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Motivation for Exercise in Adults with Spina Bifida

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This is to certify that the doctoral dissertation by

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2020

Abstract

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MS, Walden University, 2017

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The activity level among the U.S. population is low. Lack of exercise among individuals with disabilities adds a level of vulnerability to health issues for a population already facing multiple challenges. Despite considerable research on factors that may affect exercise among the general population, scant information is available about the relevance of such factors among individuals with disabilities. Furthermore, researchers have not used a coherent theoretical framework to explain empirical results. The present study addressed shortcomings in the literature by assessing, within the self-determination theory framework, if gender, self-efficacy, and self-determination predict exercise in individuals with a spina bifida. The Spina Bifida Association of America's listserve facilitated the sampling of 180 adults between the ages of 18 and 64 years. Results from a standard multiple regression analysis indicated exercise self-efficacy and self-determination, but not gender, predicted exercise. Additional analyses showed the combination of competence, fitness motives, and age associated with reported exercise. Finally, exercise, gender, and perceived social support were predictors of life satisfaction. Results provide information clearly contradicting the stereotype of individuals with disabilities as being physically inactive. Findings also showed key variables professionals could implement in clinical and social support programs targeting individuals with spina bifida as well as those with other physical disabilities. Future researchers and practitioners can extend these findings to examine the predictors of exercise and life satisfaction among members of the spina bifida community.

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Dedication

I dedicate this dissertation to my husband, my forever soulmate. I will forever cherish and appreciate your ability to love me unconditionally, providing patience, loyalty, kindness, financial stability, encouragement, sacrifice, and support throughout this graduate endeavor. Thank you for wiping my tears, listening to me at any time of day, and providing comfort during this stressful process. Thank you for being my confidant and best friend and making my dream a reality. Thank you for being on my winning team. I cannot imagine a world without you by my side. I love you with all my heart.

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I would like to thank my mother for teaching me the importance of hard work, strength, ambition, drive, persistence, discipline, courage, dedication, education, resiliency, and fighting for what I want in life.

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Chapter 1: Introduction to the Study

Introduction

Exercise is associated with improved psychological and physiological well-being (Centers for Disease Control and Prevention [CDC], 2018) as well as increased flexibility, joint structure, endurance, muscle strength, functional capacity, and quality of life (Hirst & Porter, 2015; Perrier, Shirazipour, & Latimer-Cheung, 2015; Peterson & Mahmoudi, 2015; Stănescu, 2014). Notwithstanding the benefits, a considerable number of people do not engage in the recommended amount of weekly exercise, thus contributing to poor overall health (Hirst & Porter, 2015; National Center for Health Statistics, 2015; Pfeffer & Strobach, 2018). The lack of physical activity is particularly impactful for individuals with disabilities. The American College of Sports Medicine (ACSM; 2017) found that 38% of adults with physical disabilities reported engaging in aerobics compared to 54% of adults without physical disabilities. Just 14% of adults with physical disabilities meet the recommended guidelines for both aerobic and muscle-strengthening exercise compared to 23% of adults without physical disabilities (ACSM, 2017).

Spina bifida is a physical disability that presents significant mobility challenges, placing individuals at risk for low exercise. In the United States, approximately eight children per day (Crytzer, Dicianno, & Kapoor, 2013), or seven of every 10,000 children (Spina Bifida Association of America [SBAA], 2019), are born with spina bifida. Advancements in medical and surgical care have led to longer lifespans among individuals with spina bifida, resulting in 75% of children growing into adulthood

(Crytzer et al., 2013). More than 195,000 adults live with spina bifida (CDC, 2018; SBAA, 2019; U.S. Department of Health & Human Services [HHS], 2018). The most common birth problem resulting in permanent disability, spina bifida occurs when there is an incomplete closure of the neural tube along the spine (SBAA, 2019). Individuals with a diagnosis of spina bifida experience a range of complications, including mobility restrictions, orthopedic deformities, bowel and bladder problems, and many other limitations that require extensive multidisciplinary medical care (SBAA, 2019). Therefore, adults with spina bifida are at risk of developing an inactive or low-active lifestyle.

The present study was a means to identify factors that contribute to exercise among individuals with spina bifida. My focus was on motivational factors associated with activity level as understood within the framework of self-determination theory. The chapter begins with a general overview of the literature on factors contributing to exercise, particularly for individuals with disabilities. The problem statement section includes the limitations of the current literature, followed by the study's purpose and associated research question and hypothesis. A brief overview of self-determination theory appears in the theoretical framework section. The final sections of the chapter include the nature of the study, relevant conceptual definitions, scope and delimitations, limitations, and significance.

Background

In the United States, approximately 56.7 million people with a physical disability do not meet CDC recommendations for weekly exercise (ACSM, 2017). Age is a factor, as evidenced by a sharp decline in exercise during the adult years (CDC, 2018; Kwan, Cairney, Faulkner, & Pullenayegum, 2012). Increasing exercise activity levels among adults should be a public health priority, especially for individuals with physical disabilities, as health disparities continue to rise. Evidence shows that adults with physical disabilities do not exercise regularly (CDC, 2018). The ACSM (2017) found that 34% of adults with physical disabilities reported 14 or more physically unhealthy days within the past 30 days, compared to only five percent of adults without physical disabilities. Exercise inactivity is a problem for U.S. society, as evidenced by correlations with increased risk for obesity, urinary tract infections, pressure sores, chronic pain, metabolic syndrome, heart disease, diabetes, stroke, fatigue, high blood pressure, breast and colon cancer, sleep disorders, depression, and osteoporosis (Hirst & Porter, 2015; National Center for Health Statistics, 2015; Pfeffer & Strobach, 2018). Obesity is higher in adults with physical disabilities compared to adults without physical impairments (ACSM, 2017). Adults with physical disabilities are three times more likely to have heart disease, stroke, diabetes, or cancer than adults without physical disabilities (CDC, 2018).

Table 1

Comparison of Exercise Participation Between Adults With and Without Physical Disabilities

Physical disabilities	Without physical disabilities
Obesity rates is 58%	Obesity rates is 47%
34% of adults with physical disabilities report 14 or more physically unhealthy days	5% of adults without physical disabilities report 14 or more physically unhealthy days
38% report participating in aerobic physical activity	54% report participating in aerobic physical activity
14% meet both aerobic and muscle-strengthening guidelines for overall health	23% meet both aerobic and muscle-strengthening guidelines for overall health

Note. Adapted from "Increasing Physical Activity for Adults With a Disability," by M. Johnson, 2017. Copyright 2017 by the American College of Sports Medicine.

Inactivity and insufficient activity could result when individuals are unmotivated or faced with too many demands on their time. The conflict between knowing exercise is beneficial and not exercising has led to research on factors that predict healthy exercise behavior. Adults with physical disabilities were 82% more likely to engage in exercise or physical activity recommended by a physician than were those not receiving a doctor's recommendation (HHS, 2018). For significant health benefits, adults should participate in at least 150 minutes per week of moderate-intensity or 75 minutes per week of vigorous-intensity aerobic physical activity (HHS, 2018). The National Center on Physical Activity and Disability (NCPAD; 2018) recommends individuals with a diagnosis of spina bifida exercise a minimum of 3 to 4 days a week. Nevertheless, people often lack the motivation to engage in 150 minutes of exercise per week (Teixeira, Carraça, Markland, Silva, & Ryan, 2012).

