
The purpose of this study was to examine the association between engaging in minimum levels of physical activity as defined by ACSM and perceived quality of life. A total of 43 college students were included in a repeated measures, quasi-experimental design research study that produced an overall retention rate of 65%, which resulted in 15 students being placed in the treatment group, and 28 students being placed in the control group. Analysis of variance with repeated measures was used to compare the quality of life mean scores over three administrations of the Quality of Life Inventory (QOLI), which resulted in no significant main effects for either the time measure or the group measure, but did produce a significant interaction effect. Post hoc analyses showed there was a significant difference between the treatment and control groups’ quality of life mean scores only during the second administration of the instrument. Further analysis showed that the control group had significantly higher quality of life domain scores for six of the 16 quality of life domains. There were no significant differences between groups across any of the physiological measures. These findings did not support previous research that increasing individuals’ level of physical activity will enhance their perceived quality of life. Instead, this study only provokes more questions about the connection between physical activity and perceived quality of life.
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MINIMUM LEVELS OF PHYSICAL ACTIVITY AND PERCEIVED QUALITY OF LIFE

According to the U.S. Department of Health and Human Services (2001), in 1999, 61% of adults in the United States were reported to be overweight or obese as defined by a body mass index (BMI) of 25 kg/m² or greater, while the percentage of children and adolescents who were overweight was 13 and 14, respectively. This alarming situation in the health status of the U.S. population is even more disturbing given the fact that 300,000 deaths are expected to occur each year specifically due to obesity (U.S. Department of Health and Human Services). From an economic health perspective, the cost of obesity in the U.S. was estimated to be about $117 billion for 2000 (U.S. Department of Health and Human Services).

Individuals become overweight or obese as a result of excessive caloric intake and/or insufficient physical activity (U.S. Department of Health and Human Services, 2001). Today, about 60% of the U.S. population does not meet the recommended frequency, duration and intensity for physical activity for health and quality of life purposes (Dishman, 2003). Physical inactivity is even more prevalent than three other behavior-related risk factors for heart disease, such as smoking a pack of cigarettes a day, possessing a systolic blood pressure of greater than 150 mmHg, or having cholesterol levels in excess of 265 mg/dl of blood (Dishman). Furthermore, less than 15% of the U.S. adult population is “effectively” active at a level that would raise their physical fitness level, while an additional 15% of U.S. adults are active at a level that would only
improve their health but not have a great impact on their fitness level (Dishman). In addition, approximately 30% of the U.S. population is underactive, and about 40% are completely sedentary (Dishman). Based on these health statistics, there are more adults who are not sufficiently engaging in physical activity than those who meet the recommendations for daily physical activity. Physical activity is essential in preventing and treating overweight and obesity, and physical activity is particularly useful in maintaining weight loss (U.S. Department of Health and Human Services).

While the evidence derived from physiological research has demonstrated the physiological benefits of physical activity, the corresponding psychological literature has revealed a more complex and less understood association between physical activity and psychological benefits (Lustyk, Widman, Paschane, & Olson, 2004; Scully, Kremer, Meade, Graham, & Dudgeon, 1998). Researchers have suggested that the psychological perception of self is closely associated with the sense of one’s own body (Hayes & Ross, 1986). In addition to an improved sense of one’s own body, the physiological responses of physical activity may have a restorative or therapeutic influence in relation to certain psychological conditions, such as perceived quality of life (Scully et al.). Physical activity and quality of life research illustrates an association between physical activity and perceived quality of life (Acree et al., 2006; Lustyk et al., 2004; Martin Ginis et al., 2003); however, it is still unclear what level of frequency, intensity and duration of physical activity is necessary to exhibit a connection between physical activity and perceived quality of life.
Benefits of Physical Activity

Over the years, research has documented the tremendous health benefits related to regular physical activity (Dishman, 2003). In addition to lowering the risk of obesity and diabetes, regular physical activity lowers blood pressure and cholesterol levels (Dishman). Thus, physical activity may reduce the risk of the first and third leading causes of death in the United States, heart disease and stroke (Winters, Petosa, & Charlton, 2003). According to Blair and colleagues (1989), when all-cause death rates among men and women were measured across standard levels of fitness, there was an inverse correlation between fitness levels and death rates which showed a steep reduction in death rates at the lower levels of fitness and a more linear reduction across the higher levels of fitness (Blair et al., 1989). One conclusion from this study was that the most significant benefit to the population would be to advance people from the lowest level of physical activity engagement up to the next level (Dishman). Ironically, the most common goal of fitness professionals has been to move people to the upper levels of physical fitness and not simply to advance them to the next manageable stage (Dishman). Similarly, Wei and colleagues (1999) reported that, within the specific range of BMI (25 to 28 kg/m²) at which the risk of cardiovascular disease begins growing at an exponential rate, those who adopt and maintain at least a moderate level of fitness have the potential to counteract the increased health risk of their being overweight.

Research indicates that abiding by a “no pain, no gain” philosophy is not necessary when promoting overall health benefits (Dishman, 2003). Many studies have shown health related improvement with even moderately intense levels of physical
activity (Duncan, Gordon, & Scott, 1991; Dishman). For example, reductions in triglycerides and LDL-cholesterol of approximately 5-10% have been exhibited after only six to ten months of participating in moderately intense walking or jogging (Duncan). Furthermore, Duncan and colleagues (1991) provided compelling evidence that after six to ten months of moderate physical activity, a reduction in heart disease risk was the result of a 10% increase in HDL-cholesterol or “good cholesterol.” Although several studies have validated that the more intensely one exercised, the more fit he/she would become, high intensity does not necessarily translate into equivalent advancement in health benefits (Duncan et al.). For example, the rate of energy expenditure was not salient in terms of increasing HDL levels (Dishman). HDL levels were increased independent of level of intensity, which suggests “that there may be a threshold of health benefit associated with moving people from sedentary to the active, and not necessarily an added benefit of striving for the highest levels of activity” (Dishman, p. 44).

