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THE RELATIONSHIP BETWEEN RESISTANCE TRAINING ON DEPRESSIVE
SYMPTOMS, COPING SELF-EFFICACY, AND QUALITY OF LIFE IN FEMALE
COLLEGE STUDENTS

by

KATHERINE TRAN

A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major in Health Sciences, Pre-Clinical Track
in the College of Health Professions and Sciences
and in the Burnett Honors College
at the University of Central Florida
Orlando, Florida

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Thesis Chair: Keith Brazendale, PhD.

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ABSTRACT

Background: Current studies have found a higher risk of depression, coping self-efficacy, and quality of life, specifically among female college students and predominantly pharmacotherapy or cognitive therapy intervention have been adopted to improve depression or depressive symptoms, however, current research suggests an-alternative strategy, such as exercise, may be an effective approach. Understanding the relationship between exercise, such as resistance training (RT), and other psychosocial outcomes such as depressive symptoms, coping self-efficacy, and quality of life may show the potential of utilizing RT amongst this understudied population and can provide insight on alternative or supplemental treatment options for depression. **Methods:** A cross-sectional study was conducted on a sample female college student aged 18-25 from the University of Central Florida utilizing inclusion/exclusion criteria. Individuals self-reported their physical activity modality (RT and aerobic training) and habits (number of minutes/day and number of days/week), depressive symptoms, coping self-efficacy, and quality of life utilizing the Becks Depression Inventory II (BDI-II), Coping Self Efficacy Scale (CSE), and the World Health Organization Quality of Life Brief Version (WHOQOL-BREF), respectively. Pairwise Pearson's correlations assessed for statically significant correlations between predictor variables and outcome variables. Two-sample Wilcoxon rank sum (Mann-Whitney) tests for non-normal data and independent sample t-tests for normal data was computed to test for statistically significant differences between the following subgroups: living and employment status, weight status, and race and ethnicity. **Results:** Sixty-eight (100% female, majority upperclassmen, 58.8% white, 32% minority) provided valid responses for analysis. There were no statistically significant correlations found between depressive symptoms, coping self-efficacy, and quality of life and exercise modality or habits amongst the studied population. Among subgroups individuals who reported High Quality of Life (QoL) in the psychological domain reported being .81 days more aerobically active than those who reported low psychological QoL ($p < 0.05$). Individuals reporting high social QoL resistance trained for 56.27 min on average comparably to those who reported low social QoL 74.47 minutes per average on session ($p < 0.05$). In addition, significant findings were found in non-minority groups

(n=35) reported aerobic training for 3.94 more days compared to minority groups (n=27) who aerobic trained on average 2.70 days ($p=.01$). Aerobic activity was also found 16.67 min/day more in individuals self-reporting non-overweight compared to individuals self-reporting overweight ($p=.02$). Living status on or off campus also shown evident significance as individuals who reported living on campus (n=12) reported aerobic training on average 4.17 days compared to individuals who lived off campus (n=50), who reported aerobic training 3.22 days ($p=.04$). In employment, students who were not employed (n=19) aerobic trained on average 1.09 days more than individuals who were employed (n=43) (Table 5). **Conclusion:** Our preliminary data suggests the need for future investigation of exercise modality variety and diversified participant characteristics. Due to study design limitations, pursuing a different study design for baseline prior to RT may be beneficial in providing causation. This study can advance knowledge for future studies pursuing resistance training as intervention for depressive symptoms amongst this understudied population.

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CHAPTER 1: INTRODUCTION

The World Health Organization defines mental health as “state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn and work well, and contribute to their community.” (*World Health Organization, 2022*). Mental health affects the way individuals think, feel, and act, and helps determine how we handle stress, relate to others, and make choices. (*Centers for Disease Control and Prevention, 2023*). These factors heavily impact quality of life. However, diagnosed health conditions called Mental Illnesses (MI), may contribute to negative changes to individuals’ wellbeing. MI may evoke changes in emotion and feelings of distress. These feelings may be caused by biological factors, adverse life experiences, and family history of mental health issues (*World Health Organization, 2022*).

Depression is a common MI, that involves depressed mood or loss of pleasure or interest in activities for long periods of time (*World Health Organization, 2022*). Women are twice as depressed than men (Albert, 2015) and affects individuals 18-24 years by 21.5% (Lee et al., 2023). Depression is frequently reported amongst this age, specifically college students (Lipson et al., 2022). Current interventions to combat depression are pharmacotherapy and counseling options. Despite proven benefits from both interventions, rates of relapse are high if consistent adherence is not met.

