

Wheelchair Biking for the Treatment of Depression

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The University of Iowa College of Nursing
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Scheme for Grading the Strength and Consistency of Evidence in the Guideline

Evidence-based practice guidelines are developed from several sources of evidence, such as research findings, case reports and expert opinion. The practice recommendations are assigned an evidence grade based upon the type and strength of evidence from research and other literature.

The grading schema used to make recommendations in this evidence-based practice guideline is:

- A1 = Evidence from well-designed meta-analysis or well done systematic review with results that consistently support a specific action (e.g., assessment, intervention, or treatment)
- A2 = Evidence from one or more randomized controlled trials with consistent results
- B1 = Evidence from a high quality evidence-based practice guideline
- B2 = Evidence from one or more quasi-experimental studies with consistent results
- C1 = Evidence from observational studies with consistent results (e.g., correlational descriptive studies)
- C2 = Inconsistent evidence from observational studies or controlled trials
- D = Evidence from expert opinion, multiple case reports, or national consensus reports

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Databases

Searches were performed using electronic databases CINAHL, Medline, PubMed and Google Scholar. In addition, searches were performed on the citations and reference list of documents that met the inclusion criteria. Searches were performed on the names of authors known to conduct research and publish in the area of interest.

Keywords

The following search terms (keywords) were used individually and in combinations:

- Wheelchair biking +depression + nursing home
- Nursing Home + wheelchair biking + recreational therapy
- Depression+ recreational therapy

Inclusion and exclusion criteria

The database searches were limited to documents published in peer-reviewed scholarly journals, published between 2000 and 2008, in English, and pertaining to an adult population. Documents were excluded if they were peripheral to the topic, presented no new discourse, findings or evidence, presented expert opinion only, or cited a majority of references published prior to 2000.

Number of documents identified

45

Number of documents used

37

Description of method of guideline validation

This guideline was reviewed by experts knowledgeable about research regarding recreational therapy for depression. The reviewers suggested additional evidence for selected actions, inclusion of some additional practice recommendations, and changes in the current guidelines.

INTRODUCTION

It is estimated that the incidence of depression in older adults living in long term care facilities can be as high as 77% and is the most common mood disorder of late life (Steinberg et al., 2008). Unfortunately, depression often goes undiagnosed and therefore untreated (Greensberg, 2007). Depression is often missed in older adults as they may exhibit non-specific somatic complaints rather than DSM-IV classified symptoms of depressed mood (Bekelman et al., 2007). Minor depression often becomes a chronic condition in this group but is not a part of normal aging (Lammer & Ham, 1997). Depression is a serious mental illness that affects a person's mood, behaviors, function, thoughts and physical health. It is one of the most debilitating illnesses as it is the leading cause of disabilities according to the World Health Organization (WHO, 2008). Depression may be associated with side effects of medications (Conway & Miller, 2008) or compounded by medical conditions such as a cerebral vascular accident (Levy, 2004. Evidence Grade = C1), Parkinson's Disease, (Ehrt, et al., 2006. Evidence Grade=B2) diabetes (Edege, Nietert & Zheng, 2005. Evidence Grade =C1), dementia (Landes, Sperry, & Strauss, 2005. Evidence Grade=A2), urinary incontinence (Zorn et al., 1999. Evidence Grade= A2), or sensory impairment (Capella-McDonnall, 2005. Evidence Grade=A2). Hormonal disorder may contribute to increased rates of depression in women (NIMH, 2008. Evidence Grade = A2). It may be caused by a multitude of psychological conditions such as coping with chronic illness and frequent pain, gloomy institutionalized environments, and an assortment of losses including function, independence, social roles, friends and relatives, and past leisure activities. Women who are abused have high rates of depression (Fisher & Reagan, 2006. Evidence Grade = B2) as are older adults experiencing bereavement (USDHHS, 1999. Evidence Grade =B1). Chronic pain is also associated with high rates of depression (Zanocchi, et al., 2007). Long term care residents with fecal incontinence have high incidence of depression (Hawes, & Ahmad, 2006). Residents who are dissatisfied with the food in long term care facilities are more likely to be depressed than those who are satisfied (Crogan & Evans, 2006).

Unrecognized, untreated or undertreated, depression has a host of consequences for older adults. It is important to recognize and aggressively treat depression as its impact goes far beyond affecting mood. The highest suicide rate of any age group is for those over the age of 65 (Department of Health and Human Services, 2008). This is quite significant when considering that older adults who commit suicide had visited their primary provider close to the time of the suicide: 20% on the same day, 40% within one week, and 75% within one month (Conwell, 2001). Depression is associated with functional decline and excess mortality and therefore should be treated vigorously (Stein, Cox, Afifi, Belik, & Sareen, 2006. Evidence Grade = A2). Depression is associated with increased falls (Finkelstein, Prabhu, & Chen, 2007, Evidence A2) and poorer recoveries following fractures (Craik, 1994; Mutran, Reitzes, Mossey, & Fernandez,

1995; Sheperd & Prescott, 1996). It has also been demonstrated that depression can be spread from one person to another in a phenomenon known as emotional contagion (Yappo, 2007; Goodman & Shippy, 2002. Evidence Grade = A2).

Social interactions and pleasurable experiences are ways of providing elders with opportunities to attain happiness, purpose, and quality of life. The ability to reach this mood state level is often out of reach to those elderly individuals residing in long term facilities with depressive diseases. This group frequently has compounding constraints to leisure in the form of multiple chronic conditions such as cognitive and mobility impairments and numerous medical diagnoses (Buettner & Martin, 1995). Recreational therapists are specifically trained to help individuals with disabilities overcome such complex constraints. Recreational therapy is an important, yet often overlooked treatment option for long term care residents with depression. Research examining the link between the body and mind has repeatedly demonstrated that persons' mood and attitude affects not only their immune system but also other body systems. Depression, for example, increases the parasympathetic nervous system leading to a vast assortment of medical problems (Carlin, 1998; Cole-King et al, 2001; Ferketich et al., 2000; Haroutune et al., 1998; Lammer & Ham, 1997; Penninx et al., 1998. Evidence Grade = A2).

Not everyone who is depressed needs medicating. Those not requiring medications may be older adults whose depression is mild, situational, those who have difficulty tolerating medications, or those who refuse to take medications. More serious depression is best treated using a combination of medication and non-pharmacological interventions (Byrd, 2005). None of the antidepressant medications are 100% effective in treating depression and the risks of their usage are a multitude of adverse side effects. Approximately one-third of older adults are unable to tolerate side effects of the most commonly prescribed antidepressants. The most costly of these side effects, in terms of quality of life and dollars, are falls (Sterke, et al., 2008). Association between antidepressant medication usage and falls has been repeatedly demonstrated (Richards et al., 2007). Only 50% of older adults show any improvement in depression using pharmacological treatment (Driscoll et al., 2007). Because of the serious side effects of these medications and sensitivity of older persons to them, it is safest to try non-pharmaceutical interventions for mild to moderately depressed elders. Research indicates that mild to moderate depression often can be treated successfully with non-pharmacological interventions alone (Crowe & Luty, 2005). Non-pharmacological interventions may provide a feasible, safe alternative or complementary intervention to the current treatment modality for this population. These interventions are also recommended for the prevention of depression in high risk older adults.

Psychotherapy interventions for persons in long term care are not frequently offered. However, there is growing evidence to support the use of cognitive-behavioral therapy and cognitive therapy with older adults (Thrope et al., 2001. Evidence Grade= A2). Psychosocial interventions may provide a feasible, safe alternative or complementary intervention to the current treatment modality for depression in elders. Care to residents of long-term care facilities is best delivered, and even mandated by state and federal regulations, in an interdisciplinary manner (Drinka & Clark, 2000; National Institutes of Health, 1991). The expertise of nursing and recreation therapy professionals combined, make development of psychosocial interventions for depression feasible.

Fitzsimmons (2001. Evidence Grade = A2) was the first to investigate the use of a wheelchair biking program for the treatment of depression for older adults in a long-term care setting. During this study, the program was conducted in an interdisciplinary manner by both recreational therapists and nursing staff members working as a team. Findings from this pilot study, a classical experimental design with randomization, identified a clinically and statistically significant reduction in depression after a two-week program of wheelchair biking. These findings were supported by Buettner & Fitzsimmons (2002. Evidence Grade = A2) when they replicated the study using only subjects with cognitive impairment. This study incorporated a three-month maintenance biking period after a two-week intense intervention period. The findings revealed statistically significant improvements in depression for the experimental group after the two-week period, and depression scores continued to decline through the three-month maintenance period. A third study by Benson, a recreational therapist, and Tatham (2001. Evidence Grade = A2), replicated the pilot study again and supported the significant findings.

The conceptual framework for this intervention is the Roy Adaptation Model, in which the person is conceptualized as an open adaptive system engaging in interactions with environmental stimuli (Roy, 1991). The individual, as an open system, is in constant change with the environment. Treatment of older adults with depression is aimed at manipulating the environment with a psychosocial intervention, a therapy biking program. The objective of this intervention is to increase positive coping mechanisms through social interactions and to provide enjoyable experiences to minimize, reduce, or eliminate depressive moods. The Roy Adaptive Model is a systems model that focuses on outcomes. The adaptive response to the therapy biking program intervention is a decrease in the level of depression. When people are in an adaptive state they have more energy to respond to other stimuli. "This freeing of energy links the concept of adaptation to the concept of health" (McQuiston & Webb, 1995).

"Depression is a behavior that is learned and maintained through a series of positive and negative reinforcement contingencies. Therefore, depression can be reduced or eliminated by altering the contingencies that maintain depressive behaviors and by introducing new contingencies to stimulate and maintain nondepressive behaviors. Both of these theories suggest a cycle of depression that, once interrupted, can lead to remission." (Teri & Gallagher-Thompson, 1991, p. 413).