According to Yoke (2003), the overall amount of exercise performed per week is one of the primary factors in improving cardiovascular fitness. Cardiovascular progress is similar for long-duration activities at a low-intensity and for short-duration activities at a high-intensity if the total caloric expenditure of the activities is equal. However, high-intensity physical activity leads to a higher rate of cardiovascular risks, orthopedic injuries and decreased adherence (Yoke). Thus, low-to moderate-intense physical activity regimens with longer durations are recommended for most adults (Yoke).

The American College of Sports Medicine recommends that people participate in 20 to 60 minutes of physical activity per day, three to five days a week and in a range of
45–85% of capacity (VO₂ max) depending on ability and readiness for the activity (Pate et al., 1995). These recommended guidelines were intended to improve VO₂ max, and were based on one’s age and levels of readiness and ability. This recommendation also includes a wide variety of modes of physical activity. However, according to Dishman (2003), these recommendations may not be broad and wide-ranging enough to help encourage the more than 80% of the adult population who have chosen not to adhere to them.

According to the U. S. Department of Health and Human Services Centers for Disease Control and Prevention guidelines (1996), physical activity does not have to be strenuous in order to provide some benefit. Engaging in moderately intense physical activity is an essential aspect of a healthy lifestyle for people of various ages and abilities. Most Americans could benefit from adopting a more active lifestyle. The Centers for Disease Control and Prevention defines moderately intense physical activity as any activity that burns between 3.5 and 7.0 calories per minute. These levels are equivalent to the energy a healthy person might expend while “walking quickly, mowing the lawn, dancing, swimming for recreation, or bicycling” (U.S. Department of Health and Human Services, 2001). Vigorously intense physical activity is defined as any activity that expends more than 7 calories per minute (Ainsworth et al., 2000). These levels are equal to the energy a healthy person might exert while “jogging, performing heavy yard work, participating in high-impact aerobic dancing, swimming continuous laps, or bicycling uphill” (U.S. Department of Health and Human Services).
Physical Activity and Quality of Life

Quality of life theory suggests that an individual’s satisfaction in a particular area of life is weighted according to its significance or value before the level of satisfaction with that area is entered into the equation of overall life satisfaction (Frisch, 1994). Therefore, it is assumed that one’s satisfaction in areas of life valued extremely high will have a greater influence on his/her overall life satisfaction than areas of life that are deemed to be less important or valuable.

The psychological variable, quality of life, is flourishing as a primary construct within many fields of study (Lustyk et al., 2004). The major appeal for using quality of life is that this psychological construct offers a more comprehensive alternative than some traditional views about how to measure one’s success in life (Lustyk et al.). Quality of life broadens the customary objective measures of health, wealth, and social accomplishment to also consider subjective perceptions of happiness and well-being (Lustyk et al.). Moreover, quality of life involves the congruence between desired and attained expectations related to the physical, psychological, and social aspects of life (Lustyk et al.).

Healthy lifestyle behaviors, such as making better food choices and abstaining from drugs and alcohol, tend to be associated with positive affect and quality of life. However, research investigating the advantages of regular physical activity on quality of life still remains limited and, within the research that exists, few studies have concentrated on the effects of minimum levels of physical activity on quality of life (Lustyk et al.).
In a study by Lustyk and colleagues (2004), college students’ perceived quality of life was assessed using the 32-item Quality of Life Inventory (QOLI) measure that included the following 16 domains: health, self-esteem, goals and values, money, work, play, learning, creativity, helping, love, friends, children, relatives, home, neighborhood, and community. The investigators reported the highest quality of life in the most frequently active group and in the group with the highest volume of physical activity. Results of post-hoc tests showed that participants in the high-frequency group had significantly higher health-related quality of life than those in the medium or low frequency groups (Lustyk et al.). However, the data did not support the authors’ hypothesis that higher quality of life would be related to participation in more intense physical activity. Instead, they found the highest quality of life was reported in participants who completed physical activity at a “comfortable” level of intensity, not moderate or strenuous activity (Lustyk et al.). Although results from this study showed that there was a positive relationship between high levels of intensity and those indicating high scores within the health domain, higher scores in self-esteem were positively related to low levels of intensity (Lustyk et al.), which support the belief that when intensity surpasses an individual’s comfort level, feelings of defeat may arise. Likewise, engaging in physical activity at a lower level of intensity may elevate self-confidence and feelings of affirmation (Lustyk et al.).

Acree and colleagues (2006) examined the connection between physical activity and health-related quality of life in older adults (60 years of age or older). The fundamental dimensions in a health-related quality of life assessment consisted of
“physical and social functioning, emotional well-being, role activities, and individual health perceptions” (Acree et al., p. 2). The health-related quality of life assessment contained eight domains: physical function, role-physical, role emotional, vitality, mental health, social function, bodily pain and general health (Acree et al.). Results of this study revealed that the health-related quality of life scores in all eight domains were significantly greater in the group reporting higher physical activity than in the group reporting lower physical activity (Acree et al.). It was concluded that healthy older adults (60 years of age or older) who frequently engaged in physical activity for greater than one hour per week had higher health-related quality of life scores in both physical and mental domains than individuals who were less physically active (Acree et al.).

