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Effectiveness of Physical Activity for Improving Functional Ability of Older Adults with Dementia

Catherine Steele
Pacific University

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Effectiveness of Physical Activity for Improving Functional Ability of Older Adults with Dementia

Disciplines
Mental and Social Health | Occupational Therapy

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Effectiveness of Physical Activity for Improving Functional Ability of Older Adults with Dementia

Prepared by; Catherine Steele, Occupational Therapy Student, Pacific University (email address: stee0304@pacificu.edu)

Date: November 30, 2010
Review date: November 2012

CLINICAL SCENARIO: Dementia is a rapidly increasing syndrome; it is estimated that currently there are 35.6 million people living with dementia worldwide. That number is expected to nearly double by the year 2030. Dementia is characterised as a progressive irreversible neurodegenerative disorder, which affects a person’s memory, thinking, behaviour, and the ability to perform activities of daily living (Wimo & Prince, 2010). A persons’ capability to remain independent and perform the desired activities of daily living can have a direct effect on ones’ quality of life and outcome of placement (in a nursing facility or remain at home) (Rolland et al., 2007).

According to the Center for Disease Control (2010) physical activity is an essential component for older adults to minimize the effects of the aging process. Engagement in physical activity increases muscle strength, agility, and mobility; additionally physical exercise promotes mental-health wellbeing. The positive effects of exercise could be fundamental in prolonging independence with activities of daily living for the aging population.

The outcomes of occupational therapy is for clients to remain as independent as possible within their community and continue to engage in desired and meaningful activities. Therefore, it would be beneficial to further examine the affects of physical activity as an intervention approach for older adults with dementia.

The original prompt for this CAT was the condition of retired National Football League (NFL) players. In recent news there is an increase concern with the effects of repetitive head injuries and/or concussions. The New York Times (2010) recently reported a study that found retired NFL players were 19% more likely to exhibit memory-related deficits than the normal rate for male population. Another study by McKee et al. 2009 reviewed 48 cases of documented chronic traumatic encephalopathy (CTE) and further detailed 3 particular cases of professional athletes. CTE is a progressive neurological degenerative disease; is commonly associated with professional athletes who have sustained multiple head injuries or concussions. CTE is hallmarked by dementia like symptoms: memory disturbances, behavioural and personality changes, gait abnormalities, and depression. Symptoms may emerge within months or decades post head trauma. The recent news reveals the need for research to explore the possible role of an occupational therapist with treating this developing population through physical activity.

FOCUSED CLINICAL QUESTION: What is the effect of physical activity on improving functional ability for older adults with dementia?
SUMMARY of Search, ‘Best’ Evidence’ appraised, and Key Findings:

- 5 articles were located which addressed the focused clinical question.
- The randomized controlled trial design by Rolland et al. (2007) was deemed the “best” evidence and appraised further on in this CAT.
- In a three group randomized control trial Stevens and Killeen (2006) examined the cognitive symptoms and disability of residents with dementia. The three types of interventions investigated were group one an exercise program, group two scheduled social visits, and a group three a control group (no intervention). The results suggested that regular exercise positively affects the ability to complete activities of daily living. Additionally it was found that either thru group exercise or scheduled social visits, the residents improved sociability due to the regular interaction.
- In another randomized controlled trial Tappen, Roach, Applegate, and Stowell (2000) investigated the effects of an assisted walking-only group and a walking combined with conversation group verses a conversation only group on functional mobility of nursing home residents with Alzheimer’s disease. Treatment was given 30 minutes in the morning, 3 times a week, for 16 weeks. After treatment participants in the walking-only group showed 20.9% decline in functional mobility in comparison to the conversation-only group who showed an 18.8% decline. The combined walking and conversation intervention showed to be the most effective treatment were participants showed only 2.5 % decline in functional mobility.
- Francese, Sorrell, and Butler (1997) examined the effect of regular exercise on muscle strength and functional ability with residents who have senile dementia of the Alzheimer’s type. The randomized controlled trial study found that a regular exercise program does improve muscle strength, significant level p = .05. There was no significant evidence to support the causation that an exercise program increases functional ability.
- Teri et al. (2003) examined the effect of exercise and behavioural management in a home based program for people with dementia. This study instructed caregivers in implementing regular exercise programs and behavioural modification techniques to improve the physical health and depression levels for clients with Alzheimer’s disease. This randomized controlled trial found that through caregiver education and supervision clients with dementia could increase physically activity and implement appropriate behavioural modifications.

