Role of Exercise and Physical Activity In Therapeutic Recreation Services

Kenneth E. Mobily, CTRS, University of Iowa

Abstract

The working thesis for this paper is that therapeutic recreation is in the best position to deliver an ongoing lifetime program of regular physical activity that promotes and maintains functional ability and health among many persons with disabilities and chronic conditions. Literature is presented that supports the use of exercise as a means of achieving functional and psychological improvements. Following this review, several principles are then presented as the foundation for justifying the use of recreational level exercise as a therapeutic recreation modality. The implications for adopting the use of recreational level exercise are significant for practice and professional preparation. Practitioners will not only need to be competent in exercise program leadership and delivery, but will also need to understand the idiosyncrasies of exercise as a type of leisure behavior. Professional preparation will inevitably have to integrate more exercise and behavioral science into the curriculum.

KEYWORDS: *Exercise, Recreational, Physical Activity, Prevention, Health Promotion*

Kenneth E. Mobily, CTRS is Professor and Coordinator of Leisure Studies at the University of Iowa

Introduction

A sedentary lifestyle is a risk factor for many chronic conditions (Kesaniemi et al., 2001). Cholesterol and other lipids are more prone to accumulate on the inside of blood vessels, increasing the risk of myocardial infarction, stroke and hypertension. The integrity of the skeletal system deteriorates in the absence of weight-bearing, physical activity; joints also become less mobile and flexible. Muscles lose contractile proteins and atrophy with disuse. The sedentary individual is more at risk for obesity, which in turn increases the probability of cardio-vascular disease, Type II diabetes mellitus, and some types of cancer.

If the general, asymptomatic population is at greater risk for disease and functional loss associated with inactivity, then the sub-population of persons with disabilities may be at even greater risk. Older adults are especially at risk for the development of chronic conditions. Almost half of adults over 65 have arthritis, more than one-third have hypertension, and almost 10% have diabetes mellitus (Hobbs, 1995).

Although growing older does not necessarily mean the person will experience a limitation, seniors are certainly more vulnerable to chronic conditions than younger cohorts. Unfortunately older adults are also less likely to practice exercise in amounts needed to produce any functional or preventive benefit (Le Masurier et al., 2008). Only 39% of older adults exercise at or above recommended levels. But, almost 60% of young adults conform to recommended levels of daily exercise (Haskell et al., 2007).

Other disability groups, such as persons with developmental disabilities, fair no better. Rimmer, Heller, Wang and Valerio (2004) noted a growing problem of sedentary lifestyle among persons with intellectual disability. Draheim, Williams and McCubbin (2002) surveyed 150 community-residing adults with intellectual disability and asked them about their leisure time physical activity. Results indicated that half reported little or no exercise. Because sedentary lifestyle has been found to contribute markedly to obesity (Rogers, Colbert, Greiner, Perkins, & Hursting, 2008), inactivity among persons with intellectual disability is of great concern.

Hedrick and Broadbent (1996, p. 138) maintained that "…[I]ndividuals with disabilities are at greater risk of incurring debilitating chronic health problems", often because of sedentary lifestyle. Ten years later, Ipsen (2006) underscored Hedrick and Broadbent's observation. For example, an individual with a spinal cord injury is at greater risk of osteoporosis because she cannot perform weight-bearing activities associated with everyday life. She is at greater risk of obesity because of less muscle mass to engage in activity, leaving her unable to burn as many calories as peers with no impairment. Loss of muscle tone leads to the accumulation of urine in the bladder, increasing the odds of urinary tract infections. Skin lesions and the associated risk of infection increase because the same area of the buttocks or lower extremity must bear weight in a seated position for the person using a wheelchair.

Immobility breeds conditions for the development of osteoporosis. Bone tissue builds in response to (favorable) stress, such as walking or resistance exercise. For individuals with conditions such as spina bifida, multiple sclerosis or muscular dystrophy, immobility and the absence of positive skeletal-stressing activity is an unfortunate part of daily life and the lack of exercise jeopardizes the integrity of the skeletal and joint systems (Michnovicz, 2001).

Because exercise is so often recommended as a means of preventing or postponing the onset of chronic or secondary conditions in persons at risk (e.g., older adults) and persons with disabilities, the thesis explored in the present paper is whether therapeutic recreation (TR) professionals may encourage, promote and implement exercise programs as a regular part of service. Accordingly, the purposes of this article are to:

- Review the potential benefits of exercise for older adults and persons with disabilities.
- Present a rationale for the use of exercise by TR Specialists.
- Set forth foundation principles for exercise programs delivered under the auspices of TR Services.
- Conclude by examining the implications of exercise for TR practice and professional preparation.

Exercise Benefits

The benefits of regular exercise and physical activity for the general population

are well known and supported by abundant findings that span decades of research (e.g., Ferrari, 2007; Haskell et al., 2007; Nelson et al., 2007). Regular exercise is associated with lowered risk of cardio-vascular diseases and pathologies of many types, including sudden cardiac mortality, stroke, coronary artery disease, peripheral vascular disease, and hypertension. The musculo-skeletal systems also stand to benefit from regular physical activity related to lowered risk of osteoporosis, osteo-arthritis, sarcopenia and frailty, and the risk of falls in older age. More generally, regular exercise is associated with a lowered risk of pre-mature, all-cause mortality and morbidity, including some types of cancer (e.g., breast cancer, see Monninkhof et al., 2007; endometrial cancer, see Cust, Armstrong, Friedenreich, Slimani, & Bauman, 2007; colon cancer, see Trojian, Mody, & Chain, 2007). Persons with Type II (non-insulin dependent) diabetes mellitus are known to benefit from programs of physical activity related to increasing the responsiveness of critical cells (liver cells and skeletal muscle cells) to insulin, in some cases resulting in the ability of the individual to manage his diabetes without medication, using diet and exercise instead.

Even persons with pronounced impairments, such as chronic heart failure, can benefit from some exercise. Data support the physical and psychological benefits of making exercise an important part of the patient's daily routine (Myers, 2008). Of course, exercise programs for persons with heart failure should be closely monitored by a physician and a qualified rehabilitation team. But the point to underscore here is that even those with profound limitations stand to benefit from some physical activity.

More often than not, the reported physical activity, the recommended physical activity, or the physical activity employed as an intervention in studies is of a mild to moderate intensity, especially when studies recruit participants with disabilities or chronic conditions. This mild to moderate intensity activity will be called "recreational level" physical activity or exercise for the purpose of this paper.

Recreational level exercise may be defined along a continuum of intensity, ranging from no exercise to vigorous exercise (see Figure 1). The theoretical range for "recreational level" exercise includes both the mild and moderate categories, bolded in Figure 1.

FIGURE 1.

EXERCISE INTENSITY IN METS FOR VARIOUS ACTIVITIES

	Low	**Mild**	**Moderate**	Vigorous
METs:	1 METs	**2 METs**	**3-6 METs**	>6 METs
Example activities:	Sitting quietly	**Casual walking**	**Brisk walking (about 3 MPH)**	Race walking
		Darts	**Golf (walking)**	Jogging
		Billiards	**Water aerobics/ exercise**	Bicycling (>9 MPH)
		Croquet	**Weight training (light)**	Cross-country skiing
		Fishing	**Recreational swimming**	Jumping rope
			Yoga	Racquetball
			Gardening	Soccer

** Source: www.heart.org/downloadable/heart/1176406256764PA_Intensity_table_2_1.pdf*

Findings in the TR literature supporting the benefits of recreational level exercise for various disability groups and cohorts at risk for chronic conditions can be divided into several logical sub-categories: aquatic interventions, land-based interventions, and retrospective studies.