Depression, in the long-term care setting, is maintained by a series of person-environmental interactions that include an excess of negative experiences and a deficit of positive experiences. The introduction of this powerful intervention, wheelchair biking, provides a positive experience to interrupt the cycle of depression.

PURPOSE

The purpose of this evidence-based guideline is to describe a specific recreation therapy program, wheelchair biking, for the treatment of depression in older adults, with and without cognitive impairments. The goal of this guideline is to reduce depressive mood in older adults and to provide a complimentary or alternative treatment to medications

DEFINITION OF KEY TERMS

- Recreation Therapy*: The American Therapeutic Recreation Association (ATRA) defines therapeutic recreation as "the provision of Treatment Services and the provision of Recreation Services to persons with illnesses or disabling conditions. The primary purposes of Treatment Services, which are often referred to as Recreational Therapy, are to restore, remediate or rehabilitate in order to improve functioning and independence as well as reduce or eliminate the effects of illness or disability. The primary purposes of Recreational Services are to provide recreation resources and opportunities in order to improve health and well-being. Therapeutic recreation is provided by professionals who are trained and certified, registered and/or licensed to provide therapeutic recreation" (ATRA, 2002).
- Certified Therapeutic Recreation Specialist (CTRS™)*: The National Council for Therapeutic Recreation Certification (NCTRC) states that a Recreational Therapist is "an individual who, at a minimum, is a graduate of a Baccalaureate degree program in recreational therapy accredited by a nationally recognized accreditation body; is currently a CTRS™ by the National Council for Therapeutic Recreation Certification; meets any current legal requirement of licensure, registration, or certification; or has the documented equivalent in education, training and experience and is currently competent in the field" (National Council for Therapeutic Recreation Certification, 2002). In order to obtain CTRS™ certification, candidates must first meet minimum educational and experiential requirements and then pass a computer-based examination. The examination is administered by an independent, experienced, national testing organization. CTRSs™ are also required to become recertified after five years. CTRSs™ may become recertified by accumulating a combination of work experience, continuing education, and/or retesting. This recertification program was established to ensure the continued and current competence of therapeutic recreation specialists.
- Depression*: Depression may be major, minor (dysthymic), or atypical as defined by DSM-IV criteria. Major depression is a serious medical condition that is persistent and can significantly interfere with all aspects of an older adult's life. Of all the medical conditions, major depression is the leading cause of disability in the United States (NAMI, 2008). For a diagnosis of major depressive disorder, symptoms must be present most of the day, nearly daily for two weeks. At least five of the following symptoms must be present during the same period with at least one of the first two symptoms: (1) depressed mood most of the day, nearly every day, (2) markedly diminished interest or pleasure in almost all activities most of the day, nearly every day, (3) significant weight

loss/gain, (4) insomnia/hypersomnia, (5) psychomotor agitation/retardation, (6) fatigue (loss of energy), (7) feelings of worthlessness (guilt), (8) impaired concentration (indecisiveness), and (9) recurrent thoughts of death or suicide. The essential feature of dysthymic disorder, also known as minor depression, is a chronic mood disturbance present most of the day, more days than not, for at least two years. While depressed, at least two of the following must be present: (1) poor appetite/overeating, (2) insomnia or hypersomnia, (3) low energy/fatigue, (4) low self-esteem, (5) poor concentration or difficulty making decisions, and (6) feelings of hopelessness. In addition, during the two-year period of the disturbance, the client is never without symptoms for more than two months at a time. There must also be no evidence of a major depressive episode during the first two years, never had a manic or hypomanic episode, not superimposed on a chronic psychotic disorder, such as schizophrenia or delusional disorder and cannot be established that an organic factor initiated and maintained the disturbance (American Psychiatric Association, 1994).

- *Wheelchair Biking*: Wheelchair Biking is a type of recreational intervention designed for use with older adults in order to extend their mobility and recreational options. The intervention uses a Duet bike, which is a modified tandem bicycle, also called the Rollfiets, manufactured in Germany by Robert Hoening Spezialfahrzeuge (Hoening, 2010). The front of this system is a detachable wheelchair that acts as the front wheel of the bike. This rugged wheelchair is attached to a half bicycle, which is unusable on its own. The specially designed chair, shaped from fiberglass-reinforced plastic, has padding and adjustable foot and headrests. When fixed to the cycle the chair tilts back, lifting the small front guide wheels off the ground. This gives a relaxed, stable seating position and makes conversation between resident and rider easier. This system enables residents, at all functioning levels, even with severe disabilities, to ride in the wheelchair while the caregiver pedals and steers from the back.
- *Dementia*: Dementia is a clinical state characterized by loss of function in multiple cognitive domains. The most commonly used criteria for diagnoses of dementia is the DSM-IV (American Psychiatric Association, 1994). Diagnostic features include: memory impairment and at least one of the following: aphasia, apraxia, agnosia, and disturbances in executive functioning. In addition, the cognitive impairments must be severe enough to cause impairment in social and occupational functioning. Importantly, the decline must represent a decline from a previously higher level of functioning. Finally, the diagnosis of dementia should NOT be made if the cognitive deficits occur exclusively during the course of a delirium.

INDIVIDUALS/PATIENTS AT RISK FOR DEPRESSION

This wheelchair biking guideline is designed to treat older adults who are depressed or at risk for depression. Clinical and research findings have identified the following as risk factors for depression in older adults:

- Medication Usage: Some antihypertensive, hormonal and neuroleptics agents, Carbidopa/levodopa, Beta blockers, Clonidine, Benzodiazepines, Barbiturates, Anticonvulsants, Histamine-2 blockers, Calcium channel blockers, Thiazide diuretics, Digoxin, and narcotics (Fram, 2006; U.S. Dept. of Health, 1999. Evidence B1). Polypharmacy, defined as three or more medications per day, was also found to place patients at high risk (Garcia & Tobias, 2001. Evidence Grade = A2).
- Medical Causes:
 - *Chronic conditions:* Late-life mental disorders are often detected in association with somatic illness (Reynolds et al., 1999. Evidence Grade = B2). The prevalence of clinically significant depression in later life is estimated to be highest, approximately 25 percent, among those with chronic conditions, especially with ischemic heart disease, stroke, cancer, chronic lung disease, arthritis, Alzheimer's Disease, and Parkinson's Disease (U.S. Dept. of Health, 1999. Evidence Grade = B, Davis & Strivastava, 2003. Evidence Grade = B1).
 - *Cerebrovascular accidents:* Six prospective evaluations of depressive symptoms/syndromes using various criteria revealed the prevalence of major depressive disorder to be between 10 and 27 percent in post-stroke patients, with an additional 15 to 40 percent showing less severe forms of illness within two months of the stroke (U.S. Dept. of Health, 1999. Evidence Grade = B1; Levy, 2004. Evidence Grade = C1).
 - *Dementia:* Approximately 30 to 40 percent of Alzheimer's disease patients demonstrate formal depressive mood syndromes and/or psychotic symptoms sometime during their illness (Reichman & Coyne, 1995; U.S. Dept. of Health, 1999. Evidence Grade = C1; Landes, Sperry & Strauss, 2005. Evidence Grade = A2).
 - *Parkinson's disease:* Approximately 50 percent of Parkinson's patients with dementing symptoms have major depressive disorder sometime during the course of the illness (U.S. Dept. of Health, 1999. Evidence Grade = B1, Ehrt, et al., 2006. Evidence Grade = C1).
 - *Diabetes:* Numerous recent studies that have estimated the prevalence of depression in treated samples of adults with diabetes suggest that major depressive syndrome is approximately three times more common in patients with diabetes than in the general population (U.S. Dept. of Health, 1999. Evidence Grade = B1).
 - *Coronary Artery Disease:* The relationship between depression and increased morbidity and mortality is well documented in both post-myocardial infarction patients and in coronary artery disease patients without myocardial infarction (U.S. Dept. of Health, 1999. Evidence Grade = B1).
 - *Persistent insomnia,* occurring in 5 to 10 percent of older adults, is a risk factor for the subsequent onset of new cases of major depression in older persons (U.S. Dept. of Health, 1999. Evidence Grade = B1, Kemp, et al., 2003. Evidence Grade = C1).
 - *Impaired Vision:* The rate of depression among nursing home residents with visual impairments exceeds 45% (Ip, Leung, & Mak, 2000. Evidence Grade =

- A2; Capella-McDonnall, 2005. Evidence Grade = A2)
- *Hearing Impairment*: Older adults with hearing impairments have significantly more depressive symptoms than normal hearing older adults (Kramer, Kapteyn, Kuik, & Degg, 2002. Evidence Grade = B2).
- *Posttraumatic Stress Disorder*: PTSD studies have found high levels of comorbid major depressive disorders (Franklin & Zimmerman, 2001. Evidence Grade = A2).
- *Pain*: Correlates with depression, and pain is more severe if the depression is unrecognized (Horgas & Dunn, 2001. Evidence Grade = A2). Chronic pain is associated with high rates of depression (Zanocchi, et al., 2007. Evidence Grade = C1)
- *Urinary Incontinence*: There is an association between depression and urinary incontinence (Brown, McGhan & Chekroverty, 2000; Engberg et al., 2001; Steers & Lee, 2001; Zorn et al., 1999. Evidence Grade = A2).
- Psychological Conditions:
 - *Depression*: Risk factors for late-onset depression, based on results of prospective studies, include educational attainment less than high school (Garcia & Tobias, 2001. Evidence Grade = C1), female gender, (Garcia & Tobias, 2001. Evidence Grade = C1), impaired physical functioning status (Garcia & Tobias, 2001; Jaffe, Froom, & Galambos, 1994. Evidence Grade = C1), and heavy alcohol consumption (U.S. Dept. of Health, 1999. Evidence Grade = B1).
 - *Social Isolation*: Social isolation correlates with depression among community dwelling elders (Solomon & Zinke, 1991. Evidence Grade = A2); and for nursing home residents, lack of social relationships with other residents is a strong predictor of depression (Fessman, & Lester, 2000; Garcia & Tobias, 2001. Evidence Grade = C1).
 - *Bereavement*: At least 10 to 20 percent of widows and widowers develop clinically significant depression during the first year of bereavement (Carr, House, Wortman, Nesse & Kessler, 2001; U.S. Dept. of Health, 1999. Evidence Grade = B; DHHS, 1999. Evidence Grade = B1).
 - *Losses*: Correlations have been found between depression and a variety of losses including loss of family home, friends, social activities, volunteering, financial security, and marital harmony (Bellino et al., 2001; Kivela et al., 1996; Maciejewski, Prigerson, & Mazure, 2002; Wang, 2001; Lawrence et al., 2006. Evidence Grade = C1).