Researchers have long been interested in understanding what motivates human behavior, devoting attention in the fields of psychology, education, sociology, and economics (Kusurkar, Croiset, Mann, Custers, & ten Cate, 2012). Motivation and self-efficacy are key factors, with self-efficacy more critical for the initiation of exercise and motivation for the maintenance of exercise (Slovinec D'Angelo, Pelletier, Reid, & Huta, 2014; Teixeira et al., 2006). Motivational factors can be intrinsic or extrinsic. Internal factors drive intrinsic motivation (e.g., the desire to feel good about self), with external influences driving extrinsic factors (e.g., a physician recommends exercise). Overall, research shows a correlation between extrinsic motivation and the incentive to adopt an exercise program, with intrinsic motivation associated with exercise maintenance (Banack, Sabiston, & Bloom, 2011). Motivation that is more self-regulated and intrinsically motivated could lead adults to engage in exercise more frequently (Ball, Jeffery, Abbot, McNaughton, & Crawford, 2017). Other factors associated with exercise behavior are exercise self-efficacy and exercise enjoyment (Chen, Sun, & Dai, 2017; Lewis, Williams, Frayeh, & Marcus, 2016; Ungar, Wiskemann, & Sieverding, 2016). There are also gender differences in motivation. Women report having greater motivation for appearance and physical condition than men, whereas men report being more motivated by competition, ego, and mastery (Molanorouzi, Khoo, & Morris, 2015). Also, women exhibit higher levels of intrinsic motivation, with men being more externally motivated (Al Kubaisy, Mohamad, Ismail, Abdullah, & Mokhtar, 2017).

Problem Statement

There are several shortcomings in the literature on predictors of exercise. In general, there is relatively little research on the predictors of exercise in individuals with disabilities, with most scholars studying members of the general population. Specifically, the problem is that research on exercise and activity levels among adults with spina bifida is limited. This lack is relevant due to individuals with disabilities often stereotyped as physically incompetent (Dionne, Gainforth, O'Malley, & Latimer-Cheung, 2013). The stigma related to disability is likely to influence self-concept and motivational factors. Thus, the factors that predict exercising in the general population are different from the factors predicting exercising among individuals with disabilities. A second literature shortcoming is the inconsistent theoretical grounding of most empirical research. Based on self-determination theory, the present study was an investigation of whether exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida.

Purpose of the Study

The purpose of this study was to improve the understanding of what motivates individuals with spina bifida to incorporate exercise into a daily regimen. Currently, there is a lack of research on effective motivational factors for increasing daily exercise in individuals with a diagnosis of spina bifida. To address this gap, I used a quantitative, correlational, cross-sectional survey design to examine if exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida. Self-determination theory (Deci & Ryan, 1985) anchored the conceptual understanding of the relationship between the variables of interest. Knowledge gained from this study adds to the limited, yet growing body of research associated with health promotion among people with physical disabilities.

Research Question and Hypothesis

One research question (RQ) anchored the study: Do exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida?

The hypothesis was:

Null Hypothesis (H_0): Exercise self-efficacy, self-determination, and gender do not predict exercise among individuals with a diagnosis of spina bifida.

Alternative Hypothesis (H_a): Exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida.

Theoretical Framework

Self-determination theory (Deci & Ryan, 1985) was appropriate to explain what motivates the initiation and maintenance of behavior, including exercise. Using self-determination theory, I could identify the factors differentiating people who are physically inactive from those who exercise regularly. I also explored what drives a person to engage in a physically active lifestyle as opposed to a sedentary one (Teixeira et al., 2012). Based on self-determination theory, one could argue that individuals with higher levels of self-determination would more consistently initiate and maintain physical activity (Deci & Ryan, 2000). When individuals are self-determined, internal drives motivate their behavior (Deci & Ryan, 2008). The pursuit of the behavior follows, as the action satisfies important personal needs and thus is more enjoyable (Deci & Ryan, 1985). Individuals are more likely to initiate and maintain exercise when they are self-determined (Deci & Ryan, 2000). Higher levels of self-determination come when motivation is intrinsic, stemming from the fulfillment of three psychological needs: autonomy, competence, and relatedness (Deci & Ryan, 1985).

Self-determination theory is a theory of human motivation that includes the concepts of intrinsic and extrinsic motivation and psychological needs (Deci & Ryan, 2008). The motivation spectrum in self-determination theory ranges from amotivation (no motivation; Stephan, Boiche, & Scanff, 2010) to intrinsic motivation. Between the poles of amotivation and intrinsic motivation are three forms of extrinsic motivation.

Extrinsic motivation comprises external, introjected, and identified regulation (Deci & Ryan, 2000). People act on external regulation for outside factors, such as rewards (Teixeira et al., 2012). Individuals who initiate an activity based solely on external regulation are unlikely to continue or maintain the activity (Durand & Nigg, 2016; Grodesky, Kosma, & Solmon, 2006). Introjected regulation stems from guilt or obligation (Prochaska & DiClemente, 1982). People who perform identified regulation seek the importance and positive benefits of the activity. Intrinsic motivation is the upper end of the spectrum, indicating a higher form of autonomous control (Deci & Ryan, 2000). Intrinsically motivated individuals experience feelings of enjoyment, personal satisfaction, and a sense of accomplishment (Stephan et al., 2010). Intrinsic motivation incorporates the fulfillment of three primary psychological needs: autonomy, competence, and relatedness. Deci and Ryan (2000) noted the importance of meeting these psychological needs to maintain mental health, possess integrity, and promote well-being.

In summary, the source of motivation (intrinsic or extrinsic) and the sense of autonomy in performing an activity affect how individuals regulate their behavior. The conceptual model of self-determination theory applies to physical activity, weight loss, and smoking cessation. However, few researchers have addressed physical activity among individuals with physical disabilities, and specifically, spina bifida.

Nature of the Study

I used a cross-sectional, correlational survey research design to examine if exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida. The sample was 119 men and women with spina bifida, both exercisers and nonexercisers. Participation criteria included being between the ages of 18 and 64 years and able to speak and understand the English language. The SBAA assisted in participant recruitment, with individuals completing five instruments: a sociodemographic survey, Spinal Cord Injury – Exercise Self-Efficacy Scale (SCI-ESES; see Appendix C), Behavioral Regulation in Exercise Questionnaire – 2 (BREQ-2; see Appendix D), Motives for Physical Activity Measure – Revised (MPAM-R; see Appendix E), and Physical Activity Disability Survey – Revised (PADS-R; see Appendix F).

Definitions

This section includes terms used in the context of this study, with any interchangeable use noted.

Amotivation: Along the self-determination continuum, amotivation is the absence of motivation, with the behavior carried out for neither intrinsic nor extrinsic reasons (Deci & Ryan, 1985).

Exercise: Activities structured to maintain or enhance health and fitness, such as walking, housework, swimming, bicycling, and aerobics, qualify as exercise (NCPAD, 2018). In this study, the term is interchangeable with *physical activity* (NCPAD, 2018)

External regulation: Behavior performed for an external acting influence to obtain a reward stems from external regulation (Deci & Ryan, 2000). *External* and *extrinsic* regulation appear interchangeably in this study. An example of external regulation is when people exercise because they can win a gift card or prize (reward).

Extrinsic motivation: Motivation that produces activities performed for external factors such as a reward is extrinsic (Deci & Ryan, 1985).