Recently the role of physical activity (PA) as a low-cost and feasible treatment for depression has gained attention with a number of studies, showing that exercise is effective at

reducing depressive symptoms (Xie et al., 2021). PA recommendations for adults (18-64 years) are recommended “at least 150 minutes (about 2 and a half hours) a week of moderate intensity activity such as brisk walking and at least 2 days a week of activity that strength muscles” (CDC, 2022). Despite this recommendation, research has shown a decline in PA and increase in sedentary behaviors amongst young adults during college years. (Calestine et al., 2017). Studies have shown that PA participation has a strong association to better mental health (Rodríguez-Romo et al., 2022). The current research that evaluates PA is commonly amongst to be older adults and use mind body exercise (MBE) and/or cardio activity. Resistance training (RT) has rarely been evaluated as an intervention to reduce depressive symptoms. RT may have potential to be used as adjunct therapy to treat depression amongst female college students.

CHAPTER 2: LITERATURE REVIEW

The following research seeks to determine the effects of physical activity (PA), specifically resistance training (RT), on depressive symptoms in female college students. College students experience significantly high rates of mental health problems. This correlates with a decline in academic achievement, physical health, social relationships, and quality of life. The following literature review will highlight the available research that explores the effect of RT on depression and coping skills. Many studies that utilize PA as an intervention have predominantly focused on older populations and individuals with musculoskeletal disorders. Also, the studies focusing on the college student population use other forms of PA intervention such as endurance and mind and body exercises (MBE). Understanding the effectiveness of RT as a potential modality for PA is important for females who typically report less frequent engagement in RT.

Prevalence of Mental Illness

Mental illnesses (MI) are prevalent in the United States. Nearly one in five (19%) of U.S. adults experience some form of mental illness. MI is associated with distress and/or problems functioning in social, work, or family activities (McNally, 2012). MI encompass a wide range of conditions and symptom severity varies from mild to moderate. Serious mental illnesses (SMI) represent psychological disorders resulting in significant functional impairment. They include major depressive disorder, bipolar disorder, schizophrenia, and post-traumatic stress disorder (PTSD) (Mental Health and Substance Use Disorders, 2023).

Depression is a common MI that negatively affects how a person thinks and acts significantly impacting their daily activities. Primary symptoms of depression include reduced motivation, feelings of hopelessness, lack of pleasurable experiences, and cognitive impairment (Nestler et al., 2002). Depression may make it harder for individuals to accomplish many of their daily tasks, reducing their levels of independence, resulting in lower self confidence and self-esteem (Defar et al., 2023).

Depression impacts individuals 18-24 years of age (21.5%) at a higher rate than older adults aged 65 years (14.2%) (Lee et al., 2023). There has been increased trends of depression and suicidal attempts in this age group, specifically college students. (Duffy et al., 2019). Data from the 2021 Healthy Minds study, taken by 96,000 US college students across 133 campuses reported 44% students with depression, and 15% reported having seriously considered suicide in the past year (Lipson et al., 2022). With the progressive rise of depression rates within the last decade, this may suggest a need of further attention and intervention.

Factors that may influence depression are biological, personality and psychological, college experience, and lifestyle. Biologically, the molecular etiology of depression is dependent on several neurotransmitter systems including serotonergic (serotonin (5-HT) and norepinephrine/noradrenergic systems. (Villas Boas et al., 2019). There is also an association between neuroimaging studies of hippocampus shrinkage and MDD. (Roddy et al., 2019). Hippocampus shrinkage reduce the production of neurons in the hippocampus. However, Brain-Derived Neurotrophic Factor (BDNF) is proven to show signs of neurogenesis and neuronal function in the hippocampus (Numakawa et al., 2018). BDNF is a member of the neurotrophic

family of growth factors that influences the pathogenesis of major depressive disorder (Porter & O'Connor, 2022). The dysfunction or decreased in BDNF may lead to malfunction of synaptic plasticity, and decreased excitatory neurons and glutamate; and eventually lead to depression (Yang et al., 2020). Exercise is seen to increase levels of BDNF (Jemni et al., 2023). In a meta-review evaluating BDNF levels and exercise, 76% of the studies reviewed found acute forms of exercise (aerobic and/or resistance training) increase BDNF concentrations in humans and 51% of the studies found *significant* increases in the concentration of BDNF in healthy adult subjects after acute exercise. Consequently, increased levels of BDNF from exercise may induce neuroplasticity and provoke hippocampus growth (Zhou et al., 2022).

Depression is linked with an increase in inflammatory cytokines and cortisol (Jia et al., 2019). In a cross-sectional study, consisting of 89 participants, serum cortisol concentration, were analyzed between individuals with and without depression. There was a significant positive correlation between individuals with depression and increased serum cortisol levels. Extreme serum cortisol levels released due to long term stress can cause effects such as increase in blood pressure, atherosclerosis, diabetes, immune suppression (Cay et al., 2018). It is also suggested that “elevated cortisol may be responsible for the emergence of psychotic symptoms in severe MDD”. (Keller et al., 2017).