Aquatic intervention studies. Aquatic activity programs (e.g., aquatic therapy, Arthritis Foundation aquatic exercise, etc.) have provided a frequent medium for exercise used by Therapeutic Recreation Specialists (TRS). Several small sample studies have demonstrated the benefits of exercise in the water for persons with disabilities and/or chronic conditions. The water has several attributes that facilitate favorable, exercise-induced responses:

- Buoyancy relieves the person from complete weight-bearing;
- Resistance of the water promotes muscle strength and endurance;
- Water serves as a buffer against negative outcomes associated with falls;
- Water temperature cools the body during exercise; and
- Hydrostatic pressure eases the burden on the cardiovascular system.

Broach, Dattilo, and McKenney (2007) examined the effects of aquatic therapy on variables associated with positive emotions in 4 persons (ages 30-53 years) with multiple sclerosis. They found that participants maintained or improved most factors associated with enjoyment and enjoyment itself (challenge/skill ratio, satisfaction, attention, activity enjoyment, and enjoyment of others) from baseline to intervention to follow-up; however, favorable affective responses and perceptions of enjoyment were not found across all participants. In addition, volatile baseline observations further advise the findings be considered with caution.

Broach, Dattilo and McKenney's 2007 report used data from 4 participants cited in earlier studies. In 2003 Broach and Dattilo found that the same individuals experienced some improvements in muscle strength as a result of aquatic exercise; however, the results were mixed, perhaps attributable to the fact that multiple sclerosis is a progressive disorder that is not remedied by exercise. An earlier analysis by Broach and Dattilo (2001) of the aquatic therapy intervention demonstrated that functional abilities were favorably affected by exercise in the water. Specifically, participants improved in stair climbing, upper extremity endurance (hand ergometer), and lower extremity endurance (stationary bicycling), similar to the functional improvements found in an earlier study of 3 participants (ages 36-44 years) with multiple sclerosis (Broach, Groff, Dattilo, Yaffe, & Gast, 1997/98). Collectively, the results suggest that quality of life in terms of functional ability can be improved even within the context of the natural course of multiple sclerosis.

Another study of the effectiveness of aquatic therapy demonstrated the effects of swimming on the functional abilities of persons with spinal cord injuries (Broach, Groff, & Dattilo, 1997). Participants were 4 adults (ages 30-63 years) with lesions at the mid-thoracic level or lower. After a 15 week intervention (three times per week for 1 hour a session), all 4 participants improved performance on a 12 minute swim test and decreased percent body fat. Vital capacity, a physiologic proxy for respiratory ability, did not improve.

Besides the analysis by Broach, Dattilo, and McKenney (2007) noted earlier, a few other studies have investigated whether aquatic exercise interventions are effective in improving psychological outcomes. One reported by Berlin, Moul, LePage, Mogge and Sellers (2003) recruited and randomly assigned 55 psychiatric patients to three conditions—aquatic exercise alone, aquatic exercise and cognitive therapy in combination, and a control condition. Aquatic exercise and aquatic therapy/cognitive therapy conditions exposed participants to 45 minutes of exercise or exercise in combination with cognitive therapy on 4 consecutive days each. The results showed that the dual condition that combined aquatic exercise and cognitive therapy resulted in significantly lower depression scores than the control condition. The authors cautioned, though, that they made no effort to control for medications and any other therapies the patients may have received during the intervention.

Mobily, Mobily, Lessard, and Berkenpas (2000) compared the response of 2 participants to aquatic exercise, 1 with an acute knee injury (16 year old high school student) and a 33 year old individual with pronounced rheumatoid

arthritis (who was also diagnosed with schizophrenia) localized to the right knee. The participant with the knee injury responded well to her 9 week intervention program (three times per week, 45 minutes per session), demonstrating substantial improvement in lower extremity strength and endurance. The second participant did not demonstrate significant functional improvement following the 7 month intervention (three times per week, 45 minutes per session), but field notes indicated she benefited psychologically from the aquatic exercise program.

Another chronic condition, fibromyalgia, was the topic of an investigation by Mobily and Verburg (2001). A 59 year-old female school teacher was referred because of pain, fatigue and general malaise associated with fibromyalgia that prevented her from working, conducting her routine chores around her house, and engaging in her favorite leisure activities. She participated in an aquatic exercise program of moderate intensity, three times per week for 4.5 months (45 minutes per session). Results indicated that the participant experienced a significant decrease in acute pain (measured before and after aquatic exercise session) and less disability in five lifestyle areas (home chores, recreation, socialization, work, and sex) attributable to pain on a chronic basis.

Land-based intervention studies. One of the first intervention studies using physical activity appearing in the TR literature was published by Bigelow (1971). He based his study on his observation, as well as the observations of other experts in psychiatric medicine (e.g., Wolffe), that those with severe and persistent mental illness benefited more from physically demanding activities than sedentary pursuits. Bigelow hypothesized that patients assigned to a treatment consisting of physically active pursuits (e.g., volleyball) would score better on a behavioral measure than those participating in a program of passive recreation (e.g., bingo). Forty-eight patients (M age = 41.3 years) with mental illness were assigned to a treatment group (active recreation) or a control group (passive recreation). Ward technicians made behavioral observations at baseline, at 1 month, at 2 months and a follow-up at 6 months (for the treatment group only). Groups met for 40 minutes, three times per week, for 2 months. Dependent variables (primarily behavioral observations by ward technicians) showed little difference between the groups in behavior (no statistical test of the data was presented) at any of the measurement intervals (baseline, 1 month, 2 months). The author commented that the results fell short of his expectations. This study and several others in the TR literature underscore the challenges facing field research in the profession—coincident treatments from other therapies that persist during a study interval ("history"), measurement often relying on observation of persons other than the primary investigator ("instrumentation"), limited ability to randomize ("selection bias"), diffusion of treatment, and other threats to internal invalidity.

Almost 10 years passed before another exercise intervention study appeared in the *Therapeutic Recreation Journal*. Gissal, Ray, and Smith (1980) explored the perceived benefits of using an outdoor fitness trail. Older adult participants used the trail three times per week for 12 weeks, for 60-90 minutes, working at 60% intensity (determined by a treadmill test). Thirty-one participants used the trail for the prescribed time; while 44 served as members of the control group (no indication of random assignment was reported). Participants walked and engaged in exercise at stations located at regular intervals along the course. Unfortunately, systematic collection of pre/post-test data was not reported; perceived benefits, instead of objective physiologic changes, were monitored and used to compare treatment and control groups. No statistical tests were reported. The exercise group perceived more energy, better health, more walking ability, fewer bladder and kidney problems, improved muscle strength and flexibility. Observations of this nature are well-suited to program evaluation, but not persuasive from a scientific perspective.

Although research on exercise as a TR intervention improved methodologically beginning around 1990, most studies were plagued by low numbers of participants and a variety of threats to internal validity (cited above). A collection of studies focused on social, psychological, or social-psychological outcomes associated with involvement in exercise. Social-psychological benefit was associated with providing choice of physical activity to older participants with intellectual disability. Mac-

tavish and Searle (1992) randomly assigned 26 participants (M age = 56 years) with intellectual disability (then referred to as mental retardation) to experimental and control groups (13 in each group matched for age, gender, type of residence and past activity experience, and Down's Syndrome). The experimental group was allowed to choose which physical activity they participated in each week for a period of 5 consecutive weeks. The exercise group met one time per week for 2 hours. No physiologic or functional data were collected. Participants were allowed to choose their exercise scored significantly higher on measures of self esteem, perceived competence, and locus of control when compared to participants in the control group. It is, however, unlikely that anything unique to physical activity, as opposed to choice of any recreational activity in general, contributed to the favorable outcomes of the study. In other words, choice appeared to be the operative factor for change rather than any intrinsic exercise effect.

