The Effects of Physical Activity and Exercise On Well-being

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Abstract
A growing amount of research suggests that regular physical activity can have both psychological and physiological benefits to the aging process. Well being, a global psychological state, has been found to be positively influenced by physical activity, even after short durations. The present study investigated the components of happiness, satisfaction with life, and social support, all of which are believed to be parts of overall well-being. Six older, community dwelling adults (M age • 64.5) who recently added physical activity to their lifestyles were surveyed and observed over a five-week period. Pre and post test scores were compared and attendance and score differences were correlated. While significant results were not found for this particular study, it is believed that further research will show that regular physical activity will enhance one's state of well-being.
Abstract
A growing amount of research suggests that regular physical activity can have both psychological and physiological benefits to the aging process. Well-being, a global psychological state, has been found to be positively influenced by physical activity, even after short durations. The present study investigated the components of happiness, satisfaction with life, and social support, all of which are believed to be parts of overall well-being. Six older, community-dwelling adults ($M$ age = 64.5) who recently added physical activity to their lifestyles were surveyed and observed over a five-week period. Pre and post test scores were compared and attendance and score differences were correlated. While significant results were not found for this particular study, it is believed that further research will show that regular physical activity will enhance one’s state of well-being.

The Effects of Physical Activity and Exercise On Well-being
One of the most important components to aging successfully is to engage in regular physical activity. There has been an increasing amount of research on the benefits of increased physical activity and exercise (Fletcher, Balady, Blair, Blumenthal, Caspersen & Chaitman, 1996). From a physiological perspective the benefits are countless. Recently there has been a growing focus on the psychological benefits of such activities, particularly in the domain of subjective well-being (Stathi, Fox, & McKenna, 2002). As the population of older adults is going to increase significantly over the next several years, it is expected that there will thus be a higher prevalence of psychological strain among this aging population. Even though there has not been a large amount of research on exercise therapy for maintaining well-being, the studies that have been done have yielded promising results showing the benefits.

In 1790 when the first United States Census was taken, about 50,000 of the 2.5 million Americans were 65 or older, about 2 percent of the population. By 1890 the older population increased to nearly 2.4 million and was less than 4 percent of the population. Since that time, at last count in 2000, there were 34.7 million older persons in the U.S., 12.6 percent of the total population (Atchley, 2000). According to the Administration on Aging (2001), the future projection of the older population is predicted to grow significantly. By 2025, it is expected that there will be 200 million people over the age of 60 in the world. It is expected that in 2030 there will be 70 million older people composing over 20 percent of the population in the U.S. This sharp increase will result as the “baby boom” generation reaches the age of 65.

As there are an increasing number of older individuals in the population, it can be expected that there will also be an increase in both physical and psychological aging symptoms. The aging process affects psychomotor performance and mental functioning. There are also marked changes in personality, emotions, and self-esteem. Various mental disorders also have an increased risk of developing and thus causing distress and impairing the ability to function. Depression is one disorder that is quite typical and likely to have its onset in the later years of life. Losses in physical functioning, changing social roles, losing close friends and loved ones, living alone, or side effects from other medications are all possible causes for this mental disorder later in life (Atchley, 2000). In addition to depression in old age, also comes less prevalent disorders such as loneliness, physical ailments, and social strains among other components which, when taken as a whole, contribute to an individual’s own sense of well-being (Stathi, 2002). Physiologically, many common ailments are prevalent in older age. High blood pressure and cholesterol levels, diabetes, cardiovascular disease, osteoporosis, arthritis, and certain types of cancer are among the most frequently reported somatic problems. In addition, flexibility and muscle performance are affected, all of which influence activities of daily living (ADLs) which may become increasingly harder to perform with age (Fletcher et al., 1996).

Subjective well-being has been viewed over the last several years as a fundamental indicator of successful aging. It can be defined in various ways and may differ slightly according to each researcher. For the most part, the common factors that define an individual’s sense of psychological well-being include the way in which a person judges the global quality of his or her state of existence (Stathi, 2002). When identifying psychological health, there are two ends of measurement, psychological distress (typically characterized by such conditions as depression and anxiety) and psychological well-being. It is thus presumed that anything that is deviating from the distressing end is contributing to well-being (McAuley, Blissmer, Marquez, Jerome, Kramer, & Katula, 2000). An increasing amount of research has yielded promising results that exercise can be used as a therapy for both physical and most particularly psychological well-being (McAuley, Blissmer, Katula, & Duncan, 2000).