Increased depressive symptoms may negatively impact physical health. Depression is commonly associated with increased risk for other diseases. For example, depression has been linked to type 2 diabetes mellitus, coronary artery disease (CAD), and irritable bowel syndrome. Self-reported data from more than 500,000 young adults with poor mental health had higher rates

of heart attacks, strokes, and risk factors for heart disease compared with their peers without mental health issues (Kwapong et al., 2023). Physical comorbidities may manifest and lower life expectancy and overall quality of life. Depression may also exacerbate and aggravate symptoms of other chronic diseases and vice versa (Detweiler-Bedell et al., 2008). With its rising prevalence and physiological strain, this may suggest a need for an intervention to ease symptoms of depression.

Evidence suggests that depression symptoms impact females at a disproportionate rate compared to their male counterparts (Girgus & Yang, 2015). The American College Health Association (ACHA) in 2019 found that 22.4% of women respondents and 11.6% men respondents reported that they have been diagnosed and/or treated for depression. Although more research must be done to explain the gender gap evaluation of mental illness, researchers speculate that women during this age (18-25) may endure hormonal changes and fluctuations associated with puberty, prior to menstruation, that may trigger depressive episodes (Albert, 2015). Speculation of peer pressure, changing bodies, and social and academic expectations can cause persistent feelings of sadness and stress (Tang & Zhang, 2022). Depressive symptoms can be detrimental to a student's academic success, cognitive function, and relationship with friends and family (Glier & Pine, 2002). In the college population, it may also promote individuals to partake in risk behaviors and increase risk of harmful outcomes. This may suggest that research should be conducted under young adult females to assess the reduction of depression symptoms using understudied intervention.

Treatment for Depression

Common treatment options for depression are divided into antidepressants and psychosocial intervention (S. Gautam et al., 2017). An evaluation of the current treatments and interventions used found that pharmacotherapy, especially selective serotonin reuptake inhibitor (SSRIs) antidepressants remain the most frequent option for treating depression during the acute phase (Karrouri et al., 2021). SSRIs increase the activity of serotonin in the brain by blocking the reuptake of serotonin and increasing levels of serotonin activation of nearby postsynaptic receptors (Pierz & Thase, 2014).

It is commonly used to treat depression, obsessive compulsive disorder, and panic disorders. Despite its versatility, individuals that take SSRIs may not respond to medication, have residual symptoms, or frequently relapse. And additionally experience adverse side effects such as “sexual dysfunction, weight gain, sleep disturbance” (Ferguson, 2001). There is also potential for abuse and misuse of antidepressants (Evans & Sullivan, 2014). Individuals that take SSRI may be at risk for serotonin syndrome, a life-threatening condition by over-use of serotonergic drugs (Simon & Keenaghan, 2023).

Many patients may prefer a nonpharmacological approach to treat depression. Psychotherapy options range from cognitive, behavioral, psycho, and systemic therapy. Cognitive behavioral therapy (CBT) is one of the most evidence-based psychological interventions for the treatment of depression (M. Gautam et al., 2020). CBT is a type of psychotherapy in which negative thought patterns about oneself and the world are challenged to help mood disorders. Specifically in the college population, cognitive behavioral therapy is

found to be an effective treatment, however outcomes may vary (M. Gautam et al., 2020; Irie et al., 2019). The nature of CBT delves into helping patients correct false perceptions that lead to certain mood and behaviors. Thus, the principle behind cognitive therapy is that a thought precedes a mood, and that both are interrelated with a person's environment, physical reaction, subsequent behavior (Rupke et al., 2006). This concept is thought to provoke positive thought processes and correction of maladaptive thinking to reduce symptoms of depression. (Driessen & Hollon, 2010; M. Gautam et al., 2020).

Despite proven benefits, outcomes from CBT may widely vary due to patient involvement and cooperation. Benefit of counseling is typically seen in high engagement between therapist and patient. (Vittengl et al., 2016). Additionally, many college students are reluctant to seek counseling options due to concerns of judgment (Doan et al., 2020). In a study evaluating 682 college students, found that college students may barriers to seeking help due to stigma related behaviors. Despite college students believing that counseling helped resolve mental problems, there were still admitted barriers of 'embarrassment, denial, and not wanting to be labeled crazy' that prevented students from seeking treatment (Vidourek et al., 2014). College students may feel that symptoms are typical of college stress and are sustainable to work through or ignore (Eisenberg et al., 2007). Despite the wide variety of pharmaceutical and counseling options to treat depression, depression remains one of the most critical problems of public health and has exponentially risen since the 1990s (Duffy et al., 2019).

Physical Activity and Depression

Recently the role of exercise as a low-cost and easy-to-use treatment for depression has gained attention with a number of studies showing that exercise is effective at reducing depressive symptoms and improving body functions such as cardiorespiratory system and cognitive function (Xie et al., 2021). A review of 97 studies evaluating physical activity (PA) and mental health disorders, PA demonstrated similar effectiveness in reducing symptoms as psychotherapy and pharmacotherapy. Additionally, PA has profound advantages in terms of cost, side effects, and ancillary benefits (Glied & Pine, 2002). In specifically depression, exercise is proven to have therapeutic effects on depression in all age groups (mostly 18–65 years old), as a single therapy, an adjuvant therapy, or a combination therapy, and the benefits of exercise therapy are comparable to traditional treatments for depression (Xie et al., 2021).