Identified regulation: This regulation stems from personal importance, as individuals recognize the behavior as having value to themselves (Deci & Ryan, 2008). An example of identified regulation is when a person exercises because of the positive benefits.

Internal regulation: Behaviors performed for personal satisfaction, interest, and enjoyment (Deci & Ryan, 1985) stem from internal regulation. *Internal* and *intrinsic* regulation are interchangeable in this study

Intrinsic motivation: A self-determined form of motivation, intrinsic motivation drives participation in activities for the personal feelings of enjoyment, pleasure, and satisfaction (Deci & Ryan, 1985).

Introjected regulation: Introjected regulation inspires individuals to engage in a behavior not because they want to, but out of obligation. Introjected regulation leads to behaviors performed due to guilt, worry, or shame (Deci & Ryan, 1985). An example of introjected regulation is a person exercising at a sporting event because of fear or worry about a negative reaction from peers.

Leisure-time exercise/physical activity: Exercise, physical activity, and sports occur during an individual's leisure time (NCPAD, 2018).

Moderately intense activities: Activities of at least 10 minutes resulting in minimal sweating, light breathing, and accelerated heart rate qualify as moderately intense (NCPAD, 2018).

Motivation: The driving force behind the energy necessary to complete a specific behavior or task (Deci & Ryan, 1985), motivation influences the way individuals think and explain the reasons for undertaking specific actions (Petri, 1996) and sustaining certain behaviors (Schunk, Meece, & Pintrich, 2014).

Physical activity: Activities that require movement of the body and utilize energy, such as walking, dancing, gardening, and climbing the stairs, qualify as physical activities (NCPAD, 2018).

Physical disability: An individual with a physical disability has a physical impairment necessitating the use of assistive devices or aids to attain mobility, such as scooters, crutches, canes, or wheelchairs (ACSM, 2017).

Self-efficacy: The extent or strength of an individual's belief in one's ability to complete tasks and reach goals is self-efficacy (Bandura, 1977).

Spina bifida: Spina bifida is a condition caused by an incomplete closure of the neural tube along the spine (SBAA, 2019).

Vigorous-intensity activity: Activities of a minimum of 10 minutes are of vigorous intensity when they result in heavy sweating, increased breathing, and accelerated heart rate (NCPAD, 2018).

Assumptions

I assumed that participants would answer the survey questions honestly and to the best of their ability, a necessary component of using the data to draw valid conclusions. My second assumption was that the questions in each survey were self-explanatory to the respondents, allowing them to understand each statement fully. My third assumption was that participants did not meet the recommended amount of exercise, despite there being a wide range of physical activity across the sample.

Scope and Delimitation

The study was for adults with a diagnosis of spina bifida who were between the ages of 18 to 64 years. Therefore, the individuals not included in this research study were persons who were younger than age 18 or over age 64 years. Individuals without a diagnosis of spina bifida were ineligible to participate in the study, as the focus of this research was on persons with spina bifida. Other physical disabilities were not part of this research study.

Limitations of the Study

This study was limited by the use of quantitative methods to examine reasons to participate in exercise. Implementing a quantitative approach means the researcher is unable to obtain additional information from further investigation (Creswell, 2009). In contrast, qualitative methods could be a way to uncover different aspects of why individuals choose to take part in exercise (Warner, 2013).

A cross-sectional design was another limitation of the study. Cross-sectional designs allow the examination of individuals from different age groups at one point in time. In contrast, researchers conducting longitudinal studies examine the same group of people over an extended period (Warner, 2013). A longitudinal study might have provided a more robust conclusion between variables used in this study. A further limitation of the study was the reliance on participant self-reports, which could have led to conflict between the researcher's intended meaning and the respondent's understanding of questions. Furthermore, self-report measures are likely to incur social desirability bias.

Significance of the Study

This study adds to the growing body of knowledge related to exercise among people with spina bifida. There was a lack of theory-based research on motivational factors for exercise among this population. Findings from this examination could assist future researchers in understanding motivational factors among individuals with spina bifida and possibly other physical disabilities, as well. I expect that this knowledge will contribute to the development of more effective exercise interventions. Promoting exercise among this population will be one step to incorporate a healthier lifestyle.

Understanding positive social change is often within the general aspirational goal of social justice. Social justice is anchored in the egalitarian treatment of all individuals, regardless of group membership and ability status. Positive social changes may result from this study through increased awareness of the factors that influence the decision to exercise among people with spina bifida. This knowledge could be helpful to health professionals, communities, and organizations in developing and promoting exercise strategies and programs among individuals with a disability, thus better serving a traditionally marginalized population.

Summary

Exercise is beneficial to physical and mental health; thus, increasing activity levels among adults should be a public health priority. Adults with a diagnosis of spina bifida are at significant risk for exercise inactivity or low activity. The purpose of this quantitative correlational study was to examine if exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida. I used self-determination theory to understand the variables and predict exercise outcomes. Participants recruited through the SBAA comprised 119 male and female adults who completed surveys to measure exercise self-efficacy, self-determination, and exercise frequency. This study contributes to positive social change by increasing knowledge of the factors that influence decisions to exercise among people with spina bifida. Chapter 2 will include the literature search strategy, theoretical foundation, and literature review related to key variables.

Chapter 2: Literature Review

Introduction

Many experts have underscored the significance of exercise for people with physical disabilities (Teixeira et al., 2012). Despite the plethora of evidence supporting the benefits of exercise, a significant proportion of individuals with spina bifida remains physically underactive or not active at all. Less than five percent of people with physical disabilities participate in at least 30 minutes of exercise each day (HHS, 2018; Hirst & Porter, 2015; Pfeffer & Strobach, 2018). The prevalence of exercise inactivity in adults with a physical disability is 25% compared to 12% among adults without a disability (HHS, 2018). The dissonance between knowing exercise is beneficial and not exercising has led psychologists to research factors that predict healthy exercise behavior.

Motivation and self-efficacy are key factors contributing to exercising, with self-efficacy being more critical for the initiation of behavior and motivation for the maintenance of behavior (Slovinec D'Angelo et al., 2014; Teixeira et al., 2006). Furthermore, there are reported gender differences in motives to exercise. Most of the research on motivational factors has been on general population samples. There is relatively little scholarly inquiry into the predictors of exercise in individuals with disabilities.

This literature review centers on exercise self-efficacy, self-determination, and gender as potential predictors of exercise among individuals with a diagnosis of spina bifida. In this review, I present the application of self-determination theory. A discussion of the benefits of exercise, recommended amount of exercise, and consequences of exercise inactivity shows the need to promote exercise among adults with spina bifida. The more significant part of the review will be an exploration of exercise self-efficacy and motivation, with a primary focus on intrinsic and extrinsic motivation. This examination will include a discussion of gender differences in motives to exercise.

The purpose of this chapter is to explore the body of knowledge about what motivates individuals with spina bifida to exercise. The chapter comprises three sections: the literature search strategies, self-determination theory described and discussed in line with the study's theoretical framework, and a review of the empirical literature on the key variables of the study. The chapter ends with a summary and conclusion.

Literature Research Strategy

I focused the literature review on three content areas: the research variables, the population of interest, and the interventions to address the lack of exercise problem. The search encompassed journal articles, book chapters, theses, and conference presentations from 1990 to the present. However, most of the empirical sources included were publications from 2010 to 2019. Academic databases were the primary resources for searches of relevant information and included Academic Search Premier, CINAHL Plus, Medline, ProQuest, PsycARTICLES, PsycINFO, and Dissertation Abstracts International. Searches of the SBAA, Spina Bifida Information Center, CDC online library, and Public Health Library also resulted in articles for this review, with government websites used to clarify information. Finally, Google Scholar served as a secondary search engine for documents overlooked or omitted from the database search.

