

## 06: PHYSICAL ACTIVITY AND MENTAL HEALTH

### Depression

People with severe mental illness such as schizophrenia, depression or bipolar disorder have poorer physical health and a shorter life expectancy of at least 10 years compared to the general population.<sup>1,2</sup>

The commonest physical illness being cardiovascular disease and severe depression is associated with a 78% higher risk of developing cardiovascular disease and an 85% increased risk of cardiovascular-related death.<sup>3</sup> This excess cardiovascular mortality in schizophrenia and bipolar disorder is attributed in part to the increased modifiable coronary risk factors of:<sup>2,4</sup>

- unhealthy diets
- obesity
- smoking
- diabetes
- hypertension
- hyperlipidaemia

In most of these conditions lifestyle factors of physical activity plays an important role.

#### Prevention of depression with physical activity:

Studies examining whether physical activity might be protective against the risk of depression later in life have shown promising positive effects.<sup>5</sup>

- Evidence appears effective from childhood (9-15yrs) and lasting up to twenty years later.<sup>6</sup>
- The majority of this protective effect was at low levels of activity and observed regardless of intensity.
- It has now been suggested that up to 12% future cases of depression could be prevented by just 1 hour of physical activity per week.<sup>7</sup>

#### Treatment of depression with physical activity:

There is some good evidence that regular moderate intensity physical activity is effective in the acute treatment of mild to moderate depression and in reducing depression in adult non-clinical populations.<sup>8-11</sup> It also can help reduce the risk of relapse.<sup>9</sup>

Studies suggest that activity may alleviate depressive symptoms in the general population and also that depressive symptoms may be a barrier to activity, i.e. the relationship is bidirectional.<sup>12</sup> As for the most effective form of activity, moderate intensity exercise is effective but low intensity exercise appears to have no effect.<sup>13</sup> Recent meta-analysis of the adult population, suggested that moderate intensity physical activity interventions, aerobic activity, and if supervised by exercise professionals, can have a greater effect on major depressive disorders.<sup>14,15</sup> In children and young adults (up to age 20) differing exercise intensities fail to show any significant effect.<sup>16</sup> However, within this age the scientific evidence is still limited to form firm conclusions.<sup>16</sup>

Physical activity matched to an individual's preferred intensity has also been shown to improve mental health outcomes and exercise adherence rates.<sup>17</sup> When preferred intensity exercise was combined with motivational support it improved the reduction of depressive symptoms, quality of life and exercise adherence rates.<sup>18</sup>

Advice on physical activity should be given in conjunction with antidepressant medication and or psychotherapy treatments.<sup>19</sup>

**NICE guideline CG90** on Depression in adults: The treatment and management of depression in adults recommends:<sup>19</sup>

For people with persistent sub threshold depressive symptoms or mild to moderate depression, one choice is to offer referral for a structured group physical activity programme which should:

- Be delivered in groups with support from a competent practitioner
- Consist typically of three sessions per week of moderate duration (45 minutes to 1 hour) over 10 to 14 weeks (average 12 weeks)

### Anxiety

Many studies have evaluated the effect of physical activity on anxiety and some link physical activity to a consistent reduction of anxiety symptoms.<sup>10,20,21</sup> This is best seen in state anxiety with less evidence in trait states.<sup>20,21</sup> But the research on children and young adults remains limited<sup>16</sup> so physical activities may be more effective as an adjunctive treatment for anxiety disorders and appears less effective when directly compared with antidepressant drug treatment.<sup>22</sup>

### Schizophrenia

Physical activity can play an important part in the treatment of schizophrenia. Physical activity has been shown to significantly reduce negative symptoms of mental state and improve the control of positive symptoms.<sup>23,24</sup>

The physical health of people with severe mental illness such as schizophrenia, depression and bipolar disorder is often poor with a high risk of premature death and a shorter life expectancy of at least 10 years.<sup>1,2</sup> This excess cardiovascular mortality in schizophrenia and bipolar disorder is attributed in part to the increased modifiable coronary risk factors of:<sup>2,4</sup>

- unhealthy diets
- obesity
- smoking
- diabetes
- hypertension
- hyperlipidaemia

In most of these conditions lifestyle factors of physical activity plays an important role.