CLINICAL BOTTOM LINE: Physical activity is one of many interventions used to slow the degenerative effects of dementia, enabling older adults to continue to participate in activities of daily living. Due to minimal evidence and limitations of current studies it is difficult to make a single coherent conclusion. Although the overall evidence reveals a positive correlation between physical activity and maintaining functional ability with people who have dementia.

Limitation of this CAT: This critically appraised paper has been individually prepared by a masters of occupational therapy student as part of a university project. In addition, this is not an exhaustive literature review on the topic. This critically appraised topic has not been peer-reviewed by other independent reviewers.
SEARCH STRATEGY:

Terms used to guide Search Strategy:

- Patient/Client Group: Older adults with dementia or Alzheimer’s disease (either in long-term care or living at home).
- Intervention (or Assessment): Physical activity/exercise program (endurance, strength).
- Comparison: Non-treatment group; typical medical care.
- Outcome(s): Functional ability (activities of daily living), cognition, and/or behaviour.

<table>
<thead>
<tr>
<th>Databases and sites searched</th>
<th>Date of search</th>
<th>Search Terms</th>
<th>Results</th>
<th>Limits used</th>
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</thead>
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<td>OVID Medline</td>
<td>10/2010</td>
<td>“Exercise Therapy” AND “Activities of Daily Living” AND “Dementia”</td>
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<td>Google Scholar</td>
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<td>10/2010</td>
<td>“Exercise Therapy” AND “Dementia”</td>
<td>52</td>
<td></td>
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<tr>
<td>Evidence-Based Medicine Reviews Multifile</td>
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<td>“Physical Activity and Dementia”</td>
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</tr>
</tbody>
</table>

INCLUSION and EXCLUSION CRITERIA

- Inclusion:
  - Articles from past 15 years (1995-2010)

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• Older Adults (65 and older)
• Use of physical activity (strength and/or endurance) as treatment/intervention
• Diagnosis of dementia or Alzheimer’s Disease
• Male and/or Female
• All nationalities
• Long-term residential facility or residing at home

Exclusion:
• Children, adolescent, middle aged adult population
• Treatments other than physical activity (music only intervention)
• Parkinson’s Disease

RESULTS OF SEARCH

Five relevant studies were located and categorised as shown in Table 1 (based on Levels of Evidence, Centre for Evidence Based Medicine, 1998)

Table 1: Summary of Study Designs of Articles retrieved

<table>
<thead>
<tr>
<th>Study Design/ Methodology of Articles Retrieved</th>
<th>Level</th>
<th>Number Located</th>
<th>Author (Year)</th>
</tr>
</thead>
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<tr>
<td>Two groups, non randomized (e.g. cohort, quasi-experimental)</td>
<td>II</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>One group non randomized (e.g. pre-test and post test)</td>
<td>III</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Descriptive Studies that include analysis</td>
<td>IV</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Case reports and expert opinion, which include narrative literature</td>
<td>V</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Qualitative</td>
<td>N/A</td>
<td>0</td>
<td></td>
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</tbody>
</table>

BEST EVIDENCE

The following study/paper was identified as the ‘best’ evidence and selected for critical appraisal. Reasons for selecting this study were:

- This study is recent and used a rigorous study design (randomized controlled trial).
- The methods used for this study were strict
  - Trained professionals and researchers
  - Validity of assessments
  - Good representative sample size
- This study examines the link between the decline in functional mobility, which many people with dementia or Alzheimer’s disease experience, and physical activity; it investigates if physical activity is effective at slowing the decline or improving individuals’ functional ability.

**SUMMARY OF BEST EVIDENCE**

**Table 2:** Description and appraisal of Exercise Program for Nursing Home Residents with Alzheimer’s Disease: A 1-Year Randomized, Controlled Trial by Rolland, Y., Pillard, F., Klapouszczak, A., Reynish, E., Thomas, D., Andrieu, S., Riviere, D., & Vellas, B. (2007).