There is evidence that a regular routine of exercise is comparable to individual and group psychotherapy and cognitive therapy treatments for
depression-like symptoms (Tkachuk & Martin, 1999). Research has shown that significant improvements can be gained in clinically depressed patients with as little as five weeks of basic aerobic or anaerobic activities. Various psychological and physiological theories have been proposed to explain the constructive effects that this therapy has on mental factors such as depression, anxiety, and loneliness. The psychological theories suggest that participation in exercise provides a form of meditation, a time when an individual can be distracted from disturbing thoughts and emotions, and that it leads to an increased sense of self-efficacy. In addition, social atmospheres are believed to aid in alleviating various degrees of psychological distress. The physiological theories include the thermogenic theory, the endorphin theory, and the monoamine neurotransmitter theory. Currently there is not one specific treatment strategy, psychological or physiological, that is the most extensively used. Rather, a combination of these theories is the most widely researched and implemented (Tkachuk & Martin, 1999).

There are many components that are involved in creating a sense of well-being. Measuring these factors has been done specifically through examining different types and durations of physical activity. Anaerobic versus aerobic and long durations versus short durations and lengths of time involved in activity have all been analyzed. In addition, the various ends of the spectrum have also been researched, specifically well-being at one end and psychological distress (particularly adult-onset depression) on the other end. The objective of this paper is to research each of these components and then examine the methodology and findings of the present study.

Variations of physical activity and related physiological benefits

Over the last several years there has been a vast array of research on the physiological benefits to increased physical activity and exercise (e.g., Fletcher et al., 1996). Increased physical activity can range from parking the car a few spaces further away and making the extra walk, to taking the stairs instead of the elevator, or even to getting up every hour and walking around the office or house. Exercise activities can range from walking, jogging, hiking, calisthenics, aerobic exercise, resistance training, running, bicycling, swimming, to various sports and activities in which exercise intensities exceed 40-50% of exercise capacity.

Various neurotransmitters in the brain are linked to negative thoughts and feelings. Recent findings have shown that physical activity may have antidepressant effects (Szabo, Billett, & Turner, 2001). Phenylethylamine is a neurochemical that has been linked to physical energy and mood. There has been evidence that levels of phenylethylamine and phenylacetic acid (metabolized phenylethylamine) are very low in the bodily fluids of individuals with depressive like symptoms. In a controlled experiment conducted by Szabo et al. (2001), 20 healthy men who exercised regularly each week were asked to refrain from exercising for 24 hours. A urine sample was collected before the experiment and then on the first day of controlled no exercise. On the second day the subjects were directed to run on a treadmill for 30 minutes at 70% of their maximum heart rate. For 24 hours after the physical activity, urine samples were collected. The results of this study showed that in 18 of the 20 subjects, the phenylacetic acid in their urine was higher after exercise. Such an increase implies that phenylethylamine levels are positively affected by exercise and thus greater levels of antidepressant neurochemicals are released to combat the feelings associated with depressive and similar mental feelings.