A small number of studies on people with schizophrenia, have so far shown a positive effect of physical activity on physical health, cardiometabolic factors, quality of life, positive and negative symptoms.<sup>1,2,25</sup> There is also now, some evidence that physical activity can improve cognitive functioning among people with schizophrenia, particularly with higher doses of intervention.<sup>25,26</sup> Increasing physical activity should be advocated to all people with psychosis or schizophrenia.<sup>27</sup>



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**NICE guideline CG 178** on Psychosis and Schizophrenia in adults: treatment and management recommend:<sup>28</sup>

- Before starting antipsychotic medication: an assessment of nutritional status, diet and level of physical activity
- People with psychosis or schizophrenia, especially those taking antipsychotics, should be offered a combined healthy eating and physical activity programme by their mental healthcare provider

### Sleep and psychological wellbeing

Physical activity has been shown to improve the quality of sleep,<sup>29,30</sup> whilst many studies have shown improved wellbeing with physical activity training.<sup>31</sup> Improved psychological wellbeing is also the most common comment made on self-reported feedback questionnaires.<sup>20</sup>

#### The Well-being feelings of Exercise

<b>Relaxed</b>	<b>Satisfied</b>	<b>Clear Minded</b>
<b>Positive</b>	<b>Calm</b>	<b>Fitter</b>
<b>Worthwhile</b>	<b>Alive</b>	<b>Invigorated</b>
<b>Good</b>	<b>Healthy</b>	

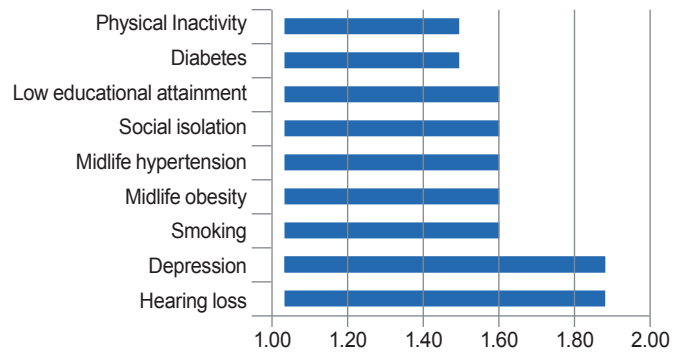
### Dementia

Dementia is a term used to describe a group of symptoms including memory loss, confusion, mood changes and difficulty with day to day tasks. It encompasses several forms with Alzheimer’s disease being the commonest and vascular dementia the second, followed by dementia with Lewy bodies.

The risk of dementia rises with age, with 1 in 14 people over 65 affected.<sup>32</sup> Globally the World Health Organisation has estimated there were 47 million people worldwide with dementia in 2015 and this figure is predicted to rise to 131.5 million by 2050.<sup>33</sup>

Given steady increases in life expectancy, dementia is now a huge public health burden and there is therefore an urgent need to identify modifiable risk factors that prevent or delay its onset. In vascular dementia, the risk is thought to increase amongst those with a family history, hypertension, high cholesterol, smoking and diabetes, with all of these vascular factors being potentially open to modification by physical activity.<sup>34</sup> Across all forms of dementia, it has been recently felt that 35% of dementia may be caused by nine potentially modifiable risk factors, one of which being physical inactivity (see diagram).<sup>35</sup>