I searched for the following key terms: *self-efficacy and enjoyment to exercise*, *motives to exercise in physical disabilities*, *self-determination theory and exercise among adults with physical disabilities*, *intrinsic and extrinsic motivation to exercis*e, *leisure activity participation and human behavior to exercise*, *self-determination theory and exercise*, *self-determination theory and Behavioral Regulation in Exercise questionnaire*, and *women motives for physical activity*. Within these searches, other key terms included *spina bifida, physical activity*, *exercise adherence, exercise behavior,* and *sports participation*. In addition, the references sections from relevant articles and book chapters underwent careful review for additional articles pertinent to the topic.

Theoretical Framework

Self-determination theory (Deci & Ryan, 1985) was the main theoretical framework driving the analysis of the proposed relationship between the key variables of the study. The source of the theory and its major propositions follow. Following a discussion of empirical support for the theory is a rationale for the selection of self-determination theory as the guiding conceptual framework for the analysis of the study's research questions.

Self-Determination Theory

Self-determination theory (Deci & Ryan, 1985) is a theory of human motivation and personality development specific to how different types of motivation lead to varying degrees of self-determination. This theory applies to the degree to which an individual's behavior is self-motivated and self-determined. Intrinsic and extrinsic motivation create a continuum for differentiating an individual's level of self-determination. Within this continuum, amotivation refers to not being motivated to engage in a given activity. Intrinsic motivation applies to activities performed for personal satisfaction and pleasure, whereas extrinsic motivation drives actions that are based on external factors, such as rewards.

Intrinsic and extrinsic motivations. Intrinsic motivation is associated with the maximum level of self-determination. When intrinsically motivated, a person considers the activity to be enjoyable or interesting (Deci & Ryan, 1985, 2000, 2008). Intrinsic motivation leads to greater persistence, more effort applied during practices and games, reduced boredom, and less dropout from sports (Banack et al., 2011). People who exercise for enjoyment are intrinsically motivated; however, they might exercise for extrinsic reasons, as well.

Extrinsically motivated individuals perform the activity to receive a benefit or avoid a negative consequence (Deci & Ryan, 1985; Ryan & Deci, 2000; Teixeira et al., 2012). Extrinsic motivation incorporates three regulation levels: external, introjected, and identified. External regulation is at the end of the spectrum, closest to amotivation, at which level the individual pursues a behavior only for rewards or punishment avoidance (Eisenberg & Phillips, 2017). In this case of introjected regulation, the motivation is internalized and linked to external reasons. A person participates in the activity not because of choice, but out of guilt or obligation (Deci & Ryan, 1985, 2000, 2008). At this level, there is no enjoyment or confidence in the actions. Identified regulation takes place when the person wants to participate in the activity freely and recognizes its importance. People in this category exercise because they value the positive benefits of the activity yet do not enjoy it (e.g., exercising is a way to stay fit). Extrinsic motivation pertains to the reasons individuals voluntarily participate in exercise without experiencing an intrinsic feeling, such as enjoyment of the activity. The continuum shows how a person can feel self-determined to exercise and be extrinsically motivated to perform the behavior of exercise for reasons such as fitness, improved appearance, and weight loss (Saebu, Sørensen, & Halvari, 2013).

Psychological needs. Individuals move toward higher levels of self-determination and intrinsic motivation along a continuum. Three fundamental psychological needs are necessary for motivation and optimum health and wellness: autonomy, competence, and relatedness (Deci & Ryan, 1985). Individuals pursue self-determined goals to satisfy basic psychological needs to solve problems, master tasks, and interact socially.

Autonomy refers to behaviors a person endorses and initiates. The environment has a significant influence on the level of autonomy. An autonomous environment contrasts with a controlled environment. People who are in autonomy-supportive environments develop self-determined motivation more easily than individuals who live in a controlled environment. People in controlled environments attribute their behaviors to external factors (e.g., rewards, peers, or family). In these situations, individuals believe they are not part of the decision-making process because others are making the decisions (Deci & Ryan, 1985, 2000, 2008). Individuals in these situations will engage in an exercise behavior based on a feeling of *having to* participate instead of *wanting to* (Teixeira et al., 2012).

People in an autonomy-supportive environment more readily believe they are in control of their decisions and behaviors (e.g., having the freedom to choose their own workout and exercise). Autonomous exercise motives are the reasons people participate in greater levels of exercise (Teixeira et al., 2012). Autonomy increases when individuals feel they have a choice in a situation (Kirkland, Karlin, Stellino, & Pulos, 2011); it is thus important for people to believe they are in control rather than controlled. Having full control of an activity allows the person to participate freely with flexibility and creativity. Deci and Ryan (2000) argued that autonomous and controlled motivation could interact with persistence only if the controlled motivation is present with external rewards and self-approval.

The psychological need for competence stems from individuals' experiences and beliefs that they can produce the desired outcome (Verloigne et al., 2011). Competence includes having a sense of mastery and effectively performing daily tasks (Markland, 1999). Relatedness refers to feeling respected, being understood by others, and closeness to others (Deci & Ryan, 2000). When the need for relatedness and competence is unfulfilled, people will feel unmotivated. Overall, self-determination theory (Deci & Ryan, 1985) indicates that when the three psychological needs are satisfied, individuals are more likely to initiate and maintain behavioral changes (Kirkland et al., 2011).

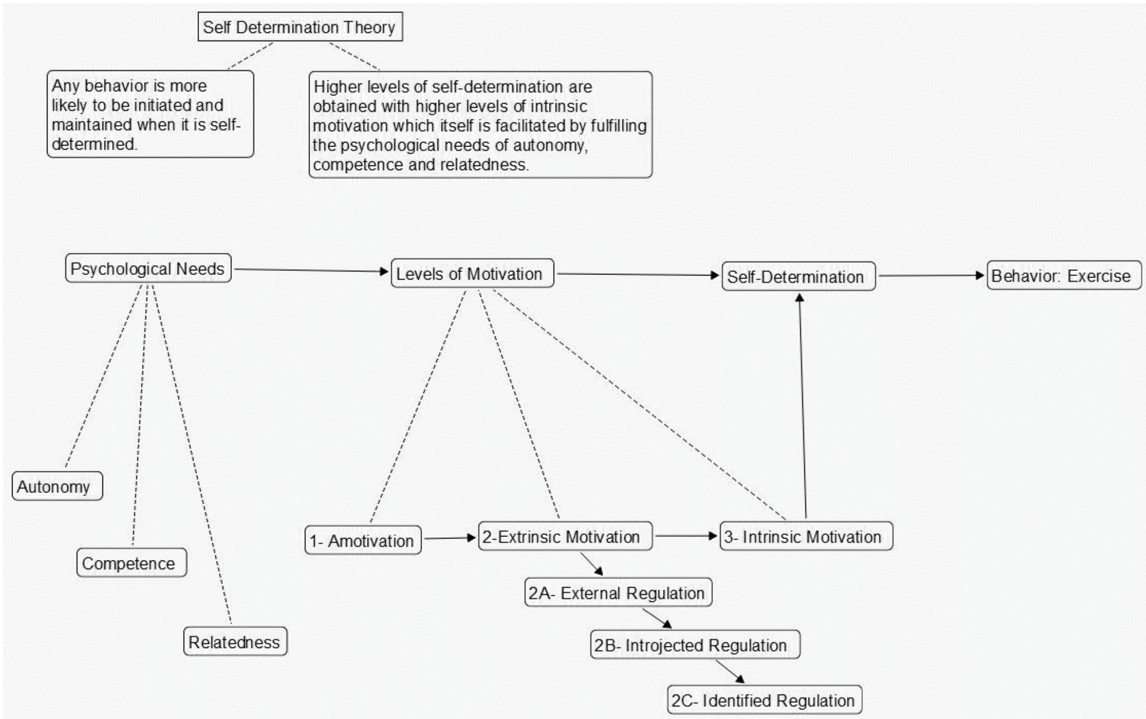

Figure 1. Self-determination theory applied to exercise. Adapted from "Self-Determination Theory," by R. M. Ryan and E. L. Deci, 2000, *American Psychologist*, *55*, p. 70. Copyright 2000 by the American Psychological Association.