ASSESSMENT CRITERION

The Wheelchair Biking program is indicated for older adults with mild to moderate depression, with or without cognitive impairments. Clients should be selected for screening based on a diagnosis or history of depression, use of an antidepressant medication without a depression diagnosis, or signs and symptoms of depression noticed by staff, family or friends (Fitzsimmons, 2001. Evidence Grade = A2). Frequently depression in elderly persons has atypical presentation and thus is not diagnosed and therefore not treated and not in their medical records (Devanand et

al., 1996). Signs of depression include sadness, weepiness, apathy, passivity, sleep disturbance, agitation, anxiety, decreased socialization, decreased verbalization, weight loss, mobility problems and frequent unspecific somatic complaints (U.S. Dept. of Health, 1999) (For further information, see the Evidence-Based Guideline: Detection of Depression in the Cognitively Intact Older Adult by Piven, 2005). Depression is common in older adults, but unless a mood assessment is performed, the diagnosis may be missed. Although mood assessment can be performed upon admission to a residential home setting, many patients may need time to adjust to their new surroundings. Allow one to two weeks to adjust to the new environment before screening for depression. Several formal assessment tools are available to assess patients with depression (listed below). These tools and their descriptions can be found in Appendix A.

- Geriatric Depression Scale - Short Form (Sheikh & Yesavage, 1986)
- Geriatric Depression Scale - Long Form (Yesavage et al., 1983)
- Cornell Scale for Depression in Dementia (Alexopoulos, Abrams, Young, & Shamoian, 1988)

ASSESSMENT TOOLS

Keep in mind there are few older adults that cannot participate in the Wheelchair Biking program. After identifying residents with depression, the next step is to determine if the resident is able to safely participate (See Appendix B: **Wheelchair Biking Resident Selection Checklist**) and if the resident has an interest in participating. As it is difficult to describe the wheelchair bike, it is best to show the bike to residents and ask them if they would like to take a ride on it to see what it is like. If they are uncertain, ask them if they would like to watch others riding. Residents that **CAN** participate include those with and without dementia, those requiring assistance to transfer or a Hoyer lift to transfer, individuals with urinary drainage devices, portable oxygen, and portable tube feedings (Fitzsimmons, 2001. Evidence Grade = A2). Residents that **CANNOT** participate are individuals who have postural or other conditions, such as a decubitus ulcer, that prohibit them from sitting upright, those with extreme, unpredictable behaviors, and those with acute illnesses. If you are uncertain, ask the patient's physician or nurse practitioner. A sample physician order for the therapy would be: Recreational Therapy: Wheelchair biking every day, for 2 weeks, for depressive symptoms.

DESCRIPTION OF THE PRACTICE

This program uses a specialized piece of therapy equipment called the Duet wheelchair bike. The Duet™ wheelchair bike is an innovative intervention as it can be used with a majority of nursing home residents (See Figure 1). This psychosocial treatment links two familiar items—a wheelchair and a bike, using the Duet™ wheelchair bicycle. The bike consists of a rugged wheelchair which attaches to a half of a bicycle which is unusable on its own. The specially designed chair, orthopedically shaped from fiberglass, reinforced plastic, has padding and adjustable footrests and headrest. When fixed to the cycle the chair tilts back, lifting the small front guide wheels off the floor. This gives a relaxed, stable seating position and makes conversation between resident and rider easier. The chair has good suspension and light handling, and its off road tires are excellent on gravel and dirt tracks. There are twin drum brakes on the

chair's wheel, and a back-pedal brake on the cycle wheel. Standard on the bike is a three-speed hub gear allowing easier pedaling up inclines. The bike comes with many additional safety features including a chest harness seat belt and wheel-spoke covers. This system enables residents, at all levels of functioning, especially individuals with severe disabilities, to ride in the wheelchair while the therapist pedals and steers from the back. This provides older adults with an opportunity to enjoy extended mobility and a sense of freedom, an opportunity to be outdoors, to feel the wind and the sun, to socialize with others, and to bring back familiar childhood memories. The therapy biking program combines the approaches of small group socialization, reminiscing, and exercise therapies without the required mobility or advanced cognitive skills thereby making this treatment available to a wide range of older adults.

The cost of a Duet™ wheelchair bike and helmets is under \$6000. The Duet™ is very well built and should last indefinitely and has the advantage that it can be used by persons other than facility staff members. It is an ideal intervention for family members to use as they are often at a loss of what to do while visiting. Facility staff members who use the bike enjoy riding with residents and have commented that it makes the residents less depressed (Fitzsimmons, 2001). It provides staff members with something meaningful and "fun" to do with residents besides the daily bathing, dressing, feeding and toileting. This program has been recommended for the treatment of depression in the Practice Guidelines for Recreational Therapy (Buettner et al., 2008. Evidence Grade = B1).

Figure 1: The Duet™ Wheelchair Bike



(Printed with permission)

Steps to Take to Set Up a Wheelchair Biking Program

- *Step 1:* Determine the feasibility of a biking program. Is there safe space to ride outdoors? Minor hills are not a problem but a paved area with little traffic is important. The bike can also be used indoors in a large facility with wide halls and good turn-around spots. If facility management, staff, residents and family members are interested in this program, all disciplines, family members and even volunteers can be taught how to assist with the program.
- *Step 2:* Determine who will be responsible for training the riders, as no one should ride a resident without understanding all functions of the bike. Make certain that everyone who is to ride residents is properly trained and rides another staff member before riding any residents (See Appendix C: Wheelchair Bike Staff and Volunteer Training, and Appendix D: Wheelchair Biking Training Record). Although the bike is easy to pedal, the steering is different from a conventional bicycle and takes some practice.
- *Step 3:* Determine a safe bike route or course. This will be specific to your location but try to include areas of interest on your campus such as a pond or gardens. Consider having walkie-talkies available, one for the bike rider and one to remain with a staff member in the facility. Or use a cellular telephone. Have sunglasses available for residents on bright days. Other items you may want to have is a squeeze-type horn for your resident to use, bread to throw to fish, nuts for the squirrels along the way, and binoculars. Taking pictures of the resident on the bike allows residents to show their friends and family when they visit.
- *Step 4:* Other considerations include: 1) set up a designated space to house the bike when not in use, and 2) select a maintenance crew for minor repairs, and tire inflation (They also make wonderful bike peddlers).
- *Step 5:* Ordering the equipment: The Duet™ Tandem Wheelchair Bicycle is made in Germany and distributed in the United States by:

Frank Mobility Systems, Inc.
1003 International Drive
Oakdale, PA 15071

Toll Free (888) 426-8581
Phone (724) 695-7822
Fax (724) 695-3710
Email: info@frankmobility.com
<http://www.frankmobility.com>

The basic model bike, called the economy Duet™, has three speeds and is adequate for most settings. Optional equipment recommendations are based on past equipment used in research with older adults and is recommended for safety purposes (Benson & Tatham, 2001;

Fitzsimmons, 2001; Fitzsimmons & Buettner, 2002). Contact the authors of this guideline for assistance and advice on purchasing the Duet. The recommended optional equipment includes:

- An adjustable headrest: helpful for patients with poor neck control.
- Swing away brackets for the footrest: making transferring on and off easier and safer.
- "H" style harness: helpful for patients who are post-stroke or have difficulty maintaining an upright position. The bike does come with a seatbelt that is adequate for most riders.
- Wheelchair spoke protectors: prevents hands and fingers from injury from the wheelchair spokes when riding.

The Program

Optimal effectiveness is achieved by implementing the intervention for a two-week period, five days per week, for one hour each time (Fitzsimmons, 2001; Fitzsimmons & Buettner, 2002). As it is not feasible to provide recreational therapy indefinitely to an individual resident, this two week intensive is followed by a maintenance period where the patient rides two days per week and is encouraged to attend other facility activities the remaining days of the week.

The one-hour program is designed for groups of three to five participants for each session. The residents should be grouped based on similar cognitive functioning levels with consideration given to the personalities of the individual residents. For example, you may not want to place two residents in the same group that have a known dislike for each other. Consideration must also be given to the physical functioning levels of the participants. For example, you may not wish to include, in the same group, four residents that require lifting devices to transfer to the wheelchair bike, unless you have the staff end equipment available during your program time to complete all of the transfers.

The program has two components, the riding experience and a discussion time (See Appendix E: **Therapy Biking Protocol for Older Adults in Residential Settings**). Once the group is assembled the first rider is assisted into the wheelchair portion of the bike. The rest of the group sits with a second staff member and discusses biking and other activities from the past. One-by-one each rider is encouraged to put his or her safety helmet and H-harness on independently and take a ride. When he or she returns to the group, a discussion is held about things seen during the ride. Ask the participant how he or she enjoyed his or her ride and record it on their ride record (See Appendix F: **Wheelchair Biking Ride Record**). This continues until all participants have had the opportunity to ride.