**Relative risk for Alzheimer’s disease**<sup>35</sup>



**Prevention of dementia with physical activity:** There are several meta-analyses of observational studies suggesting evidence that people who follow recommended levels of physical activity have a reduction in risk of cognitive decline in the order of 18-30%.<sup>36-42</sup> Higher levels of physical activity are thought to be associated with better cognitive function and a 20% lower risk of cognitive impairment in the highest quartile of activity.<sup>42-45</sup>

Ideally, random controlled trials (RCT’s) would determine whether implementing an increase in physical activity would lead to an improvement in cognitive decline. A recent meta-analysis<sup>46</sup> of RCT’s of exercise in over 50 year olds has shown physical activity interventions improved cognitive function significantly, regardless of cognitive status. Whilst another meta-analysis reported no overall evidence that exercise improves cognition in healthy older adults.<sup>47</sup>

In addition, a recent long term study of 10,000 people followed over 28 years<sup>48</sup> coupled with other recent studies<sup>47, 49, 50, 51</sup> has challenged the previous thinking by finding no overall protective effect of physical activity.

The 2017 Lancet Commission on Dementia prevention, intervention and care<sup>35</sup> suggests that “*the potential mechanisms for physical exercise to improve cognition or prevent dementia are indirect effects on other modifiable risk factors, such as obesity, insulin resistance, hypertension, hypercholesterolaemia and general cardiovascular fitness, and via direct neurological effects such as increased neurogenesis, cerebral blood flow and BDNF concentrations.*”<sup>52-54</sup>

In conclusion, it is presently thought that physical activity is beneficial for brain function and may delay a decline in cognitive function. “In spite of this link there is not yet sufficient scientific evidence that physical activity can reduce the risk of brain disease that causes dementia (e.g. Alzheimer’s disease).”<sup>55</sup>



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### Treatment of established dementia with physical activity:

The results from random controlled exercise interventions to improve cognitive and functional outcomes for this population are also mixed, but there is evidence that exercise has no adverse effects and can lead to:<sup>56-61</sup>

- Enhanced mobility
- An improved ability to perform daily functional activities
- A reduction of the burden on family members
- A possible improvement in some elements of cognitive functioning

At present, the recommendation stands that the elderly with dementia engage in physical activity for their cardiovascular and cerebrovascular health, for the reduction in the incidence of diabetes and obesity and for protection against frailty.

Exercise as a fall prevention measure amongst the healthy elderly is well established, but recent meta-analyses also suggest that physical activity has a positive effect on the prevention of falls in those with cognitive impairment<sup>62,63</sup> and Parkinson's disease.<sup>63</sup>

**NICE guideline NG97<sup>64</sup>** on Dementia focuses the guidance on managing the risk of falling for people with dementia (in community and inpatient settings) by using NICE guidance on falls in older people (see next section of this resource). When using this guidance:

- Take account of the additional support people living with dementia may need to participate effectively
- Be aware that multifactorial falls interventions may not be suitable for a person living with severe dementia

### Key message:

Exercise is an important part of any treatment plan for a patient with mental health problems. It can increase their quality of life and lead to fewer hospital admissions.

### Consider:

1. Auditing your mental health patients to see if they have been offered any physical activity advice.
2. Advising on diagnosis of the importance of this lifestyle approach for their own well-being.

### Benefits to health professionals:

Reduced admissions, drug costs, appointments and visits.

### Signpost patients to:

[The Royal College of Psychiatrists](#) has information for health professionals and patients. Or the [Alzheimer's Society](#) for dementia advice and support.