The purpose of a single subject study reported by Ferguson and Jones (2001) was to determine whether a physical activity (cross country skiing) was effective in enhancing the self confidence of a 15 year old female with mental illness. The study participant took part in cross country skiing two times per week for 1 hour intervals for a total of seven skiing sessions. Behavioral observations of the participant confirmed that cross country skiing participation was associated with her decisions to be persistent in the face of frustration, to remain in a treatment group, and to manage her anger. Her relationship with her family improved as well. Whether the observed changes were associated with the fact that she participated in a physical activity remain in question. The intensity of exercise was not reported.

The adult developmental disability population appears to respond on par with the regular adult population when exposed to mild to moderate levels of exercise stimuli. For example, Podgorski, Kessler, Cacia, Peterson, and Henderson (2004) implemented a 12 week exercise intervention including warm-up, walking and dance, strength training, and cool down (for 30 minutes 4 times per week) with 12 participants with intellectual disability attending a day habilitation center. Results indicated that 11 of 12 participants improved their aggregate fitness (range of motion, strength, mobility and gait). Ninety-two percent of the consumers at the center demonstrated improvement in at least one functional outcome and those functional improvements were maintained at a one year follow-up.

Participation of adults with intellectual disability (and a variety of secondary impairments) in physical activities was also the topic of a paper by Carter et al. (2004). Twenty adults (age range = 29-69 years) with developmental disabilities (primarily intellectual disability) were recruited for the study. Following a 1 week orientation, 11 participants completed the pre-test, the 10 week graded exercise (walking, weight training and stretching) program (meeting two times per week for about 1 hour per session) and the post-test. Intensity of exercise was increased over the 10 week intervention (e.g., walking for 20 minutes following an initial time of less than 5 minutes, increasing the number of sets performed and the amount of weight used, holding stretches for a longer period of time). Comparison (no statistical tests were reported) of pre-tests to post-tests indicated improvements in body weight, blood pressure, and resting heart rate. Field notes reported by the authors indicated that the participants increased exercise tolerance, traveled successfully to the exercise site in the community, and used exercise equipment properly. Compliance was a weakness of the study, only 6 of the 11 participants attended 50% or more of the exercise sessions.

A small sample (n = 3) of adolescents with autism were exposed to a program of vigorous exercise (20 minutes of exercise on 20 consecutive days) by Reid, Factor, Freeman, and Sherman (1988) with the intent of decreasing inappropriate and stereotypic behaviors and increasing on-task behaviors. Their results were consistent with expectations on a short-term basis, but stereotypic behaviors returned after a short time. The results suggested that the decrease in inappropriate behaviors was a fatigue-effect, not a lasting therapeutic change.

Two children with autism (one male, one female, 8 and 11 years of age) were participants in a study reported by Schleien, Krotee, Mustonen, Kelterborn, and Schermer (1987). The purpose of the study was to investigate the effect of an integrated physical activity program

on the behaviors of the 2 children and to discover whether peers without disabilities would be more accepting of them after 3 weeks. Participants engaged in a 3 week sport and fitness camp alongside their peers involving three 40 minute activity periods each day. Activities included traditional sports, fundamental movements, gymnastics, and aquatics. Favorable changes in appropriate and inappropriate play were reported. Attitudes of peers toward the 2 participants improved, although the improvement was not statistically significant. The authors did not report the frequency of physical activity, although one might assume 5 days per week because of the typical format of university-sponsored sports camps. Intensity of exercise, likewise, was not reported, making it difficult to determine if the favorable changes were attributable to fatigue, as in the study by Reid et al. (1988).

Groff, Lawrence, and Grivna (2006) investigated the effects of exercise on a child with cerebral palsy (male, aged 11 years). The researchers implemented an exercise program that included a warm-up walk, calisthenics, and soccer. A half-mile walk at the end of each session served as a cool-down. The exercise intervention was conducted twice weekly over 6 consecutive weeks. The results were mixed, showing improvement in some but not all functional measures. The participant did improve endurance, abdominal strength, upper extremity strength, and hand strength. He also demonstrated a small improvement in gross motor skill (kicking).

Richeson et al. (2006) investigated the effects of counseling/education about the use of a pedometer and encouraging lifestyle activities that increased movement throughout the day on the functional fitness and mobility-related self-efficacy in 115 older adults (*M* age = 72.9 years). During the intervention, participants were to set daily step goals of 5% above their usual, self-monitor their daily step counts using pedometers, record their daily step counts, and then reset their pedometers to zero. Small but significant improvements in functional fitness (balance, lower extremity strength, and walking speed) were reported. Improvements in mobility-related self-efficacy were less convincing. Compliance with daily step count goals by the participants was not reported. Significantly for the TR field, over 80% of the participants reported one or more chronic health conditions at the time of the study.

Fifteen older adults (M age = 74.4 years) were recruited by Mobily, Mobily, Lane and Semerjian (1998) to participate in an 8 week (three sessions per week) strength training program using light hand weights. Exercise dosage was administered at a rate of 40 minutes (5 minutes warm up, 30 minutes of strength training, and 5 minutes cool down) per session, three times per week. Functional fitness was measured at baseline, 4 weeks and 8 weeks. Performance on five of the seven functional fitness measures (flexibility, agility, coordination, upper extremity strength, and dynamic balance) improved significantly over the course of the intervention. The program was delivered in a community setting (senior center) by a TRS, but the findings were limited by the small sample size and absence of a randomized control group.

That same year Brasile et al. (1997/98) designed a study to compare three different upper extremity exercise programs (arm ergomenter) for persons with locomotor disabilities. Thirty veterans (no ages reported) were randomly assigned to each exercise protocol (10 to each protocol), each lasting 8 weeks at a rate of three sessions per week. In each group, participants exercised for 30 minutes (which included a 5 minute warm up and 5 minute cool down). The main hypothesis of interest was whether a computer driven by participants' exercise effort would produce significantly better improvement compared to two other arm ergometer protocols. No statistical differences between the groups were discovered after 8 week of training. Likewise, resting heart rate did not improve for any of the groups, pretest to post-test. The computer exercise group did show more improvement in wheelchair propulsion compared to the remaining two groups, but between group differences were, again, not statistically significant. The absence of functional and physiologic improvement for any of the exercise interventions may well have attributable to the difficulty in achieving a training effect by stimulating the relatively small amount of muscle mass represented by the upper extremities relative to the lower extremities. However, the computer group was significantly less likely to say that the exercise was boring and more likely to report a willing-

ness to continue in the exercise program.

The effects of exercise on the health of another small sample of older adults (n = 8, ages = 63-71 years) was investigated by Karper and Goldfarb (1994). The unusual dependent variable of interest was the relative incidence of respiratory tract infections among the participants under exercise and non-exercise situations. The participants were asked to report the incidence of respiratory infections in the year preceding engagement in an exercise program. Participants participated in an exercise program three times a week for a year. The exercise protocol included light weight training and walking for 50-60 minutes per session (the compliance rate for 7 of the 8 participants was 75% or higher). Four of the 8 participants reported a lower frequency of respiratory tract infections in the year of exercise participation compared to the preceding, non-exercising year. Functional fitness improved in all 8 participants. Blood tests for improvement in white blood cell counts among the participants correlated favorably with the lower reports of respiratory tract infections, lending some added validity to the findings. As with many of the studies of exercise reported, this study lacks the power to stand alone as convincing evidence for the favorable effects of exercise among susceptible participants.

Austin, Johnson, and Morgan (2006) explored to effectiveness of gardening on improving physical and emotional health of 6 community-dwelling older adults (M age = 68.17 years). Emotional health scores and social activity scores improved following the intervention; however, no significant improvements in physical function measures were reported. Furthermore, the authors did not provide a description of the frequency, duration, or intensity of the gardening activity.

