CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

HOW DOES PHYSICAL ACTIVITY THROUGH STUDENT SERVICE-LEARNING AFFECT THE QUALITY OF LIFE IN PEOPLE WITH DISABILITIES?

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ABSTRACT

HOW DOES PHYSICAL ACTIVITY THROUGH STUDENT SERVICE-LEARNING AFFECT THE QUALITY OF LIFE IN PEOPLE WITH DISABILITIES?

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People with disabilities (PWD) tend to participate less in physical activity (PA) and activities of daily living (ADL). It is well established that physical activity plays a crucial role in the quality of life (QoL) because it promotes independence. However, there is no research examining the effects of student service-led PA on quality of life in people with disabilities.

Purpose: This study aimed to examine any change in QoL after the intervention of a 13-week student service-led PA program. Design and Setting: This was a pre-post design study. The participants were recruited from the clients enrolled in the university setting exercise program at the Center of Achievement at California State University, Northridge. Thirty-two participants completed the study. NIH PROMIS questionnaires were used for data collection and analysis in order to elucidate any difference between QoL pre and post-intervention. A paired sample t-test was conducted with a Bonferroni correction to determine the mean difference. Results: Statistically significant improvements were found in anxiety (p=0.004) and ability to participate in activities and social roles (ATP) (p=0.00007). No significant changes were found in the functional mobility aid, depression, pain intensity, and pain interference after the intervention (p>0.006). Conclusion: Our results indicate that PA administered through a student service-learning program can effectively enhance ATP and decrease the level of anxiety of individuals with disabilities.

Keywords: physical activity, student service learning, disability, quality of life
Chapter One: Introduction

1.1 Background information

The Centers for Disease Control and Prevention (CDC) (2019) defines disability as certain limitations in activities and restrictions to interacting with surroundings. Disabilities often come with the perception beyond words, including pain, depression, and anxiety (Lerman et al., 2015). According to the World Report on Disability (2011), approximately 15% of the world population is suffering from secondary complications associated with disabilities such as detriments in cognition, vision, hearing, and mobility, among whom 2%-4% are at a severe level (DHDS, 2020). The total number of people with disabilities (PWD) is likely underestimated due to the inability to tally all disabled people. Studies show that aging may cause a loss in physical, cognitive, and mental domains, such as loss of muscle mass and functions, cognitive decline, and depression (Castiglione et al., 2016; Larsson et al., 2019; Lerman et al., 2015). All the physical or cognitive deficiencies associated with either disabilities or aging can compromise the quality of life in PWD (Hilari, 2011; Mavaddat et al., 2018a, 2018b; Rajati et al., 2018).

Quality of life (QoL) is defined as "the degree to which an individual is healthy, comfortable, and able to participate in or enjoy life events" (Quality of life, 2020). QoL can be assessed from whether the individual is healthy, their life is satisfying, their body is physically functional, and the individual owns a sense of happiness among other crucial factors. Considering that QoL is subjective and affected internally and externally, it is critical to assess the influential factors for QoL in PWD to develop a program to optimize the QoL in PWD effectively. Kamelska & Mazurek (2015) suggests that efforts be devoted to improving participation in physical activity (PA), condition of the family relationship, financial status, and the ability to contribute to their social environment to help improve the QoL of PWD. Among those influence factors, PA is an
essential factor in enhancing QoL because of its physiological and psychological benefits (Mazurek, 2015).

PA has been widely explored in its benefits through countless studies. PA is the most recommended way to help with maintaining, improving, and preventing the current function and movements of the individual. Studies have shown that PA can reduce the symptoms of different disabilities, reduce the health risks and significantly increase QoL (Cruz-Díaz et al., 2018; Heine et al., 2015; Ilves et al., 2017; Swaine et al., 2018; Yesil et al., 2018). PA can also increase the PWD’s physical capacity and reduce the barriers to participation. PA training programs that include CV fitness, strength, balance, and functional mobility, have been effective in improving the QoL of PWD. (Oviedo et al., 4024). PA has also been shown to be effective in improving satisfaction and self-efficacy in PWD (Nemček, 2016; Rajati et al., 2018). Besides considering the contribution of the PA as a remarkable predictor of QoL, psychological factors, such as anxiety, depression, and self-efficacy, should also be taken into account in order to increase the QoL in PWD (Rajati, 2018).

Besides barriers caused by intrinsic factors directly originated from disabilities, the barriers generated from extrinsic factors could also stand in the way of PWD, therefore further limiting activities of daily living, such as adapted exercise, and hindering the improvement of QoL in PWD. Even worse, risk factors may increase when assistants lack the foundational knowledge to working with PWD, such as the risk of postural hypotension of getting an individual to rise to a standing position from a long-term sedentary position without essential pause every 30 degrees. External barriers could also be the lack of professional attitudes towards PWD, which may discourage them from participating in PA. Therefore, educationally training the assistants of PWD with knowledge of precautions and adaptations on completing the PA are essential for safety, higher-level
effectiveness, and efficiency. Consequently, it is necessary to educate the assistants with a professional attitude and knowledge working with PWD.

Additionally, some PWD emphasize how the company and encouragement from a professional assistant can make a difference in overcoming obstacles to training, increasing the courage and confidence in challenging themselves in PA training (Rossi et al., 2018). The appropriate way to assist in training the PWD requires a professional's positive attitude towards PWD, which originates from academic study and clinic training in educational programs. The experience in the adapted PA training for PWD in the academic background is a great opportunity for professional development for students. Otherwise, the effectiveness would be compromised in reducing the barriers to participation in PA, such as fear of falling, if the assistants lack the essential knowledge about working with PWD.

