	
Type of publication	Journal article
Participants	30-40 per session with 65% of these people with dementia
Dance style	Tea dance
Intervention	Weekly tea dances of two hours duration
Methodologies and measures	<ul style="list-style-type: none"> <li>- Four clients with severe cognitive impairment were observed using Dementia Care Mapping (DCM) (Kitwood and Bredin, 1992)</li> <li>- Four clients with mild memory impairment or functional mental health problems were interviewed informally using a shortened and adapted version of the Geriatric Depression Scale (GDS) (Yesavage et al, 1983)</li> </ul>
Physical health outcomes	(see below)

Mental health and wellbeing outcomes	- 'Engaging positively in an expressive activity' with 'walking, wandering, moving in a wheelchair' together represented 45.6% of activities involved. - All four respondents to the adapted GDS evoked fewer 'depressive' responses during the tea dance
Social outcomes	'Interacting with others, verbally or non-verbally', 'being passively socially involved' and 'participating in a game' represented 35.2% of activities observed.
Evidence quality	Low: validated measurement tools; but small sample group and no control group.

#### PD 4.5.2

Palo-Bengtsson, L. Winblad, B. and Ekman, S.-L. (1998) 'Social dancing: a way to support intellectual, emotional and motor functions in persons with dementia'. <i>Journal of Psychiatric and Mental Health Nursing</i> 1998 Vol 5 pp 545-554	
Type of publication	Journal article
Participants	Six people with dementia living in/attending day care in a nursing home in Sweden
Dance style	Social dancing (to popular Swedish dance music)
Intervention	Four dance sessions
Methodologies and measures	Deductive qualitative content analysis of videotaped dance sessions using a guide developed from the variables in the Gottfries, Brane and Steen rating scale (GBS scale) which measures motor, intellectual and emotional functions and symptoms characteristic of dementia syndromes
Physical health outcomes	- Increased physical activity - Supported preservation of motor functions with protection from being confronted with diminished capabilities and negative feelings
Mental health and wellbeing outcomes	- Supported personal and cultural identity - Supported spontaneous activity - Provided opportunity to keep up skills previously learnt - Assisted with non-verbal expression - Motivation to participate resulted in autonomy and taking initiative - Supported preservation of intellectual and emotional functions with protection from being confronted with diminished capabilities and negative feelings
Social outcomes	- Stimulated communication with others - Supported ability to share experiences - Supported ability to make, maintain and end meaningful contact with others
Evidence quality	Medium: validated measurement tools; small sample size and no control group.

### 4.6 People with depression (PDN)

#### PDN 4.6.1

Birks, M. (2007) 'The benefits of salsa Classes in treatment of depression'. <i>Nursing Times</i> Vol 103 no 10 p 32	
Type of publication	Journal paper
Participants	24 adults with depression, average age 37.5 years
Dance style	Salsa
Intervention	Eight one-hour salsa classes on a weekly basis over a nine-week period
Methodologies and measures	Becks Depression Inventory (BDI) (Beck, 1961; revised 'Beck II' version 1996) used pre-intervention and at weeks 4 and 8
Physical health outcomes	n/a
Mental health and wellbeing outcomes	Significant positive improvement in BDI scores at each assessment stage for those still involved in the study
Social outcomes	
Evidence quality	Medium to low: validated measurement tools; high drop-out rate in small group due to timing of classes.

**PDN 4.6.2**

Haboush, A., Floyd, M., Caron, J., LaSota, M and Alvarez, K. (2006) 'Ballroom dance lessons for geriatric depression: An exploratory study'. <i>The Arts in Psychotherapy</i> Vol 33 pp 89-97	
Type of publication	Journal article
Participants	20 depressed community-dwelling older adults, average age 69, randomly assigned to an immediate or delayed treatment condition.
Dance style	Ballroom from a selection of six dances (foxtrot, waltz, rumba, swing, cha-cha and tango)
Intervention	One 45 minute private ballroom dance lesson each week for eight weeks
Methodologies and measures	<ul style="list-style-type: none"> <li>- Hamilton Rating Scale for Depression (HRSD) (Hamilton, 1967) (pre- and post-treatment evaluations and three month follow-up)</li> <li>- Geriatric Depression Scale (GDS) (Yesavage et al, 1983) (pre- and post-treatment evaluations and three month follow-up)</li> <li>- Symptom Checklist 90, Revised (SCL-90R) (Derogatis, 1983) (pre- and post-treatment evaluations and three month follow-up)</li> <li>- Hopelessness Scale (BHS) (Beck et al, 1974) (first pre-treatment evaluation)</li> <li>- Therapeutic Reactance Scale (TRS) (Dowd et al, 1991) (first pre-treatment evaluation)</li> <li>- Self-efficacy scale developed for the project (first pre-treatment evaluation)</li> <li>- Participant feedback questionnaire (post-treatment)</li> </ul>
Physical health outcomes	n/a
Mental health and wellbeing outcomes	Effect sizes .51 for HRSD (medium), .40 for GDS (medium) and .17 for SCL-90 (small).
Social outcomes	n/a
Evidence quality	Medium: validated measurement tools and standard statistical procedures but sample size too small to detect a statistically significant difference between the treatment conditions (ie immediate and delayed) and the intervention was short.