The daily intervention may be best viewed as an intense two-week therapy period with the objective of initiating a change in symptoms of depression. It is then followed up with a maintenance biking therapy period of eight to ten weeks, with rides given two times a week in addition to encouragement and opportunity to participate in routine facility activities (Buettner & Fitzsimmons, 2002). During the maintenance period, staff informs residents of other facility activities that are available and assists, or arranges assistance, to transport the resident to the

facility activities that interest the resident. These activities are unique to each facility but may include music, entertainment, art and crafts, intergenerational programs, pet visits, church and other ongoing facility activities. Staff may also consider using the wheelchair bike to transport residents to these activities.

Using the Duet™ Wheelchair Bicycle

The Duet™ bike has two parts to it: the wheelchair which is usable on its own, and the bike portion which is unusable on its own. The wheelchair, by itself, may be brought on a unit or into a resident's room for loading (See steps 4, 5, and 6 below). Or residents may be brought outdoors and loaded onto the chair while it is attached to the bike. The two pieces of the wheelchair bike clip together with a u-bar, shackle and locking clip. Always check the tires of the bike and wheelchair, refill when they feel soft according to the manufacturer recommendation. Caution should be taken on wet, slanting, uneven and slippery road surfaces.

Loading Riders

1. Lock the front brakes of the wheelchair by pulling up on the parking brake bar on the back of the wheelchair and pushing the bar into the parking brake clip.
2. Align the back of the bike frame with the wheelchair and slip the u-bar into the catch on the back of the wheelchair.
3. Push the shackle forward into the catch. All four wheels of the wheelchair are still on the ground and you will want to seat your rider before proceeding (See Figure 2).
4. Unclip one side of the footrest by pulling out the slip pin and swing the footrest away prior to loading the rider. Keep one side of the footrest attached. If using a lifting device to load a resident on the bike, you do not need to unclip the footrest.
5. Transfer rider to seat making certain s/he is sitting back in the chair. The chair angle may be adjusted using the directions from the manufacturer. This should be done prior to loading your passenger (See Figure 3).
6. Latch the seat belt around rider and adjust to a comfortable tightness. As with all seat belts, they should be worn low around the hips rather than the waist.
7. Adjust the footrest height to a comfortable level by loosening the bolts and sliding the footrest up or down. A tool for this adjustment is mounted on the back of the wheelchair. Then swing the footrest back into riding position and replace the slip pin. The headrest may also be raised up or down by loosening the bolts and sliding the headrest up or down. Be sure to tighten all bolts before proceeding.
8. Offer helmet and sunglasses and hat if sunny. If it is cool outdoors, offer a lap blanket or a sweater.
9. Tell your passenger that s/he will be lifted up a short distance, then push down on shackle locking clip. This will elevate the front wheels of the wheelchair approximately 2" off of the ground.
10. The peddler should then mount the bike, unlock the front brake, and then start riding

Figure 2: Step 3 shackle



Figure 3: Step 5 transfer



Unloading riders

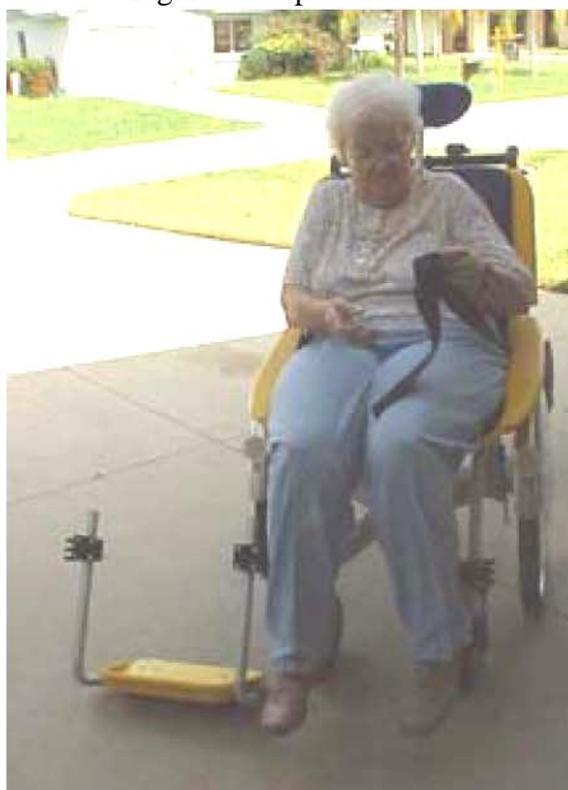
1. Stop the bike and lock the parking brakes by pulling up on the brake bar and slipping it into the parking brake clip (See Figure 4).
2. Inform rider that the chair will lower a short distance. Push up on shackle locking clip and the front wheels of the wheelchair will touch the ground (See Figure 4).
3. If you wish to bring the rider back to the unit in the wheelchair, pull up on the bike frame near the shackle and the two parts will separate. Unlock the parking brake and return the passenger to the unit. Otherwise,
4. Unclip one side of footrest by pulling out the slip pin on one side and swing the footrest to one side.
5. Unfasten seat belt (See Figure 5).
6. Assist passenger out of wheelchair.

Cautions: Never load or unload patients without the front brake on. Never ride the bike without a passenger as this causes a load imbalance and can ruin the wheelchair inner tire tubes. The wheelchair bike is also less stable to ride without a passenger. Never allow anyone to ride a patient without receiving training first. Wheelchair bike should be locked when not in use by trained staff to prevent both the theft of the bike and use by untrained personnel.

Figure 4: Step 1 & 2 parking break



Figure 5: Step 5 unfasten



EVALUATION OF PROCESS AND OUTCOME FACTORS

Process Indicators

Process indicators are those interpersonal and environmental factors that can facilitate the use of a guideline.

One process factor that can be assessed with a sample of staff is knowledge about Wheelchair Biking for Depression. The **Wheelchair Biking for Depression Knowledge Assessment Test** (See Appendix G) should be assessed before and following the education of staff regarding use of this guideline.

The same sample of staff for whom the Knowledge Assessment test is given should also be given the **Process Evaluation Monitor** (See Appendix H) approximately one month following use of the guideline. The purpose of this monitor is to determine understanding of the guideline and to assess the support for carrying out the guideline.

Nursing Interventions

The **Nursing Interventions Classification (NIC)** is a comprehensive, standardized classification of interventions that nurses perform. The Classification includes the interventions that nurses do on behalf of patients, both independent and collaborative interventions, both direct and indirect care. An intervention is any treatment, based upon clinical judgment and knowledge that a nurse performs to enhance patient/client outcomes. NIC can be used in all settings (from acute care intensive care units, to home care, to hospice, to primary care) and all specialties (from critical care to ambulatory care and long term care) (Bulechek, Butcher, & Dochterman, 2008).

Planning care and services using nursing standardized languages begins with assessment to generate accurate nursing diagnoses. For the *Wheelchair Biking* guideline, nursing diagnoses that are particularly relevant are Ineffective Coping and Social Isolation (NANDA International, 2012). Selected nursing interventions from the Nursing Interventions Classification (NIC) and outcomes from the Nursing Outcomes Classification (NOC) are listed to illustrate the process of clinical reasoning when caring for elders' regarding their coping and the potential for social isolation. The listed interventions and outcomes are intended to serve as examples, and not as an exhaustive list.

It is important to note that using NIC and NOC does not preclude an interdisciplinary team approach to care and services. *Wheelchair Biking* is a recreational therapy intervention for which collaboration with other disciplines in addition to recreation therapy is appropriate.

Major Interventions

These are the obvious interventions associated with the guideline. They were selected because they provide a good match with the focus of the guideline.

5330 Mood Management

Providing for safety, stabilization, recovery, and maintenance of a patient who is experiencing dysfunctionally depressed or elevated mood.

4860 Reminiscence therapy

Using the recall of past events, feelings, and thoughts to facilitate pleasure, quality of life, or adaptation to present circumstances.

5360 Recreation Therapy

Purposeful use of recreation to promote relaxation and enhancement of social skills.

5100 Socialization Enhancement

Facilitation of another person's ability to interact with others.

Suggested Interventions

These will address the guideline but are selected less frequently than the priority interventions.

5900 Distraction

Purposeful focusing of attention away from undesirable sensations.

5270 Emotional Support

Provision of reassurance, acceptance, and encouragement during times of stress.

5820 Anxiety Reduction

Minimizing apprehension, dread, foreboding, or uneasiness related to an unidentified source of anticipated danger.

4362 Behavior Modification: Social Skills

Assisting the patient to develop or improve interpersonal social skills.

Optional Interventions

These are interventions, in addition to the primary intervention of *Wheelchair Biking*, which apply only to some situations and allow the health care team to further tailor the plan of care.

4310 Activity therapy

Prescription of and assistance with specific physical, cognitive, social, and spiritual activities to increase the range, frequency, or duration of an individual's (or group's) activity.

5880 Calming Technique

Reducing anxiety in a patient experiencing acute distress.

7110 Family involvement Promotion

Facilitating participation of family members in the emotional and physical care of the patient.

5390 Self-Awareness Enhancement

Assisting a patient to explore and understand his/her thoughts, feelings, motivations, and behaviors.

Permission to use Nursing Interventions Classification (NIC) was obtained through Mosby, Elsevier Health Sciences. (<http://www.us.elsevierhealth.com/>).