Retrospective studies. Retrospective studies have been the exception rather than the rule in the TR literature. But beginning in the mid-1990s, some studies either looking at existing data or asking participants to recall exercise behaviors appeared. One example of a retrospective study of physical activity participation among persons with disabilities was completed by Hedrick and Broadbent (1996). They surveyed 577 university alumni (graduated between 1952-1991) with disabilities and asked them to report their physical activity during their college years and their current level of physical activity. Participants were also asked to rate the severity of their disability. Accordingly, the alumni were classified into functional disability types. The best predictor of current physical activity level was physical activity reported during the participant's college years. These data provide some encouragement for promoting exercise among persons with disabilities when they are young with the hope of an exercise habit continuing later in life. The response rate for the survey, however, was low by most standards at 40% (n = 229). The authors also pointed out that the majority of variance in participants' current practice of physical activity was unaccounted for.

Mobily, Mobily, Raimondi, Walter, and Rubenstein (2004) reported a retrospective analysis of falls among older adults by comparing those who had participated in a strength training program delivered by a TRS in the past year (n = 21, M age = 72.8 years) to participants attending a senior center but not participating in strength training in the same year (n = 22, M age = 74.5 years). Participants were matched on age and gender. Those participating in strength training in the past year reported about half as many falls as participants in the comparison group. Although the findings are encouraging, methodological limitations were also reported by the authors. The comparison group was not tested for functional fitness in a manner similar to that of the strength training group. Self-selection bias may have been operative as well, insofar as participants in better health may have been more likely to enroll in exercise programs and less likely to fall.

Santiago and Coyle (2004) surveyed 170 women with mobility impairments, aged 21-65, to ascertain frequency of participation in physical activity. Between 30% and 40% of the respondents reported no leisure time physical activity. In contrast, 33% to 48% reported regular participation in physical activity (three times per week or more). This study is unique because it is one of the few that focused on the exercise habits of persons with limitations. The report of walking as the most popular form of exercise by the participants (preferred by about 12%) was most surprising. Like Santiago and Coyle, one has to wonder whether the exercise alternatives are so limited and barriers so

profound for persons with mobility limitations that they must participate in physical activities that do not take advantage of their abilities (e.g., hand cycles or non-weight bearing activities such as aquatic exercise). Santiago and Coyle acknowledge that the study was limited by a low response rate (30%).

Fitzhugh, Klein and Hayes (2008) made use of a federal data base to identify participation patterns of a large sample (n = 5,607) of older adults (aged 60 or older). They found that about 53% of the sample participated in leisure-time physical activity once a month or more. Of those who reported at least one physical activity a month, walking was the by far most popular choice (64%), with yardwork (13.9%), cycling (13.7%), and golfing (10.9 %) the only other activities reported by 10% or more of the participants. Older participants (70-79, 80+) were less likely than the younger cohort (60-69) to report any physical activity during free time in the past month, although the difference in the percent reporting walking was negligible. Perhaps the most important and most troubling finding was that 47% of older adults in the sample did not report any physical activity over the past month. Results from national data bases are most useful because of the representativeness of the statistics, though one often has to settle for crude measures of activity (e.g., to be considered "physically active" a respondent had to report participating only one time per month in any activity listed).

Likewise, Wang (2008) analyzed a large (n = 34,087) national database of older adults (aged 65 or older, M age = 73.99) and defined participation in physical activity as one time per month or more in any of 55 activities listed. Findings revealed that older adults who reported participation, even at the study's minimal level, were more apt to rate their self-perceived health higher. Active participation in some form of physical activity was also associated with fewer reported days of poor physical health in the past month, fewer reported days of poor mental health in the past month, and fewer reported days that poor physical or mental health kept participants from doing their normal daily activities; however, the author advised caution because of the small correlations needed to attain statistical significance with the large number of participants.

Summary of Exercise Benefits

The method of physical activity intervention that has attracted the most attention among TR researchers is aquatic exercise. The findings of several small sample studies resulted in functional improvements with some musculo-skeletal disorders (e.g., arthritis, fibromyalgia) and neurological impairments (e.g., spinal cord injury, multiple sclerosis). Correlated improvement in physiologic variables was not evident.,

Using primarily sport participation as a method of exercise, psycho-social outcomes associated with physical activity were mixed. Manipulation of a second independent variable (e.g., choice, inclusion) was more likely than not the cause of any observed benefits (e.g., increase in appropriate play, compliance with treatment, anger management). To improve studies using exercise as an intervention to produce psycho-social outcomes, researchers need to employ randomization or matching to equate groups, report exercise dosage (frequency, intensity, duration, and progression), and measure functional changes (only a few studies tracked functional improvement while monitoring psycho-social outcomes).

Surprisingly few intervention studies in TR employed land-based exercise to improve physical functioning or health. Results were mixed, with strength training resulting in functional improvement, walking and strength training being associated with fewer respiratory infections, but gardening yielding no functional improvement. Small sample sizes, non-randomization, and lack of control groups further urge that these studies be viewed tentatively. Thus, considerable work lies ahead for TR if it is to show the effectiveness of the more traditional, land-based forms of exercise with clients.

Retrospective studies were fewer in number than intervention studies, though more current (most were published since 2000). Some studies showed an association between exercise and functional status. Retrospective studies also revealed that persons with disabilities report very little participation in exercise, a finding not unlike the practice of exercise among the general U. S. population, especially the older adult population. Of course, retro-

spective studies are limited by the nature of the original data set and/or the reliability and validity of participant recall over a month, year, or longer.

Why Exercise in TR Practice?

After a review of the TR literature, Austin (2002) concluded that "Now is the time for the recreational therapy profession to renew its interests in employing physical activities to intervene in the lives of clients to protect and promote their health" (p. 226). Austin accurately identified the recent trend in TR to configure service delivery around the concept of health and health promotion. Richeson was even more direct following a study of the effects of walking on function and self-efficacy (Richeson, Croteau, Jones, & Farmer, 2006), maintaining that "Therapeutic recreation needs to expand its professional repertoire to include physical activity" (p. 29). More broadly, understanding the effects of physical/recreation activities was ranked 9th of 25 TR research agenda items by NTRS members questioned in study by Wilhite, Keller, Collins, and Jacobson (2003). Clearly, interest has started to coalesce around the idea that use of physical activity as part of TR service ought to be getting more attention, even though the TR profession has made an effort to distance itself from its physical education roots for many years (Austin, 2002).

Furthermore, most TR practice models include health in some form, often as health promotion or prevention among persons with disabilities to enhance quality of life. At least three practice models are explicit about the affirmative role TR should play in promoting health as a part of quality of life. Austin's (1998) Health Protection/Health Promotion model is most explicit in its mention of health as an organizing concept central to TR practice. Next is Van Andel's (1998) Service Delivery/Outcomes models, which include health promotion as a service delivery activity of TR Specialists and illustrate that quality of life is determined by a combination of health and functional ability. Lastly, like Austin, Wilhite, Keller, and Caldwell (1999) maintain that health assumes a central place in the delivery of TR services across the lifespan.

In addition, the authors (Stumbo & Peterson, 1998) of the oldest practice model, and arguably the most widely accepted practice model, the Leisure Ability model, have noted that future iterations of the model should include more attention to health and health promotion. Likewise, the most recently articulated model, the Leisure and Well-Being model (Carruthers & Hood, 2007; Hood & Carruthers, 2007), focuses attention on interventions and activities that enhance health (well-being) through leisure.

Perhaps the profession is beginning to focus more on exercise because of the change in the nature and type of disabilities that seek TR services. Over the last several decades a noticeable change in the proto-typical client using TR services has taken place. Whereas in the 1960's and 1970's the focus of service was on developmental disabilities and traumatic injuries, a "new" disability has overtaken and surpassed developmental disabilities and traumatic injuries. The rise of the chronic condition attracts more attention from TR service providers with each year. Demographics promise to keep the chronic condition at center stage for some time to come.