In other physical activity studies, there have been questions as to which type of exercise is more beneficial. Singh and colleagues (1997) conducted a 10 week controlled study, which measured the effects of resistance training in elderly patients who suffered from clinical depression. There were 32 subjects who were on average 71.3 years of age. The results showed a 60% improvement in depressive symptoms for those who were in the exercise group as compared to a 30% improvement for those in the health lecture group (the control group). In this first phase, the depressed patients participated in weight training three days a week for 10 weeks. At the end of the ten weeks they were offered three options to continue into phase II of the experiment: to continue training at the facility where the study began, to use free weights and train at home, or to use another training facility. Regardless of the option that was chosen, all subjects were advised to continue the exercises 2-3 times a week as they had been instructed and to keep an exercise log of these exercise sessions. Throughout the second phase, the subjects were contacted on a weekly basis to monitor their health status. After the 20th week, the researchers did not implement any further exercise sessions and contact was limited to a mailed follow-up survey 26 months later. The overall outcome of this three-phase study was that at both the 20-week and 26 month follow-up, the depression was reduced compared to the control group. At the 26-month follow-up it was found that 33% of the subjects were still engaged in regular resistance training. The basic conclusions that can be made from this study are that weight training, either supervised or unsupervised, preserves its antidepressant effects and that changes in exercise behavior are achievable in some patients even without the presence of guided supervision (Singh et al., 2001).
One area that has been extensively researched is just how much physical activity is necessary to produce a decrease in negative symptoms and an increase in positive symptoms (Dimeo, Bauer, Varahram, Proest, & Halter, 2001 and Hansen, Stevens, & Coast, 2001). Because psychoactive drugs, specifically antidepressants, often have a latency time of two to four weeks before therapeutic effects are felt, exercise has a strong clinical benefit over them because the effects of exercise can be felt in a short time. One study conducted by Dimeo et al. (2001) looked at the intensity of symptoms during and after a 10-day experiment. The subjects were 12 patients (five men and seven women) with a mean age of 49 who met criteria for major depressive disorder and were in a depressive episode that was at least 35 weeks. The training consisted of walking daily on a treadmill for 10 days, with breaks only on Sundays. In the beginning, the patients performed five intervals of three minutes each at high intensities that were appropriate for each subject. Heart rates were continually observed and as heart rate decreased due to adjustments to the workout, the intensity was then regulated to maintain the desired effects. The depressive symptoms were assessed in the beginning and at the end of the experiment via the Hamilton Rating Scale for Depression (HAMD). Each day the subjects rated their mood through a visual analog scale of 0, “I feel bad” to 10, “I feel good”. The Scale for Self Assessment of Depression was also used on the first, fifth, and final days of the experiment. The results of the study demonstrated that six of the 12 patients experienced a significant improvement and depression scores were considerably reduced. These results show that aerobic training can produce a considerable improvement in negative symptoms even over a short time period of 10 days. Dimeo et al. (2001) proposed a biological explanation for the mood changes. These researchers explained that levels of neurochemicals in the central nervous system, such as adrenocorticotropic hormone, cortisol, opioid peptides, and cytokines, all of which manipulate mood either positively or negatively, are affected by exercise.

Another study also looked at the minimal amount of time of physical activity in each session that is necessary to obtain positive psychological benefits (Hansen et al., 2001). The participants of the study were 21 college students between the ages of 20-26. The subjects completed a series of mood inventories both before and after the exercise sessions. Each participant exercised at the same time on the same day of the week for four weeks. During the first week, the subjects were instructed to sit quietly for 30 minutes in front of a third-floor window. In the second week, the subjects warmed up on a stationary bike until their heart rate was at 60% of their estimated VO$_{2\text{max}}$ (maximum oxygen consumption in one minute) and then maintained that intensity while pedaling for 10 minutes. For the third session, the subject warmed up in the same way reaching 60% of their VO$_{2\text{max}}$ and then maintained the level for 20 minutes. The fourth and final week, the subjects once again warmed up to 60% of their VO$_{2\text{max}}$ but maintained this level for 30 minutes. In general, the results showed that engaging in aerobic exercise for 10 minutes at an intensity of 60% is enough activity to produce a considerable reduction in negative mood and fatigue and an increase in energy. It was also found that only confusion decreased considerably after 20 minutes of activity. This particular study suggested that 10 minute increments of physical activity are enough to provide benefits in psychological states and that there is little improvement in such states in durations longer than 10 minutes except for confusion (Hansen et al., 2001).

**Depression and related implications**

An increasingly researched area in physical activity for older persons is the effect on psychological functioning, particularly on depression. As mentioned earlier, depression is the most common mental disorder in the elderly and thus is often a crucial addition to research involving the psychological stability of aging persons. Depression and depressive like symptoms may result from a number of smaller factors all of which affect well-being, but combine to form this larger more severe state. Both preventative and treatment measures have gained increasing popularity. There have been many proposals as to the effects of physical activity and the domains to which they may help in treating these symptoms. Many physicians have begun to recommend exercise as a treatment for cases of mild depression or as part of a combination treatment with medications and/or therapy (Szabo, Billet, & Turner, 2001).