Outcome Indicators

Outcome indicators are those expected to change or improve from consistent use of the guideline. The major outcome indicators that should be monitored over time are:

Decrease in depressive symptoms: Symptoms will be individualized and specific for each person and may include:

- Sadness/weepiness
- Loss of interest/apathy
- Decreased socialization/verbalization
- Weight gain or loss
- Low energy/fatigue
- Unspecific complaints

Nursing Outcomes Classification

The **Nursing Outcomes Classification (NOC)** is a standardized classification of patient/client outcomes developed to evaluate the effects of nursing interventions. An outcome is a measurable individual, family, or community state, behavior or perception that is measured along a continuum and is responsive to nursing interventions (Moorhead, et al., 2008). The outcomes are developed for use in all settings and can be used across the care continuum to follow patient outcomes throughout an illness episode or over an extended period of care.

Suggested Outcomes

These outcomes are closely related to the guideline and may be useful in measuring effectiveness for individual patients:

1208 Depression Level

Severity of melancholic mood and loss of interest in life events.

1302 Coping

Personal actions to manage stressors that tax an individual's resources.

2000 Quality of Life

Extent of positive perception of current life circumstances.

1503 Social Involvement

Social interactions with persons, groups, or organizations.

1502 Social Interaction Skills

Personal behaviors that promote effective relationships.

Additional Associated Outcomes

These are other possible outcomes that may be useful:

1300 Acceptance: Health Status

Reconciliation to significant change in health circumstances.

1211 Anxiety Level

Severity of manifested apprehension, tension, or uneasiness arising from unidentifiable source.

0903 Communication: Expressive

Expression of meaningful verbal and/or non-verbal messages.

2008 Comfort Status

Overall physical, psychospiritual, sociocultural, and environmental ease and safety of an individual.

Permission to use Nursing Outcomes Classification (NOC) was obtained through Mosby, Elsevier Health Sciences (<http://www.us.elsevierhealth.com/>).

For this guideline, direct observation, patient record audit or standardized formal assessment instruments (see below) may be used to evaluate whether depression has decreased:

- Geriatric Depression Scale - Short Form (See Appendix A.1) (Sheikh & Yesavage, 1986)
- Geriatric Depression Scale - Long Form (See Appendix A.2) (Yesavage et al., 1983)
- Cornell Scale for Depression in Dementia (See Appendix A.3) (Alexopoulos et al., 1988)

Activity participation may be obtained from activity records. It is important to use the same method of evaluating depression before and after implementing the Wheelchair Biking intervention. It is recommended that post testing with an assessment instrument be performed after two weeks of intervention and monthly thereafter. The Wheelchair Biking Outcomes monitor described in Appendix I is to be used for monitoring and evaluating the usefulness of the Wheelchair Biking guideline in improving outcomes for elders with depression. Please adapt this outcome monitor to your organization or unit and add outcomes you believe are important.

APPENDIX A DEPRESSION ASSESSMENT TOOLS

Appendix A contains examples of assessment tools, instruments, and forms to use in assessment of depression. The purpose of the tool and instructions for use accompany each instrument or form. Tools, instruments and forms in Appendix A are:

- Appendix A.1 Geriatric Depression Scale – Short Form
- Appendix A.2 Geriatric Depression Scale – Long Form
- Appendix A.3 Cornell Scale for Depression

When assessing for depression, it is suggested to target older adults for the Wheelchair Biking intervention whose score on the 1) Short form GDS is 5 or greater, or 2) Long form GDS is 9 or greater, or 3) Cornell score is 6 or greater, or 4) the elder exhibits signs and symptoms of depression but does not score in the depression range on any scale.

APPENDIX A.1 & A.2 GERIATRIC DEPRESSION SCALE

Purpose: The short-form Geriatric Depression Scale (GDS) (Sheikh & Yesavage, 1986) is a widely used screening tool for assessment of depression in persons over the age of 55. It is especially useful in clinical settings to facilitate assessment of depression in older adults, especially when baseline measurements are compared to subsequent scores. The GDS may be used with healthy, medically ill, and mild to moderately cognitively impaired older adults. It has been extensively used in community, acute and long-term care settings.

The GDS is a simple 15-item Yes/No answer interview that takes a few minutes to complete. The questions fall into the following domains: somatic concerns, lowered affect, impaired motivation, lack of self-esteem and lack of future orientation. **A score of five or above is strongly associated with depression (Sheikh & Yesavage, 1986).** Research into the validity of this scale reported that the scale was as effective in identifying depression as the Philadelphia Geriatric Depression Scale or the 30-item Geriatric Depression Scale. The GDS has been tested and used extensively with older adults and was found to have a 92% sensitivity and an 89% specificity when evaluated against diagnostic criteria (Spitzer, Endicott, & Robins, 1978). The validity and reliability of the tool have been supported through both clinical practice and research (Salamero & Marcos, 1992). The original GDS was a 30-item questionnaire which was time consuming and challenging for some patients (and staff). The later 15-item version retains only the most discriminating questions; with its validity approaching that of the original form (Sheikh & Yesavage, 1986).

For the person who is aphasic, it is suggested to use a point-board, which is a board with yes/no next to the items so that the individual can point out the appropriate responses. The strengths of the GDS are the ease in administration, short testing time and the ability to correctly discriminate between mild, moderate and severe depression (Kavan, Pace, Ponterotto, & Barone, 1990). The test is simple enough not to be distorted by low education levels. Drawbacks include that it covers only six of the nine DSM-III-R symptom categories for major depressive syndrome and ignores others such as appetite and weight loss. When given to elderly persons with dementia, the sensitivity of the exam dropped to 65% (Gallo, Reichel, & Anderson, 1995). However, evidence that the GDS is as accurate a screening test for depression in cognitively impaired as in intact elders is reported (Burke et al., 1992; Feher et al., 1992).

Instructions: Ask elders if they prefer to read and self-administer the questions, or if they prefer, the nurse may read each question to them. If persons prefer to self-administer, ask if they require glasses. If they do, ask if they have their glasses with them.

Scoring: For Short Form GDS: Score 1 point for a “yes” response for questions 2-4, 6, 8-10, 12, and 14-15. Score 1 point for a “no” response for questions 1, 5, 7, 11, and 13. Scores can range from 0 -15. The higher the score, the more likely the individual is experiencing depression.

Although differing sensitivities and specificities have been obtained across studies, for clinical purposes a score of greater than 5 points is suggestive of depression and should warrant a follow-up interview. Scores of greater than 10 are almost always indicative of depression.

Scoring: For Long Form GDS: Score 1 point for a “yes” response for questions 2-4, 6, 8,10-14, 16-18, 20, 22-26, and 28. Score 1 point for a “no” response to questions 1, 5, 7, 9, 15, 19, 21, 27, and 29-30.

- Normal → Scored from 0 to 9
- Mild Depressives → Scored from 10 to 19
- Severe Depressives → Scored from 20 to 30
- **Scores of 10 or above suggests depression**
- **Scores of 23 or over almost always indicates depression.**

PLEASE COPY ONE OF THE FOLLOWING DEPRESSION SCALES and place it in the health records of older adults receiving the Wheelchair Biking guideline.

APPENDIX A.1
SHORT GERIATRIC DEPRESSION SCALE (SGDS)
 (Sheik & Yesavage, 1986)

Date: _____

Name: _____

Completed by: _____

*Tell patient to respond to questions based on how s/he has felt **over the past week**.*

Circle the answer that best describes how you have felt <u>over the past week</u>.			
1.	Are you basically satisfied with your life?	Yes	No
2.	Have you dropped many of your activities and interests?	Yes	No
3.	Do you feel that your life is empty?	Yes	No
4.	Do you often get bored?	Yes	No
5.	Are you in good spirits most of the time?	Yes	No
6.	Are you afraid that something bad is going to happen to you?	Yes	No
7.	Do you feel happy most of the time?	Yes	No
8.	Do you often feel helpless?	Yes	No
9.	Do you prefer to stay at home, rather than going out and doing new things?	Yes	No
10.	Do you feel you have more problems with memory than most?	Yes	No
11.	Do you feel it is wonderful to be alive now?	Yes	No
12.	Do you feel pretty worthless the way you are now?	Yes	No
13.	Do you feel full of energy?	Yes	No
14.	Do you feel your situation is hopeless?	Yes	No
15.	Do you think that most people are better off than you are?	Yes	No

Total Score: _____

APPENDIX A.2
GERIATRIC DEPRESSION SCALE- LONG FORM

Date: _____

Name: _____

Completed by: _____

Tell patient to respond to questions based on how s/he has felt over the past week.

Circle the answer that best describes how you have felt <u>over the past week</u>.			
1.	Are you basically satisfied with your life?	Yes	No
2.	Have you dropped many of your activities and interests?	Yes	No
3.	Do you feel that your life is empty?	Yes	No
4.	Do you often get bored?	Yes	No
5.	Are you hopeful about the future?	Yes	No
6.	Are you bothered by thoughts you can't get out of your head?	Yes	No
7.	Are you in good spirits most of the time?	Yes	No
8.	Are you afraid that something bad is going to happen to you?	Yes	No
9.	Do you feel happy most of the time?	Yes	No
10.	Do you often feel helpless?	Yes	No
11.	Do you often get restless and fidgety?	Yes	No
12.	Do you prefer to stay at home, rather than going out and doing new things?	Yes	No
13.	Do you frequently worry about the future?	Yes	No
14.	Do you feel you have more problems with memory than most?	Yes	No
15.	Do you think it is wonderful to be alive now?	Yes	No
16.	Do you often feel downhearted and blue?	Yes	No
17.	Do you feel pretty worthless the way you are now?	Yes	No
18.	Do you worry a lot about the past?	Yes	No
19.	Do you find life very exciting?	Yes	No
20.	Is it hard for you to get started on new projects?	Yes	No
21.	Do you feel full of energy	Yes	No
22.	Do you feel that your situation is hopeless?	Yes	No
23.	Do you think that most people are better off than you are?	Yes	No
24.	Do you frequently get upset over little things?	Yes	No
25.	Do you frequently feel like crying?	Yes	No
26.	Do you have trouble concentrating?	Yes	No
27.	Do you enjoy getting up in the morning?	Yes	No
28.	Do you prefer to avoid social gatherings?	Yes	No
29.	Is it easy for you to make decisions?	Yes	No
30.	Is your mind as clear as it used to be?	Yes	No