A chronic condition results when one or more of the body's health systems begins to lose competence—the cardio-vascular system fails and high blood pressure results, the skeletal system fails and osteoporosis results, and so on. But unlike the era of the developmental disability and traumatic injury, chronic conditions are most often modifiable and/or preventable. The "usual suspects" in terms of etiology of the chronic condition pertain to lifestyle choices that people make everyday—smoking, excessive alcohol consumption, poor eating habits, and, most relevant to the current paper, failure to get enough exercise. Not only are TR Specialists working with people with one or more chronic conditions, but they are also finding that persons with disabilities of various types (e.g., spinal cord injury) are beginning to manifest chronic conditions where none had been observed in the past.

Hence, the TR professional has to work with the primary disability; and now because persons with all manner of disability are living longer, therapists have to work with chronic conditions that superimpose upon the initial disability (e.g., a person with a spinal cord injury who manifests osteoporosis because of non-weight bearing). Furthermore, "[p]eople

with conditions across the disability spectrum are generally reported as less active than people without disabilities" (Kozub & Frey, 2005/2006, p. 13), which only exacerbates morbidity. Therefore, persons with pre-existing disabilities, congenital or acquired, are at greater risk of developing chronic conditions than the general population because: a) they are living longer with better health care, b) their disabilities often make some positive health behaviors (e.g., exercise) more difficult to practice, c) they must still negotiate an imperfect infrastructure to access venues to practice positive health behaviors (e.g., accessibility to gyms), and d) they often practice negative coping habits that contribute to chronic conditions (e.g., boredom and loneliness lead to smoking, substance abuse, etc.).

Therefore, the population of persons with disabilities is exponentially more vulnerable to chronic conditions, especially because one of the leading preventive health behaviors, exercise, is more difficult to practice. For example, 40% of persons with spinal cord injuries reported discontinuing engagement in sports following injury in a study of 985 participants reported by Tasiemski, Kennedy, and Gardner (2006). Regardless of whether the chronic condition is the primary diagnosis or secondary to another condition, the chronic condition will be the face of the population with disabilities for some time to come.

Along with the changing nature of disability in Western society comes the changing condition of health care and rehabilitation--managed care. Efficiency is rewarded in today's health care system leading to more rapid rehabilitative efforts characterized by patient education and "self-medication." Patients are no longer maintained in a rehabilitative environment for the complete course of their rehabilitation prescription. Instead, they are taught medications to take, exercises to do, and tasks to practice, and then left to their own devices following discharge to comply with their rehabilitation prescription. Not surprisingly, compliance is abysmal, whereas functional regression and recidivism are common. Furthermore, because the malady is chronic the person will need to follow a lifetime of positive health practices (e.g., exercise, compliance with medication, diet, smoking cessation, etc.) to continue to improve or maintain health. Chronic conditions are rarely cured, only managed.

What we are left with is a substantial subculture of persons, many older, with one or more chronic conditions. They need a lifetime approach to "rehabilitation" while residing in the community. They need to practice good eating habits the rest of their lives. They need to refrain from smoking the rest of their lives. And, specific to the purpose of the present paper, they need to practice a regular program of physical activity for the rest of their lives.

Foundations for Exercise and Physical Activity in TR

This section of the paper presents three foundations for the use of exercise and physical activity by TR Specialists.

1. ***The long term need for physical activity is a reality for the foreseeable future.*** Several points underscore the reality of the need for physical activity program delivery. First, the percent of individuals in the U. S. practicing sufficient exercise to maintain or improve health is an embarrassment. The Centers for Disease Control (CDC, 2008) has documented that 40% of adults report no exercise at all. The figures get progressively worse among older cohorts; 51% of those 65-74 and 65% of those 75 and older report no exercise. Although no statistics on exercise behavior among persons with disabilities are reported by the CDC, one may assume that a considerable number of persons with chronic conditions are nested within the senior cohort because a significant percent of older adults have one or more chronic conditions (e.g., arthritis, high blood pressure, osteoporosis, etc.).

   The CDC (2008) recommends 30 minutes of moderate physical activity most days. Only 15% of individuals overall report enough exercise to meet this CDC recommendation. Only 12% of adults 75 and older attain 30 minutes of moderate exercise most days.

   Macro-demographic trends suggest the problem of a sedentary lifestyle may not have bottomed yet. A greater percentage of the U. S. population will be represented by older adults in the coming decades, the very age cohorts least likely to get any exercise. The U. S. Census Bureau (2001) reported a 12% increase in the number of persons aged 65 and older be-

tween 1990 and 2000. That percentage promises to increase over the coming decades. The U. S. Census Bureau (1997) projected a 74% increase in the number of persons 65 and older by 2020; by 2030 one in five U. S. citizens will be an older adult. Also in 2001, the Medical Expenditure Panel Survey found that 15% of the total population reported one or more chronic conditions. The same organization verified that the majority of older adults have at least one chronic condition (Medical Expenditure Panel Survey, 2005). Therefore, those most in need of exercise are the least likely to adopt the habit.

2. ***Most people need recreational level exercise.*** The CDC (2008) recommends moderate physical activity because it is much more likely to be adopted in the first place compared to vigorous exercise; and because it is of sufficient stimulus to provoke beneficial changes among the inactive majority of people. This author's position is that mild to moderate exercise constitutes a classification of physical activity known as recreational level exercise (also see Figure 1). At least one national organization maintains that mild to moderate exercise is recreational level exercise (Arthritis Foundation, 2005). Mild exercise is included because the CDC encourages it for persons who cannot meet the moderate exercise standard. By defining mild to moderate exercise as recreational level exercise, the TR field delimits its scope of potential service and the qualifications necessary to conduct exercise programs with persons with disabilities and chronic conditions (discussed below under "Implications").

   Besides the notion that the intensity of recreational level exercise is below that of vigorous and less apt to result in discomfort and present the threat of a catastrophic system failure (e.g., myocardial infarction), mild to moderate level exercise is recreational in the sense that it is more likely to result in perceptions of enjoyment on the part of the participant. Importantly, Wankel (1993) argued that enjoyment is a key mediator for compliance with a program of exercise on a long-term basis. For exercise to be of benefit, it must be practiced on a habitual, long-term basis, making enjoyment a critical mediating variable in the persistence of exercise behavior.

   By "enjoyment" Wankel (1993) refers specifically to the need to make exercise intrinsically motivating if compliance over many years is the expectation (the usual figure is 50% attrition after 3 months; see Dishman, 1994). He (Wankel) makes reference to several possible dimensions of enjoyment that may be manifested during exercise. Although health is a primary motive for adopting an exercise program, compliance may have more to do with non-health related goals. The non-health related goals mentioned by Wankel may collectively be viewed as "enjoyment"; these include: social interaction (group identification, social reinforcement, competitive stimulation, supportive leadership, and team activities), testing skills ("Flow"), and experiencing subjective success. Subsequent work by several authors (Hubbard & Mannell, 2001; Oliver & Cronin, 2005; Wininger & Pargman, 2003) is consistent with Wankel's thesis on exercise compliance/enjoyment relationship.

   Therefore, recreational level exercise is called so because: (a) it is mild to moderate intensity and (b) it is enjoyable. Certainly, TR professionals should support those who wish to pursue a more aggressive version of physical activity at a vigorous level, but that "support" should amount to referring the person to professionals trained to deliver vigorous intensity exercise programs.

3. ***TR is well-positioned to deliver recreational level exercise.*** The TR field has a competitive advantage compared to other professions that may attempt to deliver recreational level exercise programs. That competitive advantage relates to efficiency and infrastructure.

TR service delivery is efficient because programs are usually delivered in groups, decreasing per capita cost. Karper and Goldfarb (1994) argued that, "In contrast, other allied health professionals (e.g., physical therapists, occupation [sic] therapists, etc.) normally do not provide group physical activity for patients and clients…" p. 16. Regrettably, TR Specialists are paid less than other allied health professionals who might seek to deliver exercise to persons with disabilities or chronic conditions (e.g., physical therapy, occupational therapy, nursing), but this fact also decreases cost. Services offered by TR are more acces-

sible because programs are typically available throughout the day and on weekends, instead of just during normal working hours, Monday through Friday, increasing the effective hours of operation of a given facility and decreasing overhead costs.