Amongst university students partaking in a 6-week aerobic exercise intervention, students self-reported improvements in depression, overall perceived stress, and perceived stress due to uncertainty. Additional reports of increased engagement in PA resulted in increased self-efficacy. This increased self-efficacy was also associated with positive perception of body image. Participants also reported an increased likelihood of sustained PA adherence over time (Garn & Simonton, 2020; Smith & Merwin, 2021a). When evaluating which physical intervention is most effective, many studies have reported equivalent findings between aerobic and anaerobic exercise in terms of mental health benefits (da Costa et al., 2022a). A study evaluating the longitudinal interrelationship of depressive symptoms, mind and body exercise (MBE) and antidepressant medications suggests that MBE therapy alone may be more common and suitable

with individuals with less severe depression (Rådmark et al., 2020). Research on PA therapy has been evaluated as significant in treatment, but have been predominantly mind and body, mobility, and aerobic focused.

Resistance Training and Depression

Resistance training is an important consideration for overall physical health but may also be effective in improving mental health (Xie et al., 2021). Resistance training increases lean muscle mass, improves resting metabolic rate, promotes fat loss, and supports functional independence. Resistance training has also demonstrated effectiveness for increasing cognitive abilities, and self-esteem (da Costa et al., 2022a).

In the past, studies had primarily focused on musculoskeletal and functional benefits gained from resistance training but are now transitioning the focus on mental benefits in self coping efficacy (Smith & Merwin, 2021b). Aside from other forms of PA, resistance training may be suggested as superior for enhancing self-concept and may induce neuropsychological changes in individuals with depression. Evidence supports that resistance exercise training may improve both anxiety and depression by acting on those same neurobiological systems, particularly neurotransmitters and neurotrophic and growth factors (Ren & Xiao, 2023).

Some studies have reported that resistant training and aerobic training have equal effects on mental health (da Costa et al., 2022a) while other states more benefit from one or the other (Ren & Xiao, 2023). Although there is limited research prevailing resistant training being more optimal than other forms of activity, studies have suggested the great effect of resistance training

due to the physiological adaptations of muscle growth (hypertrophy) and neurobiology and adaptation of depression. (Hughes et al., 2018; Ren & Xiao, 2023).

Evaluation of Literature: Depression and Resistance Training

A meta-analysis reviewing 136 studies related to resistance training and depression, found that studies tend to lack an efficient timeline for treatment plan with a wide range of 10-24 weeks of resistance training (Carneiro et al., 2020). Adherence rates were also not accounted for as many participants may have dropped out despite the initial large sample sizes. There is also a lack of work done amongst the young adult population and diagnosed depression and will need further research done. The populations of the studies are predominantly male, as there is greater participation in muscle strengthening activities amongst men than in women, with limited studies focusing on college female participation (Kessler et al., 1994).

Women are predisposed and are at higher prevalence in being diagnosed with musculoskeletal disorders than men (Wijnhoven et al., 2006). There is a positive impact of resistance training on body composition, muscle strength, and functional and fitness in older women to reduce or prevent symptoms. Resistance training may be proven to assist in reducing depressive symptoms and promoting greater satisfaction in quality of life.

Conclusion

It is evident that there is a prevalence of depression amongst female college students' population and is projected to increase in the next decade. Despite the benefit of other treatments

to combat depression, there remains issues of adherence and prevention of relapse amongst pharmacotherapy and counseling. Earlier research has suggested benefits of utilizing PA to treat depression, due to its low-cost and usability. However, these studies either primarily focus of MBE or cardio exercise intervention or gear towards older patient specific populations.

The below methodology is aimed to evaluate the efficacy of PA, specifically resistance training amongst this specific college population. With suspected research, it may be hypothesized that RT can further increase self-efficacy to reduce depression symptoms.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

Research Question and Hypothesis:

The research question for this thesis is, “evaluating the association between resistance training, depressive symptoms, and coping self-efficacy amongst the female college student population”. It is hypothesized that those who report lower levels of depressive symptoms and higher coping self-efficacy will engage in more RT. Thus, for this study, participants that RT will report lower levels of depressive symptoms compared to participants that do not RT.

Study Design and Recruitment

This study will be a cross sectional study to evaluate and assess the effects of resistance training on depressive symptoms and coping self-efficacy in female young adult college students. A cross sectional study was chosen for this study to assess the association between key variables at one point in time.

Sample

Target sample size is 100-150 female undergraduate and graduate college students between ages 18 to 25 enrolled at the University of Central Florida (UCF). Participants will be recruited through the UCF Recreation and Wellness Center, UCF John Hitt Library, and UCF Student Union.