Empirical Support for Self-Determination Theory

Researchers have been able to predict exercise participation or adherence by determining levels of motivation. Scholars have used self-determination theory in quantitative and qualitative studies to understand behavioral engagement in domains such as health, life satisfaction, perseverance, addictive behaviors, decision-making, human needs, psychological health and well-being, internalization and self-regulatory styles, self-esteem, goals, values and aspirations, motivation across cultures, relationships, mindfulness, health care, parenting, and psychopathology (Deci & Ryan, 2008). Self-determination theory has received empirical support in many diverse fields, such as exercise (Ball et al., 2017; Eisenberg & Phillips, 2017; Saebu et al., 2013; Verloigne et al., 2011), education (Rayburn, Anderson, & Smith, 2018), sports (Keshtidar & Behzadnia, 2017), employment (Manganelli, Thibault-Landry, Forest, & Carpentier, 2018), and eating disorders (Begin et al., 2018). Each of these topics presents additional information on the theory, leading to a better understanding of the significance of the theory.

Rayburn et al. (2018) conducted a quasi-experimental study to investigate the effectiveness of experiential learning among 98 college juniors and seniors. In line with self-determination theory, the results showed that the course was effective for increasing psychological needs fulfillment and student outcomes. Significant relationships emerged between needs fulfillment and student outcomes.

Keshtidar and Behzadnia (2017) applied self-determination theory and achievement goal theory to investigate motivational influences for sports among 268 athlete university students and how these influences predicted students' intentions to continue sports. The researchers found a significant positive correlation between both self-determination and achievement goal theories. Deci and Ryan (2000) reported similar findings, showing task-involving orientation to be a positive predictor of autonomous motivation, whereas ego-involving orientation was a positive predictor for both controlled motivation and autonomous motivation. Results indicated a positive correlation between autonomous motivation and future intention to continue in sports (Deci & Ryan, 2000).

Verloigne et al. (2011) conducted an exploratory factor analysis to investigate if physical activity levels in 177 adolescents with obesity were related to different motivation types and changes during a residential treatment program. Findings showed significant positive correlations between physical activity, autonomy, and introjected, identified, and intrinsic regulation. In a 3-week longitudinal study, Saebu et al. (2013) tested self-determination theory in the field of physical activity in 48 young adults with physical disabilities who were between 18 and 35 years of age and residing in a rehabilitation center. Findings showed support for the hypothesis, with perceived autonomy support positively predicting needs satisfaction after the rehabilitation stay. Participants who met the CDC's physical activity recommendations reported increased physical activity barriers and levels of autonomy, competence, and relatedness (Ball et al., 2017). A similar study showed no significant difference between autonomy, competence, and relatedness between people who did and did not meet CDC physical activity recommendations (McDaniel, 2012).

Rationale for Selecting Self-Determination Theory in Analyzing the Study's Research Question

Widely researched and applied, self-determination theory is prominent in the exercise motivation literature (Deci & Ryan, 1985, 2000, 2008). There is significant support for self-determination theory and its impact on various areas of an individual's life. Banack et al. (2011) achieved results consistent with the hypothesized association between Paralympic athletes' perceptions of autonomy and competence and their intrinsic motivation to accomplish the sport. Athletes with a physical disability need to feel in control of sports participation and competent in the area of sports, as well as be motivated to achieve the goal of the sports.

A considerable number of people do not associate exercise with enjoyment, feelings of competence, or autonomy, yet engage in activity for extrinsic goals (Ednie & Stibor, 2017b). The external motivation to exercise is apparent among university students who report motives such as improving their appearance, ill-health avoidance, and weight management more than they do enjoyment (Ednie & Stibor, 2017a; Kulavic, Hultquist, & McLester, 2013). Also, Ednie and Stibor (2017b) found extrinsic motives to be higher for groups with increased levels of fitness. Zayed and Frieze (2015) investigated the exercise behavior and motives of 263 nondisabled students in an Arab university, using self-determination theory to examine the relationship between motive and exercise behavior. Findings showed that intrinsic motives for exercise behavior (challenge, revitalization, health, affiliation, and enjoyment) were similar among male students (Zayed & Frieze, 2015). Nevertheless, female students who were physically active reported extrinsic motivations (ill-health avoidance, positive health, revitalization, weight management, and appearance) for exercise behavior.

In a study grounded on self-determination theory, Jakobsen and Evjen (2018) investigated intrinsic and extrinsic motives for 368 Norwegian students' sports participation in association with gender. Findings showed women had higher scores on intrinsic motives for sports participation, whereas men had higher scores on extrinsic motives (Jakobsen & Evjen, 2018). Enjoyment and competence increased exercise behavior, with gender having no impact (Jakobsen & Evjen, 2018).

The present study was a means to better understand what motivates individuals with spina bifida to exercise. More specifically, I was interested in determining if self-efficacy, intrinsic motivation, extrinsic motivation, and gender predicted exercise among individuals with a diagnosis of spina bifida. Self-determination theory (Deci & Ryan, 1985) was particularly useful as the foundation for this study for two reasons. First, self-determination theory is a motivational theory used to explain what motivates behavior. The purpose of this study was to respond to the question, What motivates exercise? Second, and most importantly, the core constructs at the foundation of self-determination theory (intrinsic and extrinsic motivation, self-determination) closely aligned with the key research variables of this study (intrinsic and extrinsic motivation, self-efficacy). It was, therefore, appropriate to use self-determination theory as the core theoretical foundation for this study to directly evaluate the constructs of the theory.

Literature Review Related to Key Variables

This section presents a review of the relevant literature related to the key study variables of exercise, self-efficacy, and motivation. Specifically addressed are studies pertinent to gender differences. The section concludes with a review of articles on exercise and physical activity among individuals with spina bifida.

Predictors of Exercise

Exercise is defined as a repetitive bodily movement or activity requiring physical effort, carried out to sustain or improve health and fitness (ACSM, 2017). Exercise can take the form of recreational sports, gym workouts, home exercise, walking, bicycling, and swimming. Exercise is a powerful component of physical and mental health. Researchers have identified exercise as a vital tool for enhancing overall physical health, building endurance, bone density, strength, balance, flexibility, joint structure, and muscle (Hirst & Porter, 2015; Perrier et al., 2015; Peterson & Mahmoudi, 2015; Stănescu, 2014). Exercise reduces blood pressure and cholesterol (Ghaderi et al., 2018). In addition to the promising improvements in physical health, exercise also has shown positive and therapeutic psychological benefits, improving stress level, self-concept, self-esteem, and mood (Altmann et al., 2016; Liu, Wu, & Ming, 2015; Rebar et al., 2015). Exercise can also reduce anxiety and depression symptoms and increase life satisfaction (Ghaderi et al., 2018).