Infrastructure favors the TR profession as well because the locales where exercise occurs in the community are often controlled and managed by municipal recreation departments. Many departments have resources unrivaled in the private sector—parks, community centers, swimming pools, sport fields, golf courses, community gardens, ice rinks, and senior centers. Wang's (2008) findings are consistent with the use of community resources by persons with disabilities and chronic conditions as preferred venues for physical activity.

Furthermore, the mission of tax supported, municipal recreation departments usually includes provision of services to the community's citizens, including persons with chronic conditions and disabilities who reside in the community. Many municipal recreation departments employ TR Specialists. In addition, clinical TR Specialists may partner with local municipal recreation departments to offer community-based or outpatient exercise programs. Both Austin et al. (2006) and Richeson et al. (2006) have advocated for more collaboration between clinic and community.

Implications

For Practice

Fifteen years ago Beaudouin and Keller (1994) alerted the field to a paradigm shift that will ripple through healthcare for years to come-- all health care is shifting from a clinical care model to a community focused approach. Increased costs, shorter hospital stays, and more people in need of further/continued intervention after discharge to function independently will serve to drive sustained outpatient and community-base initiatives. One service many persons with impairments need is a community-based, accessible, affordable, continuing exercise program. Fortunately, practical recommendations from reputable sources provide guidance with respect to (recreational level) exercise and physical activity for able-bodied individuals and persons with disabilities and/or chronic conditions.

The American College of Sports Medicine and American Heart Association recommendations have served as the "gold standard" guidelines for practitioners delivering exercise and physical activity programs. The most recent recommendations for adults 18-64 years of age are:

- Perform moderate intensity (equivalent to a brisk walk, about 3 miles per hour on a flat surface) for 30 minutes, 5 days per week (or vigorous aerobic activity for 20 minutes, three times per week);
- Moderate intensity aerobic activities are in addition to regular and routine activities and should be completed in bouts of at least 10 minutes or longer; and
- Strength train at least two times per week (on non-consecutive days), employing 8-10 exercises that work all major muscle groups and to a point that produces "substantial fatigue" (Haskell et al., 2007).

Further, the American College of Sports Medicine and American Heart Association clarified their exercise recommendations for persons aged 65 and older or those aged 50-64 with clinically significant chronic conditions or functional limitations (Nelson et al., 2007). Although the basic recommendations remained the same, for these groups the definition of "moderate intensity" may be adjusted according to the individual's ability and fitness. Older adults and those with significant chronic conditions should strength train using more repetitions (implying less resistance) at a level of moderate intensity. In addition to the baseline recommendations for moderate aerobic exercise and strength training, older adults should practice flexibility and balance exercises.

While plenty of people with all levels of ability (e.g., persons with disabilities, older adults, persons with chronic conditions, etc.) have ample reasons (e.g., health in general, obesity, frailty, high blood pressure, diabetes, etc.) for starting exercise programs, enthusiasm quickly wanes in too many cases. The greater challenge for TR and the delivery of the recreational level exercise concept may be to facilitate compliance with a regular, habitual exercise program that produces long-term benefit and promotes an active lifestyle.

As suggested earlier in this paper (Wankel, 1993), non-health related issues may be more important to maintenance of an appropriate physical activity level than health-related motives. Enjoyment in its various forms (e.g., social interaction, group identification, social reinforcement, competitive stimulation, supportive leadership, and team activities, testing skills, and experiencing subjective success) certainly plays into the strong suit for TR professionals. Enjoyment was noted as one reason why the 4 aquatic exercisers described in Broach et al. (1997/98) reported continuing. Furthermore, Dishman (1988) reported that lack of enjoyment was associated with higher rates of cessation of exercise.

Promotion and delivery of recreational level physical activity also figures to promote compliance by two other means. First, some evidence (Dishman, 1994; Dishman & Buckworth, 1996) suggests that people are more likely to begin and continue a moderate intensity program (i.e., recreational level exercise) than a program of vigorous physical activity. Second, in a meta-analysis of exercise participation and compliance research, Dishman and Buckworth found that offering varied types of physical activity in community settings was associated with greater involvement.

The good news for the TR profession is that responding to personal preferences has long been associated with service delivery. Furthermore, because of the field's experience with inclusion, TR should be more apt to overcome the negative attitudes towards persons with disabilities and inadequate information about physical activity reported by Tsai and Fung's (2005) students with hearing deficits.

If TR professionals feature recreational level exercise as part of an array of services for persons with disabilities and chronic conditions, then risk management needs to be a significant consideration for protection of the consumer and practitioner. Following the best practice recommendations is a beginning. Recommendations are generally given to minimize risk to the participant but provide sufficient exercise intensity to induce benefits (see above Haskell et al., 2007; Nelson et al., 2007). Hence, close inspection of dose-response relationships and accompanying risk histories is vital. In recreational level exercise the TRS seeks a level of activity that will produce the most gain at the smallest level of risk.

Best practice also suggests that additional precautions should be taken in cases where a known risk is manifested. For example, persons with cardiovascular disease, diabetes or other medical concerns should seek clearance from their physician before beginning a program of exercise (Haskell et al., 2007). Not all risk can be avoided, but by practicing due diligence, the practitioner should do everything possible to avoid a negative outcome.

Another part of non-malfeasance relates to recognition of the appropriate scope of practice with respect to delivering programs of physical activity. The professional needs to be able to identify cases in which he/she refers the consumer to another health care professional versed in a more vigorous type of exercise program or one who is better prepared to manage serious exercise risk factors (e.g., congestive heart failure, advanced osteoporosis, chronic obstructive pulmonary diseases, etc.). It goes without saying that if TR professionals choose to deliver exercise programs, professional liability insurance is a must.

The dose-response relationship between exercise and benefit is especially important for TR insofar as students and practitioners do not receive the type and amount of training necessary to deliver vigorous exercise programs safely. If, however, only a mild to moderate intensity program of exercise is necessary to secure favorable physiological and psychological outcomes, then students and practitioners are or can be prepared to deliver such "recreational level" exercise programs.

For Professional Preparation

"…[R]ecreation curricula need to incorporate educational opportunities wherein students in therapeutic recreation can acquire the skills and knowledge necessary to develop and manage physically active leisure programming for individuals with disabilities" (Hedrick & Broadbent, 1996, p. 146). These sentiments are echoed by Austin (2002) and Richeson et al. (2006).

Some of the foundation is in place because The National Council on Therapeutic Recreation Certification (NCTRC) already requires anatomy and physiology for credentialing. But more refinement of existing courses is probably necessary, such as building more of

the idiosyncrasies of exercise leadership into a required course on leadership (including best practices for avoiding injury and exercise-induced mishaps). Adding assessment of physical fitness and physical function to an existing course is another alteration that would likely be needed. Scope and limitations to exercise practice might be added to a course covering professional issues, as well.

A course in the physiology of leisure might also be required. Such a course would incorporate some aspects of a usual exercise physiology course, but also other topics pertinent to TR practice, such as:

- physiologic mechanisms and recreational level exercise,
- adaptation to recreational level exercise,
- exercise adaptations for persons with disabilities and chronic conditions,
- lifestyle consequences of various disabilities and chronic conditions,
- effects of aging on physiologic capacity for exercise,
- autonomic dysreflexia,
- neurogenic bladder and its implications for TR practice,
- field assessment proxies for laboratory evaluation of fitness,
- mind-body interactions,
- holistic health,
- neuro-endocrine pathways for stress and coping,
- physiologic basis for pain management,
- physiologic basis for intrinsic motivations, and
- epidemiology of physical activity.