An academic service-learning program example combines a therapeutic exercise program and academic training at the Center of Achievement (COA), California State University, Northridge. COA provides adapted PA for individuals with various disabilities assisted by Kinesiology students at CSUN. In this program, the clients are evaluated first on five components of fitness: flexibility, strength, cardiovascular endurance, balance and proprioception, and functional motor skills. These evaluations are performed by Kinesiology graduate students who are in academic training in Adapted Physical Activity. The clients at the COA will receive an individualized exercise program plan based on the evaluation. Each undergraduate student enrolled in the Adapted Physical Activity service-learning course is assigned to a client, instructs exercise following a developed exercise program. However, limited studies investigated how exercise would make a difference through a student service-learning program, in which case students can benefit and perform what they learn to assist PWD in completing PA training.
1.2 Problem statement

A decrease in PA may significantly impact the individual's quality of life and further make exercises more challenging (Hilari, 2011; Law et al., 2014; Mavaddat et al., 2018). With physical or cognitive challenges, PWD requires extra support or adaptation to participate in PA to some extent. The additional support or adaptation could be assistance to standing or transference to PA facilities, without which PWD cannot complete the participation or even the activities of daily living (ADL) independently. Previous reports show that PA levels and self-efficacy are some of the main predictors of quality of life (QoL) in people with disabilities (Rajati et al., 2018; World report on disability, 2018). The ability to participate in PA is a precondition for participation in many aspects of life, including employment or education (Tagaki, 2015). Therefore, PWD have a low perception of QoL.

PWD are recommended to enroll in exercise programs (Oviedo et al., 2014), as PA is the most recommended way to help maintain, improve, and prevent the current function and movements of the individual. Studies have shown that PA can reduce the symptoms of different disabilities, reduce the health risks and significantly increase QoL (Cruz-Díaz et al., 2018; Heine et al., 2015; Ilves et al., 2017; Swaine et al., 2018; Yesil et al., 2018). As far as student service-learning programs are concerned, there has been no previous research on exercise and student service-learning programs, focusing on how exercise through student service-learning programs affects the QoL in people with a disability.

1.3 Aims and Objectives

The purpose of this study was to examine the QoL in PWD through the student service-learning program. This study investigated the impact of participation in PA with Student Service-
Learning on the QoL in PWD and compared the difference in QoL measures’ outcome before and after participation in the 13-week student service-learning program.

1.4 Hypothesis

It was hypothesized that exercise through a student service-learning program would improve the participants' QoL score.

1.5 Independent Variable

13-week PA through a service-learning program

1.6 Dependent Variables

Pre and post score of PROMIS (Patient-Reported Outcomes Measurement Information System) Measure (NIH, 2020)

1.7 Categorical Variable

Age, sex, gender, and race

1.8 Extraneous Variable

1) The time of the day clients spend on exercise in or out of the program

2) The intensity of the exercise or physical activity level the clients are doing out of the program

3) Injuries, hospitalizations, family relationships, and/or mood

1.9 Operational definitions
Quality of life: a measure of the condition under which the individual is healthy, feels comfortable and can participate in any life event and enjoy themselves in the event (Britannica, Quality of life 2021).

Student service-learning: "a form of experiential education in which students engage in activities that address human and community needs, together with structured opportunities for reflection designed to achieve learning outcomes" (Jacoby, 2015, p. 1)

1.10 Limitations

1) The sample size is small

2) The study was at one location

3) The clients might be taking any medication that affected how they perceived the quality of life.

1.11 Delimitations

1) The clients must have been in the program at the Center of Achievement at California State University Northridge for at least a year.

2) The clients must be able to communicate in English, sign the consent form, and understand all the content in the questionnaire.

3) The clients may have extra exercise or physical activity outside the program at the Center of Achaemenes at California State University Northridge.

4) The clients may have medication that might affect the perception of QoL or their ability to respond to the questionnaire.
1.12 Assumptions

1) It is assumed that the clients will answer the questionnaire honestly.

2) It is assumed that the measurement—the questionnaire of NIH PROMISE—is valid.

1.13 Significance of the Study

This current study examined if PA administered by a student-service learning program affected the QoL in PWD. This study would provide insight into the effectiveness of the PA program developed by graduate students at the CoA.
Chapter Two: Review of Literature

2.1 Disability

The Centers for Disease Control and Prevention (CDC) (2019) describes a disability as any kind of condition that brings the person with the condition more challenges to completing a task or action and restrictions to interacting with the environment around him or her. The World Health Organization (WHO) claims that disabilities are a combination of impairments, limitations in activities, and restrictions in participation. People with disabilities can have impairment with one or more of the following: vision, movement, cognitive processing (thinking), memory, learning, communicating, hearing, and mental health or social relationships (The Surgeon General's Call to Action to Improve the Health and Wellness of Persons with Disabilities—NCBI Bookshelf, 2005)

2.1.2 Prevalence of disabilities and common disabilities in the US.

According to the WHO, about 15% of the population worldwide is affected by some disability, with about 2-4% being severely affected in physical function in 2019. More than 53 million people have at least one form of disability in the US, which can be estimated as 1 in 5 adults nationally, with each state ranging from 1:3 to 1:6 adults with a disability (CDC, 2019). The prevalence can be significantly higher within a specific population when compared to other populations. For example, the population aged above 65 years old has 2:5 people with some form of disability, as is shown by the data of the Behavioral Risk Factor Surveillance System (2018). Besides, as is warned in the WHO report, there is a growing number of people with disabilities, of which the total number increases to be more than the previous estimation. Mobility is rated as the most common aspect affected by disability by 13.7%, compared to others
as cognition (10.8%), independent living (6.8%), hearing (5.9%), vision (4.6%), and self-care (3.7%) (Prevalence of Disabilities and Health Care Access by Disability Status and Type Among Adults—the United States, 2016, 2016). A limitation in mobility can reduce participation in physical activity (PA) or even become a barrier.