A landmark Duke University study by Babyak and colleagues (2000) assessed the condition of subjects who were treated with one of three treatment conditions for major depressive disorder. The subjects included 156 volunteers who were 50 years and older who met the DSM-IV criteria for major depressive disorder. Subjects in the study were assigned to an aerobic exercise group, antidepressant therapy group, or a group that received a combination of both exercise and medication. The exercise group was assigned to walking, jogging, or cycling for 30 minutes, three times a week at the Medical Center on campus. The medication group was given the antidepressant sertraline (Zoloft). Severity of symptoms were reported and assessments were taken at the start of the study, four months after treatment, and then six months after the conclusion of the study.
The results of the study were that at the four month mark, patients in all three treatment groups displayed improvements. It was found that after four months between 60-70% of the subjects in all three treatment groups had recovered and were no longer considered depressed. Six months after the end of the study, the assessments showed that the subjects in the aerobic exercise group had a significantly lower rate of relapse (8%) as compared to those subjects in the sertraline group (38%). Those who were in the combinatorial group had a relapse rate of 31%. Another important point is that 64% of the subjects who were in the exercise group continued their exercise routines and 48% who were assigned to the antidepressant group decided to try exercise. The conclusions from this study are noteworthy because they show that exercise therapy is a good alternative and has been associated with improvements in symptoms in the short term and for relapse rates in the long term (Babyak et al., 2000).

This study also demonstrates that psychological distress, even the most extreme form of depression, can be helped through participation in exercise and it can be presumed that with other forms of well-being impairments, similar results would be found.

A study by McNeil, LeBlanc, and Joyner (1991) considered both the psychological and somatic symptoms of depression in a sample of 30 moderately depressed elderly subjects. Psychological symptoms included a sad mood, a loss of interest in normal activities, and a feeling of insignificance. Somatic symptoms included feelings of fatigue, loss of appetite, and disruptions in normal sleep patterns. The mean age of the participants was 72.5 years, all of which were community dwelling citizens and the majority of which were widowed. The study compared the effects of exercise against social contact enhancement in elderly patients expressing depressive symptoms. The majority of older onset depression occurs as a result of social factors; thus this component was very important. The subjects were divided into one of three groups: an exercise group that was accompanied by an experimenter, a social contact control group, and a wait-list control group. Subjects in the exercise group participated in three walking sessions each week. The sessions were originally 20 minutes each but eventually increased over the six weeks to 40 minutes in duration. The social contact control group consisted of two weekly home visits by an undergraduate student for the six-week period. Like the exercise group, the visits gradually increased from 20 to 40 minutes in duration. Casual conversation was maintained throughout the meetings. The subjects in the control group were simply told that their treatment would be delayed for another six weeks. The results were that both the exercise and social contact were equally effective in treating the overall and psychological depressive symptoms. Perhaps most importantly, the exercise group was the only group that improved in somatic symptoms. Important conclusions from this study are that in the short term, exercise accompanied by a partner, yielded a reduction in both psychological and somatic symptoms. The findings also show the importance of the social contacts, either during or without exercise, and how it has a positive effect on decreasing negative symptoms and how it has a positive influence on well-being (McNeil et al., 1991).

Connections to well-being

Each of the previous studies provides evidence that various durations and forms of physical activity can have a strong manipulative effect on psychological distress and can contribute to a sense of well-being. Looking more specifically at well-being, several studies show additional support for the positive influences of physical activity. Stathi and colleagues (2002) used a qualitative approach to identify various dimensions of subjective well-being and the ways that these components might be influenced by participation in physical activity. The participants were 28 retired older adults between the ages of 62-81. One-on-one and group interviews were conducted. Before each interview, each subject was asked to complete the Cantril's Self-Anchoring Ladder and the Satisfaction with Life Scale. The results showed that among all of the subjects, a number of common features emerged and were found to be influenced by physical activity. The final components included developmental, material, physical, mental, and social-well being. As the researchers noted, these dimensions are not fully independent of each other because each construct may contribute to another. With importance to the proposed study, the relationship between social well-being and the influences of physical activity are noteworthy. The researchers reported that all of the interviewees explained that one of the most important results of exercise participation is the opportunity to meet new people and to expand on their social horizons (Stathi, 2002).