A study by Martin Ginis and colleagues (2003) investigated the effects of a physical activity intervention on individuals with spinal cord injuries, which included 5 minutes of stretching, 15 minutes of aerobic exercise and 45 to 60 minutes of resistance training twice a week. Results of analyses of covariance indicated that after three months of continuing in the prescribed regular physical activity regime, participants reported greater perceived quality of life and improved physical self-concept than the control group. Martin Ginis and others concluded that these findings highlight the potential value of using regular physical activity for improving perceived well-being and quality of life among people with spinal cord injury.

A recent study by Blacklock and others (2007) examined the relationship between physical activity (including walking) and health-related quality of life related to adults from British Columbia, and extended this investigation to encompass walking
specifically and satisfaction with life. Health-related quality of life components that portrayed improvements with physical activity (including walking) and walking were general health, social functioning and vitality (Blacklock et al.). The major finding was that similar health-related tendencies were identified for walking only and physical activities (including walking), with the exception of general health showing a greater score associated with total physical activity than walking (Blacklock et al.).

A 2007 study by Tessier and colleagues used the 36-item Medical Outcomes Study (Short Form-36) questionnaire, which measured health-related quality of life in eight dimensions, to assess whether changes in leisure-time physical activity across three years were associated with changes in health-related quality of life related to adults living in France (Tessier et al.). Over three years, increased leisure-time physical activity was associated with high scores in health-related quality of life dimensions: physical functioning, mental health, vitality for both sexes and social functioning for women only (Tessier et al.). Men had greater health-related quality of life scores than women no matter what the dimension, but the changes in health-related quality of life scores were similar between the sexes (Tessier et al.). The increase in health-related quality of life was of similar quantity when the subjects followed Centers for Disease Control and Prevention and American College of Sports Medicine recommendations for leisure-time physical activity (American College of Sports Medicine position stand, 1990; U.S. Department of Health and Human Services, 1996).

A study by Kruger and colleagues evaluated the association between physical activity, body mass index (BMI) and health-related quality of life among 9,173 United
States adults (2007). The results indicated that inactive adults were more likely to report fair to poor health-related quality of life than active adults, regardless of BMI status (Kruger et al.). Physical activity participation was inversely related to frequency of low health-related quality of life, and the relationship was not changed by BMI status (Kruger et al.). In addition, inactive respondents were more likely to report poor or fair self-rated health (Kruger et al.). Kruger and others did not find BMI to be a considerable effect modifier of the relationship between level of physical activity and any of the health-related quality of life indicators (Kruger et al.). According to this study, the surveyed participants’ level of physical activity was significantly associated with their health-related quality of life, regardless of their BMI status (Kruger et al.).

While this review of literature supports a positive connection between physical activity and perceived quality of life, it is important to note that many of these findings were limited to subpopulations such as college students, older adults and individuals with spinal cord injuries, and did not reflect a cross-sectional sample. A limited number of studies have also shown that males have a greater health-related quality of life score than females across all dimensions. While there is a growing body of evidence to support the positive association between different forms and intensities of physical activity and perceived quality of life, it is still unclear if there is a minimum level of physical activity that must be practiced before finding improvements in one’s perceived quality of life (Acree et al., 2006; Lustyk et al., 2004; Martin Ginis et al., 2003). There may be a threshold of psychological benefit associated with moving people from “underactive” to “active.”
Therefore, the purpose of this study was to examine the association between engaging in minimum levels of physical activity as defined by ACSM and perceived quality of life. The null and working hypotheses for this study were:

**H₀:** There is no significant difference between the control and treatment group’s quality of life scores at each of the three administrations of the quality of life instrument.

**H₁:** The control group’s quality of life scores will be significantly higher than the treatments group’s quality of life scores at each of the three administrations of the quality of life instrument.

**H₀:** There is no significant difference in either the control group’s or the treatment group’s quality of life scores across the administrations the quality of life instrument.

**H₂:** There is a significant difference in either the control group’s or the treatment group’s quality of life scores across each of the three administrations of the quality of life instrument.

**H₀:** There is no significant difference between the control and treatment groups’ quality of life scores across each of the 16 domains.

**H₁:** The control group’s quality of life scores will be significantly higher than the treatment groups’ quality of life scores across each of the 16 domains.

**H₀:** There is no significant difference between the control and treatment groups’ mean scores for each of the physiological measures.

**H₄:** There is a significant difference between the control and treatment groups’ mean scores for each of the physiological measures.

**Method**

**Sample**

The target population for this study was students who attended a major urban university in the southwest. A convenience sample of undergraduate and graduate students was used. Students across a variety of courses were recruited in order to draw various levels of physical activity participation. During the summer 2007 semester, 24
students volunteered to participate in the study with 9 of these students unable to adhere to the study’s protocol due to work or personal conflicts, which resulted in 15 complete subject’s data. The recruitment was again initiated in the fall 2007 semester, with 35 students initially volunteering for the study. Twelve students were unable to adhere to the study’s protocol and were dropped, while 23 students were able to complete the entire process. A total of 43 subjects were included in the research project that spanned two semesters, which resulted in an overall retention rate of 65%.