Total Score: _____

APPENDIX A.3

CORNELL SCALE FOR DEPRESSION

(Alexopoulos et al., 1988)

Purpose: This is a 19-item clinician-administered instrument that uses information from interviews with both the patient and a nursing staff member, a method suitable for patients with dementia (Alexopoulos et al., 1988) and provides a quantitative estimate of depressive severity. The scale was designed for rating of depression in demented patients with the goal of creating an instrument sensitive to changes in symptomatology during the progression of the disease and sensitive to pharmacologic treatment. The ratings are based on information obtained by a clinician after interviewing the patient's caregiver as well as the patient. The Cornell Scale has 19 items or five broad categories: (1) mood-related signs, (2) behavioral disturbance, (3) physical signs, (4) cyclic functions, and (5) ideational disturbance. Each of the items is rated according to three explicitly defined grades: (1) absent, (2) mild or intermediate, and (3) severe. Items on the scale emphasized observable signs of depression such as sadness, agitation, sleep difficulties and lack of energy. The scale has high interrater reliability (Cohen's kappa = 0.67), internal consistency (coefficient alpha=0.84), and sensitivity. Total Cornell Scale scores correlate (0.83) with depressive subtypes of various intensity classified according to Research Diagnostic Criteria (Alexopoulos et al., 1988).

SCORING OF CORNELL DEPRESSION SCALE

1. Clinician interviews the patient using this scale.
2. Family member/caregiver observes the patient for approximately seven days. Based on observations, caregiver rates the various categories.
3. Scores are reviewed by clinician. Any discrepancy, clinician interviews both patient and caregiver for various categories.

Note: In rating the score of the Cornell Depression Scale, there is no real cutoff point for depression. However, guidelines for suspected depression that are used are as follows:

- For persons with suspected dementia, a score below 6 suggests the person is likely NOT depressed.
- For persons with suspected dementia, a score of 6-9 is suggestive of minor depression.
- For persons with suspected dementia, a score of 10-17 is suggestive of major depression.
- For persons with suspected dementia, a score above 18 indicates major depression.

CORNELL SCALE FOR DEPRESSION
(Alexopoulos, et al., 1988. Reprinted with Permission)

NAME _____ AGE _____ SEX _____ DATE _____

WING _____ ROOM _____ PHYSICIAN _____ ASSESSOR _____

Ratings should be based on symptoms and signs occurring during the week before interview. No score should be given if symptoms result from physical disability or illness.

SCORING SYSTEM

a = Unable To Evaluate 0 = Absent 1 = Mild to Intermittent 2 = Severe

a 0 1 2 A. MOOD-RELATED SIGNS

				1. Anxiety: anxious expression, rumination, worrying
				2. Sadness: sad expression, sad voice, tearfulness
				3. Lack of reaction to present events
				4. Irritability: annoyed, short tempered

a 0 1 2 B. BEHAVIORAL DISTURBANCE

				5. Agitation: restlessness, hand wringing, hair pulling
				6. Retardation: slow movements, slow speech, slow reactions
				7. Multiple physical complaints (score 0 if gastrointestinal symptoms only)
				8. Loss of interest: less involved in usual activities (score only if change occurred acutely, i.e., in less than one month)

a 0 1 2 C. PHYSICAL SIGNS

				9. Appetite loss: eating less than usual
				10. Weight loss (score 2 if greater than 5 pounds in one month)
				11. Lack of energy: fatigues easily, unable to sustain activities

a 0 1 2 D. CYCLIC FUNCTIONS

				12. Diurnal variation of mood symptoms worse in the morning
				13. Difficulty falling asleep: later than usual for this individual
				14. Multiple awakening during sleep
				15. Early morning awakening: earlier than usual for this individual

a 0 1 2 E. IDEATIONAL DISTURBANCE

				16. Suicidal: feels life is not worth living
				17. Poor self-esteem: self-blame, self-deprecation, feelings of failure
				18. Pessimism: anticipation of the worst
				19. Mood congruent delusions: delusions of poverty, illness or loss

Notes/Current Medications: _____

APPENDIX B
WHEELCHAIR BIKING RESIDENT SELECTION CHECKLIST
(Suzanne Fitzsimmons, 2002)

Purpose: The Wheelchair Biking Resident Selection Checklist is used to insure that all areas of consideration for selection and safety of the patient are considered.

Instructions: Answer questions on checklist with either yes or no. In order to be considered for the Wheelchair Biking program, all of the questions must be answered “yes”.

WHEELCHAIR BIKING RESIDENT SELECTION CHECKLIST

(© Suzanne Fitzsimmons, 2002. Reprinted with Permission)

Does patient have depression signs and symptoms? (Based on assessment instrument or observed behavior)	YES	NO
Is patient able to sit in an upright position? (Conditions that might prevent this are contracture, postural considerations, decubitus ulcer, or order for leg elevation at all times)	YES	NO
Is patient medically stable? (Febrile conditions, infections, and other acute conditions that would prevent patient from leaving unit and going outdoors)	YES	NO
Is patient's behavior predictable and controllable? (Severe physical agitation or anxiety or other behaviors that might be exacerbated by leaving unit and going outdoors)	YES	NO
Has patient agreed to take a ride? (Show patient the bike, demonstrate how it is used, ask if they would like to ride. If no, ask if they would like to watch someone else ride, then offer a ride again)	YES	NO

Note: You must answer yes to all of these questions for patient to be considered for the wheelchair biking program.

APPENDIX C
WHEELCHAIR BIKE STAFF AND VOLUNTEER TRAINING
(Linda Buettner, 1999)

Purpose: The Wheelchair Bike Staff and Volunteer Training form is used to insure that all personnel who will be riding has had training and is able to complete each skill as it pertains to operating the wheelchair bike. No person should ever ride the wheelchair bike without receiving training (Fitzsimmons, 2001; Buettner & Fitzsimmons, 2002).

Instructions: The wheelchair bike staff training reviews all parts of operating the bike, using the checklist to insure all parts are covered. Verbal instructions should be followed by demonstration. In turn, each trainee should practice all functions of the bike and demonstrate them to the trainer. Trainers check off areas of training when they feel trainees are competent. All trainees should practice with riders until they feel conformable with the handling of the bike. When trainees have shown competence in all areas of the staff-training sheet, the sheet is signed and dated by the trainer and kept on file with the Recreation Department. This information is also placed on the Wheelchair Training Biking Record (See Appendix D: **Wheelchair Biking Training Record**).

WHEELCHAIR BIKE STAFF AND VOLUNTEER TRAINING

(© Linda Buettner, 1999. Reprinted with Permission)

**Gear stuff** (check off as rider completes each skill)

- Gear shifter - 3 speed - keep pedaling without effort as you change gears
- Gear will not engage immediately, stop pedaling for a moment
- Change gears before you get to a hill

Brake (check off as rider completes each skill)

- For normal conditions use the back pedal brakes
- The front drum brake is similar to a car's parking brake. If you use it too much while in motion it can heat the drum brake and cause a loss of lubricant and damage to the brake.
- Parking brake application and release: Always apply when loading/unloading.
- Seat is adjustable - three positions for rider
- Saddle is adjustable for the biker

Boarding the passenger

- Push the parking brake to "on" position
- Tilt seat forward by opening shackle
- Remove one side of the footrest
- Transfer the resident- use a transfer belt if you need to
- Put the footrest back in place and tighten the bolts
- Ask the passenger to put on the safety harness and helmet (Assist if needed)
- Raise seat (inform rider) and re-shackle

Separating/Connecting the wheelchair from/to the bike

- Pull parking brake
- Open the shackle, lower the wheelchair and hang off bike unit
- Pull up on bike and detach from chair
- Re-attach bike to wheelchair

Safety check the overall bike before your ride

- Seat and tires - especially inflation levels
- Pedals
- Straps/harness
- Footrest
- Shackle

Before riding any resident you must ride a recreation therapy staff member to prove your knowledge and skills on the DUET Bike.

Riding Tips:

1. This is a 3-wheeled bike and handles differently than a 2-wheeled bike.
2. The bike has a wide turning radius so plan ahead.
3. Never ride the bike without a passenger - it is balanced for loaded operation only.
4. Always practice with a staff member first, go slowly for your first few rides.

Date of In-Service: _____ Training given by: _____

Name: _____

APPENDIX D WHEELCHAIR BIKING TRAINING RECORD

(Suzanne Fitzsimmons, 2002)

Purpose: The Wheelchair Biking Training Record builds an easily accessible list of all the persons who are eligible to ride the wheelchair bike (Buettner & Fitzsimmons, 2002; Fitzsimmons, 2001).

Instructions: After staff or other personnel has satisfactorily completed the wheelchair biking training, that person's information, as it pertains to the training, should be filled in the following form. This form should be kept in the Recreation Department office and a copy posted where the bike is stored.

APPENDIX E
THERAPY BIKING PROTOCOL FOR OLDER ADULTS
IN RESIDENTIAL SETTINGS

(Linda Buettner, 1999)

Purpose: The following is a recreational therapy protocol to guide the therapist/staff member in implementing the wheelchair biking program. Following this format insures consistency for the program and replicates the program that was found to significantly reduce depression in three separate research studies (Benson & Tatham, 2001; Buettner & Fitzsimmons, 2002, Fitzsimmons, 2000; Fitzsimmons & Buettner, 2001).

Instructions: Review the Wheelchair Biking for the Treatment of Depression guideline prior to implementing the program. Use the guideline to determine equipment needed during the program and for possible outcomes to achieve.