But the preceding suggestions are only meant to stimulate discussion of the curriculum implications of recreational level exercise. If the profession chooses to seriously consider adding recreational level exercise to its programming efforts, then some consensus will likely be necessary. What curriculum modifications or additions materialize should be the result of a national forum on professional preparation in TR, such as the periodic Therapeutic Recreation Education Conference (last held in June of 2009).

Summary

By this point in its evolution, the TR profession should be confident enough in its distinct identity to explore physical activity and exercise without feeling threatened by Physical Education, Exercise Science, or related disciplines. The profession needs to be able to predict healthcare trends and agile enough to proactively incorporate those trends into practice, when appropriate. Such is the case with physical activity as a medium for TR.

Intervention studies demonstrate that functional and psychological improvements can result from the use of exercise as a modality. To this point, most intervention studies in the TR literature have employed low numbers of participant; hence, the continuing need for replications and larger sample intervention research.

Retrospective research is also a promising line of inquiry for TR researchers who are often constrained by small research budgets and difficulty accessing large numbers of participants through field studies. But retrospective research in TR is only in its infancy and too little of it has been completed to draw any conclusions.

Based mostly on literature outside of TR, several assumptions form the foundation for the use of recreational level exercise in TR practice. These include: that the need for recreational level exercise is sustainable for the long-term, that the most promising level of exercise for adoption and compliance by the masses is of a mild to moderate level of intensity, and that community-based TR and outpatient TR services are well-positioned to deliver recreational level exercise.

The implications for adopting the use of recreational level exercise are significant for practice and professional preparation. Practitioners will not only need to be competent in exercise program leadership and delivery but also need to understand the idiosyncrasies of exercise as a type of leisure behavior. Professional preparation will inevitably have to integrate more exercise and behavioral science into the curriculum.

The use of mild to moderate intensity exercise is consistent with the mission of delivering activities that promote improved function and quality of life. The type of exercise advocated for in the present paper represents

an intensity commonly associated with better participation and compliance, especially if health-related motives are supplemented with non-health related variables associated with enjoyment. Recreational level exercise is an opportunity for TR to deliver a necessary and quality service to a large segment of the population. Whether TR is comfortable with re-visiting an area of service it has distanced itself from for 50 years remains to be seen.

References

Arthritis Foundation. (2005). Arthritis Foundation Aquatic Program: Trainer's guide. Atlanta, GA: Arthritis Foundation.

Austin, D. R. (2002). A call for training in physical activity. In D. R. Austin, J. Dattilo, & B. P. McCormick (Eds.), *Conceptual foundations for therapeutic recreation* (pp. 225-234). State College, PA: Venture.

Austin, D. R. (1998). The health protection/health promotion model. *Therapeutic Recreation Journal, 32*, 109-117.

Austin, E. N., Johnson, Y. A. M., & Morgan, L. L. (2006). Community gardening in a senior center: A therapeutic intervention to improve the health of older adults. *Therapeutic Recreation Journal, 40*, 48-56.

Beaudouin, N. M., & Keller, M. J. (1994). Aquatic-solutions: A continuum of services for individuals with physical disabilities. *Therapeutic Recreation Journal, 28*, 193-202.

Berlin, B., Moul, D. E., LePage, J. P., Mogge, N. L., & Sellers, D. G. (2003) The effect of aquatic therapy interventions on patients with depression: A comparison study. *Annual in Therapeutic Recreation, 12*, 7-13.

Bigelow, G. W. (1971). A comparison of active and passive recreational activities for psychotic patients. *Therapeutic Recreation Journal, 5*, 145-151, 191.

Brasile, F. M., Hedrick, B. N., Manny, B., Haussey, P., Legernes, K., & Prathipati, S. (1997/98). Efficacy of interactive computer game in physiological and psychological outcomes related to arm ergometer exercise participation of hospitalized elderly patients. *Annual in Therapeutic Recreation, 7*, 52-63.

Broach, E., & Dattilo, J. (2001). Effects of aquatic therapy on adults with multiple sclerosis. *Therapeutic Recreation Journal, 35*, 141-154.

Broach, E., & Dattilo, J. (2003). The effect of aquatic therapy on strength of adults with multiple sclerosis. *Therapeutic Recreation Journal, 37*, 224-239.

Broach, E., Dattilo, J., & McKenney, A. (2007). Effects of aquatic therapy on perceived fun or enjoyment experiences of participants with multiple sclerosis. *Therapeutic Recreation Journal, 41*, 179-200.

Broach, E., Groff, D., & Dattilo, J. (1997). Effects of aquatic therapy on adults with spinal cord injuries. *Therapeutic Recreation Journal, 31*, 160-173.

Broach, E., Groff, D., Dattilo, J., Yaffe, R., & Gast, D. (1997/98). The effects of aquatic therapy on adults with multiple sclerosis. *Annual in Therapeutic Recreation, 7*, 1-20.

Carruthers, C., & Hood, C. D. (2007). Building a life of meaning through therapeutic recreation: The leisure and well-being model, Part I. *Therapeutic Recreation Journal, 41*, 276-297.

Carter, M. J., McCown, K. M., Forest, S., Martin, J., Wacker, R., Gaede, D., & Fernandez, A.(2004). Exercise and fitness for adults with developmental disabilities: Case report of a group intervention. *Therapeutic Recreation Journal, 38*, 72-84.

Centers for Disease Control. (2008). Healthy people 2010. Retrieved January 1, 2008 from http://www.heathypeople.gov/document/html.

Cust, A. E., Armstrong, B. K., Friedenreich, C. M., Slimani, N., & Bauman, A. (2007). Physical activity and endometrial cancer risk: A review of the current evidence, biologic mechanisms and the quality of physical activity assessments. *Cancer Causes and Control, 18*, 243-258.

Dishman, R. K. (1988). Determinants of physical activity and exercise for persons 65 years of age and older. *American Academy of Physical Education Papers, 22*, 140-162.

Dishman, R. K. (1994). Motivating older adults to exercise. *Southern Medical Journal, 87*, S79-S82.

Dishman, R. K., & Buckworth, J. (1996). Increasing physical activity: A quantitative synthesis. *Medicine and Science in Sports & Exercise, 28*, 706-719.

Draheim, C. C., Williams, D. P., & McCubbin, J. A. (2002). Prevalence of physical inactivity and recommended physical activity in community-based adults with mental retardation. *Mental Retardation, 40*, 436-444.

Ferguson, D. D., & Jones, K. (2001). Cross-country skiing as a self-efficacy intervention with an adolescent female: An innovative application of Bandura's theory to therapeutic recreation. *Therapeutic Recreation Journal, 35*, 357-364.

Ferrari, C. K. B. (2007). Functional foods and physical activities in health promotion of aging people. *Maturitas, 58*, 327-339.

Fitzhugh, E. C., Klein, D., & Hayes, G. (2008). Leisure-time physical activity participation among older adults: Implications for therapeutic recreation specialists. *Annual in Therapeutic Recreation, 16*, 117-128

Gissal, M. L., Ray, R. O., & Smith, E. L. (1980).Fitness trails: A healthful activity for older adults. *Therapeutic Recreation Journal, 14*, 43-48.

Groff, D., Lawrence, E., & Grivna, S. (2006). Effects of a TR intervention using exercise: A case study with a child with cerebral palsy. *Therapeutic Recreation Journal*, *40*, 269-283.

Haskell, W. L., Lee, I., Pate, R.R., Powell, K. E., Blair, S. N., Franklin, B. A., Macera, C. A., Heath, G. W., Thompson, P. D., & Bauman, A. (2007). Physical activity and public health: Updated recommendations for adults from the American College of Sports Medicine and American Heart Association. *Circulation, 116*, 1081-1093.

Hedrick, B. N., & Broadbent, E. (1996). Predictors of physical activity among university graduates with disabilities. *Therapeutic Recreation Journal, 30*, 137-148.