2.2 Quality of life

Disabilities can impact the lives of people with disabilities (PWD) negatively. The magnitude of this negative effect depends on the specific type and the severity of the particular disability. Moreover, it would be clearer and more specific to understand how the life of PWD is affected by the related disability based on the knowledge of how the contributors to QoL are affected by disabilities. Therefore, the definition of QoL is essential. QoL is defined as how an individual perceives his or her ability to exist within the external situation where "occupational performance and occupational engagement occurs" and live a meaningful and joyful life, measurable and can be understood subjectively or objectively (Molineux, 2017).

For more understanding, QoL is defined as the condition under which the individual is healthy, feels comfortable, and can participate in any life event and enjoy themselves in the event. In the study by Kamelska and Mazurek (2015), QoL can be assessed from whether the individual is healthy, the life is satisfying, the body is physically functional, the individual owning the sense of happiness, and other crucial factors. Kamelska & Mazurek (2015) remind them of considering these necessary factors as a reference to care about PWD, the type and severity of the disability, the condition of the family relationship, and fanatical status and the ability to contribute to the closest milieu. This study also highlights the crucial importance of the PA to QoL, considering both physiological and psychological benefits. In a sentence, QoL
represents well-being and overall happiness. Well-being includes six different aspects, according to Dr. Bill Hetler's model of Six Dimensions of Wellness established in 1976. The six Dimensions of Wellness include emotional, occupational, physical, social, intellectual, and spiritual aspects. Through the understanding of well-being, it is another way to identify what makes the quality of life.

2.3 Questionnaire

Along with the tendency to increase attention in health care, there has been an increasing evaluation of health-related QoL by outcome measures based on the concerns of the patients (Bergner, 1989). To assess the effectiveness of the interventions on alleviating the symptoms and restoring the functions of people with diseases, such as muscular-skeleton or neurological disease, feasible and accurate patient-based outcome measures are required (Fitzpatrick et al., 1998). "PROMIS® (Patient-Reported Outcomes Measurement Information System) is a set of person-centered measures that evaluates and monitors physical, mental, and social health in adults and children. It can be used with the general population and with individuals living with chronic conditions." (PROMIS, 2020)

Quach et al. (2016) assessed the validity and reliability of PROMIS towards six of the measures, including fatigue, anxiety, pain, depression, and fatigue, utilizing Cronbach's alpha for reliability and assessing correlations with the legacy instruments Memorial Anxiety Scale for Prostate Cancer and SF-12v2. "The result showed high Cronbach's alpha values (0.86–0.96), moderate to strong correlations between PROMIS and legacy measures (0.41–0.77) of similar constructs. Discriminant validity was demonstrated with weak correlations between measures of distinct domains (-0.20–0.31)." The study approved the reliability and validity of six measures
of PROMIS. Higginson & Carr (2001) point out that measures of PROMIS are reliable and valid but required training on associated skills to make the clinical assessment more useful. The study also suggests that reducing the number of participants with severe pain would be more clinically meaningful.

2.4 Quality of life in people with disabilities

Masakuni (2015) presented in detail how Japanese men with long-term spinal cord injury (SCI) reconstructed their life after the injuries happened and what they expected their life trajectory to be if they had not had the disability. During the interviews, the participants highlighted how challenging life was for them to control and how a supportive environment made a difference in improving their quality of life. The author recruited ten men aged at least 20 years old that also had at least ten years of history of SCI illness. All the participants had been informed thoroughly of the research purpose by the group leaders before the first interview and data collection.

Preinjury life had been described as "ordinary and peaceful" for most of the participants except the one who had met the bottleneck in his career. As a result, all the participants felt helpless and appalled when they realized their disabilities would not be cured. Two participants, with L1 and L4 injuries, as primary family supporters, also shared severe concern about the changes that might be brought to their quality of life in their families. Most participants recounted having ordinary pre-injury lives and not experiencing any particular problems. However, the participant with an L1 injury mentioned had faced a barrier in his job. All of the participants could still remember their feelings "as if it had happened yesterday". They felt profoundly shocked and helpless when being comforted by their families because their
disabilities could not be cured after the explanations from their doctors. The individual with an L1 injury recounted that he worried most concerning that his marriage and domestic life with his wife and children would be hampered so much that his marriage might break up.

Concerning how disabilities could affect the quality of life in PWD, there is another study completed by Hilari (2011). This study established that the same disability in different severities can also bring significantly different results. Those who suffered from a more severe disability, such as a stroke, could have an enormous negative impact on their quality of life, as shown in this study. Some of the people post-stroke may also lose their ability to speak, also causing a more significant negative impact on their quality of life even than those who also have a stroke while sharing almost the same conditions such as physical abilities, level of a supportive environment and well-being (Hilari, 2011). In this study, concerning the comparison of long-term outcomes as the indicators of quality of life, 126 participants were recruited, 96 (76%) of which were people with aphasia (PWA), and 87 (69%) of which were people without aphasia. There all had comparable PA, level of social support, and well-being. However, they had significant differences in the extended Activities of Daily Living (ADLs) and quality of life. PWA had significantly worse results in both outcomes. The study demonstrates how the severity of a disability can affect the life of PWD.

A nine-month study of 427 children (229 boys and 128 girls) with disabilities showed that the quality of life was significantly reduced for these children (Law et al., 2014). During nine months of data collection, Child Health Questionnaire (CHQ) was utilized three times to describe the complete status of quality of life of children with disabilities. The Impact on Family Scale and the Craig Hospital Inventory of Environmental Factors measured family characteristics and environmental barriers. The quality of life of children with disabilities is dependent on
factors of life such as family function, environmental barriers, children's physical and behavioral functions, and difficulties performing ADLs. It indicates that if any of the factors were to change, it would seriously affect the quality of life (QoL) in the children.