A study by McAuley, Blissmer, Marquez, et al. in 2000 examined the effects of physical activity on subjective well-being. These researchers randomly assigned sedentary older adults with an average age of 65.5 years to either an aerobic activity program or a stretching and toning program. The aerobic exercise group was conducted three times a week for 6 months with increasing intensity and duration levels. The stretching and toning control group also met three times a week for 6 months and concentrated on exercises that were designed specifically for helping older adults with stretching, limbering, and strengthening. Demographic and health and physical
activity questions provided the researchers with important health history information. The various components of well-being were measured by the following: happiness was assessed by the Memorial University of Newfoundland Scale of Happiness, loneliness by the UCLA Loneliness Scale, satisfaction with life by the Satisfaction with Life Scale and social support by the Social Provisions Scale. The results demonstrated that satisfaction with life and happiness significantly increased and loneliness significantly decreased over the 6 month study. In this particular study, these changes did not differ by the form of physical activity group. The researchers did note that it appeared that an exercise environment could provide the social resources to combat the feelings of loneliness (McAuley Blissmer, Marquez, et al., 2000).

In another study by McAuley, Blissmer, Katula, and Duncan (2000), exercise environment was researched. Eighty, previously sedentary older adults, with a mean age of 65.5 years, were randomly assigned to either an aerobic activity group of mall walking or a stretching and toning program. Participants completed a demographic questionnaire packet as well as self-efficacy measurements and the Subjective Exercise Experiences Scale. The researchers controlled for both duration and intensity of exercise and were able to demonstrate a significant finding in relation to the present study. The results of the study by McAuley and colleagues (2000) show that positive affective responses to physical activity may be increased with group or social environments as opposed to those environments in which exercising is done alone. The researchers proposed that organized group exercise atmospheres provide for an opportunity for social support influences to develop. It is believed that when such environments are available, a familiar social network of peers may enhance feelings of positive well-being including belonging, accomplishment, and increased self-worth (McAuley, Blissmer, Katula et al., 2000).

When examining the model of health, there are typically six dimensions that are discussed including physical, emotional, social, intellectual, spiritual, and environmental components. These various aspects of health can often be described in terms of a Rubik’s Cube because one dimension of health and wellness is most always affected by the other dimensions. Marinelli and Plummer (1999), referred to this example and researched just how related some of these dimensions were. Four senior community physical activity and exercise groups were chosen for subject participation. Each of the four groups had nine to eleven participants for the study who volunteered to meet one time for an hour and a half. It was hypothesized that because each of the groups had begun as activities involving exercise, the physical dimension of wellness would be the most prominently identified. After conducting interviews and surveys, physical health was one of the top four in addition to the social, emotional, and intellectual constructs. The researchers explained that the social component is mostly based on the interaction between members that typically occur both before and after the program. The emotional component was also highly reported and is believed to occur because of the bonding that takes place within the social support systems that develop (Marinelli & Plummer, 1999).

It is quite apparent that various studies that have been conducted have attempted to more clearly understand within the aging population, psychological well-being and the common deviations away from it, most commonly adult onset depression. The various models of health and wellness have identified components that are believed to reflect and influence each other. With a growing amount of research, the correlation between physical and social well-being have gained much attention. The present study aimed to research the social aspect of well-being. It was hypothesized that even in short bouts of exercise both subjects participating in the group exercise classes and in the individual exercise regimen will demonstrate an increase in well-being after five weeks of a newly added physical activity routine. Additionally, it was also hypothesized that those members participating in the group exercise classes in comparison to those performing an individual exercise routine would yield a greater increase in well-being and social support measures from pretest to posttest as a result of the group structure and the benefits that it often provides.

**Method**

**Participants**
The subjects for the proposed study were 6 community-dwelling, older adults at posttest, ranging from 55 to 78 years, with the average age being 64.5. The requirement for consideration in the present study was to be a new member no more than a month into their membership. Both male and female subjects were recruited. The majority of the subjects had little to no previous participation in structured physical activity programs. It was hoped that an equal number of subjects would be taken from those who opt for individual exercise and from those who opt to join the group exercise classes. However, only subjects for the individual exercise group were able to be obtained.

**Recruitment**
Initial contact was made with administrative staff at the Center for Lifetime Wellness in Monroe Community Hospital, located in Rochester, New York. Subjects were recruited from the beginning part of their membership at the fitness center. Permission to conduct the study was granted as well as to gain access to attendance records. The participants were
given a form describing the purpose of the present research study, what would be required from them, and contact information if they chose to participate. It was hoped that because of the various options for involvement within the atmosphere of this particular fitness center, a similar number of subjects would be selected from both the structured group exercise classes and from those who opt for the individual exercise programs. Due to lack of participation as a whole and for reasons to be discussed, only subjects for the individual exercise program were able to be obtained. Nine participants began the study and six remained at posttest.