*Extracted from the Wales HEIW CPD module on physical activity [Motivate2Move](#). Now part of the RCGP Clinical Priority on physical activity and lifestyle. Review Dec 2020*

## REFERENCES

- 1 Martinsen EW, Taube J. Ch 44 Schizophrenia. Swedish National Institute of Public Health. Physical Activity in the prevention and treatment of disease. 2010. (cited 2019 Jul 03) Available from: <http://www.fyss.se/wp-content/uploads/2018/01/44.-Schizophrenia.pdf>
- 2 De Hert M, Dekker JM, Wood D, et al. Cardiovascular disease and diabetes in people with severe mental illness position statement from the European Psychiatric Association (EPA), supported by the European Association for the Study of Diabetes (EASD) and the European Society of Cardiology (ESC). *European Psychiatry*. 2009 Sep 30;24(6):412-24.
- 3 Correll CU, Solmi M, Veronese N, et al. Prevalence, incidence and mortality from cardiovascular disease in patients with pooled and specific severe mental illness: a large-scale meta-analysis of 3,211,768 patients and 113,383,368 controls. *World Psychiatry*. 2017 Jun 1;16(2):163-80.
- 4 Compton MT, Daumit GL, Druss BG. Cigarette smoking and overweight/obesity among individuals with serious mental illnesses: a preventive perspective. *Harvard Review of Psychiatry*. 2006 Jan 1;14(4):212-22.
- 5 Mammen G, Faulkner G. Physical activity and the prevention of depression: a systematic review of prospective studies. *American Journal of Preventive Medicine*. 2013 Nov 30;45(5):649-57.
- 6 McKercher C, Sanderson K, Schmidt MD, et al. Physical activity patterns and risk of depression in young adulthood: a 20-year cohort study since childhood. *Social Psychiatry and Psychiatric Epidemiology*. 2014 Nov 1;49(11):1823-34.
- 7 Harvey SB, Øverland S, Hatch SL, et al. Exercise and the Prevention of Depression: Results of the HUNT Cohort Study. *American Journal of Psychiatry*. 2017 Oct 3;appi-pp.
- 8 Cooney GM, Dwan K, Greig CA, et al. Exercise for depression. *Cochrane Database of Systematic Reviews*. 2013, Issue 9. Art. No.: CD004366. DOI: 10.1002/14651858.CD004366.pub6.
- 9 Kjellman B, Martinsen EW, Taube J, Andersson E. Ch 24 Depression. Swedish National Institute of Public Health. *Physical Activity in the prevention and treatment of disease*. 2010. (cited 2019 Jul 03) Available from: <http://www.fyss.se/wp-content/uploads/2018/01/24.-Depression.pdf>
- 10 Rebar AL, Stanton R, Geard D, et al. A meta-meta-analysis of the effect of physical activity on depression and anxiety in non-clinical adult populations. *Health Psychology Review*. 2015 Aug 7;9(3):366-78.
- 11 Schuch FB, Deslandes AC, Stubbs B, et al. Neurobiological effects of exercise on major depressive disorder: a systematic review. *Neuroscience & Biobehavioral Reviews*. 2016 Feb 29;61:1-11.
- 12 Pereira SM, Geoffroy MC, Power C. Depressive symptoms and physical activity during 3 decades in adult life: bidirectional associations in a prospective cohort study. *JAMA Psychiatry*. 2014 Dec 1;71(12):1373-80.
- 13 Dunn AL, Trivedi MH, Kampert JB, et al. Exercise treatment for depression: efficacy and dose response. *American Journal of Preventive Medicine*. 2005 Jan 31;28(1):1-8.
- 14 Stanton R, Reaburn P. Exercise and the treatment of depression: a review of the exercise program variables. *Journal of Science and Medicine in Sport*. 2014 Mar 31;17(2):177-82.
- 15 Stubbs B, Vancampfort D, Rosenbaum S, et al. Dropout from exercise randomized controlled trials among people with depression: A meta-analysis and meta regression. *Journal of Affective Disorders*. 2016. 190:457-466