| Aim/Objective of the Study/Systematic Review: | The purpose of this multicenter randomized controlled trial was to evaluate the efficacy of an exercise program for reducing decline with functional abilities (activities of daily living) in nursing home residents with Alzheimer’s disease. Secondary measures examined were improvement in physical performance, nutritional status, and a decrease in behavioural disturbances and depression. |
| Study Design: | Researches used a multicenter, randomized, controlled, single-blind study. The study lasted for twelve months and was parallel-group design of ambulatory participants with Alzheimer’s disease. Participants were randomly assigned to either the exercise program or to the routine medical care (control). Outcomes were measured prior to randomization at baseline then at 6-months and 12-months on different days from intervention. A single geriatrician who was blinded to the intervention assignment measured all outcomes. |
| Setting: | Interventions took place in five nursing homes facilities in Toulouse, France. |
| Participants: | One-hundred and thirty-four nursing home residents were enrolled in the study: 67 participants were assigned to the exercise intervention and 67 were assigned to the control group and received no intervention. Participants lived at one of five nursing homes. Participants in the exercise group had a mean age of 82.8 years and the mean age of the control group participants was 83.1 years. The majority of participants were female (48 in the exercise group; 53 in the control group). All participants’ charts were initially screened for a diagnosis of Alzheimer’s disease or a Mini-Mental State Examination score of less than 25; a trained geriatrician then confirmed the diagnosis of Alzheimer’s disease for all participants. Additionally all participants meet the National Institute of Neurological and Communicative Disease and Stroke/Alzheimer’s Disease and Related Disorders Association criteria for probable or possible Alzheimer’s Disease. Other eligibility criteria met was that participants must have been living at the nursing home for at least 2 months and be able to transfer from a chair and walk at least 6 meters without human assistance. Exclusion criteria... |
included evidence of vascular dementia or Parkinson’s disease, if a transfer was planned from the nursing home for surgery in the year to come, a cardiac condition that might deteriorate during exercise, or a diagnosis of a terminal illness with a life expectancy of less than 6 months.

Dropouts were reported. Twenty-four participants dropped-out over the course of a year. Within the exercise group: 3 changed institutions, 7 died, and 1 refused to continue. In the control group: 5 changed institutions and 8 died.

**Intervention Investigated**

*Control:* Participants in the control group had no exercise or specific behavioural management intervention. They did receive routine medical care.

*Experimental:* Participants assigned to the exercise treatment were divided into exercise groups ranging from 2 to 7 participants (group assignments were determined by baseline scores and affinity between participants). Changes were made to the groups throughout the year due to acute events. Exercise consisted of one session for one hour during the afternoon twice a week, separated by at least 2 days; at total of 88 sessions were proposed. Intervention lasted a year from February 2004-February 2005. The same occupational therapist conducted all exercise sessions. Exercise initially was light intensity and gradually increased over the first month of intervention. Each session incorporated strength (focused on lower extremity), flexibility, balance training, and aerobic exercise; walking was required for at least half of the session. Music accompanied each session.

**Outcome Measures** *(Primary and Secondary)* Give details of each measure, maximum score for each measure and range, administered by whom, where.

Primary outcome measured: decline in activities of daily living performance from baseline with the exercise group compared with the control groups’ performance.

Measure: Katz Index of ADLs – 6 items (eating, transferring from bed to chair, walking, using the toilet, bathing, and dressing) were scored from 0 to 1 (0 meant participant was unable to perform the activity without compete help, 0.5 was given if the participant was able to perform the activity with little help, and 1 was given when the participant was able to perform the activity without any help. Scores ranged from 0 to 6.

Secondary outcomes measured: physical performance, nutritional status, behaviour disturbances, and depression.

Measures: The 6-meter walking speed, Get-Up-and-Go test, and one-leg balance test were used as measures of physical performance. The Get-Up-and-Go test assesses how a participant is able to rise from an armchair, walk three-meters, turn around and walk back to the chair, and sit down again. A score is given from 1 to 5 (1 means the participant has no instability and a 5 means the participant is very abnormal – unable/off-balance). For the one-leg balance test the participants had to remain balanced for 5 seconds on each leg otherwise they were determined abnormal. The participants’ body weight and the Mini-Nutritional Assessment measured nutritional status. Behaviour disturbances were determined using the Neuropsychiatric Inventory, participants with a score greater that 11 from at least three domains were considered to have marked neuropsychiatric symptoms. Depression was assessed using the Montgomery-Asberg Depression Rating Scale; this measurement has been proven effective with participants who have dementia or Alzheimer’s disease; participants who scored 18 or higher were marked as depressed.
Other variables measure or evaluated: age, sex, current medications, visual and/or hearing impairments, dementia severity (Mini-Mental State Exam), comorbid disease, history of past surgery or trauma, number of falls, fractures, hospitalizations, and deaths were reported daily. Adherence to overall treatment was documented.