In the part of the center where individual exercise took place there was a wide range of experiences that provided opportunities for social interaction. It was perceived that the environment of the fitness center had more motivational factors and social opportunities than if the subjects were to try to increase their physical activity independently outside of the facility. The subjects were free to move around the gym at their own pace and in the order that they choose. Both aerobic exercise equipment (including treadmills, row machines, stair machines, and stationary bikes) and aerobic weight apparatus (including various machines and free weights) were available for all participants. The subjects went to each piece of equipment and performed the exercise and then moved on to the next until they completed the circuit that they had developed with a trainer. It was observed that while waiting for the next machine or even while performing the exercises there were most certainly opportunities for communication among the members and multiple interactions were often visible.

Materials and Measures

Demographics and health history. A general demographics questionnaire was distributed. Their age, gender, and marital status were collected. In addition, the subjects were asked questions about their previous levels of physical activity, reasons for becoming a member at the Center for Lifetime Wellness, and personal views about their current level of health.

Subjective well-being. Subjective well-being can be defined through several related measures including physical, developmental, material, mental, and social well-being. When combined, these components are all believed to affect one's overall sense of their own well-being. The present study looked at these combined measures, particularly concentrating on overall well-being. The first component measured was satisfaction with life using the 5-item Satisfaction with Life Scale created by Diener, Emmons, Larsen, and Griffin (1985). This scale was formulated to measure an individual's overall sense of life satisfaction by rating various life domains according to his or her own standards. It ranges from a low score of 5 to a high score of 35, higher scores indicating greater satisfaction with life. The component of happiness was measured by The Memorial University of Newfoundland Scale of Happiness (MUNSH) which is a 24-item scale developed by Kozma and Stones (1980). This scale was formulated to measure happiness in the elderly and ranges from scores of -24 to +24, with a high positive score indicating a higher degree of happiness. A third component of social support was measured by the Social Provisions Scale. Formulated by Weiss (1974), this 24-item scale assesses social relationships and feelings of social support. The score ranges for this scale are from a low of 24 to a high of 96, with the higher score indicating a greater feeling of social support.

Design and Procedures

A description of the present study was distributed to several new members to the Center. Those who were interested in participating responded and were then contacted. A time was set up to meet each of the subjects and to have them sign an informed consent. The subjects were then distributed the questionnaire about demographics, the Satisfaction With Life Scale, the MUNSH scale, and the Social Provisions Scale. General observations of exercise participation and social interactions took place periodically over the five weeks. At the end of the fifth week, the same three scales were redistributed. Also, during the observation period the attendance records were examined. All of the observations were recorded and the scales and questionnaires were collected, compared, and then finally summarized.

Results

The intent of the study was to compare all subjects pretest to posttest to evaluate the effects of increased physical activity on psychological well-being. An additional intent was to compare individual exercises to group (exercise class) participants to evaluate whether or not group participants demonstrated a greater degree of psychological well-being and social support. Since the type of program that they participated in was completely based upon their preference and choice, there were no participants for the present study from the group exercise classes. Consequently, all of the data and analysis was based on the individual exercise participants. Also at pretest, there were nine participants in the individual exercise group. Because of some significant health problems of several of the participants, at posttest there were only six remaining subjects.

There were three dependent variables that were collected at pretest and posttest: a measurement through the Satisfaction with Life Scale, a
measurement of happiness through the Memorial Newfoundland Scale of Happiness, and a measurement of social support through the Social Provisions Scale. General demographic data was collected in addition to data on how frequently the subjects attended the exercise facility. About half of the subjects had little to no previous exercise involvement and the remaining half of the subjects had a history of walking or with some form of leisure physical activity such as tennis or golf. The most common responses for why the participants chose to join the Center were to get into shape, lose weight, and lower cholesterol. Other responses were to extend rehabilitation that they had been previously engaged in. All of the subjects rated their health as either good or very good. Half of the participants were either divorced or widowed and half of the subjects were still married. The average age of the participants was 64.5 and two of the participants were male. On average the subjects attended 10.33 times within the five weeks with number of attendances ranging from 8-12 times. For a further summary of descriptive data refer to Table 1.