Measures

Prior to data collection, the study was approved by the University’s Institutional Review Board and participants were fully informed of the purpose, methods, risks and benefits of the study. Each participant provided voluntary informed consent. All students who volunteered to participate in this study were initially asked the following screening question in order to place them into one of two discrete groups: active-c (control) or underactive-t (treatment): “The American College of Sports Medicine (ACSM) recommends that adults participate in 30 minutes or more of physical activity per day, between 4 to 6 days a week (American College of Sports Medicine, 2001). Based on your interpretation of this ACSM recommendation for physical activity, which of the following statements best describes your level of weekly physical activity over the past month?”

The students were asked to select only one of the following possible responses: (A) I do not meet ACSM’s recommendation, (B) I sometimes meet ACSM’s
recommendation, (C) I always meet ACSM’s recommendation, or (D) I exceed ACSM’s recommendation. Students who selected either response (A) I do not meet ACSM’s recommendation or response (B) I sometimes meet ACSM’s recommendations were randomly placed in either the underactive-c group or the underactive-t group. The underactive-c group was asked to maintain their daily routine over a two-week period, while the underactive-t group was asked to participate in a 2-week intervention regime. Students who selected either response (C) I always meet ACSM’s recommendation or response (D) I exceed ACSM’s recommendation were put into the active-c group, and were instructed to maintain their daily routine over a 2-week period. Due to a lack of subjects, there were no students placed in the underactive-c group, which resulted in 15 students being placed in the underactive-t group, and 28 students being placed in the active-c group.

The Quality of Life Inventory (QOLI) is a 32-item evaluation of life satisfaction (Frisch et al., 2005). The QOLI measures the participant’s importance level and satisfaction level for each of the following 16 domains: health, self-esteem, goals and values, money, work, play, learning, creativity, helping, love, friends, children, relatives, home, neighborhood and community. The QOLI incorporates a 3-point Likert-type rating scale of importance that ranges from 0 (not important) to 2 (important). The QOLI satisfaction scale incorporates a 6-point Likert-type rating scale that ranges from -3 (very dissatisfied) to +3 (very satisfied) in terms of satisfaction for each domain. The QOLI consists of weighted domain (WD) scores for each of the 16 areas of life, as well as an overall raw score. The WD scores were configured by multiplying the subject’s
importance rating for a specific area of life by the satisfaction rating for the same area of life (Frisch, 1994). The WD scores could range from -6 to +6, with the positive values reflecting greater positive quality of life within that domain. The overall raw score was computed by dividing the sum of all the WD scores by the total number of relevant domains (Frisch). For example, when a subject rated a domain not important, it was assigned a score of zero, and therefore reduced the number of relevant domains used to calculate the overall raw score. For interpretive purposes, the overall quality of life raw scores as defined by Frisch (1994) were categorized into the following four groups: very low (-6.0 to 0.8); low (0.9 to 1.5); average (1.6 to 3.5); and high (3.6 to 6.0).

In previous studies, the test-retest coefficient for the QOLI ranged from 0.80 to 0.91, and the internal consistency coefficients ranged from 0.77 to 0.89 across clinical and nonclinical samples (Lustyk et al., 2004; Frisch, 1994). For this study the reliability was measured using Cronbach's alpha, which produced a 0.75 coefficient for the initial administration of the instrument, a 0.87 for the second administration, and a 0.89 for the final administration at the end of the second week. In addition to the physical activity and quality of life measures, demographic traits were collected using a self-reported questionnaire that included age, gender, race, marital status, employment, year in school, and estimated height and weight. An automatic blood pressure machine was used to measure blood pressure and resting heart-rate, a standard scale to measure height and weight, and an electronic impedance machine to measure body fat. Body mass index (BMI) was calculated as weight in kg divided by height (in meters^2).
Design

The treatment group and the control group were both administered the QOLI three times over a two week period: at the initial administration, after one week (second administration), and at the end of the second week (final administration). During the initial meeting with the researcher, all participants (control and treatment) were asked to complete a short battery of physical activity, demographics, psychological (QOLI), and physiological assessments to determine their initial levels of physical activity and perceived quality of life. After one week, all participants were asked to complete the quality of life instrument a second time. After the second week interval, all participants were again given the psychological (QOLI) and physiological assessments. The treatment subjects were asked to participate in the physical activity intervention for two consecutive weeks because two weeks is the amount of time needed to see changes in the dependent variable.

All participants initially met with the researcher to determine their level of physical activity and demographic characteristics, and to complete the psychological (QOLI) and physiological measurements, but only the underactive-t group was assigned an individual target heart rate (THR) based on the Karvonen or heart rate reserve method (HRR). The THR is calculated using the Karvonen formula (Yoke, 2003) where:

1. $220 - \text{age} = \text{estimated max heart-rate}$
2. $\text{Estimated max heart-rate} - \text{resting heart-rate} = \text{HRR}$
3. $\text{HRR} \times \text{percentage (45 %)} = \text{percent of HRR}$
4. $\text{Percent of HRR} + \text{resting heart-rate} = \text{THR}$
Once their individual THR was determined, the underactive-t group was asked to
exercise at the student recreation center four times per week, for 30 minutes each session
for two consecutive weeks. During that time, the participants walked on a treadmill while
monitoring their heart rate using the treadmill’s built-in sensors. They were instructed to
walk at a pace at which the built-in sensors indicated that they were exercising at their
individual target heart rate (45% of their individual heart rate reserve) which minimally
meets the recommendation by ACSM. Subjects were briefed on how to use the treadmill,
built-in sensors and heart rate monitor for safety and reliability purposes. The
intervention protocol meets the minimum ACSM requirements for health purposes. After
the two-week treatment period, the participants were instructed to meet with the
researcher again, to measure their resting heart rate, blood pressure, height and weight, as
well as their body fat percentage.