**4.7 People with Parkinson's Disease (PPD)****PDP 4.7.1**

Hackney, M. E., Kantorovich, S. and Earhart, G. M. (2007) 'A Study of the Effects of Argentine Tango as a form of Partnered Dance for those with Parkinson Disease and the Healthy Elderly'. <i>American Journal of Dance Therapy</i> Vol 29 No 2 December	
Type of publication	Journal article
Participants	19 people with Parkinson Disease (PD) plus 19 in control group without PD
Dance style	Partnered Argentine Tango
Intervention	20 hour-long tango or exercise classes completed over 13 weeks. Research project designed in the context of falls being a leading cause of injury deaths in older adults, with the major contributor of declines in gait, balance and cognitive function being more pronounced in those with PD
Methodologies and measures	<ul style="list-style-type: none"> <li>- Subjects assessed the week prior to intervention and after intervention</li> <li>- Activities-specific Balance Confidence (ABC) Scale (Powell and Myers, 1995)</li> <li>- Modified Falls Efficacy Scale (Hill et al, 1996)</li> <li>- 17-item Philadelphia Geriatric Center Morale Scale (Lawton, 1975)</li> <li>- Functional Reach (Duncan et al, 1990) and One Leg Stance Test (Vellas et al, 1997) for balance</li> <li>- Walking velocity assessed by tracking a reflective marker placed on the trunk using a motion capture system (Motion Analysis Corporation, Santa Rosa, CA)</li> </ul>
Physical health outcomes	<p>Only PD tango group improved on all measures of balance, falls and gait with other groups showing gains in some measures only</p> <p>Walking velocity: all groups showed small but not significant increases</p> <p>Balance/falls:</p>

	<p>a) PD tango group believed they had experienced more gains in balance than the PD exercise group (mean of 1.78 against 2.89 on a scale of 1-5, where 1 = strongly agree and 5 = strongly disagree). Control tango and exercise groups reversed this trend</p> <p>b) PD tango group showed some improvement in all four measures for One Leg Stance (increase in 0.4 seconds), Functional Reach (increase in 0.52 inches), Falls Efficacy, ACB while PD exercise group only showed improvements in Functional Reach and One Leg Stance, with other scores declining.</p>
Mental health and wellbeing outcomes	Mood enhanced
Social outcomes	People with PD in both the tango and exercise groups appreciated the camaraderie and socialisation engendered by the programme and liked the challenge of learning something new; however the tango class provided variety and touch and greater interest in continuing to attend classes (seven people compared to none from the exercise class)
Evidence quality	High: randomised controlled trial; use of validated measurement tools and standard statistical procedures.

## Appendices

### Appendix I

#### Summary of key policy and advocacy publications

The Department of Health's Report of the Review of Arts and Health Working Group (2007) set out the following key findings:

- arts and health are, and should be firmly recognised as being, integral to health, healthcare provision and healthcare environment, including supporting staff
- arts and health initiatives are delivering real and measurable benefits across a wide range of priority areas for health, and can enable the Department and NHS to contribute to key wider Government initiatives
- there is a wealth of good practice and a substantial evidence base
- the Department of Health has an important leadership role to play in creating an environment in which arts and health can prosper by promoting, developing and supporting arts and health
- the Department should make a clear statement on the value of arts and health, build partnerships and publish a Prospectus for arts in health in collaboration with other key contributors

The subsequent joint publication by the Department of Health and Arts Council England of A prospectus for arts and health (2007) celebrates and promotes the benefits of the arts in improving everyone's wellbeing, health and healthcare, and its role in supporting those who work in and with the NHS. It describes a wide range of initiatives and interventions, from participatory arts projects to arts and the physical environment.

Within this broad arts context, there has been some focus on dance. Arts Council England's Dance and health folder, published in 2006 with the Department of Health and Department of Culture, Media and Sport, included many examples of dance projects which:

- add to the range of physical activity that people can choose from, while also offering wider benefits to physical, emotional and mental wellbeing
- help develop creativity, self-esteem and confidence in young people as well as raising their physical activity levels and helping to tackle childhood obesity
- increase older people's activity levels and reduce the risk of fractures due to falls, also providing a social context that lessens isolation and helps build confidence and self-esteem
- can assist in awareness raising about health issues
- are successful in working with 'hard to reach' groups and individuals who are socially excluded

The benefits of dance are listed as:

#### *Physical and mental*

- healthier heart and lungs
- stronger muscles
- stronger bones and reduced risk of osteoporosis
- better co-ordination, agility and flexibility
- improved balance and enhanced spatial awareness
- increased physical confidence
- improved mental functioning
- increased energy expenditure that helps counteract unwanted weight gain

#### *Personal and social*

- improved general and psychological wellbeing
- greater self-confidence and self-esteem
- better social skills
- reduced social isolation and exclusion

#### *Educational*

- changed attitudes to health related issues such as teenage pregnancy, drug and alcohol abuse

Dance South West's publication Dance, health and wellbeing and case studies on its website ([www.dancesouthwest.org.uk](http://www.dancesouthwest.org.uk)) provide regional examples of projects delivering these positive health outcomes.

The Cross-Government Obesity Unit recognised the significance of dance's contribution to health in Healthy weight, healthy lives (2008):

**Dance has a huge potential for both young and old in contributing to healthier lifestyles. It is an art form which can truly engage people both mentally and physically and is particularly appealing to girls and those who are turned off by competitive sports.**

Another key Government report Be active, be healthy (2009) cites the 'unique contribution' dance can make to health and wellbeing, especially for people who favour dance as an activity and would otherwise not be active. It recommends an early focus for development work on encouraging older people to become more active, preserving their mobility and independence and preventing falls. Let's Dance with Change for Life (2009) provides an introduction to different dance styles, giving a choice of ways of getting fit.

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