To detect a change in subjective wellbeing, several paired T-tests were used on the data. In order to evaluate a change in satisfaction with life the pre and post scores of the scale were subjected to a paired T-test. It was found that there was no significant difference, t(5)=39, p=.71. To evaluate a change in happiness, the pre and post scores of the MUNSH scale were also subjected to a paired T-test. With this test it was also found that there was no significant difference, t(5)=94, p=.39. Additionally, to evaluate a change in social support, the pre and post scores of the Social Provision Scale were subjected to the same paired T-test. Similarly, the results showed no significant difference, t(5)=.50, p=.64.

To evaluate how the frequency of attendance was related to the measures of wellbeing, attendance was correlated with a “difference in score” for each variable. The “difference in score” measure was obtained by finding the difference between the pre and post test score for each of the three scales. After subjecting the Satisfaction with Life difference in score to a correlation with attendance, the score was not found to have a significant difference, r =.62, p=.19. Likewise, the pre and post difference in MUNSH happiness scores were correlated with attendance and no significant difference was found, r =.34, p=.51. Finally, the pre and post difference in scores of social support were also correlated with attendance and no significant difference was found, r =.40, p =.43. Refer to summary Table 2 for further detail.

Discussion

The intended purpose of the present study was to examine the effects of increased physical activity on psychological well-being. An increasing amount of research has shown that individuals who add a regimen of physical activity to their everyday lifestyle typically begin to experience not only physiological effects but psychological effects as well. Several studies have yielded significant results showing that even after short periods of time with increased physical activity, positive psychological effects can be detected, particularly in overall psychological well-being (i.e. McAuley, Blissmer, & Katula, 2000 and Stathi, 2002). In addition, similar studies have found evidence that participation in group exercise as opposed to individual activity will yield a greater degree of the same results (McAuley Blissmer, Marquez, et al., 2000). It was hypothesized that in the present study the subjects participating would demonstrate an increase in well-being after five weeks of a newly added physical activity routine. Accordingly, it was also hypothesized that those members participating in the group exercise classes in comparison to those performing an individual exercise routine would yield a greater increase in wellbeing and social support measures from pretest to posttest.

In comparison to other studies on this topic, the present study does not yield results that are related to prior research. Previous examinations of this topic, most much larger, have yielded significant results demonstrating that exercise does have a positive effect on psychological well-being. While none of the data of the present study was significant, it should be mentioned that while some of the scores did not increase, comparatively, they did not decrease either; thus indicating that exercise does not have a negative effect on overall well-being. For those subjects at pretest who had a fairly high overall sense of wellbeing, most retained the same level at the end of the five weeks. This maintenance could thus indicate that for individuals who have a stable sense of wellbeing, increased exercise may result in helping them to maintain this sound psychological state.

It is apparent that there were several problems with the present study. The size of the subject population was much smaller than intended. With a larger pool of subjects it is believed that the results would have been different and most likely significant. The hypotheses regarding the comparison of well-being scores between group exercise participants and individual subjects as well as the social comparison of social support scores between the two groups had to be dropped as a result of the lack of group exercise participants for the study. I was unable to obtain any participants who were recently new members to the Center and who opted to participate in group exercise classes. It is now believed that perhaps new members are still somewhat intimidated by the group exercise setting, especially in this particular environment with a wall of windows and one with mirrors and do not
feel comfortable enough yet to exercise in front of what they think is the rest of the fitness center. Additionally, it is believed that new members, most presumably new to exercise as a whole, might opt to try to perform and master individual routines before they attempt to exercise in a group atmosphere. Had subjects been available from the group exercise realm, it is still hypothesized that these subjects would have demonstrated greater increases in psychological well-being and in social support measurements.

Other environmental issues that may have contributed to the insignificance of results could have been several weather issues that may have certainly prevented some of the subjects from coming to the Center and thus feeling the hypothesized increase in well-being. Comparatively, there is also a high chance that the tension leading up to and now during the present war in Iraq may have influenced some of the subjects motivation to participate in their regular routines. For many, this time has yielded some sort of psychological and/or emotional affect. In addition, within the Center, there were a few days in a row that three of the five treadmills were unusable. It is believed that some individuals may have either been turned off from coming the following days (especially if this machine was a normal and significant part of their routine at the center) or while at the Center, were unable to participate in the same manner that they had been since they had joined.