Study Protocol

Students who meet eligibility criteria and decide to participate in study will receive study information and will be asked to complete a five-to-ten-minute questionnaire via Qualtrics. Data will be evaluated to seek association of modularity's of physical activity and depressive symptoms.

Survey Measures:

The following measures will be used to collect outcome data in this study.

Participant Demographics

Participants were asked to answer questions regarding their demographic information such as sex, age, race, and ethnicity. These demographic questions were administered using Qualtrics.

Physical Activity Questionnaire

Physical Activity questionnaire will be a self-made survey measuring current participants engagement and duration of physical activity (resistance, aerobic, or both). Survey item was administered using Qualtrics.

Beck's Depression Inventory-II (BDI-II)

Depressive symptoms will be measured using Beck's Depression Inventory-II (BDI-II). The BDI-II is a 21-item self-report questionnaire corresponding to DSM-IV diagnostic criteria for Major Depressive Disorder (MDD). Total scoring of 0-13 is considered minimal range, 14-19 is mild, 20-28 is moderate, and 29-63 is severe. This measure has demonstrated satisfactory internal reliability (Cronbach's $\alpha = .93$) in other reports of exercise interventions aimed at young adults with MDD. Survey items were administered using Qualtrics.

Coping Self-Efficacy Scale (CSES)

Coping Self Efficacy will be measured using the Coping Self-Efficacy Scale (CSES) is a 26-item measure of a person's perceived ability to cope effectively with life challenges. Participants rated their responses on a 10-point scale (0 measuring - cannot do at all, 5 - moderately certain can do, and 10 - certain can do.) Questions include a ranking evaluation to questions: "When things aren't going well for you, how confident are you that you can: (1) Keep from getting down in the dumps. (2) Talk positively to yourself..." For each subscale, a sum score is recorded. Survey item was administered using Qualtrics.

-

World Health Organization Quality of Life Brief Version (WHOQOL-BREF)

The World Health Organization Quality of Life Brief Version (WHOQOL-BREF)

is a 26-item self-report measuring an individual's perception of their position in life across four domains (i.e., physical, psychological, social, environmental) in the last four weeks. The

WHOQOL-BREF is rated on a Likert scale of 1 through 5 with various questioning subscales evaluating an individual's standards, pleasures, and occurrences of events. Survey items were administered using Qualtrics.

Analysis of Data

Descriptive statistics (mean/median, minimum, and maximum values, and standard deviations) were computed. Pairwise Pearson's correlations assessed for statically significant correlations between predictor variables (resistance training days or minutes/day, aerobic training days or minutes/day) and outcome variables (quality of life, depressive symptoms, coping self-efficacy). A Shapiro Wilk test was computed to assess the normality of data distributions. Two-sample Wilcoxon rank sum (Mann-Whitney) test for non-normal data or independent sample t-test for normal data was computed to test for statistically significant differences between subgroups below. The four domains of the QoL scale, Physical, Psychological, Social, Environmental were coded as High vs. Low based on a median split of the data. For Coping Self Efficacy, participants who reported High CSE were compared to others 'Not High'), the Becks Depression Inventory data did not produce enough variation (i.e., 55 out of 57 respondents had no depressive symptoms), so no analyses took place for this variable. Demographic data was coded as Non-minority versus Minority, with the Minority group consisting of those who did not identify as Non-Hispanic White or European American. Individuals self-reported weight in lbs. and height in inches, which was transformed into BMI weight classifications (underweight, normal weight, overweight, obese). Participants were grouped as either Overweight or Obese (OWOB) or Not-OWOB. Differences

were also explored across living-status (on versus off-campus), employment status (employed vs. not-employed), and Age (22 and older vs 21 and younger). All statistical analysis will be conducted using Stata (v.16.1, College Station, TX).

CHAPTER 4: RESULTS

Study Sample and Demographics

The sample size for this study was 118 college students with Qualtrics survey responses. Out of the 118 responses, 68 participants provided valid demographic and exercise data, and 62 provided valid data for at least one of the survey instruments (QoL, CSE, and Becks Depression Inventory). Of the 56 responses considered not valid, 55 were due to insufficient Qualtrics survey data for analyses or ineligible for the study (male gender =1). The majority ethnic demographic shown was Non-Hispanic White and European American 58.8% (n=40) and Hispanic or Latino 20.16% (n=14). (see **Table 1**). According to university class status, most students were either in their third (junior;33%) or fourth (senior;36%) year. Other demographic information of the sample shows most students were employed part-time (63.24%), lived off campus (79.41%), were not overweight (71%) and did not use antidepressant medication (86.76%). The average number of days of resistance training recorded was 2.9 (± 1.6 days) with an average of 67.0 (± 54.2 minutes) minutes per day (Table 1).