Predictors of exercise include self-efficacy (Hegele, Kirk, & Zhu, 2018), enjoyment (Anens, Zetterberg, Urell, Emtner, & Hellström, 2017), motivation (Ednie & Stibor, 2017a, 2017b), social support (Bethancourt, Rosenberg, Beatty, & Arterburn, 2014; Laird, Fawkner, & Niven, 2018; Scarapicchia, Amireault, Faulkner, & Sabiston, 2017), past exercise participation (Chen, Li, & Yen, 2016), and demographic factors (Ghaderi et al., 2018). Social support and encouragement from significant others, family members, coworkers, and friends are strong contributors for both beginning and continuing exercising. In a qualitative study, Laird et al. (2018) explored how social support influenced physical activity among 18 female adolescents. Findings showed that social support predicted physical activity through self-efficacy, performance improvements, enjoyment, and motivation (Laird et al., 2018). A similar study by Pedersen, Halvari, and Olafsen (2019) indicated the importance of coworker social support to engage in leisure-time, moderate-to-vigorous physical activity for cardiorespiratory fitness and reducing musculoskeletal complaints. Pederson et al. used a one-way analysis of variance (ANOVA) to report significantly increased levels of autonomous motivation for physical activity and cardiorespiratory fitness. Soto, Arredondo, Haughton, and Shakya (2018) evaluated social network support for exercise associated with engaging in moderate to vigorous leisure-time physical activity. The findings of the cross-sectional study of 436 Hispanic participants showed that having a supporter with whom to be active was positively associated with participation in leisure-time physical activity. In comparison, encouragement and reminders to exercise had no association with leisure-time physical activity (Ball et al., 2017).

Chen et al. (2016) used a correlational, cross-sectional research design to examine predictors of regular exercise among 151 older adults residing in three residential care homes in Taiwan. Older adults who exercised regularly had fewer chronic diseases, better-perceived health and functional status, and higher self-efficacy and exercise outcome expectations. The authors concluded that older adults who had made a habit of exercise before moving to a facility were more likely to engage in physical activity; thus, past exercise participation and self-efficacy were significant positive predictors of regular exercise. Chen et al. (2016) conducted a similar study examining gender differences and reported comparable findings among 304 older adults residing in assisted living facilities. The authors found no gender difference in light to moderate activity and total variance of physical activity. However, in older men, educational level, past regular exercise participation, better functional status, better self-rated health, and higher self-efficacy expectations predicted more physical activity. In older adult women, better self-rated health, lower depression, and higher self-efficacy expectations contributed to increased physical activity (Chen et al., 2016).

Ghaderi et al. (2018) conducted a cross-sectional, descriptive study on demographics and physical activity using a sample of 418 adult participants working in a hospital setting. Findings from the International Physical Activity Questionnaire showed 273 nurses with low physical activity, 104 nurses with moderate physical activity, and 33 nurses with intense physical activity participation. Ghaderi et al. identified a positive relationship between marital status and physical activity and memberships in a sports club and physical activity. An independent *t*-test showed a significant relationship between age and physical activity. However, there was no relationship between work experience and past exercise experience (Ghaderi et al., 2018). Other researchers (Bopp, Kaczynski, & Campbell, 2013; Heinen et al., 2013; McNeill, Stoddard, Bennett, Wolin, & Sorensen, 2012; VanWormer, Linde, Harnack, Stovitz, & Jeffery, 2012) have provided similar results. In a quantitative cross-sectional study with a sample of 340 adults, Batool, Nayyereh, Fahim, and Fatemeh (2018) found a positive relationship between adults aged 60 to 69 years and physical activity. A similar study contradicted Batool et al.'s findings, as Burton and Turrell (2000) identified a negative relationship between age and the level of physical activity.

Self-Efficacy and Exercise

Self-efficacy is a person's confidence in the ability to execute specific actions essential to achieve specific outcomes (Bandura, 1977). Self-efficacy for exercise is one's confidence in engaging in particular amounts and types of exercise (Higgins, Middleton, Winner, & Janelle, 2014). Examples of exercise self-efficacy statements are "I can walk 10 miles" and "I can finish this exercise class." Self-efficacy has become pivotal in predicting health behavioral choice and persistence of the chosen behavior in the face of obstacles (Bandura, 1977; Slovinec D'Angelo et al., 2014). If a person has a strong sense of efficacy toward a behavior, the individual is likely to perform the behavior.

In contrast, if individuals do not feel self-efficacious about the behavior, they are unlikely to perform the behavior (Tamura, 2014). Self-efficacy ties to the amount of effort consumed in failure situations (Bandura, 1986). Individuals with weak senses of efficacy will disengage from the behavior or task when they experience failure or difficulty (Tamura, 2014). A person with a strong sense of efficacy will persevere in attempting to complete a task or behavior, even when encountering failure or difficulty (Bandura, 1977). Self-efficacy of the same tasks can vary based on environmental, behavioral, and situational characteristics (Tamura, 2014**)**. For example, a person may feel 100% confident of the ability to perform a leg press with 50 pounds. The following week, the same person may feel 60% sure of performing the leg press with 50 pounds because of staying up late the night before to study, thus getting only 4 hours of sleep.

Self-efficacy is the strongest and most reliable psychological predictor of physical activity (Banks et al., 2017; Flanagan & Perry, 2018; Higgins et al., 2014; Lim & Noh, 2017) and plays a critical role in enacting positive exercise behavior changes (Dyck et al., 2018; Ednie & Stibor, 2017b; Pauline, 2013). Dyck et al. (2018) conducted a qualitative study consisting of 30-minute education classes and group exercise classes. Findings showed that a 4-week education- and exercise-focused group improved self-efficacy in care providers diagnosed with type 1 diabetes by providing exercise advice to patients. However, patients diagnosed with type 1 diabetes did not experience an improvement in self-efficacy. The more individuals think they can exercise successfully, the more likely they are to adhere to an exercise program. Huberty et al. (2008) conducted a qualitative pilot study and found high self-efficacy is essential for women to adhere to exercise.

Motivation and Exercise

As a psychological factor, motivation is the central component in the study of human behavior (Beauchemin, Gibbs, Granello, & Gabana, 2019). Motivation is what guides an individual to achieve a goal. Motivation is the process by which individuals perform, direct, and maintain activities through the use of energy (Deci & Ryan, 1985; Hagger & Chatzisarantis, 2007). The energy element is the amount of effort dedicated to a specific task and the direction element is the person's level of interest in the activity. The energy and direction of human behavior differ by individual. For example, the motivation to exercise for a person walking a track while listening to music will be different from a bicyclist training for the Olympics.

Intrinsic and extrinsic motivation. Intrinsically motivated individuals perform an activity for enjoyment, interest, satisfaction, and competence (Deci & Ryan, 1997, 2000, 2008). Intrinsic motivation is an internal drive, with the motivation for the activity coming from within the participant. Intrinsic motivation is critical for adherence, regardless of a person's motives for exercising. Extrinsically motivated individuals perform an activity for rewards or outcomes (Deci & Ryan, 1997, 2000, 2008). A person who exercises for intrinsic reasons feels energized, confident, and satisfied, whereas one who exercises for extrinsic motives might not achieve the same outcomes (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997).