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## REFERENCES

- 16 Larun L, Nordheim LV, Ekeland E, et al. Exercise in prevention and treatment of anxiety and depression among children and young people. *Cochrane Database of Systematic Reviews* 2006, Issue 3. Art. No.: CD004691. DOI: 10.1002/14651858. CD004691.pub2.
- 17 Callaghan P, Norman P. A Prospective Evaluation Of The Theory Of Planned Behaviour And Transtheoretical Model Of Change On Exercise In Young People. *Psychology and Health*. 2004 Jun 1;19:29-30.
- 18 Callaghan P, Khalil E, Morres I, Carter T. Pragmatic randomised controlled trial of preferred intensity exercise in women living with depression. *BMC Public Health*. 2011 Jun 12;11(1):465.
- 19 National Institute for Health and Care Excellence. London Depression in adults: recognition and management. *NICE clinical guideline 90*. 2016. (cited 2019 Jul 03) Available from: <https://www.nice.org.uk/guidance/cg90>
- 20 Warburton DE, Katzmarzyk PT, Rhodes RE, Shephard RJ. Evidence-informed physical activity guidelines for Canadian adults. *Applied Physiology, Nutrition and Metabolism*. 2007 Nov 14;32(S2E):S16-68.
- 21 Martinsen EW, Taube J. Ch 16 Anxiety. Swedish National Institute of Public Health. *Physical Activity in the prevention and treatment of disease*. 2010. (cited 2019 Jul 03) Available from: <http://www.fyss.se/wp-content/uploads/2018/01/16.-Anxiety.pdf>
- 22 Jayakody K, Gunadasa S, Hosker C. Exercise for anxiety disorders: systematic review. *British Journal of Sports Medicine*. 2013 Jan: 187-196.
- 23 Gorczyński P, Faulkner G. Exercise therapy for schizophrenia. *Cochrane Database of Systematic Reviews* 2010, Issue 5. Art. No.: CD004412. DOI: 10.1002/14651858. CD004412.pub2.
- 24 Vancampfort D, Probst M, Helvik Skjaerven L, et al. Systematic review of the benefits of physical therapy within a multidisciplinary care approach for people with schizophrenia. *Physical Therapy*. 2012 Jan 1;92(1):11-23.
- 25 Firth J, Cotter J, Elliott R, et al. A systematic review and meta-analysis of exercise interventions in schizophrenia patients. *Psychological Medicine*. 2015 May;45(7):1343-61
- 26 Firth J, Stubbs B, Rosenbaum S, et al. Aerobic exercise improves cognitive functioning in people with schizophrenia: a systematic review and meta-analysis. *Schizophrenia Bulletin*. 2016 Aug 12;43(3):546-56.
- 27 Vancampfort D, Stubbs B, Ward PB, et al. Why moving more should be promoted for severe mental illness. *The Lancet Psychiatry*. 2015 Apr 1;2(4):295.
- 28 National Institute for Care Excellence. London. Psychosis and schizophrenia in adults: prevention and management. 2014 Mar. (cited 2019 Jul 03) Available from: <https://www.nice.org.uk/guidance/cg178>
- 29 Department of Office of Disease Prevention and Health Prevention. 2018 Physical Activity Guidelines Advisory Committee Scientific report. (cited 2019 Jul 03) Available from: <https://health.gov/paguidelines/second-edition/report/>
- 30 King AC, Oman RF, Brassington GS, et al. Moderate-intensity exercise and self-rated quality of sleep in older adults: a randomized controlled trial. *JAMA*. 1997 Jan 1;277(1):32-7.
- 31 Jonsdottir IH, Ursin H. Ch 46 Stress. Swedish National Institute of Public Health. *Physical Activity in the prevention and treatment of disease*. 2010. (cited 2019 Jul 03) Available from: <http://www.fyss.se/wp-content/uploads/2018/01/46.-Stress.pdf>
- 32 Alzheimers society report on dementia in the UK. (cited 2019 Jul 03) Available from: <https://www.alzheimers.org.uk/about-us/policy-and-influencing/dementia-uk-report>
- 33 Prince M, Wimo A, Guerchet M, et al. World Alzheimer report 2015 – the global impact of dementia: an analysis of prevalence, incidence, cost and trends. London: *Alzheimer's Disease International*, 2015
- 34 Aarsland D, Sardahaee FS, Anderssen S, Ballard C, the Alzheimer's Society Systematic Review group. Is physical activity a potential preventive factor for vascular dementia? A systematic review. *Aging and Mental Health*. 2010 May 1;14(4):386-95.
- 35 Livingston G, Sommerlad A, Orgeta, et al. Dementia prevention, intervention, and care. *The Lancet Commissions*. [www.thelancet.com](http://www.thelancet.com) Published online July 20, 2017 (cited 2019 Jul 03) Available from: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)31363-6/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)31363-6/fulltext)