Qualtrics Survey Data: Coping Self Efficacy and Quality of Life

Table 2 presents the raw scores for the QoL, Coping Self-Efficacy and Becks Depression Inventory. No overall association was found between RT and QoL, Coping Self-Efficacy, and Depressive Symptoms. However, differences were observed by subgroups. Individuals who reported a High QoL in the psychological domain reported being aerobically active for .81 days more versus those who reported low QoL on the psychological domain ($p=.03$). The Quality-of-

Life Index reported high social QoL (n=28) in individuals who resistance trained for 56.27 on average comparably to those who reported low QoL (n=29) for 74.47 minutes per average on session (p=.05). Individuals (n=22) with high QoL reported training on average 3.95 days compared to individuals reporting low psychological QoL (n=35) on average of 3.14 days in a span of a week (p<.05). Statistical significance was found in individuals (n=28) that reported high social QoL that trained for an average of 56.27 min and low social QoL for 74.47 minutes (p=.05) see Table 3).

Qualtrics Survey Data: Demographic Subgroup

Table 4 shows the differences of race/ethnicity and self-reported weight status for aerobic training days and minutes. Non-minority groups (n=35) reported aerobic training for 3.94 days compared to minority groups (n=27) who aerobic trained on average 2.70 days (p=.01). Additionally, individuals who self-reported themselves as overweight (n=18) reported aerobic training for 53.62 min/day, compared to non-overweight individuals who reported 73.29 min per day of aerobic activity (p=.02). Individuals living on campus (n=12) reported aerobic training on average 4.17 days compared to individuals who lived off campus (n=50), who reported aerobic training 3.22 days (p=.04). Students who were not employed (n=19) aerobic trained on average 1.09 days more than individuals who were employed (n=43) (Table 5).

Table 1. Characteristics of Study Participants (N=68))

% Female	100% (68)
Ethnicity/Race	% (N)
Non-Hispanic White or European American	58.8% (40)
Non-Hispanic African American or Black	7.35% (5)
Hispanic or Latino/a/x	20.6% (14)
Pacific Islander, Asian, Asian-American	2.9% (2)
Prefer not to respond	1.5% (1)
Class Status	% (N)
% First Year	8.82% (6)
% Second Year	14.7% (10)
% Third Year	33% (23)
% Fourth Year	36% (25)
% Fifth Year	5.9% (4)
Employment Status	% (N)
% Not Employed	30.88% (21)
% Employed (Full Time)	5.88% (4)
% Employed (Part Time)	63.24% (43)
Living Status	% (N)
% On campus	20.59% (14)
% Off campus	79.41% (54)
Medication Use	% (N)
% No	86.76% (59)

% Yes	13.24% (9)
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Self-reported weight-status	% (N)
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% OWOB	29.0% (18)
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% Not OWOB	71.0% (44)
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Exercise Modality	Mean (\pmSD)
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Aerobic – # of Days	3.5 (\pm 1.6)
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Aerobic – minutes per day	66.8 (\pm 52.4)
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Resistance Training – # of Days	2.9 (\pm 1.6)
---------------------------------	------------------

Resistance Training - minutes per day	67.0 (\pm 54.2)
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SD =Standard Deviation; OWOB=Overweight or Obese

Table 2. Raw values for Study Participants for Quality of Life (QoL) Domains, Coping Self Efficacy, and Becks Depression Inventory

Survey Tool	N	Mean	±SD	Min	Max
QoL: Physical Domain*	57	40.54	9.46	17.86	64.29
QoL: Psychological Domain*	57	48.10	10.21	16.67	70.83
QoL: Social Domain*	57	58.92	26.11	8.33	100.00
QoL: Environmental Domain*	57	54.39	10.21	21.88	75.00
Coping Self Efficacy Scale	62	35.70	9.30	10.83	52.00
Becks Depression Inventory	62	2.24	2.75	0.00	12.00

*Represent the transformed QoL scores from the WHOQOL-BREF

Table 3. Aerobic and Resistance Training Outcomes by Quality-of-Life Domain

Quality of Life (QoL) Domain (N=57)																	
Exercise Variable (average values)	Physical				Psychological				Social				Environment				
	High QoL (n=17)	Low QoL (n=40)	Diff.	p-value	High QoL (n=22)	Low QoL (n=35)	Diff.	p-value	High QoL (n=28)	Low QoL (n=29)	Diff.	p-value	High QoL (n=23)	Low QoL (n=34)	Diff.	p-value	
Aerobic Training (Minutes Per Day)*	57.99	74.92	16.93	0.34	80.89	62.95	17.94	0.71	70.53	69.23	1.30	0.81	69.21	70.32	-1.11	0.25	
Aerobic Training (Number of Sessions Per Week)	3.82	3.30	0.52	0.20	3.95	3.14	0.81	0.03	3.39	3.52	-0.12	0.74	3.35	-0.18	0.63		

Resistance Training (Minutes Per Day)*																
	70.15	63.56	6.59	0.86	73.00	60.83	12.17	0.60	56.27	74.47	- 18.20	0.05	68.81	63.30	5.51	0.67
Resistance Training (Number of Days)**																
	3.06	2.68	0.38	0.43	3.32	2.46	0.86	0.05	2.50	3.07	-0.57	0.74	3.04	2.62	0.43	0.34