Quality of Life Inventory overall raw scores between the two groups were
compared using the Statistics Package for the Social Sciences (SPSS; Chicago, IL)
version 14.1, frequencies, analysis of variance (ANOVA) with repeated measures and t-
tests. Significance for all analyses was based on a $p$-value $\leq 0.05$.

Results

Descriptive Analysis

Of the 43 participants, 30 were men and 13 were women. The average age of the
participants was 21.7 years ($SD = 1.67$) with ages ranging from 19 to 27 years, and the
mode was 21 years of age ($n = 18$) which represented 41.9% of the total sample. The
majority of participants were Caucasian (67.4%, \(n = 29\)) followed by African American (18.6%, \(n = 8\)), Hispanic (9.3%, \(n = 4\)), Indian (2.3%, \(n = 1\)) and other (2.3%, \(n = 1\)). In addition, most of the students were seniors (67.4%, \(n = 29\)), followed by juniors (20.9%, \(n = 9\)), sophomores (7.0%, \(n = 3\)), graduate (2.3%, \(n = 1\)), and freshman (2.3%, \(n = 1\)).

Besides demographic measures this study also examined several physiological characteristics of the participants. The participants’ average resting heart rate at the initial meeting was 65.8 beats/minute (\(SD = 11.38\)). Their systolic blood pressure averaged 129.3 mmHg (\(SD = 17.12\)), and their diastolic blood pressure averaged 74.2 mmHg (\(SD = 11.42\)). Overall, the participants’ body fat averaged 18.3 percent (\(SD = 6.45\)). The participants’ BMI averaged 25.8 kg/m\(^2\) (\(SD = 5.04\)), which is considered “overweight” according to the U.S. Department of Health and Human Services (2001).

Results indicated that at the initial meeting, 2 participants (4.7%) reported not meeting ACSM’s recommendation for physical activity; 13 participants (30.2%) reported sometimes meeting ACSM’s recommendation for physical activity; 9 participants (20.9%) indicated always meeting ACSM’s recommendation for physical activity, and 19 participants (44.2%) indicated exceeding ACSM’s recommendation for physical activity. Based on their initial level of physical activity, the subjects were placed into one of two discrete groups: underactive- t (treatment) and active-c (control). All subjects in the underactive-t group were asked to participate in the minimum levels of physical activity intervention, which required them to meet the minimum standard for physical activity according to ACSM’s physical activity guidelines. Twenty-eight of the 43 students were
placed in the active-c group (65.1%) and 15 students were placed in the underactive-t

group (34.9%).

For all 43 participants, the average overall quality of life raw score, combining all
three administrations of the quality of life instrument, was 3.0 ($SD = 0.95$) and ranged
from 0.9 to 4.9. For all participants (treatment and control), the overall quality of life raw
score at the initial administration averaged 3.0 ($SD = 1.22$), then averaged 2.9 ($SD =
1.30$) after the first week, and finally averaged 3.1 ($SD = 1.37$) at the end of the second
week. Examination of each domain revealed that the highest average WD scores for all
three administrations were: friends (4.3; $SD = 1.91$), goals and values (3.8; $SD = 1.47$)
and relatives (3.7; $SD = 1.84$). Conversely, the lowest average WD scores for all three
administrations were: money (1.1; $SD = 1.68$), children (1.7; $SD = 2.06$) and
neighborhood (1.7; $SD = 1.89$).

During the initial administration of the quality of life instrument, of the 16
domains, the highest WD scores were: friends (4.4, $SD = 2.27$), relatives (4.0, $SD = 1.83$)
and goals and values (4.2, $SD = 1.73$), while money (1.2, $SD = 1.99$), neighborhood (1.9,
$SD = 2.21$) and children (2.0, $SD = 2.77$) received the lowest average WD scores with the
two groups combined. For the second administration of the quality of life instrument, of
the 16 domains, friends (4.4, $SD = 2.23$), relatives (3.9, $SD = 2.56$) and goals and values
(3.7, $SD = 1.81$) had the highest average WD scores, while money (1.0, $SD = 1.93$),
children (1.8, $SD = 2.58$) and neighborhood (2.0, $SD = 2.06$) had the lowest average WD
scores. Similarly, at the end of the two week period, friends (4.4, $SD = 2.18$), relatives
(3.9, $SD = 2.24$) and goals and values (3.8, $SD = 2.08$) obtained the highest average WD
scores, while money (1.2, \( SD = 2.07 \)), children (1.7, \( SD = 2.68 \)) and neighborhood (2.1, \( SD = 2.02 \)) received the lowest average WD scores with the two groups combined.