The previous study demonstrates how 'parents' feedback and objective evaluations influence 'PWD's lives. As we know, disabilities impact PWD, not only physically but also mentally and subjectively. Additional research has been completed to study how PWD perceive their QoL. Mavaddat et al. (2018) investigated how post-stroke individuals self-evaluated their health so that future interventions could be adjusted to help future post-stroke individuals have a better perception concerning their health based on the findings of this study. The participants included 28 individuals post-stroke who were recruited to respond to semi-structured interviews. The results showed that stroke 'survivors' perception of their health could be affected by multiple factors, such as physical, psychological, and social aspects (Mavaddat et al., 2018). Specifically, factors could be how the individual perceives aging, how much, and how soon they would recover. Therefore, how effective the therapeutic exercise could be and how much the participants could gradually improve and participate in secular society are related to exercise. At the same time, it shows how many factors could be affected, which could impact the perception of the quality of life of PWD. To summarize, this study demonstrates how disabilities have decreased the quality of life in PWD and how exercise could improve the QOL in PWD.

Rajati et al. (2018) propose that self-reported physical activity level is one predictor that can be referred to concerning the QOL in PWD, together with gender, environmental support, and self-efficacy. These predictors are significant contributors to the QOL in PWD, thus would affect the mental status of PWD. A study was conducted among 302 PWD, examining some of the items on the 36-Item Short-Form Health Survey (SF-36), including PA, self-efficacy, and
depression/anxiety level. The results showed that these predictors could help us to detect and improve the QoL in PWD by making tailored interventions. The study once again shows how a disability can reduce the QoL in PWD due to limited ADLs. In the meantime, it also shows how important exercise is to maintain or improve QoL in PWD.

2.5 Quality of life in people with disabilities through PA

According to the studies discussed above, disabilities reduce the QoL in PWD. The limited participation in PA or exercise due to disabilities is the leading cause of the QoL decrease. At the same time, it is vital to maintain a level of PA for PWD to improve or maintain their QoL. However, exercise or physical activity is not the focus of those studies above. The following research directly targets how exercise would affect the QoL in PWD.

From the sport point of view, Nemček (2016) compared which population is more satisfied with their quality of life indicators (QoL) and score higher in quality of life domains (QoL), people with physical disabilities (PPD), or people who are deaf or hard of hearing (PD/HH). The study recruited 315 individuals with PPD (n = 150; male = 76) and PD/HH (n = 165; male = 85). They were assigned into two groups based on whether the individual exercises regularly or not in their free time. The data was collected through the second part of the Subjective Quality of Life Analysis (S.QUA. LA), including 23 QoLI and 5 QoLD. It turned out that PD/HH was significantly more satisfied and scored higher in terms of 7 evaluated QoLI and all 5 QoLD within the group of individuals who exercise regularly in their free time. In the other group, PD/HH was more satisfied with 13 QoLI, and 4 QoLD while PPD with 8 QoLI and only 1 QoLD (Nemček, 2016). In another data comparison, PD/HH presented significantly higher scores in overall QoL in the exercise group, while no significant differences appeared in the non-
exercise group. The findings showed that exercise provides PWD more satisfaction in multiple domains. Even among PWD, individuals with physical disabilities have less satisfaction than individuals with disabilities that have brought fewer barriers to PA or exercise (Nemček, 2016).

As for the intellectual disabilities (ID) that do not cause direct physical impairments still result in physical challenges such as decreased cardio fitness and strength and a deficiency in balance and function, thus reducing the QoL. In this case, Oviedo et al. (2014) explored the effectiveness of a combined PA training program, aiming to improve cardiovascular fitness, strength, balance, and functional motor skill. There were 37 individuals with ID at a mild to moderate level recruited into the intervention group. The intervention group would be trained 1 hour a day, three days a week, for 14 weeks, while the control group of 29 individuals of the same population received no training. The results showed a significant increase in balance, cardiovascular fitness, handgrip, and leg strength in the intervention group. The control group showed no improvements (Oviedo et al., 2014). Therefore, the combined exercise training of cardio, strength, balance, and function effectively improves the predictors of quality of life.

Disabilities bring about illness in multiple domains as physical or mental domains besides direct physical or intellectual impairments and are responsible for other health problems and risks. However, exercise is effective in decreasing health risks. Among Children with intellectual and developmental disabilities (IDD), Collins & Staples (2017) investigated whether completing ADLs could improve physical fitness and, therefore, the health of the children by reducing the inactivity time. The study recruited 25 boys and ten girls with IDD, aging from 7 to 12, who were evaluated before and after the program, utilizing the Brockport Physical Fitness Test. The children were trained in the program 90 minutes a day, one day a week, for ten weeks. The program was made of fundamental movement skills. The results showed an improvement in
aerobic capacity and muscular strength, and endurance in children with IDD (Collins & Staples, 2017). The study demonstrated how essential PA is to maintain fitness components.

2.6 Student Service Learning and People with Disabilities

Exercise plays an essential role in staying healthy against the health problems and risks of disabilities. Efforts in training the assistants of PWD to complete the PA are essential for more effectiveness and higher efficiency. It's necessary to have the contributors to QoL taken care of and create a tailored program for every unique individual among PWD. Also, PWD emphasizes how the accompaniment and encouragement from the assistant make a difference in overcoming the fear and the courage and confidence in challenging themselves in PA training (Rossi et al., 2018). Besides, there are also many precautions and adjustments for which an assistant needs to be prepared. Studies are showing how students benefit from student service-learning (SSL) programs.