Bolded values indicate statistical significance at p<0.05

*Wilcoxon Rank Sum Test for Non-Normal Data

** Independent Samples T-test for Normal Distribution

Table 4. Aerobic and Resistance Training Outcomes by Coping Self Efficacy, Race/Ethnicity, and Weight-status

Exercise Variable (average values)	Coping Self Efficacy (CSE) (n=62)				Race/Ethnicity (n=62)				Weight-status (self-reported)			
	Not High											
	High CSE (n=31)	CSE (n=31)	Diff.	p-value	Non-Minority (n=35)	Minority (n=27)	Diff.	p-value	OWOB (n=18)	Not OWOB (n=44)	Diff.	p-value
Aerobic Training												
(Minutes Per Day)*	66.91	68.24	-1.33	0.97	79.10	52.64	26.46	0.07	53.62	73.29	19.67	0.02
Aerobic Training												
(Number of Days)**	3.42	3.39	0.03	0.93	3.94	2.70	1.24	0.01	3.06	3.55	-0.49	0.23
Resistance Training												
(Minutes Per Day)*	65.72	63.96	1.76	0.64	68.74	59.78	8.96	0.24	71.78	62.00	9.78	0.64
Resistance Training												
(Number of Days)**	2.81	2.77	0.03	0.94	3.09	2.41	0.68	0.11	2.72	2.82	-0.10	0.83

*Wilcoxon Rank Sum Test for Non-Normal Data

** Independent Samples T-test for Normal Distribution

OWOB = Overweight or Obese

Table 5. Aerobic and Resistance Training Outcomes by Living Status, Employment, and Year of Birth

Exercise Variable (average values)	Living Status (n=62)				Employment Status (n=62)				Age (n=62)			
	On-Campus (n=12)	Off-Campus (n=50)	p- Diff. value		Employed (n=43)	Not-employed (n=19)	p- Diff. value		22 and Older (n=32)	21 and younger (n=30)	p- Diff. value	
Aerobic Training (Minutes Per Day)*	96.39	60.66	35.73	0.35	60.96	82.56	-21.60	0.25	68.38	66.72	1.66	0.42
Aerobic Training (Number of Days)**	4.17	3.22	0.95	0.04	3.07	4.16	-1.09	0.01	3.34	3.47	-0.12	0.74
Resistance Training (Minutes Per Day)*	68.19	64.04	4.16	0.36	66.55	60.98	5.57	0.35	60.08	69.92	-9.85	0.20
Resistance Training (Number of Days)**	2.58	2.84	-0.26	0.63	2.72	2.95	-0.23	0.62	2.66	2.93	-0.28	0.51

*Wilcoxon Rank Sum Test for Non-Normal Data

** Independent Samples T-test for Normal Distribution

CHAPTER 5: DISCUSSION

The purpose of this study was to investigate the association between RT on depressive symptoms, coping self-efficacy, and quality of life in female college students. No overall association was found between RT and QoL, Coping Self-Efficacy, and Depressive Symptoms. However, differences were observed by subgroups. A positive relationship between female students and social and psychological quality of life, that partake in either aerobic or resistance modality of exercise. These preliminary findings provide evidence that may suggest alternative lifestyle approaches for individuals reporting low quality of life, however further causal research is needed to determine the impact of RT on these outcomes.

Statistical significance was found in the psychological and social domains of QoL. Specifically, individuals reporting high psychological QoL participated in more aerobic (+0.81 days) and resistance (+0.86 days) training compared to individuals that reported low QoL. Previous literature has found a positive association between PA and overall QoL in the physical and psychological domain amongst adults 18-65 years (Marquez et al., 2020). And more specifically, across the cross-sectional studies analyzed, there is an evident positive association between more PA and higher-assessed QoL. However, in social QoL, statistical significance found individuals that reported partaking in more resistance minutes per day, reported lower social QoL than those who had resistance training 18.20 minutes less. Despite this, previous literature evaluating RT and overall QoL amongst older women has utilized RT group interventions and thus found high social QoL. This is also found in other studies implementing RT regime or recreation membership, as participants reported alleviation of social isolation and

loneliness. This may suggest the vital role of social participation physical activity intervention in inducing positive social wellbeing.

Regarding race/ethnicity findings, activity levels, and modality, statistical significance was found in non-minority individuals (i.e., participants who identified as Caucasian or White) who reported aerobic training for 1.24 more days than minority individuals. Previous literature supports this, as findings conclude that Black, Asian Americans, and Hispanic adults ages 18-65 were less likely to engage in sufficient physical activity levels compared with whites (Patel et al., 2022). Individuals that self-reported not overweight reported spending 73.29 minutes of aerobic training, compared with individual self-reported overweight of 53.62 minutes. This also aligns with previous literature evaluating activity levels in individuals of overweight and not overweight, as there is a small to moderate inverse relationship of body fatness and activity levels and daily minutes of exercise spent in moderate intensity activity or greater are associated with weight status (Cooper et al., 2000; Davis, et al 2012.). This may be due to physical activity increasing the number of calories used for energy and improving metabolic health.