**Inferential Analysis**

Analysis of variance with repeated measures was used to test hypotheses 1 and 2, which compare the quality of life mean scores for the time (main effect) and for the group (main effect) as well as the group by time interaction effect. Results indicated there was no significant main effects for either the time measure \( (F = 0.58, df = 2, p = 0.45) \) or for the group measure \( (F = 2.68, df = 1, p = 0.11) \), which resulted in a failure to reject the null hypotheses regarding time and group quality of life differences. However, results showed a significant time by group interaction effect \( (F = 4.65, df = 2, p = 0.037) \), which resulted in a failure to accept the null hypothesis, and consequently accept the alternative hypothesis that quality of life scores significantly differed between groups across time. Furthermore, interpretation of the interaction results indicated there was no significant difference between the control and treatment groups’ overall quality of life raw scores for the initial administration of the instrument \( (F = 0.8, df = 1, p = 0.39) \) nor at the final administration \( (F = 3.5, df = 1, p = 0.07) \) (Table 1). Therefore, there was no justification to reject the null hypothesis related to these findings. However, a significant difference was found between the control and treatment groups’ overall quality of life raw scores at the second administration of the quality of life instrument \( (F = 6.5, df = 1, p = .014) \). Consequently, there was no evidence to support the null hypothesis, and the alternative
was accepted that the quality of life scores were significantly higher for the active-c group than the underactive-t group at the second administration (Table 1).

Table 1

*Overall Quality of Life Mean Scores between Groups and across Time*

<table>
<thead>
<tr>
<th></th>
<th>Time 1 (initial)</th>
<th>Time 2 (second)</th>
<th>Time 3 (final)</th>
<th>Marginal Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>active-c (n=28)</td>
<td>2.8</td>
<td>3.3*</td>
<td>3.3</td>
<td>3.2</td>
</tr>
<tr>
<td>underactive-t (n=15)</td>
<td>3.2</td>
<td>2.3*</td>
<td>2.5</td>
<td>2.7</td>
</tr>
<tr>
<td>Marginal Means</td>
<td>3.0</td>
<td>2.8</td>
<td>2.9</td>
<td></td>
</tr>
</tbody>
</table>

*statistically significant at p < .02*

While the initial analysis of variance with repeated measures was used to examine differences in the overall quality of life scores, a second analysis of variance with repeated measures was used to examine group differences within each of the 16 quality of life domains (Table 2). In general, the analysis revealed that of the 16 domains, the self-esteem domain was the only domain that produced a significant time effect. In addition, the self-esteem domain was the only domain that had a significant interaction effect, which superseded the significant time effect produced for this domain. Post hoc analysis of the self-esteem interaction effect revealed there was a significant difference between the active-c group’s mean score (3.68) and the underactive-t group’s mean score (2.13) for self-esteem, ($F=5.98, df=1, p=0.019$). No significant difference was found between the active-c group’s mean score (3.96) and the underactive-t group’s mean score (3.87)
Table 2

*A Comparison of the Underactive-t Group (n = 15) and the Active-c Group (n = 28)*

Quality of Life Domain Scores

<table>
<thead>
<tr>
<th>Quality of Life Domains</th>
<th>Time Effect</th>
<th>Interaction Effect</th>
<th>Group Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>$F=2.98$, $df=2$, $p=0.06$</td>
<td>$F=1.66$, $df=2$, $p=0.20$</td>
<td>$F=19.53$, $df=1$, $p&lt;0.001$</td>
</tr>
<tr>
<td>Self-Esteem</td>
<td>$F=5.95$, $df=2$, $p=0.004$</td>
<td>$F=3.33$, $df=2$, $p=0.041$</td>
<td>$F=3.51$, $df=1$, $p=0.07$</td>
</tr>
<tr>
<td>Goals &amp; Values</td>
<td>$F=1.28$, $df=2$, $p=0.28$</td>
<td>$F=0.81$, $df=2$, $p=0.45$</td>
<td>$F=6.00$, $df=1$, $p=0.019$</td>
</tr>
<tr>
<td>Money</td>
<td>$F=0.48$, $df=2$, $p=0.62$</td>
<td>$F=1.95$, $df=2$, $p=0.15$</td>
<td>$F=1.11$, $df=1$, $p=0.30$</td>
</tr>
<tr>
<td>Work</td>
<td>$F=1.39$, $df=2$, $p=0.26$</td>
<td>$F=0.09$, $df=2$, $p=0.92$</td>
<td>$F=3.13$, $df=1$, $p=0.08$</td>
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<tr>
<td>Play</td>
<td>$F=0.34$, $df=2$, $p=0.71$</td>
<td>$F=0.03$, $df=2$, $p=0.98$</td>
<td>$F=4.57$, $df=1$, $p=0.04$</td>
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<tr>
<td>Learning</td>
<td>$F=0.87$, $df=2$, $p=0.42$</td>
<td>$F=1.25$, $df=2$, $p=0.29$</td>
<td>$F=4.53$, $df=1$, $p=0.04$</td>
</tr>
<tr>
<td>Creativity</td>
<td>$F=0.15$, $df=2$, $p=0.87$</td>
<td>$F=1.33$, $df=2$, $p=0.27$</td>
<td>$F=0.06$, $df=1$, $p=0.80$</td>
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<tr>
<td>Helping</td>
<td>$F=0.69$, $df=2$, $p=0.51$</td>
<td>$F=0.22$, $df=2$, $p=0.80$</td>
<td>$F=3.29$, $df=1$, $p=0.08$</td>
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<tr>
<td>Love</td>
<td>$F=0.07$, $df=2$, $p=0.94$</td>
<td>$F=2.07$, $df=2$, $p=0.13$</td>
<td>$F=0.59$, $df=1$, $p=0.45$</td>
</tr>
<tr>
<td>Friends</td>
<td>$F=0.27$, $df=2$, $p=0.76$</td>
<td>$F=1.49$, $df=2$, $p=0.23$</td>
<td>$F=0.24$, $df=1$, $p=0.63$</td>
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<tr>
<td>Children</td>
<td>$F=0.61$, $df=2$, $p=0.54$</td>
<td>$F=1.22$, $df=2$, $p=0.30$</td>
<td>$F=0.01$, $df=1$, $p=0.95$</td>
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<tr>
<td>Relatives</td>
<td>$F=0.47$, $df=2$, $p=0.62$</td>
<td>$F=0.92$, $df=2$, $p=0.40$</td>
<td>$F=0.63$, $df=1$, $p=0.43$</td>
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<tr>
<td>Home</td>
<td>$F=0.06$, $df=2$, $p=0.95$</td>
<td>$F=0.98$, $df=2$, $p=0.38$</td>
<td>$F=18.33$, $df=1$, $p&lt;0.001$</td>
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<tr>
<td>Neighborhood</td>
<td>$F=0.30$, $df=2$, $p=0.74$</td>
<td>$F=0.76$, $df=2$, $p=0.47$</td>
<td>$F=11.49$, $df=1$, $p=0.002$</td>
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<tr>
<td>Community</td>
<td>$F=0.51$, $df=2$, $p=0.60$</td>
<td>$F=1.70$, $df=2$, $p=0.19$</td>
<td>$F=2.70$, $df=1$, $p=0.11$</td>
</tr>
</tbody>
</table>