Woodruff & Sinelnikov (2015) recruited 50 undergraduate students (30 males and 20 females) from an APE course at a large public university and 24 young adults with intellectual disabilities for a total of 384 sessions, each of which is about 1.25 hours. Two students were paired up with one young adult with a disability, having a program of cardiovascular and strength and conditioning instruction. Each instruction plan is individualized based on the assessment by the student towards each recruited young adult with disabilities. This study aimed to study the students' perceptions towards the meaningful things required during the whole program and how their perceptions evolved within this program period. They found that the students all had their own unique experience of anticipation, familiarization, and commitment. The students all attached the most significant meaning to the relationship with the young adult
paired up with them, established, and developed during the process. The students also highlighted that the art of communication with the young adults they served and the teaching skills were sharpened. Also, the students got to understand more about young adults with disabilities, which enabled them to make better-adapted programs for the young adult they paired up with. Ylitalo & Meyer (2019) presented another view to learn the SSL program. This study found that SSL helped to bridge the gap of classroom learning to practice in a real setting, meeting the community's needs. The opportunity to practice and experience better engagement in the community was highly valued. From the students' side, these two studies show how students could benefit from SSL programs.

However, limited studies aim to study how exercise would make a difference through a student service-learning program, in which case students get to perform what they learn to assist PWD in completing PA training.

2.7 Summary

It is possible that the statistics presented by the WHO is an underrepresentation of the actual number of people with disabilities (PWD) because of the inability to access everyone (WHO, 2019). PWD include anyone that may have impairments in vision, movement, cognitive processing (thinking), memory, learning, communicating, hearing, and mental health or social relationships (The Surgeon General's Call to Action to Improve the Health and Wellness of Persons with Disabilities—NCBI Bookshelf, 2005). The impairments associated with disabilities can be classified into components of physical-motor, mental, visual, and hearing, speech, and psychiatry (WHO, 2014), among which physical function is the most commonly affected life domain generally (Prevalence of Disabilities and Health Care Access by Disability Status and
Type Among Adults—the United States, 2016). Edemekong et al. (2020) showed that a reduction in mobility and overall physical fitness is associated with a reduced ability to perform ADLs and a compromised quality of life (QoL). PWD needs to continue to engage in regular bouts of PA to retain their ability to perform ADLs and keep a satisfactory QoL.

QoL is defined as how an individual perceives his or her ability to exist within the external situation where occupational performance and engagement occurs and live a meaningful and joyful life, measurable and can be understood subjectively or objectively (Molineux, 2017). The NIH PROMIS can be utilized to quantify QoL by using a Likert scale and several objective determinants, contributors, or predictors of QoL. Objective determinants, contributors, and predictors of QoL are selected based on their ability to control or maintain normal daily lives. The utilization of the NIH PROMIS and objective predictors of QoL make it possible for professionals to construct programs for PWD. For successful programs to be developed, it is essential for self-monitoring and progress checks to occur that are grounded in objective measures.

As is shown in the literature, it is evident that PWD may experience severe psychological distress due to numerous reasons, including the inability to provide for familial-related endeavors and even the inability to perform basic tasks such as ADLs (Tagaki, 2015). Hilari (2011) showed how the inability to communicate affected the participants because it significantly reduced their QoL and motivation to participate in physical activity. It is possible that being unable to communicate makes it challenging to exercise because of the psychological barrier it presents with a personal trainer. Nemček shows that having physical disabilities affects people more than having cognitive disabilities because it might affect how people perceive themselves. It is possible that being physically unable to walk or hold objects may result in psychological pain
that results in a negative feedback loop, preventing further engagement in physical activity. The implementation of a PA program may improve the QoL in PWD, which is first presented by Rajati et al. (2018). Rajati et al. (2018) noted that disability could reduce the QoL due to the inability to perform ADLs. PA training may be the best intervention to help PWD perform ADLs more successfully.

Nemcek (2016) showed that PA might provide PWD more satisfaction in the multiple domains in the S.QUA.L.A. Oviedo et al. (2014) explored the effectiveness of a combined PA training program that aimed to improve cardiovascular fitness, strength, balance, and functional motor skill, which will be the same intervention utilized in the upcoming study of CoA. Most PWD have an assistant that supports them with completing ADLs. A student-service learning (SSL) approach can be used to provide a PA program to PWD while also educating young professionals on how to provide PA to a disabled population. Woodruff & Sinelnikov (2015) found that the students developed a meaningful relationship with their clients with disabilities and that the local community valued the students who were administering programs based on the SSL approach. Due to the sparse literature involving PA in PWD and an SSL approach, this study examined if the SSL-administered PA program affected PWD that had been attending the CoA for at least one academic semester.
Chapter Three: Methodology

3.1 Study Design

This study was designed to examine the impact of PA programs administered through student service-learning on the QoL in individuals with disabilities at the Center of Achievement at California State University, Northridge. This study compared the changes in QoL in participants before and after the study. The exercise intervention lasted 13 weeks and consisted of an aquatic/land-based therapeutic exercise program implemented by undergraduate students under clinical supervision. This pre-post design enabled the researchers to study the effect of PA through student service-learning programs on quality of life in PWD after 13 weeks. This study utilized the QoL measures (PROMIS, 2020) in PWD to measure QoL in the participants.

3.2 Study Setting

The study was conducted at The Center of Achievement, which was an adaptive physical activity center. The Center of Achievement has been devoted to helping PWD in PA by providing adapted aquatic/land-based exercise programs combined with academic training for Kinesiology undergraduate students. All participants were required to attend a 13-week land- or aquatic-based exercise program.

3.3 Sampling

A total of 100 participants were recruited from the CoA using a simple random sampling (lottery) method. The simple random sampling method was known for its unbiased nature and allowed every participant to participate in a study. The unbiased nature of the random sampling method proved to be a significant advantage for the researcher because the evidence obtained should give an actual effect of physical activity on the QoL in PWD. All participants completed
a total of 26 exercise sessions across the 13-week intervention. Krejcie & Morgan (1970) provided the sampling table to be applied in selecting the number of participants to be included in the study, which was consistent with the study's whole population. The inclusion criteria for this study were (1) to obtain medical clearance for participation in the program, (2) being able to communicate in English, and (3) participation in the CoA for at least one full academic semester. The exclusion criteria for this study were (1) any mental health conditions and (2) being absent for anything greater than or equal to 80% of the intervention program.

3.4 Data Collection

Pre- and post-assessments were conducted using a self-report QoL survey, NIH Patient-Reported Outcomes Measurement Information System (PROMIS) SF v 1.0. Pre-intervention assessment took place within one week before the start of the intervention, and the post-assessment occurred within two days of completing the intervention. The participants were expected to respond to the questionnaire honestly. It was also the only questionnaire that can measure the QoL through multiple aspects, including sleeping, anxiety, depression, pain, fatigue, and depression. In this study, the questionnaire included all the PROMIS SF v1.0 survey aspects to measure the QoL.

"PROMIS® is a set of person-centered measures that evaluates and monitors physical, mental, and social health in adults and children. It can be used with the general population and with individuals living with chronic conditions" (NIH, 2020, p. 1). The prominent feature of this study was to assess the effect of PA through SSL using a legacy quality of life measure (PROMIS, 2020). QoL was measured from the following aspects:

+ Physical function with mobility aids
Sleep disturbance – SF8a

Pain interference-SF8a

Fatigue – SF8a

ED-Depression-SF8a

ED-Anxiety-SF8a

Pre-Assessment

All participants were well informed of the purpose and objectives of this study. Participants were required to sign consent forms if they agreed to participate. Next, the participants were presented with a structured questionnaire to complete and return at their convenience. The data from the questionnaire was used to set the baseline for future data analysis. To assist the participants, the ‘researchers' telephone numbers and email addresses were provided to the participants to keep the researchers available for clarification at any time in need. The data collected was stored in a password-protected Masterfile database and kept out of access from any third party.

Post-Assessment

The second data collection was held after the 13-week intervention, and the participants filled out the same questionnaire at their convenience and returned at their convenience.

3.5 Data Analysis

Statistical analysis was utilized to analyze the data from the participants' pre and post visits. To check for completeness and accuracy, the data was imported into (SPSS) version 24.
Descriptive statistics were generated by SPSS and presented in graphics formats. A paired t-test was utilized to explore the mean difference between the two variables of concern (Participants pre vs. post). The significant level was set at $p < 0.05$. From here, the researcher could statistically infer the effect of SSL-administered PA on the QoL in PW that had been attending the CoA for at least one academic semester.
Chapter Four: Results

A total of 57 participants with disabilities were initially recruited from the clients at the Center of Achievement (CoA), who had enrolled at the center for at least one semester before recruitment. Data collection was carried out to evaluate the QoL in the participants before and after exposure to a 13-week physical activity program intervention. Out of the 57 participants recruited, 32 participants completed the study. The remaining 25 participants were excluded because they did not complete the post-intervention data collection. Eight aspects of QoL were evaluated through the NIH PROMIS questionnaire: (1) Physical Function with Mobility Aids, (2) Fatigue, (3) Anxiety, (4) Pain, (5) Sleep, (6) Depression, (7) Pain Intensity, and (8) Ability to Participate in Social Roles and Activities. Pre and post-intervention assessments were compared to ascertain any significant differences in the eight aspects of QoL with the 32 participants who completed the study.

The results were summarized and presented in Table 1.

A paired t-test revealed significant improvement in Anxiety (p=0.004), Pain Intensity (p=0.027), and Ability to Participate in Social Roles and Activities (ATP) (p=0.00007). Insignificant findings were found for Physical Function with Mobility Aids (PFMA) (P=0.173), Fatigue (p=0.100), Pain Interference (p=0.210), Sleep (0.514), and Depression (p=0.124). Due to the simultaneous eight analyses conducted on QoL, the chances of committing a Type I error increased. To correct this potential error by repeating mean comparisons, a Bonferroni correction was utilized to adjust the p-value from 0.05 to 0.006. Following correction, Anxiety significantly decreased from 15.75 to 12.50 (p<0.006), and ATP significantly increased from 23.09 to 30.91.
(p<0.006). The aspects of PFMA, Fatigue, Pain interference, Sleep Disturbance, Depression, and Pain Intensity failed to reach statistical significance.
Table 1: Summary of results collected from the 32 study participants

<table>
<thead>
<tr>
<th></th>
<th>PRE</th>
<th>St. Deviation</th>
<th>Post</th>
<th>St. Deviation</th>
<th>Sig. Level</th>
<th>T value</th>
<th>Critical T-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PFMA</td>
<td>29.8125</td>
<td>15.15817</td>
<td>33.1875</td>
<td>15.38210</td>
<td>0.173</td>
<td>-1.393</td>
<td>+/- 2.0395</td>
</tr>
<tr>
<td>Fatigue</td>
<td>18.2500</td>
<td>7.97577</td>
<td>15.2813</td>
<td>6.22293</td>
<td>0.100</td>
<td>1.695</td>
<td>+/- 2.0395</td>
</tr>
<tr>
<td>Anxiety</td>
<td>15.7500</td>
<td>8.12801</td>
<td>12.5000</td>
<td>6.63811</td>
<td>0.004</td>
<td>3.103</td>
<td>+/- 2.0395</td>
</tr>
<tr>
<td>Sleep</td>
<td>17.7813</td>
<td>7.20096</td>
<td>18.9688</td>
<td>6.20865</td>
<td>0.514</td>
<td>-0.660</td>
<td>+/- 2.0395</td>
</tr>
<tr>
<td>Depression</td>
<td>14.5313</td>
<td>7.41831</td>
<td>12.8125</td>
<td>7.38978</td>
<td>0.124</td>
<td>2.316</td>
<td>+/- 2.0395</td>
</tr>
<tr>
<td>Pain-intensity</td>
<td>7.5625</td>
<td>3.71516</td>
<td>5.9063</td>
<td>2.68039</td>
<td>0.027</td>
<td>1.580</td>
<td>+/- 2.0395</td>
</tr>
<tr>
<td>ATP</td>
<td>23.0938</td>
<td>7.73079</td>
<td>30.9063</td>
<td>6.95311</td>
<td>0.00070</td>
<td>-4.588</td>
<td>+/- 2.0395</td>
</tr>
</tbody>
</table>
Chapter Five: Discussion

This study examined the effect of physical activity (PA) through student service-learning (SSL) on quality of life (QoL) in people with disabilities (PWD). A longitudinal design was employed to investigate any significant changes in QoL by utilizing the NIH PROMIS questionnaire. NIH PROMIS questionnaire includes (1) Physical Function with Mobility Aids, (2) Fatigue, (3) Anxiety, (4) Pain, (5) Sleep, (6) Depression, (7) Pain Intensity, and (8) Ability to Participate in Social Roles and Activities. The study was conducted at the Center of Achievement at California State University, Northridge, known for administering both land and aquatic PA training through an SSL format. It was hypothesized that PA through an SSL program would improve the QoL in PWD.

This study revealed that Anxiety and the Ability to Participate in social roles and activities (ATP) significantly improved following a 13-week SSL program. Although there were no significant improvements, the results in Physical Function with Mobility Aids (PFMA), Depression, Fatigue, Pain Intensity, Pain Interference, and Sleep showed a trend of improvement after the physical activity program intervention.

5.1 Anxiety

In this study, anxiety scores significantly decreased after the physical activity intervention program. This finding is consistent with the majority of literature that documented reduced levels of anxiety in PWD following completion of a physical activity program (Chan et al., 2012; Craft & Perna, 2004; Maddali Bongi et al., 2016; Pilutti et al., 2014; Streeter et al., 2007; Yohannes et al., 2010). Regarding the physiological benefits, it is possible that increased levels of gamma-aminobutyric acid and dopamine, increased β-endorphins, increased physical
activity, less muscle tension, and positive distraction from worries following physical activity were the potential reasons as to why PA can improve anxiety (Chan et al., 2012; Streeter et al., 2007). It is possible that the participants decreased their anxiety level due to the levels of gamma-aminobutyric acid and dopamine increased. Another potential physiological benefit for reduced anxiety levels may be related to increased β-endorphins concentrations following physical activity. Craft & Perna (2004) showed that β-endorphins increased after exercise, associated with positive mood and sense of well-being. Orlava et al. (1990) also showed that daily exercise could enable greater endorphins and concurrent improvements in mood and well-being. PA may be helpful by contributing to increasing β-endorphins as endorphin can help people to endure pain and stress. Another reason for the improvement could also be that participation in the program changed the 'participants' previous long-time inactivity status. Most of the participants in this program had limited physical activity due to PWD's barriers. In this study, the PA program with SSL enables PWD to participate in PA by offering instructions and assistance to students, significantly reducing barriers. It is consistent with the finding of the study by Battalio et al. (2020), which suggested that PA might be necessary to improve the imbalance of negative affect (anxiety and depression) due to physical inactivity. In addition, the increased core temperature of the body may also help decrease stress by alleviating the anxiety symptom of muscle tension. According to DeVires (1981), PA may decrease anxiety by increasing the brain's temperature to make people feel relaxed and less muscle tension. From the studies above, psychological and physiological effects from PA played a role in reducing anxiety levels.

Psychological problems are also affecting the QoL in PWD. According to the National Institute of Mental Health, people with anxiety display excessive worry about their health, social interactions, and everyday routine life circumstances.
Additionally, those with anxiety may often experience symptoms of restlessness, fatigue, difficulty concentrating, and muscle tension (NIMH Anxiety Disorders, 2020). The previous literature showed that PA would help reduce tensions by diverting excessive anxiety and improving their concentration regarding the psychological effects. PWD often display uncertainty and overanxiousness about their health or life circumstances (Smith, 2011). SSL in this study provided a positive and nurturing environment for the participants. It is believed that the participants were able to put aside their worries as they participated in this study through the sense of community and positive interaction with students. Overall, the previous literature is in line with our findings showing that physical activity may improve anxiety levels.

5.2 Ability to participate in social roles and activities

The increased ATP can be attributed to reduced exercise barriers, increased self-efficacy, and increased confidence. Mansfield (2016) showed that participation in PA was effective in reducing barriers to exercise by increasing their low self-efficacy and willpower towards PA while improving the ability to participate in physical activity among people post-stroke by enhancing their gait, flexibility, and strength. Limitations in physical function, such as flexibility and gait, may have been a physical barrier to participation in activities. In this study, the increase of ATP of the participants may be a result of their increased PFMA score. Through the SSL program, physical functions such as flexibility and gait were trained. Many participants gradually relied less on mobility aids to complete the same or a higher level of physical activity. Similar findings have also been shown by Turner, Kivlahan, and Haselkorn (2009) in which treadmill walking increased the participation of PA in people with multiple sclerosis (MS). Aruin, Ganesan, and Lee (2017) have shown that PA can promote ATP in physical activities by enhancing postural control and muscle mass in people with disabilities, which directly improves
an individual's confidence and functional ability to participate in activities of daily living. The participants presented this outcome in the current study that they became active and positive towards participation in physical activity during the intervention. Many participants in this study were people with stroke, and some had minimal postural control. With the amount of energy consumption on postural control, it was expected that some participants had negative feelings during the intervention at first. Still, they became more positive as they gained more endurance than before. Besides the contribution of physical function improvements, the increased self-efficacy along with the training may also improve ATP because enhanced physical fitness typically yields higher self-esteem. Mikkelsen et al. 2017 found that completing a physical activity program gave participants a feeling of mastery, which yielded increased self-efficacy and self-esteem. It is possible that those with higher self-esteem may have greater adherence to goals, which would directly increase the possibility of ATP. Previous literature has stated that motivation was essential to the association between physical disability, PA, and activity adherence (Lui & Hui, 2009; Teizeira, 2012). In this study, less motivated participants showed higher motivation as their physical function improved during the intervention. Based on this research, PA's importance in improving confidence to prevent apathy towards improving one's physical health is evident.