- 36 O'Donovan G, Blazeovich AJ, Boreham C, et al. The ABC of Physical Activity for Health: a consensus statement from the British Association of Sport and Exercise Sciences. *Journal of Sports Sciences*. 2010 Apr 1;28(6):573-91.
- 37 Helbastaad JL, Taraldsen K, Saltvedt I. Ch 23 Dementia. Swedish National Institute of Public Health. *Physical Activity in the prevention and treatment of disease*. 2010. (cited 2019 Jul 03) Available from: <http://www.fyss.se/wp-content/uploads/2018/01/23.-Dementia.pdf>
- 38 Blondell SJ, Hammersley-Mather R, Veerman JL. Does physical activity prevent cognitive decline and dementia?: A systematic review and meta-analysis of longitudinal studies. *BMC Public Health*. 2014 May 27;14(1):510.
- 39 Baumgart M, Snyder HM, Carrillo MC, et al. Summary of the evidence on modifiable risk factors for cognitive decline and dementia: a population-based perspective. *Alzheimer's Dementia*. 2015 Jun 30;11(6):718-26.
- 40 Norton S, Matthews FE, Barnes DE, et al. Potential for primary prevention of Alzheimer's disease: an analysis of population based data. *The Lancet Neurology*. 2014 Aug 31;13(8):788-94.
- 41 Ahlskog JE, Geda YE, Graff-Radford NR, Petersen RC. Physical exercise as a preventive or disease-modifying treatment of dementia and brain aging. *In Mayo Clinic Proceedings* 2011 Sep 30 (Vol. 86, No. 9, pp. 876-884). Elsevier.
- 42 Sofi F, Valecchi D, Bacci D, et al. Physical activity and risk of cognitive decline: a meta-analysis of prospective studies. *Journal of Internal Medicine*. 2011 Jan 1;269(1):107-17.
- 43 Saxena S, Van Ommeren M, Tang KC, Armstrong TP. Mental health benefits of physical activity. *Journal of Mental Health*. 2005 Jan 1;14(5):445-51.
- 44 Weuve J, Kang JH, Manson JE, et al. Physical activity, including walking, and cognitive function in older women. *JAMA*. 2004 Sep 22;292(12):1454-61.
- 45 National Institute for Health and Care Excellence. London. Mental well-being and independence in older people: *Public health guidance 16*. 2016 (cited 2019 Jul 03) Available from: <https://pathways.nice.org.uk/pathways/mental-wellbeing-and-independence-in-older-people>
- 46 Northey JM, Cherbuin N, Pampa KI, et al. Exercise interventions for cognitive function in adults over 50: a systematic review with metaanalysis. *British Journal of Sports Medicine*. Published Online First 24 April 2017 doi:10.1136/bjsports-2016-096587.
- 47 Young J, Angevaren M, Rusted J, Tabet N. Aerobic exercise to improve cognitive function in older people without known cognitive impairment. *The Cochrane Library*. 2015 Apr 22.
- 48 Sabia S, Dugravot A, Dartigues JF, et al. Physical activity, cognitive decline, and risk of dementia: 28 year follow-up of Whitehall II cohort study. *BMJ*. 2017 Jun 22;357:j2709
- 49 Sink KM, Espeland MA, Castro CM, et al. Effect of a 24-month physical activity intervention vs health education on cognitive outcomes in sedentary older adults: the LIFE randomized trial. *JAMA*. 2015 Aug 25;314(8):781-90.
- 50 Snowden M, Steinman L, Mochan K, et al. Effect of exercise on cognitive performance in community-dwelling older adults: review of intervention trials and recommendations for public health practice and research. *Journal of the American Geriatrics Society*. 2011 Apr 1;59(4):704-16.
- 51 Andrieu S, Guyonnet S, Coley N, et al. Effect of long-term omega 3 polyunsaturated fatty acid supplementation with or without multidomain intervention on cognitive function in elderly adults with memory complaints (MAPT): a randomised, placebo-controlled trial. *The Lancet Neurology*. 2017 May 31;16(5):377-89.
- 52 Leckie RL, Oberlin LE, Voss MW, et al. DNF mediates improvements in executive function following a 1-year exercise intervention. *Frontiers in Human Neuroscience*. 2014;8.
- 53 Brown BM, Peiffer JJ, Martins RN. Multiple effects of physical activity on molecular and cognitive signs of brain aging: can exercise slow neurodegeneration and delay Alzheimer's disease? *Molecular Psychiatry*. 2013 Aug 1;18(8):864.
- 54 Jensen CS, Hasselbalch SG, Waldemar G, Simonsen AH. Biochemical markers of physical exercise on mild cognitive impairment and dementia: systematic review and perspectives. *Frontiers in Neurology*. 2015;6.