**Main Findings:** (inset table of mean scores/ mean differences/ treatment effect, 95% confidence intervals and p-values etc where provided)

<table>
<thead>
<tr>
<th>Table 2. Significant Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome</strong></td>
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<tr>
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<tr>
<td>Activity of daily living disability, mean ± SD*</td>
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<tr>
<td>Physical performance</td>
</tr>
<tr>
<td>Walk speed, m/s, mean ± SD</td>
</tr>
<tr>
<td>Get-up-and-go test, mean ± SD</td>
</tr>
<tr>
<td>Abnormal one-leg balance test, n (%)</td>
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<tr>
<td>Nutritional status</td>
</tr>
<tr>
<td>Weight, kg, mean ± SD</td>
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<tr>
<td>Mini-Nutritional Assessment score, mean ± SD</td>
</tr>
<tr>
<td>≥24.0, n (%)</td>
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<tr>
<td>23.5–17.0, n (%)</td>
</tr>
<tr>
<td>&lt;17.0, n (%)</td>
</tr>
<tr>
<td>Behavioral disturbances and depression</td>
</tr>
<tr>
<td>NPI total score, mean ± SD</td>
</tr>
<tr>
<td>Patients with marked neuropsychiatric symptoms, n (%)</td>
</tr>
<tr>
<td>MADRS-Total, mean ± SD</td>
</tr>
<tr>
<td>Depressed patients, n (%)*</td>
</tr>
</tbody>
</table>

* 0 = dependent, 6 = independent.
1 Comparison of the 6-month changes between exercise group and routine medical care.
2 Comparison of the 12-month changes between exercise group and routine medical care.
3 Montgomery-Asberg Depression Rating Scale (MADRS) score ≥18.
4 SD = standard deviation.

Interpreting the table above reveals a significant difference in walking speed outcomes from participating in a regular exercise group; however there was no significant change in other physical performance (Get-Up-and-Go and one-leg balance) or with the secondary measures of nutritional status, behavioural disturbances, and depression.

![Figure 2. Spearman correlation (r) between number of sessions completed and change in activity of daily living (ADL) score from baseline to 12 months in the exercise program group (n = 56).](image-url)
The graph above shows that there were no significant differences noted for performance of activities of daily living. Though there was a correlation with an increase in sessions/compliance and slowing of deterioration of ability to perform activities of daily living.

**Original Authors’ Conclusions (paraphrase as required. If providing a direct quote, add page number)**

The authors of this study concluded that an exercise program (1 hour, 2 times a week) for nursing facility residents with Alzheimer’s disease could be an effective intervention for maintaining the functional ability to perform activities of daily living. There was no significant effect of an exercise program on improvement on nutritional status and decreasing behavioural disturbances, or depression measures. “Exercise adherence was a significant predictor of change in ADL score, and ADL scores of participants with high adherence did not decrease significantly during the intervention period” (pg. 164). Larger field studies are needed and should be directed at improving and increasing adherence to exercise programs.

### Critical Appraisal:

**Validity (Methodology, rigour, selection, bias, provide PEDro score/ PEDro partitioned score and sub-test items 1-10 for RCTs; other study designs, follow headings used in critical appraisal checklist forms. Comment in missing information in original paper)**

PEDro Scale was used to rate the methodological quality of the randomized controlled trial. The clinical trial is rated on 11 different criteria to assess its internal validity.