THERAPY BIKING PROTOCOL FOR OLDER ADULTS IN RESIDENTIAL SETTINGS

(© Linda Buettner, 1999. Reprinted with Permission)

Name of Program: Therapeutic biking group.

Staff requirements: One therapist or nurse plus one assistant for each session.

Equipment: Duet wheelchair bicycle and helmet for rider and bike driver. (Optional equipment: Bike horn, two-way radios, sunglasses, clip-on sunglasses, sun screen, lap blanket, wide brim hat, bread to feed birds, squirrels, fish, etc). Books on biking, transportation, bike parts.

Entrance criteria: Enjoyed biking in the past plus symptoms of mild to moderate depression (as evidenced by 1) Short form GDS is 5 or greater, or 2) Long form GDS is 9 or greater, or 3) Cornell score is 6 or greater, or 4) patient exhibits signs and symptoms of depression but does not score in the depression range on any scale).

Exit criteria: No longer enjoys biking program and/or free of symptoms of minor depression.

Group size: Therapeutic biking program will be completed in groups of three to five residents.

Duration: Each resident will receive 15 minutes of riding time for a total session of one-hour (4 residents at 15 minutes each) five times per week for two weeks. At the end of the two-week period, residents will receive two rides per week and encouragement to participate in facility activities on the other three days of the week.

Safety considerations: Each participant should have medical clearance to participate in the therapeutic biking program. Participant will wear a safety helmet and seat belt while on the Duet bike. Make sure resident is dressed appropriately for the weather. Provide sunscreen or cover for those with sun sensitivity. Participants will be assisted on and off the wheelchair bike when boarding and de-boarding the bike.

Methods: The program has two components. In part one, participants will have a small group discussion about bike riding. In part two, each resident will take a 15 minute ride with his or her therapist.

Part I: The aide will sit with those residents who are waiting for their turn to ride. During this time the small group will discuss bike riding in the past. Discussion questions will tap into long term memory and might be: “Do you remember your first bike? What color was it? What was it like?” “How old were you when you learned to ride a two-wheeler?” “Did you ever ride a bicycle built for two?” “Where did you ride your bike when you were young?” “Did you ever get hurt riding your bike?” “Did you ever teach anyone else to ride a bike?” “What was the best thing about bike riding?” Discussion may also include photographs of bicycles and other forms of transportation, plus bicycle parts such as bells, pumps, mirrors, etc.

Part II: Lock bike parking brakes. The Duet wheelchair will be lowered for boarding and the foot rest will be swung away. Each resident will be assisted to board the wheelchair bike. Each resident will put on the helmet and attach the seat belt for comfort. The therapist will double check the harness and helmet before raising the chair to biking position and beginning the ride. The ride will take place on the flat driveway areas surrounding the nursing facility for 10-15 minutes. When the ride ends, the resident will remove harness, helmet, and footrest. After the ride, staff is to debrief the resident about the quality and satisfaction of their ride and then discuss with the group what things they observed during their ride. From this information a group discussion would follow about what was observed. For example, if the resident described a bird he or she saw, the discussion would lead to bird watching, bird feeding, and birds as pets. If fish were seen, a discussion about fishing would then take place. If flowers and plants were seen, a discussion about gardening would follow. These discussions would lead to other leisure program options for the resident after the two-week intensive biking program. Questions to be asked about the ride should provide the information for filling out the Wheelchair Biking Ride Record (see Appendix F). This includes asking if they enjoyed their ride, and would they do it again in addition to how it made them feel, would they recommend it to others, and was the ride too slow or too fast, bumpy or smooth.

Maintenance Period: During this period residents participate in the wheelchair bike program as described above, but for two days per week only. During the other days of the week, staff informs residents of other facility activities that are available and assists, or arranges assistance, to transport the resident to the facility activities. These activities are unique to each facility but may include music, entertainment, art and crafts, gardening, intergenerational programs, pet visits, church and other ongoing facility activities. Staff may also consider using the wheelchair bike to transport residents to these activities.

Possible Objectives:

- To improve small group socialization as evidenced by verbalizing with at least one other person in the group during each session.
- To improve mood as evidenced by positive comments about riding and by a happy expression.
- To increase appetite as evidenced by improved nutritional intake.
- To improve sleep as evidenced by reducing nighttime rising.
- To improve concentration as evidenced by staying in the group and remaining on topic during discussions.
- To improve self-esteem as evidenced by positive descriptions of experience on bike.
- Reduce feelings of apathy as evidenced by an expression of looking forward to another ride in the future.

APPENDIX F
WHEELCHAIR BIKING RIDE RECORD
(Suzanne Fitzsimmons, 2001)

Purpose: The Wheelchair Biking Ride Record is designed to be a method of documenting the resident's response to the wheelchair biking program and the number of times the resident participated in the program.

Instructions and Scoring: This record should be kept in a notebook for all the current participants of the biking program. Transfer assistance should be filled in to insure safe transfer of all participants. The therapist or other staff member implementing the program should fill out this form by checking all that applies under the Participation, Socialization and Behavior/Mood sections of the form. Record should be filled out at the end of each program and the completed forms should be reviewed weekly, or more often, to determine if any participants are not appropriate for the program. This would include residents that regularly refuse to ride, show fear, agitation or weepiness. At the end of each week these forms are placed in residents' charts in the Recreation Therapy section.

WHEELCHAIR BIKING RIDE RECORD
 (© Suzanne Fitzsimmons, 2001. Reprinted with Permission)

Name: _____ **Room Number:** _____
Transfer Assistance: _____

Date: _____ Check all that apply, add comments if needed

Participation

- _____ Enjoyed
- _____ Would do again
- _____ Needed encouragement
- _____ Participated to be polite
- _____ Refused to participate

Socialization

- _____ Interacted with staff & other participants
- _____ Interacted with staff only
- _____ No interaction with others

Behavior/Mood

- _____ Appeared happy
- _____ Restless/anxious
- _____ Showed fear/frustration
- _____ Agitated
- _____ Became weepy

How was your ride?

Comment:

Date: _____ Check all that apply, add comments if needed

Participation

- _____ Enjoyed
- _____ Would do again
- _____ Needed encouragement
- _____ Participated to be polite
- _____ Refused to participate

Socialization

- _____ Interacted with staff & other participants
- _____ Interacted with staff only
- _____ No interaction with others

Behavior/Mood

- _____ Appeared happy
- _____ Restless/anxious
- _____ Showed fear/frustration
- _____ Agitated
- _____ Became weepy

How was your ride?

Comment:

APPENDIX G
WHEELCHAIR BIKING FOR DEPRESSION KNOWLEDGE ASSESSMENT TEST

The individual who will be managing use of this evidence-based guideline and coordinating education of staff, should be the only one who has access to this test key. Following proper education with regard to wheelchair biking, each peddler should be given an opportunity to take this test. Use this test as a learning tool only. Please have riders take this test without the key present, and once they are done, let them code how many questions they answered correctly and incorrectly. Guidance in determining why they answered as they did can also be part of the learning process.

WHEELCHAIR BIKING KNOWLEDGE ASSESSMENT TEST KEY

1. F
2. A
3. G
4. B
5. C
6. D
7. A
8. C
9. E
10. D

WHEELCHAIR BIKING KNOWLEDGE ASSESSMENT TEST

1. Risk factors for depression may include:
 - A. Dementia diagnoses
 - B. Chronic illnesses
 - C. Bereavement
 - D. Certain medications
 - E. All but D
 - F. All of the above

2. Depression often goes undiagnosed and therefore untreated.
 - A. True
 - B. False

3. Which of the following is related to older adults with depression:
 - A. Depression is associated with functional decline
 - B. Older persons may exhibit non-specific somatic complaints
 - C. Depression is the most common mood disorder of late life
 - D. Depression is a contagious condition
 - E. Depression causes excess mortality
 - F. All but D
 - G. All of the above

4. Patients that cannot ride the wheelchair bike are those who:
 - A. Have indwelling urinary catheters
 - B. Have acute illness
 - C. Need a lifting device for transfers
 - D. Are over 100 years of age

5. Persons who cannot serve as bike peddlers are:
 - A. Facility department heads
 - B. Certified nurses' aides
 - C. Nurses who have not had the bike training
 - D. Family members
 - E. Volunteers

6. The front disc brakes of the wheelchair bike should be used:
 - A. Whenever you need to stop the wheelchair bike
 - B. Whenever the bike is parked
 - C. When loading and unloading patients
 - D. B and C
 - E. All of the above

7. The wheelchair bike program is most effective for reducing depression when used as a daily, intense two-week intervention.
 - A. True
 - B. False

8. The following clinical outcome factors are expected with consistent and appropriate use of wheelchair biking guideline:
 - A. Decreased depression
 - B. Increased socialization
 - C. A and B

9. Recreation Therapy:
 - A. Is the provision of activities such as bingo and large group entertainment
 - B. Restores, remediate or rehabilitates in order to improve functioning and independence as well as reduce or eliminate the effects of illness or disability
 - C. Has a process similar to nursing: Assessment, goals and objectives, intervention, evaluation
 - D. May be ordered by a physician
 - E. All of the above except A
 - F. B and C

10. A Certified Recreation Therapist Specialist (CTRS):
 - A. Has a minimum of 4 years of college
 - B. Has passed a national standard minimal competency examination, similar to nursing's NCLEX
 - C. Is required to obtain continuing education credits to remained certified
 - D. All of the above

APPENDIX H PROCESS EVALUATION MONITOR

The purpose of this monitor is to evaluate perceived understanding and support of each leader in carrying out the guideline.

PLEASE COPY THE FORM ON THE NEXT PAGE and ask each front line staff member, nurse and/or physician who uses the guideline to complete it approximately one month following initial use of this guideline.