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## REFERENCES

- 55 GCBH. The brain–body connection: GCBH recommendations on physical activity and brain health. Washington, DC: *Global Council on Brain Health*, 2016.
- 56 Groot C, Hooghiemstra AM, Rajimakers PG, et al. The effect of physical activity on cognitive function in patients with dementia: a meta-analysis of randomized control trials. *Ageing Research Reviews*. 2016 Jan 31;25:13-23.
- 57 Brett L, Traynor V, Stapley P. Effects of physical exercise on health and well-being of individuals living with a dementia in nursing homes: A systematic review. *Journal of the American Medical Directors Association*. 2016 Feb 1;17(2):104-16.
- 58 Forbes D, Thiessen EJ, Blake CM, et al. Exercise programs for people with dementia. *Cochrane Database of Systematic Reviews* 2015, Issue 4. Art. No.: CD006489. DOI: 10.1002/14651858.CD006489.pub4.
- 59 Farina N, Rusted J, Tabet N. The effect of exercise interventions on cognitive outcome in Alzheimer's disease: a systematic review. *International Psychogeriatrics*. 2014 Jan;26(1):9-18.
- 60 Öhman H, Savikko N, Strandberg TE, et al. Effects of exercise on cognition: the Finnish Alzheimer disease exercise trial: a randomized, controlled trial. *Journal of the American Geriatrics Society*. 2016 Apr 1;64(4):731-8.
- 61 Pitkälä KH, Pöysti MM, Laakkonen ML, et al. Effects of the Finnish Alzheimer disease exercise trial (FINALEX): a randomized controlled trial. *JAMA Internal Medicine*. 2013 May 27;173(10):894-901.
- 62 Chan WC, Yeung JW, Wong CS, et al. Efficacy of physical exercise in preventing falls in older adults with cognitive impairment: a systematic review and meta-analysis. *Journal of the American Medical Directors Association*. 2015 Feb 1;16(2):149-54.
- 63 Sherrington C, Michaleff ZA, Fairhall N, et al. Exercise to prevent falls in older adults: an updated systematic review and meta-analysis. *British Journal of Sports Medicine*. 2016 Oct 4
- 64 National Institute for Health and Care Excellence. Dementia: assessment, management and support for people living with dementia and their carer. London. 2018. (cited 2019 Jul 03)  
Available from: <https://www.nice.org.uk/guidance/ng97>