For self-esteem at the initial administration ($F=0.03$, $df=1$, $p=0.87$), nor was there a significant difference found between the active-c group’s mean score (4.00) and underactive-t group’s mean score (2.80) for self-esteem mean scores at the final administration of the quality of life instrument ($F = 3.78$, $df = 1$, $p = 0.06$). In terms of the group effect, there were six domains that showed a significant difference between the active-c group and the underactive-t group. The domains and group means that showed a
significant difference between groups in terms of group effect were: Health (active-c = 4.19, underactive-t = 1.98); Goals and Values (active-c = 4.36, underactive-t = 3.13); Play (active-c = 4.04, underactive-t = 2.82); Learning (active-c = 2.96, underactive-t = 2.00); Home (active-c = 3.99, underactive-t = 1.51); Neighborhood (active-c = 2.63, underactive-t = 0.82).

Results of the $t$-test analysis for group differences across physiological measures exhibited no significant differences between the active-c (mean = 64.96, $SD = 12.44$) and underactive-t (mean = 67.33, $SD = 9.27$) groups’ resting heart rate. In addition, no significant difference was found between the active-c (mean = 130.44, $SD = 18.24$) and underactive-t (mean = 127.27, $SD = 15.27$) groups’ systolic blood pressure, and no significant difference was shown between the active-c (mean = 71.93, $SD = 12.43$) and underactive-t (mean = 78.33, $SD = 8.17$) groups’ diastolic blood pressure. Furthermore, no significant difference was found between the active-c (mean = 19.57, $SD = 6.49$) and underactive-t (mean = 16.01, $SD = 5.91$) groups’ body fat. Lastly, no significant difference was found between the active-c (mean = 26.68, $SD = 5.19$) and underactive-t (mean = 24.22, $SD = 4.49$) groups’ BMI.

Conclusions

The purpose of this study was to examine the effect of engaging in minimum levels of physical activity as defined by ACSM for two weeks on perceived quality of life. This study employed a quasi-experimental, unbalanced design that incorporated both a control and treatment group for comparative analysis. The quality of life measure was
the major dependent variable used to compare group differences. The quality of life instrument generates values for 16 major areas of life or domains based on scores in an importance scale and a satisfaction scale.

This study examined college students’ level of physical activity and perceived quality of life, and while the demographics seemed to represent the average college student, this study used a convenience sample. All 43 participants were recruited from one of two different fields of study, kinesiology and recreation. Therefore, generalization of these results should be interpreted with caution.

This study also examined group differences within each of the 16 quality of life domains. In general, the analysis revealed that out of the 16 domains, the self-esteem domain was the only domain that produced a significant time effect. In addition, the self-esteem domain was the only domain that had a significant interaction effect, which surpassed the significant time effect produced for this domain. The active-c group’s mean score (3.68) was significantly higher than the underactive-t group’s mean score (2.13) for self-esteem. In terms of the group effect, there were six domains that showed a significant difference between the active-c group and the underactive-t group. The following six of the 16 domains were found to be significantly higher for the active-c group than for the underactive-t group: health, goals and values, play, learning, home, neighborhood. For example, the active-c group’s mean score for home was 3.99, which is considered “high,” while the underactive-t group’s mean score for home was 1.51, which is considered “low,” according to Frisch’s classification for overall raw scores (1994).
Unlike the majority (80%) of the U.S. adult population who do not meet the ACSM’s broad and wide-ranging recommendations for physical activity (Dishman, 2003), 65.1% of the participants in this study did meet ACSM’s recommendations for physical activity, while only 34.9% did not meet the recommendations. The active group represented about two-thirds or 65% of the total sample, while the underactive group represented about one-third or 35% of the total sample. This may be due in part to the fact that this study was based on a convenience sample of undergraduate and graduate level, kinesiology and recreation students, who are currently at one of the most active stages in their lives.

There was no significant difference between the control and treatment groups’ overall quality of life raw scores for the initial and final administrations of the quality of life instrument. However, the control group’s overall quality of life raw score (3.27) was shown to be significantly higher than the treatment group’s overall quality of life raw score (2.26) at the second administration of the quality of life instrument.