- Written consent was obtained from patients and caregivers or legal guardians. The institutional review boards of the nursing homes involved approved the study. The authors reported this information.
- Screening methods, inclusion and exclusion criteria were identified and explained in detail.
- Random and concealed allocation: participants were randomly assigned to either the exercise group or to routine medical care. Staff not involved in the intervention or assessment performed randomization by lottery draw. A single geriatrician who was blinded to the intervention assignment measured outcomes at baseline, 6 months, and 12 months.
- Baseline similarity: There was no significant difference in baseline characteristics between the exercise group and the routine medical care group except for comorbidity.
- Blinding of participants, therapists, and assessors: the participants in the exercise group were aware that they were receiving some type of intervention but may have not been aware if they were the only group to receive treatment. The exercise group was lead by one occupational therapist that was trained, thus showing them they were the experimental group. The assessor was blinded to the intervention assignment.
- Measures of key outcomes from more than 85 % of participants and intent to treat analysis: drop-outs were accounted for but due to many drop-outs only 82.1% of participants completed the study.
- Adherence to treatment was reported but due to a range of high adherence to no adherence from participants in the experimental group not all received the intervention that was allocated.
- Between-group statistical comparison: there was an analysis comparing the experimental group and control group at baseline, 6 months, and post-treatment (12 months).
- PEDRO Scale: the study measured a 7/11
Interpretation of Results:
- The results of this randomized controlled trial showed useful evidence that there is a positive correlation between regular moderate exercise and the decline or slowing of the progressive deterioration in ability to perform activities of daily living for people with Alzheimer’s Disease in a nursing home.
- Results showed with the primary effectiveness assessment that at 6 months and 12 months, activity of daily living scores declined significantly in both groups. Mean change in activity of daily living score from baseline to 12 months indicated that the exercise program group participants declined approximately one-third as much as the routine medical care patients (0.6 + 1.2 vs. 0.9 + 1.1, P = 0.02).
- Results for the secondary effectiveness assessment revealed that in a regression analysis significant improvement was made in walking speed in the exercise program compared with the routine medical care group at 6 months (P = .01) and at 12 months (P = .002).
- None of the other physical performance measure significantly changed, and no differences were found between groups.
- Additionally Analysis noted that the number of sessions completed was significantly correlated with less deterioration in ability to perform activities of daily living (correlation coefficient = 0.37, P = .005). At 12 months activities of daily living score declined, although not significantly for participants with high adherence; participants with a low adherence declined significantly (P < .001).

Summary/Conclusion:
The outcomes of this study provided evidence that older adults with Alzheimer’s disease living in a nursing facility can benefit functionally through engaging in regular moderate exercise. Over a year long period residents who exercised showed approximately one-third, the progressive deterioration in the ability to perform activities of daily living in comparison to a group who just received routine medical care. This study also concluded that physical activity improves mean walking speed. No significant effect was found on nutritional status, behavioural disturbance, or depression measures, further studies are need to be conducted to find a correlation.

Table 3: Characteristics of included studies

<table>
<thead>
<tr>
<th>Study 1: Frances, Sorrell, &amp; Butler (1997)</th>
<th>Randomized Control Trial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention investigated: The treatment intervention consisted of an exercise regime, which incorporated use of beanbags, beach balls, squoosh ball, Velcro ball and mitt, parachute leg weights, canes, and music. Exercise took place at an Alzheimer’s care unit in a Medicare nursing facility, for 20 minutes, 3 mornings a week, over a seven week period.</td>
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<tr>
<td>The participants were non-ambulatory, late stage dementia residents.</td>
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<tr>
<td>Comparison intervention: Participants in the control group meet for the same amount of time but received no formal intervention. The control group watched a music video sing-a-long for the 20 minutes, 3 mornings a week, for seven weeks.</td>
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<tr>
<td>Outcomes used: Participants muscle strength and balance was measured through a physical therapy assessment (measure muscle strength in upper</td>
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</table>
and lower extremities) and the Tinetti Balance Evaluation Test. Participant’s performance in activities of daily living (ADLs) was assessed using the Changes in Advanced Dementia Scale (CADS), which evaluates the cognitive abilities to perform ADLs and not the physical ability.

**Findings:** The findings of this RCT showed that a regular exercise regime can improve muscle strength in residents who have senile dementia of the Alzheimer’s type but there was no significant correlation between improved muscle strength and improved cognitive ability in performance of activities of daily living.

**Intervention investigated:** The investigated intervention was an assisted walking group for residents with Alzheimer’s Disease at a nursing home. The participants walked for 30 minutes at own-pace, 3 times a week, for 16-weeks.  
**Comparison interventions:** Two comparison groups were used. 1) Conversation only intervention; participants received 30 minutes of conversation, 3 times a week, for 16 weeks of natural conversation with an interviewer who discussed topics that were of personal interest to the participant. 2) The third treatment group was a combination of both walking exercise and conversation simultaneously, again for 30 minutes, 3 times a week for 16 weeks. Interviews encouraged both walking and conversation with each participant.  
**Outcomes used:** Functional mobility was measured with a modified version of the 6-minute walk. The test was modified to allow use of an assistive device and/or physical assistance from the examiner. The examiner was allowed to provide physical and verbal cues to promote continuous walking throughout the test. Due to the low endurance of many of the participants rests were allowed for as often and as long as needed; the clock continues running though. The test was scored by distance completed in the 6-minutes time interval.  
**Findings:** The study found that for the largest effect (preventing deterioration and maintaining functional mobility) nursing home residents with Alzheimer’s Disease should pair walking with effective communication (encouraging and supportive). |