Statistically significant results from living and employment status follow the previous literature modality and activity levels. Individuals that reported living on campus aerobics trained +0.95 more days than individuals that lived off campus. This may be because of free on-campus accessibility and resources that promote physical and social engagement such as the college recreation and wellness center, intramurals, walking trails etc. More specifically, previous literature has found that individuals living off campus can be detrimental to diet and physical activity levels compared to those living on campus (Brunt, et al., 2008). Students living

off campus have reported high workloads and lack of time and transportation to facilities as barriers to physical activity participation (Small et al., 2013). Regarding employment status, unemployed individuals reported aerobic training 4.16 days, in comparison to employed individuals that aerobic train 3.07 days. A lack of time is an obvious and potential barrier, this may be conclusive to employed individuals reporting lower physical activity levels than those who are unemployed (A et al., 2019). According to the CDC, employment status is consistently identified as an indicator of socioeconomic status and is strongly related to health outcomes. It has also been demonstrated in previous literature, the inverse relationship between socioeconomic status and unhealthy behaviors such as physical inactivity (Pampel, et al., 2010). More specifically, individuals of lower income status may spend more of their time at their occupation and have reported are less likely to participate in health prevention or promotional acts. (Wang, et al., 2019).

Strengths of this study include the use of valid subjective survey instruments, such as the Beck's Depression Inventory-II (BDI-II), Coping Self Efficacy Scale (CSES), and the World Health Organization Quality of Life Brief Version (WHOQOL-BREF) and the investigation of an understudied population. Limitations of this study include the small sample size and homogeneity of the sample, which can compromise statistical power and generalizability. For example, most individuals participating in the study were already physically active, thus differentiating the effects of modality and activity levels may have been challenging. Additionally, although acceptable valid measures, both predictor and outcome variables were self-reported, and thus may be open to reporting biases or errors (e.g., over or underreporting

physical activity levels). The study recruitment and data collection timeline were two weeks and may have limited participants and participant diversity. Lastly, the cross-sectional nature of the study design does not allow for causation, and only offers observational analysis during one point in time in this population. Future studies should 1) incorporate more participants from diversified areas of study to students capture a snapshot of all college students more accurately, 2) explore different exercise modalities, 3) consider using objective measures (e.g., accelerometers) of physical activity time to strengthen the claims for RT intervention.

There is recent evidence of RT as intervention in relieving depressive symptoms, and improving coping self-efficacy, and quality of life amongst adults (18-65). Findings from this study found differences in RT and QoL among demographic, living circumstances, and self-reported weight-status subgroups. Our initial data suggest future research to evaluate these factors in more depth and its association on well-being. Future research evaluating the variety of exercise modalities and diversifying participants activity background, to evaluate its effect on depressive symptoms, coping self-efficacy, and quality of life may also provide insight on PA aside from aerobic and resistance training. Additionally pursuing a different study design for baseline prior to resistance training intervention may be more evident in proving causation of potential treatment. It is significant for future research in this area to improve and studied to aid in the relief of depressive symptoms and improve coping self-efficacy and quality of life amongst female college students.

APPENDIX
IRB APPROVAL



UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board

FWA00000351

IRB00001138, IRB00012110

Office of Research

12201 Research Parkway

Orlando, FL 32826-3246

EXEMPTION DETERMINATION

January 10, 2024

Dear A'Naja Newsome:

On 1/10/2024, the IRB determined the following submission to be human subjects research that is exempt from regulation:

Type of Review:	Initial Study
Title:	Examining the Relationship Between Resistance Training, Depressive Symptoms and Coping Self-Efficacy Among Female College Students
Investigator:	A'Naja Newsome
IRB ID:	STUDY00006308
Funding:	None
Documents Reviewed:	<ul style="list-style-type: none">• BDI-II, Category: Survey / Questionnaire;• Coping Skills Self-Efficacy, Category: Survey / Questionnaire;• Demographics, Category: Survey / Questionnaire;• Explanation of Research, Category: Consent Form;• Physical Activity Questionnaire, Category: Survey / Questionnaire;• Request for Exemption, Category: IRB Protocol;• Research Flyer, Category: Recruitment Materials;• Study 6308 Recruitment email to faculty clean.docx, Category: Recruitment Materials;• WHOQOL, Category: Survey / Questionnaire;

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made, and there are questions about whether these changes affect the exempt status of the human research, please submit a modification request to the IRB. Guidance on submitting Modifications and Administrative Check-in is detailed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system. When you have completed your research, please submit a Study Closure request so that IRB records will be accurate.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Kristin Badillo
Designated Reviewer

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