For all 43 participants, the average overall raw score combining all three administrations of the quality of life instrument was 2.98 or about “average” according to Frisch’s classification of the overall raw scores (1994). For all participants (control and treatment), the overall quality of life raw score at the initial administration averaged 2.96, then decreased to 2.92 after the first week (second administration), and increased to a 3.06 at the end of the second week (final administration). All three overall raw score values for each of the three administrations of the quality of life instrument are
considered “average” (1.6 to 3.5) according to Frisch’s classification of overall raw score values.

Previous studies examining physical activity and perceived quality of life revealed slightly different findings. Unlike the study by Lustyk and colleagues (2004), Acree and colleagues (2006), Blacklock and colleagues (2007), Kruger and colleagues (2007) which examined individuals’ perceived quality of life only once and found a positive relationship between physical activity and perceived quality of life, this study did not show a positive relationship between minimum levels of physical activity and quality of life. In addition, the study by Kruger and colleagues used a slightly different method of categorizing survey respondents (2007) and found a positive connection between physical activity and perceived quality of life. Furthermore, unlike the study by Acree and colleagues (2006), who examined the connection between physical activity and quality of life in older adults (60 years and older), this study compared the physical activity and quality of life of only college age students between ages 19 and 27. Acree and colleagues findings supported a positive relationship between physical activity and perceived quality of life. Altogether, the literature review supported a positive connection between physical activity and perceived quality of life (Acree et al., 2006; Blacklock et al., 2007; Lustyk et al., 2004; Martin Ginis et al., 2003; Tessier et al., 2007), unlike this study which did not support a positive connection between physical activity and perceived quality of life.

Limitations

This study examined only undergraduate and graduate college students’ level of
physical activity and perceived quality of life, and while the demographics seemed to represent the average college student, this study used a convenience sample. All 43 participants were between 19 and 27 years and were recruited from one of two different but related fields of study, kinesiology and recreation. Therefore, generalization of these results should be interpreted with caution.

The quality of life inventory Likert-type rating scale of importance only ranged from 0 (not important) to 2 (important), giving the participants only one of three possible responses: 0 (not important), 1 (important) and 2 (extremely important) (Frisch, 1994). Four possible responses would allow the participant to rate his or her level of importance more specifically. For example, it may be beneficial to change the QOLI rating scale of importance to the following four possible responses: 0 (not important), 1 (somewhat important), 2 (important) and 3 (very important).

Next to each of the 16 domains was a brief description of the domain. For example, directly after the word "play" (Items 11 and 12), is the following description: "play is what you do in your free time to relax, have fun, or improve yourself. This could include watching movies, visiting friends, or pursuing a hobby like sports or gardening" (Frisch, 1994). Individuals may interpret each of the 32-items within the quality of life instrument (QOLI) differently. For example, one person may interpret "work" as pertaining to jobs that earn money (income) and not consider taking care of a family, "work," while another person may consider household tasks and child-care or parental responsibilities, "work." How the participants interpret each of the 16 domains will
influence their response to each item, and, therefore, influence their weighted domain (WD) scores and overall raw scores.

The participants may have interpreted the physical activity screening question in a variety of ways. One person may consider dancing or house-hold tasks, "physical activity," while another person may only consider exercises aimed at improving one's level of fitness, "physical activity." How the participants interpret the physical activity screening question will influence their response. Thus, for example, if two participants are equally active, but one interprets physical activity as only exercises aimed at improving one’s level of fitness, while the other participant interprets physical activity as including various house-hold tasks and hobbies, each of their responses to the physical activity question will be different, even though they are equally active.

One of the 16 domains can affect (influence) one or more of the others. For example, "work" can either positively or negatively influences one's satisfaction in the following five areas of life: money, play, home, neighborhood and community. In addition, money can either positively or negatively influence one's satisfaction in the following seven areas of life: play, helping, friends, children, home, neighborhood and community. Also, one’s neighborhood can either positively or negatively influence one's satisfaction in the following five areas of life: play, friends, children, home, community.

Furthermore, with a small sample size of only 43 participants, 15 underactive-t and 28 active-c, generalization of these results should be interpreted with caution, and a larger sample size containing more participants in each group, and an additional control (underactive control) group is needed for better assessment and group comparison.
Implications

The results were based on a convenience sample of only college students between 19 and 27 years; therefore, care must be taken to extrapolate this study’s findings to the general student population. Future research concerning the general public's levels of physical activity and perceived quality of life is needed. While most college students may consider friends, goals and values and relatives as important areas of life, many non-students may consider children, money and neighborhood as important areas of life instead. Thus, because college students and non-students tend to value various areas of life differently, non-students need to be studied separately from college students.

Since this study examined the connection between minimum levels of physical activity and perceived quality of life across only 2 weeks, further studies with longer treatment periods are needed to better capture the association between the variables. Two weeks may not be enough time to see significant changes in the dependent variable, perceived quality of life.

Acknowledging the high prevalence of inactivity (Dishman, 2003) and overweight and obesity (U.S. Department of Health and Human Services, 2001) in the US, additional research in how to effectively promote enhanced levels of physical activity is needed, as well as public health announcements encouraging those who are underactive or insufficiently active to meet physical activity recommendations by ACSM and Centers for Disease Control and Prevention.

In summary, this study did not find a positive connection between physical activity and perceived quality of life. In addition, changing one’s physical activity from
“underactive” to “active” may not result in enhanced perceived quality of life after two weeks. Thus, this study’s findings did not support previous observations that increasing individual’s level of physical activity will enhance their perceived quality of life. Instead, this study only provokes more questions about the connection between physical activity and perceived quality of life.
REFERENCE LIST