Once the front line staff, nurses and/or physicians who are using the guideline complete this Process Evaluation Monitor, the individual in charge of implementing the guideline should provide feedback to each participant who completed a form and offer further education or support as needed. To calculate a total score, add up the response given for each item. The highest total score possible on this monitor is 36, while the lowest score possible is 9. Those who have higher scores on this monitor are indicating that they are well-equipped to implement the guideline, and understand its use and purpose. On the other hand, those who have relatively low scores are in need of more education and support in the use of the guideline.

PROCESS EVALUATION MONITOR

Directions: Please circle the number that best communicates your perception about your use of the Wheelchair Biking for the Treatment of Depression.

		Strongly Disagree	Disagree	Agree	Strongly Agree
1.	I feel knowledgeable to carry out the Wheelchair Biking guideline.	1	2	3	4
2.	Implementing the Wheelchair Biking guideline enhances the quality of care on the unit.	1	2	3	4
3.	I feel supported in my efforts to implement the Wheelchair Biking guideline.	1	2	3	4
4.	I feel comfortable riding the Wheelchair bike and well prepared to implement the social group portion of the guideline with the assistance of the Recreation Department.	1	2	3	4
5.	I am able to identify depressive symptoms.	1	2	3	4
6.	I am able to identify and carry out the essential activities of the Wheelchair Biking intervention.	1	2	3	4
7.	I had enough time to learn about the Wheelchair Biking guideline and practice riding before it was implemented.	1	2	3	4
8.	We are managing depression better with the use of the Wheelchair Biking guideline.	1	2	3	4
9.	Wheelchair Biking is one way that enables me to better meet the needs of most depressed patients.	1	2	3	4

**APPENDIX I
WHEELCHAIR BIKING OUTCOMES MONITOR**

For each person receiving the Wheelchair Biking program, please complete the form on the following page. This form should be completed on at least a weekly basis. For persons receiving the intervention, please keep a record of the changes observed in their health records.

PLEASE MAKE A COPY OF THE FORM ON THE NEXT PAGE and place it in the medical record of each person who is receiving the Wheelchair Biking guideline. The outcomes on this form should be assessed and recorded for each person on a weekly basis.

TO USE THE FORM: Place the appropriate criteria key next to each separate outcome for each assessment. We have provided a total of 8 boxes, which represent the first eight-week period.

EXAMPLE

The example below is for one outcome elicited from an interview, and displays the criteria keys:

Criteria Key	
Y=Yes /met criteria	
N=No /criteria not met	
J=Justified Variation e.g. patient not included in the monitor; note <i>why</i> patient is not included	

Please place the appropriate criteria key next to each outcome for each assessment period.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Outcome 1: Patient verbal and non-verbal responses reveals that patient is in a better mood as noted by the following indicators:								
Patient Interview reveals a decrease in weepiness/sadness, apathy, and complaints.	N	N	Y	Y	Y	Y	Y	Y

WHEELCHAIR BIKING OUTCOMES MONITOR

Criteria Key

Y=Yes/met criteria

N=No/criteria not met

J=Justified Variation; e.g. patient not included in the monitor; note *why* patient is not included

Place the appropriate criteria key next to the outcome indicators for each monitoring period.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Outcome 1: Patient verbal and non-verbal responses reveal that patient is in a better mood as noted by the following indicators.								
Patient Interview reveals a decrease in weepiness/sadness, apathy, and complaints.								
Patient Interview reveals an increase in energy, socialization, verbalization								
Patient GDS scores are or have declined or remained low.								
Patient has increased facility activity participation.								
Patient family member has expressed improvement in patient's mood.								
Outcome 2: Patient weight/appetite to be within normal limits.								
Patient Interview reveals a good appetite.								
Patient Observation reveals he/she enjoys meals.								

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Outcome 3: Patient has adequate levels of sleep.								
Patient Reports sleeping well and with little daytime fatigue.								
Patient Records reveal increase in nighttime sleeping.								
<i>Comments:</i>								
Week 1: _____								
Week 2: _____								
Week 3: _____								
Week 4: _____								
Week 5: _____								
Week 6: _____								
Week 7: _____								
Week 8: _____								

**ANNOTATED BIBLIOGRAPHY
WHEELCHAIR BIKING FOR THE TREATMENT OF DEPRESSION**

Fitzsimmons, S. (2001). Easy rider wheelchair biking: A nursing-recreation therapy clinical trial for the treatment of depression. *Journal of Gerontological Nursing, 27(5), 14-23.*

The purpose of this study was to examine the use of a prescribed therapeutic recreation-nursing intervention, wheelchair biking, for the treatment of the symptoms of depression in older adults in a long-term care setting. The target population was residents with a diagnosis of, or symptoms of, depression residing in a long term care facility. A classical experimental design was used and was guided by the Roy Adaptation Model. After the initial screening with the short form GDS, fifty-five subjects were identified as being eligible for the study. Forty subjects were then randomly selected from the fifty-five eligible subjects and those forty were randomized into an equal number of participants in the experiment and control groups (Treatment = 20, Control = 20 for a total of 40 subjects). Comparisons made between the two groups determined that equality between groups in relationship to the extraneous variables had been achieved through random assignments. These subjects, average age 80.5, had a variety of mental and physical conditions. Thirty-one percent of the subjects were without a chart diagnosis of depression and fifty-one percent of the subjects were currently not receiving any treatment at all for depression. Within the subjects in the treatment group there were three who required lifting equipment to be transferred into the wheelchair bike. One subject required portable oxygen to be attached to the bike, one had an indwelling catheter and one had a continuous tube-feeding device that required continuous feeding during riding. Eleven of the twenty had a diagnosis of dementia, and of them, five resided on a special care unit. Four subjects were over the age of 92 and one would be turning 100 shortly after the study ended. A two-week trial of biking therapy was provided to the treatment group and all subjects were post-tested again with the GDS. The GDS scores were analyzed using a t-test for independent samples with a two-tailed significance at the $\alpha = .05$ level. The control group pre-test GDS means of 7.95 increased slightly at the post-test to 8.65, indicating a slight increase (+0.70) in depression. The treatment group GDS pre-test means of 7.68 decreased to 4.21 (-3.47) at the post-test denoting a marked decrease in depression. The analysis of these variables determined that the difference in post-test GDS means for the treatment group was statistically significant at the $p < .0001$ level. With the exception of one subject, whose score remained the same, all depression scores improved for treatment group subjects.

Buettner, L., & Fitzsimmons, S. (2002). AD-Venture program: Therapeutic biking for the treatment of depression in long term care residents with dementia. *American Journal of Alzheimer's Disease, 17(2), 121-127.*

The purpose of this study was to assess the effectiveness of the wheelchair biking program on depression for older adults with dementia. The sample included 70 residents with dementia from the two participating facilities: long-term care (n=41) and assisted living (n=29) who screened positive for depression. The range of Mini-Mental State Examination Score for this study was 0-24. Of this sample, 43.9% did not have a diagnosis of depression and 53.7% were not receiving

any treatment for depression. The design for this study was a classical experimental design with randomization, a control and treatment group and testing at three time points: pre-test, post-test and follow-up. The interventions period were as follows: The treatment groups received a two-week intense biking period, followed by post-test data gathering, then followed by a ten week maintenance intervention period and then follow-up testing. During this maintenance period the subjects received wheelchair biking two times per week. The remaining three days per week the subject participated in other activity programs to connecting them with currently offered programs within the facility. This phase of the study ensured maintenance of the program and continued treatment of residents with depression when the research staff withdraws. The major variable examined was depression as determined by the short version of the GDS. At baseline, there were no significant differences between control and treatment groups in any demographic characteristics. The scores were analyzed using a t-test for independent samples with a two-tailed significance at the (α) = .05 level. The treatment groups' pre-test means of 8.00 decreased to 4.48 at the post-test and declined further to 3.14 at follow-up denoting a marked decrease in depression. The control groups' pretest means of 8.40 increased to 8.90 at the post-test and declined slightly to 8.37 at follow-up. The analyzes of these variables showed that the difference in both posttest and follow-up GDS means for the treatment group were statistically significant at the $p < .001$ level. A twenty minute professional made educational video-tape and training manual was produced by the research team as part of this project.

Benson, J., & Tatham, J. (2001). Just duet bike study. Pinnacles: Canadian Physiotherapy Association. *Gerontology Division Newsletter*, (57) Fall.

The purpose of this study, by Benson, a Certified Recreational Therapist Specialist, was to replicate the Fitzsimmons (2000) research pertaining to participation in a therapy biking program for depressive symptomatology in older adults living in long-term care facilities. For this study, the target population was residents with a diagnosis of depression. The study followed a classical experimental design. From four different sites in Canada, 32 participants identified through random sampling were separated into a control group and a treatment group. The 16 participants in the treatment group experienced a leisurely 15 minute bike ride once daily for two weeks. Data analysis consisted of pre and post testing using the Geriatric Depression Scale (Sheikh & Yesavage, 1986) and the Cornell Depression Scale for Dementia (Alexoupoulous et al., 1988) and Independent t-tests. The GDS and Cornell scores were analyzed using a t-test for independent samples with a 2-tailed significance at the $\alpha = .05$ level. Applying this method, the differences between the pairs of observations for the repeated measurement on the matched pairs were used. This enabled the researchers to test the null hypothesis to determine whether there was a significant difference between subjects' pre and post-test scores on the GDS (1986) / Cornell (1988). The control groups' pre-test mean of 4.50 increased slightly at the post-test to 4.70, indicating a slight increase (0.20) in depression. The treatment groups pre-test mean of 5.80 decreased to 4.10 (-1.70) at the post-test indicating a significant decrease in depression at the $p < .05$ level.

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Key: (R) = Research (L) = Non-Research Literature (N) = National Guidelines

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