Additionally, the exact amount of time that the subjects were actually participating in physical activity was not the same for all subjects. The number of times that each subject attended in the five weeks was monitored, however, the length of participation they were there each time was not. The durations, thus presumably reflecting intensity of workout, was not measured. Duration and intensity are two factors that may have had an influence on the scores and unfortunately were not recorded. On average the participants attended 10.33 times in the five weeks, with visits ranging from eight to twelve times. As a whole the attendance rates were descent with most participating two to three times a week, which is the recommended amount of time for individuals of their ages.

In addition, because of the limitations of the timeframe for which the study could be performed in, it actually did not match with the beginning of the new sessions of group exercise classes within the center. It is thus presumed that if the start of the study was matched with the start of the new session of classes, there is a greater chance that group exercise participants would have been obtained as subjects. Though with most classes, members are always welcome to join, most do not for reasons of their own. In respect to the present study, if the subjects had joined half way through the session, it can be hypothesized that the theory of social support would be disrupted and not equivalent to the believed potential of the premise.

As mentioned earlier, although the present study did not show significant results, it is important to note that the results also did not show that exercise had a negative impact on psychological well-being. Perhaps the greatest implication of the present study would be that exercise might help to maintain a constant state of well-being. For those that have a high sense of this psychological state to begin with is an advantage to adding exercise to a lifestyle.

Suggestions for future research are numerous. Because this field is just now gaining significant attention there are many possibilities for future studies. To begin, a study similar to the present could be replicated with a few modifications. If a larger subject pool was used it would thus allow for a greater possibility of obtaining subjects who opt to try group exercise. Additionally, with a larger subject pool, it is quite possible that there would be a greater degree of variability in the scores of the subjects, with the hope of more positive and significant results. In a replication of this study there should also be a way to monitor not only attendance, but also duration and intensity of physical activity to enable better generalizations from the data. Perhaps the whole hypothesis of group versus individual group exercise at initial start of membership should be dropped because it might be possible that individuals new to exercise might indeed be too intimidated to begin with group exercise. Also, finding a way to place more stringent limitations on “new membership” either having the researcher present from the start of their first day or say one week of membership and initial participation might prove advantageous. It is also suggested that a longer time frame is used to complete the study in, without the limitations of semester timeframes. Perhaps a longer time frame between pre and post testing might also carry a greater chance for significant results.

Other perspective studies may include asking further background information about medications and the possibility of already present psychological disturbances. For instance, if some of the subjects in the current study already had underlying psychological instabilities, such as depression with it’s many degrees, multiple confounding effects could influence the results if the subject backgrounds are not monitored. Either controlling for subjects with or without such disturbances would be an interesting area to explore.

Another appealing area to research would be to investigate how everyday routines are influenced, presumably through positive psychological changes resulting from exercise. Measuring how each day is influenced as a result of the presence or lack of
exercise in the daily routine. For example, it is presumed that the days that had exercise as part of the routine would go smoother with lower degrees of both stress and tiredness. Additionally, comparing weekly routines with exercise three to five times a week with those that were with one or two times or with those that do not exercise at all. Again stress levels, exhaustion levels, and degrees of accomplishments could be measured and correlated.

Taken all together, the present study and the past studies that were discussed all provide significant data on a topic that is beginning to catch the attention of medical professionals, healthcare providers, employers, and the general public alike. More and more researchers are investigating the various areas surrounding the topic of exercise science and its multitude of benefits. As society becomes increasingly technologically advanced, the rapidly growing discovery of benefits of physical activity and exercise are being welcomed for sure. The research and often promising results could not be escalating at a better time as a large portion of the population are beginning to age and as society as a whole is beginning to face greater psychological challenges in everyday life.

Table 1: Descriptive Data for Each Scale

<table>
<thead>
<tr>
<th>Scale</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction With Life</td>
<td>26.5</td>
<td>26.0</td>
</tr>
<tr>
<td>MUNSH</td>
<td>16.33</td>
<td>11.12</td>
</tr>
<tr>
<td>Social Provisions</td>
<td>77.67</td>
<td>76.0</td>
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</table>

Table 2: Analytical Data for Pretest/Posttest Score Differences and Attendance Correlations

<table>
<thead>
<tr>
<th>Scale</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
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<td>Satisfaction with Life</td>
<td>10.33</td>
<td>1.86</td>
</tr>
<tr>
<td>MUNSH</td>
<td>-5.12</td>
<td>13.41</td>
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<tr>
<td>Social Provisions</td>
<td>-1.67</td>
<td>8.16</td>
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References