| Study 3: Stevens & Killeen (2006) | Pre and Post-Test Randomized Control Trial  
**Intervention investigated:** The focus of the intervention was for nursing home residents with dementia. The experimental group participated in a exercise program that’s design focused on joint and large muscle group movements with the objective to create gentle aerobic exertion. Music accompanied each session, which occurred for 30 minutes, 3 times a week, for 3 months.  
**Comparison intervention:** There were two control groups for this study; one control group received no intervention. The second control group was help for the same duration as the experimental group and consisted of a social visit from the researcher. The researcher discussed health-related issues with the participants but did not incorporate any physical activity.  
**Outcomes used:** Cognition and progression of symptoms of dementia. |
Function was measured and determined by the amount of nursing care a resident requires in relationship to activities of daily living. Formal assessments used were The Clock-Drawing Test and the Revised Elderly Persons Disability Scale (REPDS). Categories that REPDS assessed included: communication, physical probs, self-help skill, confusion, behaviour, sociability, psychiatric, and nurse dependence. Informal assessments were gathered thru interviews and participants medical charts.

**Findings:** This study concluded that regular exercise has a positive impact for people with dementia. Improvement was significant in the particular areas of self-helping skills, confusion, and behaviour measures. It was noted that regular structured social interaction either thru exercise activity or social visits improves the sociability of people with dementia.

<table>
<thead>
<tr>
<th>Study 4: Teri, Gibbons, McCurry, Logsdon, Buchner, Barlow, Kukull, LaCroix, McCormick, &amp; Larson (2003)</th>
<th>Randomized Control Trial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intervention investigated:</strong> Patient (with Alzheimer’s Disease)-caregiver dyads participated in an active treatment program within their homes for 3 months. The program consisted of an exercise (aerobic/endurance activities, strength training, balance, and flexibility training) component with a target goal of 30 minutes daily and a behavioural management component. Caregivers received instruction/education of exercises and techniques to use to modify patient behavioural problems.</td>
<td><strong>Comparison intervention:</strong> A control group received routine medical care (acute medical or crisis intervention at a community health care center).</td>
</tr>
<tr>
<td><strong>Outcomes used:</strong> Physical health, function, affective status, patient behavioural disturbances, and caregiver distress were measured by using the following:</td>
<td></td>
</tr>
<tr>
<td>1. Medical Outcome Study 36-item Short-Form Health Survey (physical function and physical role functioning)</td>
<td></td>
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<tr>
<td>2. Sickness Impact Profile (body care and movement, mobility, home management)</td>
<td></td>
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<tr>
<td>3. Hamilton Depression Rating Scale and the Cornell Scale for Depression in Dementia</td>
<td></td>
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<tr>
<td>4. Walking speed, functional reach, and standing balance</td>
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<tr>
<td>5. Caregiver report of minutes spent walking and other aerobic exercise over a one week period</td>
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<tr>
<td>6. Revised Memory and Behaviour Problem Checklist</td>
<td></td>
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<tr>
<td><strong>Findings:</strong> This study showed that caregivers have a positive impact on the physical fitness and decrease depression for clients with Alzheimer’s Disease. This impact is guided thru the implementation of an exercise program and training in behavioural management techniques.</td>
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</tbody>
</table>

**IMPLICATIONS FOR PRACTICE**

-The studies reviewed showed a positive correlation between physical exercise programs and slowing the decline in functional ability to perform activities of daily living for older adults with dementia.

-Occupational therapists are concerned with the roles of clients and their ability to participate in necessary and desired activities.

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- Occupational therapist need to understand the roles they can play in implementing an exercise program to promote the physical health and mental wellbeing of clients with dementia or Alzheimer’s disease.

**FUTURE RESEARCH:**
- Future evidence-based research should be done to strengthen the correlation between physical activity and clients with dementia. A majority of the studies had a low adherence rate, which should be further investigated as to the reasoning.
- Currently there is no research in regards to the role an occupational therapist plays working with retired professional athletes who suffer from chronic traumatic encephalopathy.

**EDUCATION:**
- When developing an exercise group precautions should be taken into account such as overall physical health of client, pre-existing medical conditions, and a physician should be consulted before starting exercise.
- The exercise group should be graded for people of different cognitive and physical abilities.
- An exercise group should incorporate socialization.
REFERENCE:


