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Physical Activity, Social Support, and Health-Related Quality of Life in Adults with Visual Impairment

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PHYSICAL ACTIVITY, SOCIAL SUPPORT, AND HEALTH-RELATED QUALITY OF LIFE IN ADULTS WITH VISUAL IMPAIRMENT

By

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ABSTRACT

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The purpose of this study was to examine the relationship between participation in physical activity (PA), social support for exercise, and health-related quality of life (HRQoL) in adults with visual impairments (VI). Due to limited existing literature, this study was used to investigate variables that may impact HRQoL among the specified population. This study used a cross-sectional design and online surveys to determine relationships between the examined variables. Data was collected via Qualtrics Surveying and Google Forms Software. Physical activity was assessed using the International Physical Activity Questionnaire Short Version (IPAQ-SF), a 7-day recall of walking, moderate PA, vigorous PA, and sedentary time. HRQoL was measured using the SF-12 survey, which consists of 12 questions evaluating vitality, physical health, mental health, and social functioning. Social support for exercise was evaluated using the Social Support for Exercise Scale (SSES). This scale measures support for exercise from family and friends. Analyses included 80 total participants, consisting of 28 men and 52 women with VI. The SF-12 was summed into separate physical and mental health components and PA was summed into a combined variable of moderate/vigorous PA (MVPA) MET-min/week. The SSES was scored into family participation, family rewards and punishment, and friend participation categories. Data were non-normally distributed, with descriptive statistics being presented as the medians and 25th and 75th percentiles. Participants were grouped into 2 visual classification categories, blind and low vision. Measures of central tendency between

visual classifications were compared using a Mann-Whitney U test. Hierarchical linear regression was used to examine associations between PA-related variables (MET-min/week, sedentary time) and HRQoL components (mental and physical). Significant correlations were observed between physical HRQoL and age ($p = 0.003$) and physical HRQoL and BMI ($p = 0.001$). BMI was also found to significantly correlate with sitting time ($p = 0.003$). With each 0.15 increase in hours of sitting per day ($B = 0.151$), there was a one unit increase in BMI. A modest sample size may have impacted the likelihood of observing trends among participation in PA, HRQoL, and social support among adults with VI.

This thesis is dedicated to my family, for supporting me every step of the way.

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Table of Contents

LIST OF TABLES

CHAPTER I

INTRODUCTION

Problem Description

An estimated 285 million people worldwide experience some level of visual impairment (VI). Thirty-nine million of these individuals are classified as blind (WHO, 2010). Quality of life (QoL) is a commonly measured variable among populations diagnosed with chronic mental or physical health-related conditions. Vision impairment can have significant negative impacts on adults (Chadha & Subramanian, 2010). Health-related quality of life (HRQoL) is found to be lower among individuals with VIs and blindness than it is in those with normal vision (Varma et al., 2006). Further, greater severity of VI is associated with lower self-reported HRQoL (Park et al., 2015; Varma et al., 2006).

Engaging in regular physical activity (PA) has been shown to mediate the relationship between self-efficacy and HRQoL for adults with VI (Haegele & Zhu, 2019). Previous research has also shown that there is a positive relationship between QoL and level of PA among non-VI adults (Puciato et al., 2017). Therefore, we theorize that the same relationship may exist among adults with VI.

An additional component in the participation in exercise behaviors is social support. Social support can be provided by friends, family, or significant others and is the process of supporting a peer in their attempt to achieve a desired outcome (Kaplan et al., 1976; Sallis et al., 1987). Social support for exercise from friends and partners has been shown to associate positively with an individual's participation in PA (Darlow & Xu, 2011). This positive correlation has been demonstrated in older adults (Resnick et al., 2002) and young adults (Treiber et al., 1991).

Engaging in prolonged sedentary behaviors can have negative impacts on waist circumference and metabolic risk score (Healy et al., 2008). Additionally, greater time spent sitting is associated with substantially elevated risk of obesity in women (Hu et al., 2003). Individuals with a disability that impairs their mobility were found to have greater levels of sedentary time compared to their peers (Manns et al., 2015). This reported sedentary time was also longer in duration among those with disability (Manns et al., 2015). They were also more likely to report fewer and shorter bouts of exercise (Manns et al., 2015). In one study, adults with VI reported spending, on average, between 8.5 and 10 hours per day engaging in sedentary behaviors such as watching TV, working on the computer, and traveling (Starkoff et al., 2016). In another study, females with VI aged 20-49 years spent a significantly greater amount of time engaging in sedentary activities than their sighted peers (Smith et al., 2019) Additionally, adults with VI aged 50 and older reported about 80 less minutes of PA per week than their sighted peers (Smith et al., 2019). The greatest differences were observed in adult women; they spent much less time engaging in PA and more time choosing sedentary behaviors (Smith et al., 2019).

PA is widely known to be associated with improved overall mental and physical health (Łabudzki & Tasiemski, 2013). Research regarding the relationship between participation in PA and QoL among those with VIs is limited (Haegele & Zhu, 2019). However, research thus far has demonstrated a positive relationship between HRQoL and levels of PA engagement (Haegele et al., 2017b; Haegele & Zhu, 2019, 2021). Self-reported overall satisfaction with life also has a positive correlation with levels of PA (Łabudzki & Tasiemski, 2013). This study is being conducted to examine levels of social support and PA to better understand the relationships between these variables and how they may impact HRQoL.

Statement of Purpose

The purpose of this study was to examine the relationship between participation in PA, social support for exercise, and HRQoL in adults with VI.

Significance of Study

The significance of this study was to expand on current literature pertaining to the VI community and provide further information on variables that may influence overall QoL for those individuals.

Research Hypothesis

1. Individuals with VI who regularly participate in PA will self-report greater HRQoL.
2. In comparison to those who report little social support for exercise, greater levels of social support for exercise will be associated with greater participation in PA and less sedentary time.

Variables

Independent Variables

For hypothesis 1, the independent variables in the study are PA and sedentary time. For hypothesis 2, the independent variable is social support for exercise.

Dependent Variables

The dependent variable for hypothesis 1 is HRQoL as reported by the SF-12 mental and physical health questionnaire. Sedentary time and PA will serve as dependent variables for hypothesis 2.

Limitations

There is a lack of repetitive research for the specific relationships that were examined. It was acknowledged that this study should be used to further investigate variables that have the potential to influence HRQoL among the VI community. Given that this study was performed using online surveys, some of the data collected, such as height, weight, vision status, etc., may not be as valid as if measurements were taken in person. The IPAQ-SF has been found to have relatively poor validity when compared to data collected using accelerometers (Lee et al., 2011). The IPAQ-SF is often found to overestimate the total level of PA compared to a device, therefore underestimating sedentary time (Lee et al., 2011).

A widely selected age range of 18 years and older may have resulted in discrepancies between the measured variables depending on age. Survey responses are expected to represent the opinions of the participating subjects most accurately.

Delimitations

This study was delimited to individuals aged 18 years and older who self-reported a VI. Participants must also have had access to the internet and been able to respond to survey questions independently or with assistance. Participants with an injury or other condition preventing all participation in PA were not included in this study.

Operational Definitions

- VI (vision impairment): A loss of visual acuity that is not correctable

  - B1: Inability to recognize hand shape regardless of distance or direction and lack of light perception in either eye (USABA, 2020).
  - B2: Visual acuity of 20/600 and/or a visual field of less than 5 degrees in the best eye with correction, to the ability to recognize hand shape (USABA, 2020).
  - B3: Visual acuity better than 20/600 and up to 20/200 and/or a visual field greater than 5 degrees but no greater than 20 degrees in the best eye with correction (USABA, 2020).
  - B4: (Low vision-USABA) Visual acuity better than 20/200 and up to 20/70 with a visual field greater than 20 degrees in the best eye with correction (USABA, 2020).
- Quality of Life (QoL): An individual's overall physical and mental health and well-being.
- Health-Related Quality of Life (HRQoL): A summary of scores of self-reported mental and physical health (assessed by the SF-12).
- PA (physical activity): Any bodily movement produced by skeletal muscle contraction resulting in an increased energy expenditure demand (ACSM, 2018). For the purpose of this study, all forms of exercise are included such as leisure time, transportation, and job demand.
- Social support – Any circumstance in which a friend or family member provides physical or emotional support to an individual striving towards a desired outcome.

CHAPTER II

LITERATURE REVIEW

The Importance of Physical Activity

Disability is often seen as a barrier to exercise and PA (Smith et al., 2019). Low levels of PA among these populations puts them at an even greater risk for developing health conditions such as high blood pressure, obesity, and hyperglycemia (CDC, 2014). Staying regularly active is often more difficult for those who require assistance with many day-to-day activities (Smith et al., 2019). Relying on others for transportation and lack of accessible equipment and exercise environments are common exercise barriers for people with VI (Capella-McDonnall, 2007). An entirely separate variable to consider is sedentary time. Prolonged engagement in sedentary behavior can have detrimental effects on not only physical health but mental health as well (de Rezende et al., 2014). Physical activity has been found to be beneficial for all populations. The U.S. Department of Health and Human Services (DHHS, 2008) recommends that children aged 6-17 should participate in at least 60 minutes of aerobic PA each day. Adults are recommended to participate in 150-300 minutes (about 2.5-5 hours) of moderate-intensity aerobic PA, 75 minutes of vigorous-intensity aerobic PA, or an equal combination of both activities each week (DHHS, 2008). Unfortunately, children and adults with disabilities are less likely to meet these recommendations (DHHS, 2008).

Research regarding the relationship between VI and PA is currently more limited than it is in other populations (Haegele et al., 2016; Haegele et al., 2017b; Haegele & Zhu, 2019; Smith et al., 2019). Often, recreation and sports are done in groups, adding a sense of community, and aiding in the adjustment for individuals that have recently experienced vision loss. Finding

activities that may help with the adjustment period would be a great resource for groups that support individuals that have recently become visually impaired. Additional research about visually impaired populations could create new, accessible resources and improve the QoL for individuals nationwide.

Sedentary Behavior and Physical Activity Participation Among VI

When considering the impacts of sedentary behavior and PA on health, they must be treated independently from one another (Smith et al., 2019). Prolonged sedentary behavior in adults can be detrimental to overall health and well-being (de Rezende et al., 2014). Sedentary activities are popular choices among the visually impaired (Starkoff et al., 2016). Previous research found that adults with various degrees of VI on average spent 8.53 hours of their weekend days and 9.95 hours of their weekdays participating in sedentary behaviors such as watching TV, doing paperwork, listening to music, and speaking on the phone (Starkoff et al., 2016). Sighted adults spend marginally less time engaging in sedentary behavior (Matthews et al., 2008).

More recent research demonstrated similar findings. Adults with VI self-reported, on average, spending 10.4 hours per day engaging in sedentary activities (Haegele et al., 2017c). Findings pertaining to PA levels demonstrated differences based on age. Individuals aged 12-19 years with VI demonstrated similar levels of PA when compared to their sighted peers (Smith et al., 2019). In early adulthood to middle adulthood, ages 20-49, women with VI were less active than their sighted peers (Smith et al., 2019). Adults aged 50 and up with VI also demonstrated greater sedentary time than those with presenting with normal vision, with greater differences being observed in women (Smith et al., 2019). These findings on sedentary behavior among individuals with VI are found to be greater than those in sighted individuals. Reasons for this may

include lack of social support, resources, transportation, confidence, or desire to participate in activity (Jaarsma et al., 2014). Another factor that may need to be taken into consideration is the reliance on technology for accessible communication and work. To understand why physical inactivity more often occurs with VI, we must determine why individuals are unable to participate or choose not to.

Determining factors that impact PA participation enables professionals in the field to develop processes and services to help vision-impaired populations overcome their perceived barriers. In a study by Haegele et al. (2017c), it was found that participants recognized their barriers to participating in PA. Barriers could be of personal nature or environmental. Personal barriers could include lack of social support and willingness to participate (Haegele et al., 2017c). Common environmental barriers are lack of transportation and easy accessibility of exercise location and/or equipment (Capella-McDonnall, 2007). This may include but is likely not limited to, walking trails, fitness facilities and recreational areas. Participants in Haegele et al. (2017c) also reported that they felt that they had the ability to personally control their barriers. This control could also stem from support provided to participants by their family and peers. Social support from family and/or friends is likely to impact one's exercise behaviors (Darlow & Xu, 2011). Findings demonstrated inconsistent intentions pertaining to decisions to participate in daily PA. It was also observed that participants were aware of the benefits of regularly participating in PA, however, they opted to engage in sedentary activities (Haegele et al., 2017c). Consistent participation in PA has the potential to reduce the risks of hypertension, high cholesterol, obesity, and even depression (DHHS, 2008). Sedentary adults with a reported disability are 50% more likely than their active counterparts to suffer from at least one chronic disease (Carroll et al., 2014).

Life Satisfaction and Quality of Life

As the literature has grown, it has been continuously found that PA provides physical health benefits as well as mental health benefits (Penedo & Dahn, 2005). These benefits are important to the general population and potentially even more important for individuals that may feel isolated daily due to differences in ability. Łabudzki and Tasiemski (2013) examined the relationship between levels of PA and life satisfaction in people with VI residing in Poland and found a positive correlation between levels of PA and overall life satisfaction (Łabudzki & Tasiemski, 2013). Greater levels of life satisfaction were reported among those that were classified as highly active. Individuals that were classified as inactive reported significantly lower levels of life satisfaction (Łabudzki & Tasiemski, 2013). A large majority of the activity recorded in this study was attributed to walking. Researchers had suggested that greater periods of time spent walking could be due to the use of public transportation (Łabudzki & Tasiemski, 2013). Those with VI are more likely to depend on public transportation than their peers without VI (Łabudzki & Tasiemski, 2013). Sampling a population with less access to public transportation may demonstrate lower levels of PA due to the reliance on family or peers for means of transportation.

Quality of life is impacted by levels of PA (Puciato et al., 2017). Inadequate levels of regular PA increase the risk of a wide variety of health conditions (World Health Organization, 2020). This includes cardiovascular diseases, obesity, hypertension, diabetes, and many more life-threatening conditions (World Health Organization, 2020). QoL is commonly examined in elderly populations and populations with health-related disabilities. The SF-12 is a short form survey used to assess HRQoL (Ware et al., 1996). Haegele and Zhu (2019) found a positive relationship between participation in PA and HRQoL among adults with VI. These findings agree with the previously mentioned findings from Łabudzki and Tasiemski (2013).

The physical health benefits of participating in consistent PA are well known. While the psychological and social benefits are lesser known, moderate-intensity PA has shown to improve mood and prevent or treat depressive and anxiety disorders (Peluso & de Andrade, 2005). Individuals who experience isolation due to disability may benefit even more than the general population from the camaraderie and support provided by a group or team (Peterson et al., 2017). In one recent example, individuals with VI participating in baseball reported significantly greater physical and mental QoL than a sedentary control group (Mirandola et al., 2019).

Vision loss may occur at any point over the course of an individual's life. It has been suggested that vision loss occurring later in life is more taxing on an individual than when it is lost earlier. Research by Chadha and Subramanian (2010) examined the QoL among children with vision loss. It was found that children between the ages of 3 and 16 with vision loss had significantly lower QoL scores when compared to peers of their age. It was also reported that older children had lower QoL scores than the younger children, although this difference was not significant (Chadha & Subramanian, 2010).

Social Support for Exercise

Many factors impact the decision to participate, or not to participate, in PA on a regular basis. Social support has been found to be a predicting factor in exercise behaviors and likelihood to change exercise behaviors (Courneya et al., 2000). Individuals are more likely to regularly participate in PA when their peers also regularly participate (Booth et al., 2000). One's exercise habits are associated with the habits of both close friends and significant others (Darlow & Xu, 2011).

There are several reasons why a peer's or family member's exercise habits may impact one's own decisions to participate in PA. The actions of a friend or family member may influence an individual to model similar behavior (Darlow & Xu, 2011). Another reason may be that the individual recognizes their peers' behaviors as admiral and chooses to engage in similar "normal" exercise behaviors (Christakis & Fowler, 2007). Modeling similar behavior patterns also provides social interaction with friends and family and the potential for conversation stemming from that topic of interest (Darlow & Xu, 2011). Lastly, it is widely thought that we tend to seek out friends and significant others that share similar lifestyles and behaviors (Bahr et al., 2009).

The most heavily preferred form of social support among adults aged 18 to 39 years is the opportunity to participate in group exercise (Booth et al., 1997). Social support from friends and/or family likely has different impacts on males and females. Exercise habits of friends had a greater effect on females compared to males (Darlow & Xu, 2011). Women tend to be less physically active than their male counterparts, with men spending more time participating in outdoor activities such as home repair and sport (Talbot et al., 2000). Some barriers to exercise that women may experience are feeling self-conscious in a gym or public setting or feeling discouraged due to interactions with friends and family (King et al., 2000). Treiber et al., 1991, found that relationships between social support and activity were more strongly correlated among women. This is consistent among young adults (Treiber at al., 1991) and college-age students (Gruber, 2008). Overall, these findings suggest that women may need greater social support to regularly exercise or begin making exercise behavior changes than males. Older adults living in a community setting are more greatly influenced by social support from friends

(Resnick et al., 2002). This is due to the social interaction that they experience when engaging in similar behaviors to their peers.

Quality of Life Instruments

Quality of life has multiple definitions and can be assessed using a variety of instruments. The World Health Organization Quality of Life instrument is a 26-item measuring system evaluating physical health, psychological health, social relationships, and environment (Puciato et al., 2017). This tool adequately assessed perception of QoL among working men and women between the ages of 55 and 64 (Puciato et al., 2017). While sufficient for the general population, this instrument may not be fitting for populations with various disabilities. Commonly used QoL questionnaires for the visually impaired include the Low Vision Quality of Life Questionnaire (LVQOL) and the Short Form-12 questionnaire (SF-12). The LVQOL has been utilized in previous research regarding the QoL in children due to the lack of adult-specific questions and required a shorter duration for completion (Chadha & Subramanian, 2010). The SF-12 is more commonly used for adult populations. This is a 12-item questionnaire used to assess HRQoL and has been successfully executed in previous research (Haegele & Zhu, 2019; Mirandola et al., 2019; Varma et al., 2006).

Summary

Disability, specifically VI, may act as a barrier to exercise due to psychological and environmental factors (Haegele et al., 2017a; Smith et al., 2019). Prolonged sedentary behavior and non-participation in exercise can be detrimental to physical and mental health and well-being. Individuals with VI spend more time engaging in sedentary behaviors than their sighted peers

(Starkoff et al., 2016). One way to combat sedentary behavior and promote overall health is engaging in PA. Previous research has shown that regularly participating in PA may be effective in mitigating negative impacts on HRQoL (Haegele & Zhu, 2019). One of the more impactful ways of maintaining or changing PA habits is through friend and family support (Courneya et al., 2000).

Future research should aim to build on the framework that has been developed to this point. Previous research has shown that PA may positively impact QoL and life satisfaction among individuals with VI (Haegele & Zhu, 2019). Future research should delve deeper into the relationship between the social and physical aspects of sport or recreation and QoL. Social support from family and friends impacts exercise participation among the general population (Booth et al., 2000). However, we are unsure whether the impact of support varies for special populations. Further evaluation on the impacts of PA on QoL among adults with VI needs to be conducted to support previous findings. There are many additional questions that have not yet been investigated. An important variable to consider is whether earlier participation in group activity aids in adjustment for newly impaired individuals. Narrowing the focus onto a more specific subgroup of the visually impaired population may help determine specific barriers.

CHAPTER III

METHODOLOGY

Research Design and Instrumentation

This is a cross-sectional study that utilized surveys to determine correlations between variables. Data was collected using an online survey through Qualtrics and Google Forms. Software was pilot tested for compatibility with VI assistive programs. Participants completed their surveys individually, with auditory assistance or with the help of screen reader technology. HRQoL was assessed utilizing the SF-12 survey. The SF-12 consists of 12 questions evaluating current physical functioning, vitality, physical health, mental health, and social functioning (Ware et al., 1996). Participation in PA was measured using the International Physical Activity Questionnaire Short Version (IPAQ-SF) (Craig et al., 2003). This short-form questionnaire is commonly used (Haegele, Brian, & Lieberman, 2017; Haegele et al., 2016; Haegele & Zhu, 2019; Haegele et al., 2018; Puciato et al., 2017) due to its low participant burden and ability to measure planned and unplanned activity. Activity is recalled from the previous seven days and categorized into time spent walking, engaging in moderate PA, engaging in vigorous PA, and sitting (Craig et al., 2003). Weekly minutes of PA were totaled and multiplied by metabolic equivalent (MET) factors to provide a variable of MET-min/week. Measures of social support for participation in exercise were assessed using the Social Support and Exercise Scale (SSES; Sallis et al., 1987). Sociodemographic and anthropometric data such as age, sex, height (inches), body mass (pounds), race/ethnicity, employment status, prior military enlistment, and visual acuity were also collected.

Participants and Recruitment

The sample population for this study was individuals 18 years or older and have been living with VI for a minimum of 12 months. Participants were required to be free of upper or lower body injuries that limited mobility and participation in PA and/or sport. Inclusion criteria for VI was based on the classification system used by the International Blind Sports Federation and United States Association of Blind Athletes as seen in previous research (Haegele et al., 2016). The classification categories are as follows:

- B1: Inability to recognize hand shape regardless of distance or direction and lack of light perception in either eye
- B2: Visual acuity of 20/600 and/or a visual field of less than 5 degrees in the best eye with correction, to the ability to recognize hand shape
- B3: Visual acuity better than 20/600 and up to 20/200 and/or a visual field greater than 5 degrees but no greater than 20 degrees in the best eye with correction
- B4: (Low vision-USABA) Visual acuity better than 20/200 and up to 20/70 with a visual field greater than 20 degrees in the best eye with correction

Participants were recruited via listserv email through the National Federation of the Blind and Mississippi State National Research and Training Center on Blindness and Low Vision. Additional recruitment was completed utilizing posts to groups on social media platforms (Facebook). Questionnaire data was collected utilizing Qualtrics and Google forms, platforms that are user-friendly for various levels of VI.

Procedures were submitted to the Darden College of Education and Professional Studies' Institutional Review Board for review and approval prior to any recruitment or data collection

taking place. All participants were subjected to an informed consent process, but since the survey was anonymous, written informed consent was not obtained.

Approximately 122 people began the survey, but after excluding those with incomplete data and those who did not have VI (two people responded they didn't have VI), 80 participants remained. Forty participants were excluded from the analysis due to missing data. A total of 80 participants, 28 males and 52 females, were included in the main analyses.

SF-12 Questionnaire

The SF-12 questionnaire was developed to assess multiple parameters of overall health to interpret QoL (Ware et al., 1996). This 12-question assessment is a shortened version of the original SF-36 and contains questions regarding eight concepts of health: physical functioning, role-physical, bodily pain, general health, energy/fatigue, social functioning, role-emotional, and mental health. The SF-36 proved to be too long for some measures of HRQoL, leading to the development of the shortened questionnaire (Ware et al., 1996). The shortened questionnaire can be completed in approximately 2 minutes (Ware et al., 1996). The SF-12 was developed by selecting a subset of 12 items from the SF-36 representative of the 8 original concepts (Ware et al., 1996). Six questions were selected to determine the Physical Health Summary (PCS) measures and an additional 6 questions determine the Mental Health Summary (MCS) measures (Ware et al., 1996). PCS and MCS measures of the SF-12 were found to have a test-retest reliability of 0.890 and 0.760, respectively, in the United States (Ware et al., 1996). Relative validity coefficients ranged from 0.93 to 0.98 for the MCS measures of the SF-12 in comparison to the MCS measures of the SF-36 (Ware et al., 1995). Following 12 tests of validity, PCS measures of the SF-12 were found to have a median relative validity coefficient of 0.67 (Ware et al., 1995). The SF-12

reproduces upwards of 90% of the variance in SF-36 PCS and MCS measures within the United States (Ware et al., 1995). When selecting the instrument to measure self-reported HRQoL, it was crucial to consider adequate reporting, regardless of vision status. A study by Varma et al., 2006, found that the SF-12 scores were not different in individuals with VI compared to individuals with normal sight.

IPAQ-SF Questionnaire

The process of precisely measuring weekly PA has been found to be a challenge. Recall questionnaires must be specific enough to estimate levels of PA but also short enough to ensure adequate responses from the target population. The short form version of the International Physical Activity Questionnaire (IPAQ-SF) was designed to measure time spent walking, participating in moderate and vigorous intensity physical activity, and sedentary time over a 7-day period (Craig et al., 2003). The IPAQ-SF 7-day recall has been reported to have test-retest reliability correlation coefficients ranging from 0.66 to 0.88 (Craig et al., 2003). The previously mentioned correlations were based on a summation of total MET/min for all levels of PA (Craig et al., 2003). Measures of validity show that the long and short form IPAQ demonstrate reasonable agreement with a correlation of 0.67 (Craig et al., 2003). The IPAQ-SF has been found to overestimate levels of PA by 38-173% in comparison to using an accelerometer (Lee et al., 2011). In an international study, 82% of participants reported at least 150 minutes (2,514 MET·min/week) of PA per week, reaching the guideline recommendation (Craig et al., 2003). The 2018 PA guidelines recommended a minimum of 150 minutes (about 2 and a half hours) per week of moderate PA to obtain health benefits (DHHS, 2018). According to Zenko et al., 2019, only 9.7-44.8% of adults meet the minimum recommended amount, further supporting that the IPAQ-SF may overestimate

PA. Overestimation may be a result of the difficulty of a 7-day recall questionnaire (Bauman et al, 2009). Overall, the IPAQ-SF is an adequate measure to assess total PA among large scale surveys among individuals aged 18-69 years (Bauman et al, 2009). Marmeleira et al., 2013, demonstrated that the IPAQ-SF is a valid instrument for assessing PA among adults who are blind, supporting previous findings of validity (Craig et al., 2003). No significant differences between levels of moderate and vigorous activity were reported between the IPAQ-SF (33.71 min/day) and accelerometer data (22.25 min/day) (Marmeleira et al., 2013). Adults with blindness reported average PA of 2,278.5 MET·min/week, which is comparable to normative values from previous studies (Craig et al., 2003; Marmeleira et al., 2003).

Social Support for Exercise Survey (SSES)

Social support is the process of a peer, family member, or colleague supporting another individual emotionally, financially, or tangibly, when they are attempting to reach a specific goal or outcome (Kaplan et al., 1976; Sallis et al., 1987). Social support from friends and family has shown to be influential to individuals attempting to make changes to their health behaviors. A reliable and valid method of measuring social support for exercise was developed in 1987 (Sallis et al., 1987). Measures of reliability indicate that test-retest reliability had an average of 0.70 and internal consistency of 0.79 (Sallis et al., 1987). Friend and family support for exercise habits were also found to significantly correlate ($p<0.001$) with measurements of participation in vigorous exercise (Sallis et al., 1987). The SSES uses a scale measure of social support specific to exercise behavior to examine factors of friend/family support and friend/family rewards and punishments (Walker et al., 2019). The SSES uses a 5-point scale, ranging from 1 (none) to very often (5) (Sallis

et al., 1987). Support from friends and family are reported independently for each question (Sallis et al., 1987).

Data Processing

Scores for the SF-12 were computed based on the methodology reported in Haegele and Zhu (2019), who carried out a study among adults with VI. Summation of mental variables and physical subscales was computed separately. Possible scores on the physical subscale ranged from 6-20, while scores on the mental subscale ranged from 6-27.

Physical activity levels were calculated by multiplying minutes of each activity type by appropriate MET factors (vigorous: 8; moderate: 4; walking: 3.3). The focus of this analysis was MET-min/week of moderate-vigorous PA (MVPA). Sedentary time was reported as the average amount of time on weekdays spent sitting or lying down from question 7 of the IPAQ-SF. A few individuals, when asked about their PA and sitting time, provided ranges of time (e.g., 3-4 hours; 15-30 minutes). An average of the range was taken and included in the analysis. Several individuals reported their sitting time in minutes rather than hours, and these were also re-coded as hours.

The SSES was analyzed based on the summation of family participation subscale (questions 11-16, 20-23), family rewards and punishment subscale (questions 17-19), and friend participation subscale (questions 11-16, 20-23). The rewards and punishment subscale for friends was not scored, as it has not demonstrated validity in factor analysis (Sallis et al., 1987). Three participants had one missing item from the SSES, and imputation was used in these cases so that their data was still usable for the analyses. The average value from completed items on the same subscale was used as the imputed value for the missing item.

One individual, when asked to report their age, responded with "499," this value was re-coded to 49 to make it plausible.

Statistical Analyses

The distributions of PA-related, HRQoL, and SESS data were checked by inspecting histograms and Q-Q plots. Most variables showed skewed distributions, and MET-min/week of MVPA was resistant to transformation due to a relatively high number of 0 values. Therefore, non-parametric analyses (Mann-Whitney U tests) were used to compare these variables by vision status groups. Due to relatively small numbers of participants in B2, B3, and B4 visual groups, they were combined into one low vision classification (n = 30), while B1 remained a separate group (n = 50).

Next, hierarchical linear regression was used to examine the associations between PA-related variables (MVPA MET-min/week, sedentary time) and HRQoL components (mental and physical). Age, body mass index (BMI), sex, and VI impairment classification were entered into an initial block. Next, MVPA (MET-min/week) and sedentary time were entered into the next block to examine how much additional variance in the model these variables explained. Finally, additional regression models were used to examine the relationships between SSES variables and PA levels. Age, BMI, sex, and VI impairment classification were entered into the first block, while subscale scores from the SSES were entered into a second block. MVPA MET-min/week and sedentary time served as the dependent variables. MET-min/week was divided by 1000 to produce an interpretable coefficient.

For all regression models, residual plots were used to examine goodness of fit, and variance inflation factor (VIF) was used to assess multicollinearity among the variables. An alpha of < 0.05

was used to indicate statistical significance in SPSS (Version 27; IBM SPSS Statistics for Windows, Armonk, NY, USA).

CHAPTER IV

RESULTS

Summation of Scales and Data Distribution

Most of the independent and dependent variables were found to be non-normally distributed. For this reason, the measure of central tendency is presented as the median (25^{th}, 75^{th} percentiles). Table 1 presents the descriptive statistics and percentiles. Many of the participants, 76.3% were Caucasian. An additional 5% each identified as African American or black, Hispanic/Hispanic American, or multi-racial. An additional 3.8% each identified as either Asian/Asian American or other race. The remaining ~1% identified as Native American. Fifty-five percent of participants reported being unemployed, 15% reported working part time (under 35 hours per week), and 30% reported working full time (35+ hours per week). All participants completed a minimum of a high school education. 3.8% reported receiving a high school diploma or an equivalent, 21.3% completed some college, and 75% completed at least a bachelor's degree.

Table 1

Central Tendency & Percentiles

	Mdn (25^{th},75^{th})
Age (y)	53.5 (39.0, 67.0)
BMI (kg/m^2)	28.2 (24.1, 33.4)
SF-12 Physical (6-20)	18.0 (14.0, 19.0)
SF-12 Mental (6-27)	21.0 (18.0, 24.0)
MVPA (MET-min/wk)	860 (180, 2370)

Total PA (MET-min/wk)	1476 (424, 3149)
Sedentary Time (h/day)†	6.0 (4.0, 10.0)
SSES Family Participation (10-50)	14.0 (10.0, 20.8)
SSES Family Rewards and Punishment (3-15)	3.0 (3.0, 3.0)
SSES Friend Participation (10-50)	14.0 (10.0, 20.8)

Note. Values are shown as median (25^{th}, 75^{th} percentiles). MVPA, moderate/vigorous physical activity. SSES, Social Support for Exercise Scales. †n = 77 due to 3 participants with missing or implausible values.

Differences by Visual Impairment Status

Table 2 presents the data resulting from comparing differences in HRQoL, PA, and SSES by VI status. No significant differences were observed between these variables when comparing by visual status ($p > 0.05$).

Table 2

Health-Related Quality of Life, Physical Activity, and Social Support Variables by Visual Impairment Group

Variable	*Mdn* (25^{th},75^{th}) Blind	*Mdn* (25^{th},75^{th}) Low Vision	U	p
SF-12 Physical (6-20)	18.0 (14.8, 18.3)	17.5 (13.0, 19.0)	718	0.747
SF-12 Mental (6-27)	21.5 (19.0, 24.0)	20.0 (17.0, 23.3)	645	0.294

MVPA (MET-min/wk)	940 (70, 2595)	660 (220, 2280)	736.5	0.893
Total PA (MET-min/wk)‡	1377 (441, 2979)	1533 (340, 3547)	695.5	0.877
Sedentary Time (h/day)†	6.0 (4.0, 10.0)	6.0 (4.3, 10.0)	676	0.832
SSES Family Participation (10-50)	14.0 (10.8, 21.3)	14.0 (10.0, 20.0)	695.5	0.584
SSES Family Rewards and Punishment (3-15)	3.0 (3.0, 3.0)	3.0 (3.0, 3.0)	742.5	0.897
SSES Friend Participation (10-50)	14.0 (10.0, 21.0)	14.0 (10.0, 20.0)	714.5	0.720

Note. Values are shown as median (25^{th}, 75^{th} percentiles). MVPA, moderate/vigorous physical activity. SSES, Social Support for Exercise Scales. ‡n = 78 due to 2 participants with missing or implausible values. †n = 77 due to 3 participants with missing or implausible values.

Physical and Mental Health-Related Quality of Life

Table 3 presents the hierarchical linear regression used to predict physical HRQoL based on age, BMI, sex, and VI classification, MVPA and sedentary time. All VIF values were less than 1.5, meaning there were no major issues with multicollinearity. Significant negative associations were observed between physical HRQoL and age ($p = 0.003$) and BMI ($p = 0.001$). Thus, as age

and BMI increased, physical HRQoL decreased. All other associations were insignificant (p > 0.05).

Table 3

Regression Coefficients for Predicting Physical Health-Related Quality of Life

Model	Predictor	*B*	*SE* B	β	*p*	R^2	ΔR^2
1						.234	.234*
	Age	-.060	.020	-.324	.003*		
	BMI	-.132	.039	-.365	.001*		
	Sex	-.481	.655	-.080	.465		
	VI Status	-.187	.623	-.031	.765		
2						.277	.043
	Age	-.058	.020	-.311	.004*		
	BMI	-.104	.041	-.288	.013*		
	Sex	-.635	.665	-.106	.343		
	VI Status	-.228	.615	-.038	.712		
	MVPA	.117	.148	.084	.432		
	Sedentary Time	-.156	.088	-.195	.079		

Note. MVPA MET-min/wk was divided by 1000 to get an interpretable coefficient.
*Significant at the .05 level. n = 77 due to missing values for sedentary time.

Table 4 shows the regression used to predict mental HRQoL based on age, BMI, sex, and VI status, MVPA and sedentary time. All VIF values were less than 1.5, indicating no major issues with multicollinearity between predictors. The initial block predictors accounted for 9 percent of the variance (R^2 = 0.090), with no significant correlations. The second block accounted for 11% of the variance (R^2 = 0.118), also with no significant correlations.

Table 4

Regression Coefficients for Predicting Mental Health-Related Quality of Life

Model	Predictor	*B*	*SE* B	β	*p*	R^2	ΔR^2
1						.090	.090
	Age	.025	.029	.099	.391		
	BMI	-.067	.057	-.138	.243		
	Sex	-1.477	.965	-.183	.130		
	VI Status	-.490	.918	-.061	.595		
2						.118	.028
	Age	.027	.029	.108	.354		
	BMI	-.037	.061	-.076	.543		
	Sex	-1.633	.992	-.202	.104		
	VI Status	-.532	.918	-.066	.564		
	MVPA	.141	.220	0.75	.525		
	Sedentary Time	-.166	.131	-.154	.207		

Note. MVPA MET-min/wk was divided by 1000 to get an interpretable coefficient.
*Significant at the .05 level. n = 77 due to missing values for sedentary time.

Physical Activity and Sedentary Time

Table 5 shows the regression for predicting MVPA from SESS scores. The demographic, anthropometric, and VI status variables and SSES subscales were entered into the two blocks to examine how much variance they accounted for. All VIF values were less than 1.5, indicating no major issues with multicollinearity. No associations between predicting factors and MVPA were found (all $p > 0.05$).

Table 5

Regression Coefficients for Predicting MVPA (MET-min/wk)

Model	Predictor	*B*	*SE* B	β	*p*	R^2	ΔR^2
1						.079	.079
	Age	15.0	15.1	.112	.324		
	BMI	-39.3	29.5	-.155	.188		
	Sex	-601.8	506.9	-.140	.239		
	VI Status	-111.5	476.0	-.026	.815		
2						.126	.047
	Age	26.1	16.6	.196	.120		
	BMI	-38.0	29.6	-.150	.204		
	Sex	-652.6	511.8	-.152	.206		
	VI Status	-99.9	473.8	-.024	.834		
	Family Participation	18.6	32.7	.069	.572		
	Family Rewards and Punishments	344.9	278.59	.145	.220		
	Friend Participation	29.7	38.02	.103	.437		

Note. n = 80

Table 6 presents the regression models used to examine the relationships between SSES and sedentary time. All VIF values were less than 1.5, indicating no major issues with multicollinearity. Age, BMI, sex, and VI impairment status were entered into the first block, while scores on the social support for exercise questionnaire were entered into a second block. BMI was

found to associate significantly with sitting time (p = 0.005). For every one unit increase in BMI there is a .15 increase in hours of sitting per day *(B* = 0.151).

Table 6

Regression Coefficients for Predicting Sedentary Time

Model	Predictor	*B*	*SE* B	β	*p*	R^2	ΔR^2
1						.127	.127*
	Age (yr)	.026	.026	.112	.319		
	BMI	.151	.052	.335	.005*		
	Sex	-1.423	.874	-.190	.108		
	VI Status	-.349	.831	-.047	.676		
2						.153	.027
	Age (yr)	.009	.029	.039	.757		
	BMI	.151	.053	.334	.005*		
	Sex	-1.385	.891	-.185	.125		
	VI Status	-.324	.839	-.044	.700		
	Family Participation	-.043	.058	-.093	.460		
	Family Rewards and Punishments	-.369	.537	-.078	.495		
	Friend Participation	-.048	.073	-.085	.513		

Note. *Significant at the .05 level. n = 77 due to missing values for sedentary time.

CHAPTER V

DISCUSSION

The purpose of this study was to examine the extent to which social support for exercise influences participation in PA and subsequently HRQoL among adults with VI. It is common for those that surround themselves with peers who engage in or encourage PA to maintain similar habits and behaviors (Treiber et al., 1991). It has also been observed that consistent participation in PA among this population results in greater reported HRQoL (Haegele & Zhu, 2019). For this study, PA was measured utilizing the IPAQ-SF, a 7-day recall questionnaire. HRQoL was assessed via a self-reporting questionnaire, the SF-12. The SSES evaluated exercise-specific social support that participants received from their family and friends. There were two main hypotheses investigated in this study. The first hypothesis was that individuals with VI who regularly participate in PA will report greater HRQoL. The dependent variable for this hypothesis was HRQoL, as reported by the mental and physical components of the SF-12 questionnaire. Second, those who report greater levels of exercise-related social support from friends and family will also report more time spent engaging in PA. The dependent variables for the second hypothesis were PA and sedentary time, as measured by the IPAQ-SF. The sections below address the dependent variables of the study and whether the hypotheses were supported.

Physical and Mental Health-Related Quality of Life

The SF-12 is a commonly used tool to assess HRQoL among adults (Haegele & Zhu, 2019; Mirandola et al., 2019; Varma et al., 2006). With limited research on PA and HRQoL among individuals with VI, there is little data to compare this study's results with. A large portion of

research pertaining to HRQoL is in comparison to level of visual acuity and/or correctability (Chie et al., 2004; McKean-Cowdin et al., 2007; Varma et a., 2006). One study by Haegele at al. (2017b) found that HRQoL and PA were significantly correlated. Additional research is indicative of the positive relationship between participation in PA and HRQoL and satisfaction among adults with disabilities (Giacobbi et al., 2008; Kawanishi & Greguol, 2013; Thompson et al., 2012).

When entered into a hierarchical regression model, neither MVPA (MET-min/week) nor sedentary time were found to significantly correlate with physical or mental HRQoL. It is speculated that because the associations between PA and HRQoL are likely to be small-to-modest in size, a larger sample may have been needed to show any statistically significant associations. Indeed, as can be seen in *Table 3* and *Table 4*, the co-efficients between MVPA and HRQoL were positive in direction, while the co-efficients between sedentary time and HRQoL were negative. The direction of the relationships matches previous findings, and the lack of statistical power may explain why they were not statistically significant in the present study.

Age and BMI, however, were found to significantly correlate with physical HRQoL, with younger individuals and those with lower BMIs having greater self-reported HRQoL. While it is widely accepted that age impacts HRQoL, this is also consistent with the findings of Le and Delevry (2021), who found that individuals with obesity have significantly lower reported HRQoL. Several other studies support that specifically physical HRQoL seems to be more negatively impacted by high BMI (Fontaine & Barofsky, 2001; Kolotkin & Andersen, 2017).

Physical Activity and Sedentary Time

Within the last few decades, it has been increasingly evident that participation in regular PA is highly recommended to prevent and treat adverse health outcomes. Children and adults

with a disability are less likely to meet the recommendations and guidelines for weekly activity (DHHS, 2008). The median reported sedentary time in both vision groups was 6 hours per day. This is slightly lower than the findings of Haegele et al. (2017c), with an average of 626 minutes, or 10.4 hours, of sedentary time daily. This may be due to the fact that their estimate is the mean, while ours is the median. That finding was consistent with a study by Marmeleira et al. (2014), which reported an average sedentary time per day of 11.3 hours.

Scores on the SSES were not found to significantly correlate with time spent engaging in MVPA or sitting time. This conflicts with findings by Darlow and Xu (2011) that exercise habits of friends and family were associated with one's own exercise tendencies. Additional research has shown that social support for exercise was correlated with participation in PA (Treiber et al., 1991). BMI, however, was found to significantly correlate with sitting time. Those with the greater calculated BMIs were significantly more likely to report more sitting time throughout their day. This is in agreement with previous research that demonstrated a correlation between time spent watching television and obesity in adults with VI (Lenz et al., 2015). A study by Smith et al. (2019) found that adults aged 50 years and older with VI reported greater participation in sedentary behaviors.

Limitations

A number of limitations are present in this study. Using online data collection may be viewed as a limitation due to issues with accessibility and accuracy of responses. It was also acknowledged that there is a lack of repetitive research investigating the relationships examined in this study. This study was a way to further investigate variables that have the potential to influence HRQoL among the VI community. Due to the instrumentation utilized and the fact that

this study was virtual, the accuracy of some of the collected data (height, weight, VI status, etc.) may not be as strong as if physical measurements had been used. The IPAQ-SF is identified as an additional weakness of this study. It has demonstrated relatively poor validity regarding measurement of PA levels, specifically when compared to accelerometer data (Lee et al., 2011). The IPAQ-SF tends to overestimate levels of PA and underestimate sedentary time (Lee et al., 2011).

CHAPTER VI

CONCLUSION

The purpose of this study was to examine the relationship between participation in PA, social support for exercise, and HRQoL in adults with VI. An additional purpose was to expand on existing literature and explore factors that may influence engagement in PA and overall QoL. Prior studies regarding social support and exercise demonstrated that individuals more frequently engaged in PA when they received greater levels of social support from their friends and families. Thus, it was hypothesized that adults with VI who regularly participate in PA would report greater HRQoL and levels of social support from family and friends. Exercise participation and changes in exercise habits tend to mirror those that immediately surround an individual. Increased participation in PA has been positively correlated with HRQoL among adults with VI. Due to these correlations, it was believed that there would be positive relationships observed between HRQoL, levels of PA, and social support among this population.

The results of this study were largely insignificant, with few significant relationships being observed. Physical HRQoL and age were significantly correlated (p = 0.003), with younger individuals reporting greater physical HRQoL. Additionally, BMI and physical HRQoL were significantly negatively correlated (p = 0.001), meaning those with higher BMIs had lower physical HRQoL. Individuals with greater calculated BMIs were also found to report significantly greater sitting time (p = 0.003). Age and BMI were the most significant predictors of HRQoL. These findings are supported throughout current literature pertaining to physical health and physical activity. The lack of significance between the variables of interest may be due to a modest sample size.

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Appendix A

Background Questionnaire

1. Which of the following best describes your level of visual impairment?
   a) No light perception in either eye or some light perception with an inability to recognize the shape of a hand at any distance or in any direction. (B1)
   b) Visual acuity of up to 20/600 and/or a visual field of less than 5 degrees in the best eye with the best practical eye correction. (B2)
   c) Visual acuity above 20/600 but less than 20/200 and/or a visual field between 5 and 20 degrees in the best eye with the best practical eye correction. (B3)
   d) Better than the previous answer.
   e) I do not have a visual impairment.

2. What gender do you identify as?
   a) Female
   b) Male
   c) Other

3. How old are you?

_____ years old

4. Which of the following best describes your ethnicity/ race?
   a) African American
   b) Caucasian/ Non-Hispanic
   c) Asian / Asian American
   d) Hispanic/ Hispanic American
   e) Native American
   f) More than one of the above
   g) Other: _____

4. Are you currently or have you previously served in the US military?
   a) Yes
   b) No

5. Please describe your current employment status:
a. Not working
b. Part time working (under 35 hours per week)
c. Full time working (35+ per week)

6. Please describe your education background:

a. Did not complete high school.
b. Completed high school.
c. Some college or above.
d. Completed at least a bachelor's degree.

7. Height in inches _____

8. Weight in pounds _____

Primary cause of visual impairment

9. What is the primary cause of your visual impairment?
a) macular degeneration or other macular disorder
b) diabetic retinopathy or other retinal vascular disease
c) other retinal disorders
d) anterior segment or other refractive disorders
e) glaucoma or other optic neuropathy
f) Cerebrovascular accident or brain injury
g) injury to the eye
h) other

Additional Health Conditions

10. Do you currently experience, or have you in the past 5 years experienced, any of the following health conditions? (bold as many as are relevant)
a) diabetes mellitus
b) arthritis
c) Stroke or brain hemorrhage
d) high blood pressure
e) angina
f) heart attack
g) heart failure
h) asthma
i) skin cancer
j) other cancers
k) back problems
l) deafness or hearing problems.
m) other _____

Appendix B

SF-12 Questionnaire

1. In general, would you say your health is:

   ___ Excellent (1)
   ___ Very good (2)
   ___ Good (3)
   ___ Fair (4)
   ___ Poor (5)

The following questions are about activities you might do during a typical day. Does **your health now limit you** in these activities? If so, how much?

2. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.

   ___ **Yes**, limited a lot
   ___ **Yes,** limited a little
   ___ **No,** not limited at all

3. Climbing several flights of stairs.

   ___ **Yes**, limited a lot
   ___ **Yes,** limited a little
   ___ **No,** not limited at all

During the **past 4 weeks,** have you had any of the following problems with your work or other regular daily activities **as a result of your physical health?**

4. Accomplished less than you would like.

   ___ Yes
   ___ No

5. Were limited in the kind of work or other activities.

   ___ Yes
   ___ No

During the **past 4 weeks,** have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

6. Accomplished less than you would like.

   ___ Yes
   ___ No

7. Did work or activities less carefully than usual.

   ___ Yes
   ___ No

8. During the **past 4 weeks,** how much **did pain interfere** with your normal work (including work outside the home and housework)?

   ___ Not at all
   ___ A little bit
   ___ Moderately
   ___ Quite a bit
   ___ Extremely

These questions are about how you have been feeling during the **past 4 weeks.** For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks…**

9. Have you felt calm and peaceful?

   ___ All of the time
   ___ Most of the time
   ___ A good bit of the time
   ___ Some of the time
   ___ A little of the time
   ___ None of the time

10. Did you have a lot of energy?

    ___ All of the time
    ___ Most of the time
    ___ A good bit of the time
    ___ Some of the time
    ___ A little of the time
    ___ None of the time

11. Have you felt down-hearted and blue?

___ All of the time
___ Most of the time
___ A good bit of the time
___ Some of the time
___ A little of the time
___ None of the time

12. During the **past 4 weeks,** how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting friends, relatives, etc.)?

___ All of the time
___ Most of the time
___ Some of the time
___ A little of the time
___ None of the time

Appendix C

IPAQ-SF Questionnaire

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days.** Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise, or sport.

Think about all the vigorous activities that you did in the **last 7 days. Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days,** on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

   _____ days per week
   _____ no vigorous physical activities → skip to question 3

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

   _____ hours per day
   _____ minutes per day
   _____ don't know/not sure

Think about all the **moderate** activities that you did in the **last 7 days. Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days,** on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ days per week
_____ no moderate physical activities → skip to question 5

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

   _____ hours per day
   _____ minutes per day
   _____ don't know/not sure

Think about the time you spent **walking** in the **last 7 days.** This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days,** on how many days did you **walk** for at least 10 minutes at a time?

   _____ days per week
   _____ no walking → skip to question 7

6. How much time did you usually spend **walking** on one of these days?

   _____ hours per day
   _____ minutes per day
   _____ don't know/not sure

The last question is about the time you spent sitting on weekdays during the **last 7 days.** Include time spent at work, at home, while doing course work and during leisure time. This may include times spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days,** how much time did you spend **sitting** on a **weekday**?

   _____ hours per day
   _____ minutes per day
   _____ don't know/not sure

Appendix D

Social Support for Exercise Scales

Below is a list of things people might do or say to someone who is trying to exercise regularly. If you are not trying to exercise, then some of the questions may not apply to you, but please read and give an answer to every question.

Please rate each question twice. Under family, rate how often anyone living in your household has said or done what is described during the last three months. Under friends, rate how often your friends, acquaintances, or coworkers have said or done what is described during the last three months.

1. During the past three months, my family (or members of my household) exercised with me.
   - None
   - Rarely
   - A few times
   - Often
   - Very often
   - Does not apply

2. During the past three months, my family (or members of my household) offered to exercise with me.
   - None
   - Rarely

- A few times
- Often
- Very often
- Does not apply

3. During the past three months, my family (or members of my household) gave me helpful reminders to exercise ("Are you going to exercise tonight?").

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

4. During the past three months, my family (or members of my household) gave me encouragement to stick to my exercise program.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

5. During the past three months, my family (or members of my household) changed their schedule so we could exercise together.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

6. During the past three months, my family (or members of my household) discussed exercise with me.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

7. During the past three months, my family (or members of my household) complained about the time I spend exercising.

- None
- Rarely
- A few times

- Often
- Very often
- Does not apply

8. During the past three months, my family (or members of my household) criticized me or made fun of me for exercising.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

9. During the past three months, my family (or members of my household) gave me rewards for exercising (bought me something or gave me something I like).

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

10. During the past three months, my family (or members of my household) planned for exercise on recreational outings.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

11. During the past three months, my family (or members of my household) helped plan activities around my exercise.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

12. During the past three months, my family (or members of my household) asked me for ideas on how *they* can get more exercise.

- None
- Rarely
- A few times

- Often
- Very often
- Does not apply

13. During the past three months, my family (or members of my household) talked about how much they like to exercise.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

This second set of questions will ask about your experiences with your friends, acquaintances, or coworkers. For these questions, rate how often they have said or done what is described during the last three months.

1. During the past three months, my friends exercised with me.

- None
- Rarely
- A few times
- Often

- Very often
- Does not apply

2. During the past three months, my friends offered to exercise with me.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

3. During the past three months, my friends gave me helpful reminders to exercise ("Are you going to exercise tonight?").

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

4. During the past three months, my friends gave me encouragement to stick to my exercise program.

- None

- Rarely
- A few times
- Often
- Very often
- Does not apply

5. During the past three months, my friends changed their schedule so we could exercise together.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

6. During the past three months, my friends discussed exercise with me.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

7. During the past three months, my friends complained about the time I spend exercising.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

8. During the past three months, my friends criticized me or made fun of me for exercising.

- None
- Rarely
- A few times
- Often
- Very often
- Does not apply

9. During the past three months, my friends gave me rewards for exercising (bought me something or gave me something I like).

- None
- Rarely
- A few times
- Often
- Very often

- Does not apply

10. During the past three months, my friends planned for exercise on recreational outings.
    - None
    - Rarely
    - A few times
    - Often
    - Very often
    - Does not apply

11. During the past three months, my friends helped plan activities around my exercise.
    - None
    - Rarely
    - A few times
    - Often
    - Very often
    - Does not apply

12. During the past three months, my friends asked me for ideas on how *they* can get more exercise.
    - None
    - Rarely
    - A few times

- Often
- Very often
- Does not apply

13. During the past three months, my friends talked about how much they like to exercise.
    - None
    - Rarely
    - A few times
    - Often
    - Very often
    - Does not apply

Appendix E

SOCIAL MEDIA RECRUITMENT MATERIALS

National Federation of the Blind Recruitment

Dear National Federation of the Blind members,

My name is Tayah Otterness, and I am a master's student in the MS Exercise Science program at Old Dominion University in Norfolk, Virginia. I am conducting a study examining the relationships between levels of social support, participation in physical activity, and health-related quality of life among adults who are blind or who have low vision. Adults aged 18 years and older who are blind or have low vision are eligible to participate. Participants are asked to complete an anonymous online survey, which should take approximately 20-25 minutes.

If you, or someone you know, is interested in participating in this study, please follow one of the links below:

https://docs.google.com/forms/d/e/1FAIpQLSfAPbSxJMziXh216E_RQcSPvQE9t8SRM-DUfugIG27t_yBdFQ/viewform?usp=sf_link
https://odu.co1.qualtrics.com/jfe/form/SV_1GhslVywDZRzVNc

If you have any questions regarding this study, please contact me. My information is below.

Thank you,

Tayah Otterness
Old Dominion University
totte002@odu.edu

Appendix F

INFORMED CONSENT
OLD DOMINION UNIVERSITY

PROJECT TITLE: Physical Activity, Social Support, and Health-Related Quality of Life in Adults with Visual Impairment

INTRODUCTION
The purposes of this form are to give you information that may affect your decision whether to say YES or NO to participation in this research, and to record the consent of those who say YES. This project will be conducted via online survey.

RESEARCHERS
Patrick Wilson, PhD, Associate Professor, Department of Human Movement Sciences, Old Dominion University
Justin Haegele, PhD, Associate Professor, Department of Human Movement Sciences, Old Dominion University
Tayah Otterness, master's student, Department of Human Movement Sciences, Old Dominion University

DESCRIPTION OF RESEARCH STUDY
The purpose of this study is to examine the relationships between levels of social support, participation in physical activity, and health-related quality of life in adults with visual impairment.

If you decide to participate, then you will be asked to complete an online survey with questionnaires about social support you receive for exercise, health-related quality of life, physical activity participation, and demographic information. The questionnaires should take approximately 20-25 minutes to complete.

EXCLUSIONARY CRITERIA
To the best of your knowledge, you should not be under the age of 18, as that would keep you from participating in this study. You should also identify as having a visual impairment and be free of any upper or lower body injuries preventing physical activity within the previous 7 days.

RISKS AND BENEFITS
RISKS: There are no expected or predicted potential risks associated with participation in this study. And, as with any research, there is some possibility that you may be subject to risks that have not yet been identified.

BENEFITS: There are no expected or predicted potential benefits associated with the participation in this study.

COSTS AND PAYMENTS
You will not receive any payment for participating. There are no foreseeable costs to participating.

NEW INFORMATION
If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

CONFIDENTIALITY
The survey is designed to be anonymous, meaning no one will know your identity based on your responses. The anonymous data will be stored in online platforms like Qualtrics and Google Forms until data collection finishes, at which point it will be downloaded and deleted from the online platforms. The data and results from this study may be used in reports, publications, or presentations, but the investigators will not identify you as a participant.

WITHDRAWAL PRIVILEGE

It is okay for you to decide to not participate. Even if you begin the survey, you can quit the survey at any time by closing your web browser.

CONTACT INFORMATION

If you have any questions about the research, you may contact Patrick Wilson, PhD, associate professor of exercise science at Old Dominion University (757-683-4783; pbwilson@odu.edu) or Tayah Otterness, MS student (totte002@odu.edu). If you have any concerns about the research, you may also contact John Baaki, chair of the Old Dominion University Darden College of Education and Professional Studies IRB committee (757-683-5491; jbaaki@odu.edu).

VOLUNTARY CONSENT

The return of your completed questionnaire constitutes your informed consent to act as a participant in this research. You may print a copy of this page for your records and to save the contact information of the investigators.

By checking this box and continuing to the questionnaire, you consent to participating in this study.

VITA

Tayah Otterness
356 Legato Cir Apt 303 Virginia Beach, VA 23462
(218)-255-4226 E-mail: totte002@odu.edu

PROFESSIONAL EXPERIENCE

Onelife Fitness, Chesapeake, VA
Zone 4 Site Director: April 2022-Present
- Coordinates member classes and body composition analysis
- Develops and oversees wellness programs, new member recruitment, and member retention

Onelife Fitness, Chesapeake, VA
Personal Trainer: February 2022-Present
- Displays attention to detail by creating individualized exercise prescription to meet personal goals
- Utilizes organization skills to maintain detailed fitness records of clients

Old Dominion University, Norfolk, VA
Graduate Teaching Assistant: August 2020-December 2021
- Motivated and nurtured learning experiences by creating honest relationships with students
- Taught students to apply new knowledge and skills by directing hands-on laboratory sessions
- Demonstrated problem solving skills by adjusting teaching techniques based on learning needs

Serenity Assisted Living & Memory Care, Dilworth, MN
Wellness Assistant: February 2018-July 2020
- Applied interpersonal skills while delegating tasks for resident exercise prescription based on strengths and weaknesses
- Designed and implemented safe and effective exercise and therapy plans for residents

Steamboat Adaptive Recreational Sports, Steamboat Springs, CO
Winter Programs and Special Events Intern: January 2020-May 2020
- Utilized communication skills by coaching adaptive winter sports, promoting independence
- Enhanced critical thinking skills by creating and analyzing evaluations, providing data for grants
- Developed adaptive sports progressions by creating step-by-step instruction manuals

EDUCATION

Old Dominion University, Norfolk, VA
Candidate for Master of Science in Exercise Science
- GPA: 4.0
- Expected Graduation Date: August 2022

North Dakota State University, Fargo, ND
Bachelor of Science in Exercise Science, Minor: Psychology
- GPA: 3.8
- Magna Cum Laude