Hobbs, F. B. (1995). *65+ in the United States*. Washington, D. C.: Bureau of the Census.

Hood, C. D., &. Carruthers, C. (2007). Enhancing leisure experience and developing resources: The leisure and well-being model, Part II. *Therapeutic Recreation Journal, 41*, 298-325.

Hubbarrd, J., & Mannell, R. C. (2001). Testing competing models of the leisure constraint negotiation process in a corporate employee recreation setting. *Leisure Sciences, 23*, 145-163.

Ipsen, C. (2006). Heath, secondary conditions, and employment outcomes for adults with disabilities. *Journal of Disability Policy Studies, 17*, 77-87.

Karper, W. B., & Goldfarb, A. H. (1994). Effects of exercise on acute upper and lower respiratory tract infections in older adults. *Therapeutic Recreation Journal, 28*, 8-24.

Kesaniemi, Y. A., Danforth, E., Jensen, M. D., Kopelman, P. G., Lefebvre, P., & Reeder, B. A. (2001). Dose-response issues concerning physical activity and health: An evidence-based symposium. *Medicine and Science in Sports & Exercise, 33,* S531-S538.

Kozub, F. M., & Frey, G. (2005/2006). Facilitating leisure-time physical activity in individuals with disabilities using general systems theory: Recommendations for therapeutic recreation specialists. *Annual in Therapeutic Recreation, 14*, 12-24.

Le Masurier, G. C., Bauman, A. E., Corbin, C. B., Konopack, J. F., Umtattd, R. M., & Van Emmerik, E. A. (2008). Assessing walking behaviors of selected subpopulations. *Medicine and Science in Sports & Exercise, 40*, S594-S602.

Mactavish, J. B., & Searle, M. S. (1992). Older individuals with mental retardation and the effect of a physical activity intervention on selected social psychological variables. *Therapeutic Recreation Journal, 26*, 38-47.

Medical Expenditure Panel Survey. (2001). Retrieved January 13, 2008 from http://www.meps.ahcpr.gov/mepsweb//data_files/publications/st58/stat58.pdf

Medical Expenditure panel Survey. (2005). Retrieved January 13, 2008 from http://www.meps.ahrq.gov/mepsweb/data_files/publications/st203/stat203.pdf

Michnovicz, J. J. (2001). Diagnosing and treating osteoporosis among adults with disabilities. *Exceptional Parent, 31*, 44-47.

Mobily, K. E., Mobily, P. R., Lane, B. K., & Semerjian, T. Z. (1998). Using progressive resistance training as an intervention with older adults. *Therapeutic Recreation Journal, 32*, 42-53.

Mobily, K. E., Mobily, P. R., Lessard, K. A., & Berkenpas, M. S. (2000). Case comparison of response to aquatic exercise: Acute versus chronic conditions. *Therapeutic Recreation Journal, 34*, 103-119.

Mobily, K. E., Mobily, P. R., Raimondi, R. M., Walter, K. L., & Rubenstein, L. M. (2004). Strength training and falls among older adults: A community-based TR intervention. *Annual in Therapeutic Recreation, 13*, 1-11.

Mobily, K. E., & Verburg, M. D. (2001). Aquatic therapy in community-based therapeutic recreation: Pain management in a case of fibromyalgia. *Therapeutic Recreation Journal, 35*, 57-69.

Monninkhof, E. M., Elias, S. G., Vlems, F. A., Van Der Tweel, I., Schuit, A. J.,Voskuil, D. W., &Van Leeuwen, F. (2007). Physical activity and breast cancer: A review. *Epidemiology, 18*, 137-157.

Myers, J. (2008). Principles of exercise prescription for persons with chronic heart failure. *Heart Failure Reviews, 13*, 61-68.

Nelson, M. E., Rejeski, W. J., Blair, S. N., Duncan, P. W., Judge, J. O., King, A. C., Macera, C. A., & Castaneda-Sceppa, C. (2007). Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association. *Medicine and Science in Sports and Exercise, 39*, 1435-1455.

Oliver, K., & Cronan, T. A. (2005). Correlates of physical activity among women with fibromyalgia syndrome. *Annals of Behavioral Medicine, 29*, 44-53.

Podgorski, C. A., Kessler, K., Cacia, B., Peterson, D. R., & Henderson, C. M. (2004).Physical activity intervention for older adults with intellectual disability: Report on a pilot project. *Mental Retardation, 42*, 272-283.

Reid, P. D., Factor, D. C., Freeman, N. L., & Sherman, J. (1988). The effects of physical exerciseon three autistic and developmentally disordered adolescents. *Therapeutic Recreation Journal, 22,* 47-56.

Richeson, N. E., Croteau, K. A., Jones, D. B., & Farmer, B. C. (2006). Effects of a pedometer -based intervention on the physical performance and mobility-related self-efficacy of community-dwelling older adults: An interdisciplinary preventive health care intervention. *Therapeutic Recreation Journal, 40*, 18-32.

Rimmer, J. H., Heller, T., Wang, E., & Valerio, I. (2004). Improvements in physical fitness in adults with Down Syndrome. *American Journal of Mental Retardation, 109*, 165-174.

Rogers, C. J., Colbert, L. H., Greiner, J. W., Perkins, S. N., & Hursting, S. D., (2008). Physical activity and cancer prevention. *Sports Medicine, 38*, 271-296.

Santiago, M. C., & Coyle, C. P. (2004). Leisure-time physical activity among women with mobility impairments: Implications for health promotion and leisure education. *Therapeutic Recreation Journal, 38*, 188-205.

Schleien, S. J., Krotee, M. L., Mustonen, T., Kelterborn, B., & Schermer, A. D. (1987). The effect of integrating children with autism into a physical activity and recreation setting. *Therapeutic Recreation Journal, 21*, 52-62.

Stumbo, N. J., & Peterson, C. A. (1998). The leisure ability model. *Therapeutic Recreation Journal, 32*, 82-96.

Tasiemski, T., Kennedy, P., &, Gardner, B. P. (2006). Examining the continuity of recreation engagement in individuals with spinal cord injuries. *Therapeutic Recreation Journal, 40*, 77-93.

Trojian, T. H., Mody, K., & Chain, P. (2007). Exercise and colon cancer: Primary and secondary prevention. *Current Sports Medicine Reports, 6*, 120-124.

Tsai, E., & Fung, L. (2005). Perceived constraints to leisure time physical activity participation of students with hearing impairment. *Therapeutic Recreation Journal, 39*, 192-206.

U. S. Census Bureau. (1997). Retrieved March 1, 2007 from http://www.census.gov/ipc/prod/97agewc.pdf.

U. S. Census Bureau. (2001). Retrieved March 1, 2007 from http://www.census.gov/prod/2001pubs/c2kbr01-10.pdf.

Van Andel, G. (1998). TR service delivery and TR outcomes models. *Therapeutic Recreation Journal, 32*, 180-192.

Wang, Y. (2008). Physical activities and health-related quality of life in older adults: Findings from the BRFSS 2000. *Annual in Therapeutic Recreation, 16*, 105-116.

Wankel, L. M. (1993). The importance of enjoyment to adherence and psychological benefits from physical activity. *International Journal of Sport Psychology, 24*, 151-169.

Wilhite, B., Keller, M. J., & Caldwell, L. (1999). Optimizing lifelong health and well-being: A health enhancing model of therapeutic recreation. *Therapeutic Recreation Journal, 33*, 98-108.

Wilhite, B., Keller, M. J., Collins, J. R., & Jacobson, S. (2003). A research agenda for therapeutic recreation revisited. *Therapeutic Recreation Journal, 37*, 207-223.

Wininger, S. R., & Pargman, D. (2003). Assessment of factors associated with exercise enjoyment. Journal of Music Therapy, 40, 57-73.