Motives for exercise. People exercise for different reasons. Motives reflect different levels of intrinsic and extrinsic motivation. Using the Participation Motivation Questionnaire, Guedes and Netto (2013) found skill development and fitness to be important motives among athletes aged 12 to 18 years, with enjoyment and achievement/status the least prominent. Beauchemin et al. (2019) conducted a cross-sectional survey to examine motives for walking program adherence among 345 participants via the MPAM-R. Results showed that adherence was higher with intrinsic motives aligned with competence, enjoyment, and social benefits and lower with extrinsic motives related to fitness and appearance (body-related motives). Body-related motives are a type of extrinsic motivation, reward, or outcome for engaging in physical activity. Beauchemin et al. found that although body-related incentives accounted for the initial motivation of the walking program, such incentives failed to predict exercise adherence.

Ryan et al. (1997) categorized activities into sports and exercise/fitness to examine the association of enjoyment, competence, and body-related factors with sports and exercise participation. The results showed an increase in enjoyment and competence in sports participation and a rise in body-related motive in exercise and fitness participation. Consistent with previous studies, Liu et al. (2017) showed the predictive strength of interest, enjoyment, and competence for physical activity in a sample of 887 college students. The researchers did not distinguish between the types of physical activity (e.g., exercise or sports), which might account for the findings. Badau, Rachita, Sasu, and Clipa (2018) investigated motivation and the level of physical activity among university students. The researchers used both the Physical Activity Measure – Revised and the MPAM-R to conduct a factorial and correlation analysis, with findings positively correlated with previous studies.

Goguen Carpenter et al. (2017) employed a cross-sectional analysis and multilevel logistic regression model approach to investigate the relationship between physical activity motives and type of physical activity engaged in by 800 youth. Categories of physical activity were individual (walking and biking), group-based (dance and basketball), organized (soccer, ice hockey, and dance), and nonorganized (hide-and-seek and tag). Results indicated that nonorganized physical activity had the highest percentage rate of participation. Enjoyment was positively associated with participation in organized physical activity; in turn, competence had a positive association with involvement in group-based physical activity. Goguen Carpenter et al. concluded that intrinsic motives could assist youth in meeting physical activity guidelines.

Gender and Exercise

Sixty percent of women do not participate in the recommended levels of exercise (Teixeira et al., 2012). Studies have shown that social pressures for extrinsic motives (health and physical attractiveness) could serve to initiate and promote exercise and fitness for women (Kohlstdt, Weissbrod, Colangelo, & Carter, 2013). However, prior research showed a negative correlation with persistence (Teixeira et al., 2006).

Król-Zielińska et al. (2018) conducted a secondary analysis of 1,231 adolescent students. Results from the study indicated that the variable *boys* predicted a 10.4% variance for all motives in the vigorous intensity of physical activity, whereas the variable *girls* predicted a 7.4% variance for all motives in the vigorous intensity of physical activity. Boys showed a higher level of physical activity than girls. Król-Zielińska et al. also suggested that both competence and appearance motives are important for adolescent boys and girls participating in vigorous-intensity physical activity.

Gender motives. Numerous empirical studies have shown a connection between motives and gender differences**.** In similar studies, Leslie et al. (1999) and Lowry et al. (2000) found women's motives focused on weight loss or control and men's motives centered on muscle gain. Kilpatrick, Hebert, and Bartholomew (2005) arrived at similar findings, with women reporting an increased level of weight management and men identifying greater levels of challenge, competition, social recognition, and strength. Utilizing the Exercise Motivation Inventory-2 questionnaire, Cerar, Kondrič, Ochiana, and Sindik (2017) examined differences in sports participation motives in 5,271 university students. Findings showed male students' motives for engaging in sports were enjoyment, challenge, social recognition, affiliation, competition, strength, and endurance. In comparison, female students' motives for participating in sports were stress, weight management, ill-health avoidance, positive health, and appearance. Nevertheless, sports participation motives and engagement were low among students, likely due to modern technology and the age of the participants (Cerar et al., 2017).

Sirard, Pfeiffer, and Pate (2006) identified male students' motives for participating in sports to be competition, social recognition, and health. Similarly, Egli, Bland, Melton, and Czech (2011) and Guedes, Santos Legnani, and Legnani (2012) found male students motivated by intrinsic factors, with female students more inspired by extrinsic influences. Specific to exercise, Guedes et al. noted that power, competition, challenge, and fitness motivated men. In contrast, Lauderdale, Yli-Piipari, Irwin, and Layne (2015) found that women had decreased levels of identified regulation and were motivated to exercise because of external factors.

In a study of 1,845 adults, Van Uffelen, Khan, and Burton (2017) identified three main motives for both men and women: prevent health problems, feel good, and lose weight. Compared to men, women were motivated by improving appearance, spending time with others, meeting friends, and losing weight. Results of a similar study indicated a significant relationship between physical activity participation and appearance motivations (Turke, 2012). Enjoyment (intrinsic motivation) significantly decreased between the first minute of exercise and the minute before reaching their threshold in women who watched their caloric intake, indicating that women worked out at an increased intensity, not enjoying exercising to the same degree as men (Gao, Xiang, Lee, & Harrison, 2008).

Vora and Naik (2016) used the Sports Motivation Scale to examine gender differences in athletic motivation among 51 sports players. The findings showed that female athletes took part in sports for enjoyment and satisfaction. Pelletier et al. (1995) found men had lower levels of intrinsic motivation to accomplish goals and tasks, with higher levels of external regulation and amotivation than women. Correspondingly, Hollembeak and Amorose (2005) found that females reported higher scores on intrinsic and extrinsic motivation compared to males.

Disabilities, Spina Bifida, and Exercise

The benefits of exercise in people with spina bifida are wide-ranging. Despite the evidence of multiple health benefits in people with a diagnosis of spina bifida, the level of exercise among this population remains low (Crytzer et al., 2013; Vanderbom, Driver, & Nery-Hurwit, 2014).

Spina bifida. Spina bifida is a permanent, lifelong disability in which individuals are particularly vulnerable to secondary conditions due to physical limitations and an inactive lifestyle (SBAA, 2019). Spina bifida occurs with spinal cord malformation during the fetus's development inside the uterus. Incomplete closing of the spinal cord during fetal development leads to impaired mobility, muscle weakness, lack of sensation in the lower limbs, hydrocephalus, and bowel and bladder dysfunction, as well as cognitive and social challenges that affect individuals' daily lives (Vanderbom et al., 2014). Due to muscle weakness and paralysis, a wheelchair or ambulatory aids (e.g., crutches, walking braces, canes, walkers, gait trainers) are necessary to engage in everyday activities.

Buffart et al. (2010) conducted a case study to highlight physical activity and aerobic fitness in participants with physical disabilities. After 3 months, individuals' physical activity improved by 51%, with 76% specific to people with cerebral palsy and spina bifida. Aerobic fitness (a 6-minute walk or wheel distance by wheelchair) improved by 16%, nine percent for individuals with cerebral palsy and spina bifida. Researchers were unable to implement a monitoring system for the home-based session, which they concluded would not have improved aerobic fitness. Using archival data on adults with physical disabilities, de Hollander and Proper (2018) found self-reports were in line with previous studies (Carroll et al., 2014; von Heijden, van den Dool, van Lindert, & Breedveld, 2013), showing low physical activity levels among people with physical disabilities. In a similar study on adults with physical disabilities, Kaptein and Badley (2012) reached inconsistent findings, likely due to the differences in the age of participants, definitions of physical activity and physical disabilities, gender sample size, and study design.