5.3 Non-significant findings

In this study, there were no significant differences in PFMA, Depression, Fatigue, Pain Intensity, Pain Interference, and Sleep but showed a positive trend towards improvement after the intervention.
The positive trend in these variables is consistent with the previous literature. Studies have shown that PA effectively promotes PFMA (Khallaf, 2020; Ribeiro et al., 2017; Wolf et al., 2020). In the study by Ribeiro et al. (2017), 38 patients with subacute stroke were assigned into two groups, the intervention group loaded with an extra 5% body weight during their treadmill training. However, there were no significant differences between the two groups. Both groups showed significant improvements in gait parameters, including walking speed, hip, and knee joint excursion. These improvements were maintained 40 days after the intervention. These findings indicated that PA improved 'participants' physical function. This current study also had ATP, which may have contributed to the positive trend in PFMA. The study by Wolf et al. (2020) also demonstrated increased PFMA in aged women after the PA program. In this study, the strength training group effectively improved muscle function and dynamic balance, whereas the multicomponent training group was more effective in functional capacity and gait ability.

Khallaf (2020) showed that PA was also effective in improving the static and dynamic postural control and trunk range of motion among patients with subacute stroke. These findings were also consistent with the positive trend of the current study. Studies have shown that PA could be effective in increasing PFMA in many aspects.

Previous studies have shown that PA can also improve depression and pain (Babyak et al., 2000; Chan et al., 2012; Chalder et al., 2012; Cochrane et al., 2005.; Murphy et al., 2016; O'Reilly et al., 1999; Thomas, 2002). Those studies showed a significant difference in depression and pain had at least six months of intervention (Baybyak et al., 2000; Cochrane et al., 2005; Chalder et al., 2012; O'Reilly et al., 1999; Thomas, 2002). It can be explained that the current study did not show a significant decrease in depression because the intervention was not long enough. However, Chalder et al. (2012) showed that facilitated PA did not improve
depression in people diagnosed with depression. This may be because the study's findings did not include the social aspects present in the current study. Furthermore, the current study's population was PWD, while the population in Chalder et al. (2012) were people with a diagnosis of depression, which may have led to different results.

Other studies also showed that PA could reduce fatigue in PWD (Danks et al., 2016; Dodd et al., 2011; Edwards & Pilutti, 2017; Hebert et al., 2011; Kargarfard et al., 2012; Katz et al., 2018; McCullagh et al., 2008), which was consistent with a positive trend for fatigue in the current study. In the study by Dodd et al. (2011), progressive resistance training was found to be effective in reducing physical fatigue through a 10-week program. One reason for the inconsistency with other studies might lie in differences in populations. The population of previous studies was people with Rheumatoid Arthritis or multiple sclerosis, which were different from this current study population. People with different disabilities may have different physiological reactions to PA, which might lead to different results. For people with MS, fatigue is a common symptom, in which case they may be more sensitive to the changes regarding fatigue.

Bodnari et al. (2017) demonstrated that Sleep, PA, and anxiety were correlated. Increased PA would decrease anxiety, thus improve sleep quality by reducing sleep disturbance. In this current study, sleep disturbance may be reduced when anxiety significantly decreased and PA increased, consistent with previous studies (Akodu & Akindutire, 2018; Hartescu et al., 2015). The insignificance may be associated with other uncontrollable factors that affect sleep. Also, the results might not be comparable as PWD in this current study may react differently from people with sleep latency in the previous literature.
In summary, it is also possible that these aspects did not reach significance because the clients were returning clients to the CoA, and thereby they might have already achieved much of the physical and psychological benefits that are associated with physical activity administered through SSL format. Studies have shown that the gain from PA could be maintained until several months later (Babyak et al., 2000). The returning clients may have significant improvements before the recruitment; therefore, the intervention was not effective enough to bring forth more significant improvements.

5.4 Student Service-Learning

To our knowledge, there has been limited research investigating the effect of SSL programs on the QoL of PWD. Rossi (2018) identified key features of a group exercise program for people with Parkinson's disease by exploring the experiences of participants, student assistants, and the exercise instructor (Rossi et al., 2018). They responded that the SSL program had a positive and nurturing environment, consisted of varied and individually tailored exercise content and social cohesion. The CoA offers a program where local community members can interact with university students and contribute to 'students' academia by serving as clients in return for a quality physical activity program. This interaction may help foster positive camaraderie and life-long relationships. Our results suggest SSL may be effective for improving the QoL in PWD.

5.5 Limitations

Although the findings of this research are novel, there are some limitations. The sample size consists of only 32 participants, where at least 100 participants are required according to the power analysis. A small sample size makes the findings of this research difficult to extrapolate to
the greater population. Another limitation is that this study occurred only at a single site using a convenience sample. It is possible that different communities may have different levels of motivation depending on social class and age.

5.6 Conclusions

PA through a SSL program can improve anxiety and ATP as well as possibly affect PFMA, Depression, Fatigue, Pain Intensity, Pain Interference, and Sleep of individuals with disabilities. The outcomes of the present study were that both anxiety and ability to participate in activities and social roles improved even after participation in 13-week physical activity using a service-learning model. Researchers and practitioners can utilize this research to motivate and plan for continuous improvements in PWD.
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