Kirby (1996) surveyed 36 individuals with physical disabilities and 21 without who played wheelchair netball. Among the participants with physical disabilities, 13 had received diagnoses of spina bifida, 13 had cerebral palsy, and 10 had spinal tumors as a result of motor vehicle accidents. Findings showed no significant difference in age and gender between people with physical disabilities and people without. The benefits of exercise given by individuals with physical disabilities were self-confidence (86%), socialization (58%), and enjoyment (41%); in turn, nondisabled individuals reported finding self-confidence (80%), enjoyment (61%), and socialization (4.8%). Enjoyment was higher among the general population. Nevertheless, in a similar study, Martin (2006) reached contradictory findings, noting that enjoyment was a critical personal factor in commitment to a youth disability sport.

Hamrah Nedjad, Jansson, and Bartonek (2013) conducted a study of 159 adults with cerebral palsy, 87 men and 72 women, with a mean age of 36 years. Findings showed that participants who received total assistance had lower participation and duration in exercise compared to people receiving partial or no assistance. Hamrah

Nedjad et al. found that 66% of participants reported enjoyment (intrinsic motive) during exercise and 12% reported nonenjoyment. Further, 74% of participants said exercise was important for their health and well-being (extrinsic motives).

The findings of a qualitative pilot study by Wilroy, Knowlden, and Birch (2016) showed significant differences in exercise motivation among individuals with physical disabilities in various stages of readiness for physical activity. The exercise motivations of enjoyment (intrinsic motive) and revitalization (extrinsic motive) were higher for individuals in the maintenance stage of the stages of change model compared to those in the precontemplation phase. However, in a cross-sectional study, Usuba, Oddson, Gauthier, and Young (2015) found that more than 40% of adults identified the purpose of leisure-time physical activity to be fitness and body maintenance (extrinsic motives). Walking, home exercise, and swimming were the most frequently reported leisure-time physical activities among adults with cerebral palsy, a group more likely than the general population to participate in home exercise.

Crytzer et al. (2013) conducted a systematic review of 18 studies to determine the state of the literature on health-related measures of fitness, exercise, and physical activity in adults with spina bifida. Each of the studies had small sample sizes, which resulted in a low quality of evidence. The authors of six articles tested exercise, finding that individuals with spina bifida who used power or manual wheelchairs were at a higher risk for secondary conditions than individuals who walked with an assistive device (e.g., cardiovascular disease).

Summary and Conclusion

Research indicated that people with physical disabilities often fail to meet the recommended exercise guidelines (SBAA, 2019). The context for the literature review was the significance of exercise. The review presented research findings of exercise predictors, exercise self-efficacy, motivation, gender, and disability, showing the relevance of motivational factors and exercise among adults with spina bifida. The self-determination theory was pivotal for this study and helped guide the discussions of motivation and exercise.

Predictors of exercise include self-efficacy, gender, and intrinsic and extrinsic motivation among individuals, both disabled and nondisabled. Due to limited research of people with physical disabilities, inconsistent findings persist. Among the general population, extrinsic motives were more likely to predict exercise than intrinsic motives. The reasons for exercise given by people with physical disabilities showed a discrepancy between intrinsic motives (enjoyment), self-efficacy, and extrinsic motives. Both types of motives are important to initiate exercise, indicating an inconsistency among the findings. Several researchers who conducted empirical studies found different motives for nondisabled men and women than for disabled individuals, indicating the need for more information on the influence of gender.

The literature review showed a variety of methodologies researchers used to investigate whether key variables predicted exercise among people with physical disabilities. The most common means of data collection across the studies was self-reporting standardized questionnaires. More quantitative studies occurred (e.g., Hamrah

Nedjad et al., 2013; Usuba et al., 2015) than did qualitative research (e.g., Wilroy et al., 2016) on motivational factors and people with physical disabilities. A systematic review showed the need for research using a larger sample and gender variability with people with spina bifida to establish age and gender differences (Crytzer et al., 2013). Longitudinal studies are needed to provide insight into the daily participation of physical activity and the role exercise plays in decreasing secondary conditions in adults with spina bifida as they age (Crytzer et al., 2013). In Chapter 3, I discuss the research design and methodological approach for this study.

Chapter 3: Methodology

Introduction

The purpose of this quantitative study was to examine if exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida. A cross-sectional, correlational survey design was appropriate to measure factors that contribute to exercise among adults with spina bifida. This chapter begins with a discussion of the research design and the rationale behind its selection. The sampling procedures appear in detail, along with an explanation of the power analysis used to determine the sample size for the study. I discuss the recruitment procedures, informed consent, survey participation, and data collection from adults with a diagnosis of spina bifida. There is a description of the reliability and validity of the four data collection instruments and brief demographic survey, followed by the data analysis plan in line with the research question. Chapter 3 concludes with threats to validity and ethical procedures for the study.

Research Design and Rationale

This research methodology I used for this study was quantitative. Quantitative researchers usually test a theory that they either support or reject based on the findings (Frankfort-Nachmias, Nachmias, & DeWaard, 2014). Quantitative research is a means to generate numerical data for statistical analysis (Creswell, 2009). A quantitative approach is appropriate to test attitudes, opinions, and behaviors and to generalize results from large sample sizes (Creswell, 2009). In comparison, qualitative methodology was not suitable for this study, as the approach would not allow for the testing of assumptions to adequately respond to the study's research question (cf. Frankfort-Nachmias et al., 2014). A qualitative researcher does not address prediction, making it the wrong approach to guide the conceptual understanding of factors associated with the prediction of exercise.

Deci and Ryan's (1985) self-determination theory served as the conceptual framework for the cross-sectional, correlational study. (See Chapter 2 for a detailed description and discussion of this theory.) This study was an examination of whether exercise self-efficacy, self-determination, and gender (independent variables) predicted exercise (dependent variable) among individuals with spina bifida.

A cross-sectional, correlational survey allowed me to examine the relationship between the study's variables and, specifically, to assess if exercise was predictable based on self-efficacy, intrinsic and extrinsic motivation, and gender. A correlational research design is appropriate when the independent variable does not undergo manipulation and there is no treatment of participants (Creswell, 2009). In this study, I neither manipulated independent variables nor provided treatments to participants. A cross-sectional, correlational survey design was appropriate for this study, with all measures taken once and at the same point in time (as opposed to a longitudinal study, in which researchers take measurements repeatedly over a set period). Correlational designs are ways to measure a positive or negative statistical relationship between two or more variables by determining the tendency or pattern between variables (Creswell, 2014; Fowler, 2009). Among the advantages of a cross-sectional study are that it provides a picture of the population under study, does not require a long time to complete, and is less expensive than other analytical approaches. I used multiple regression analyses to test the study's hypothesis.

Methodology

Population and Sample

The target population was male and female adults with a diagnosis of spina bifida. The sample comprised 119 individuals ages 18 to 64 years with a diagnosis of spina bifida. Men and women with a broad degree of participation in physical activity and exercise were eligible to participate in the study.

Sampling and Sampling Procedures

A convenience sampling strategy was appropriate for this research study. Collecting data from the entire population of adults with spina bifida would have been costly and impractical. Quantitative researchers use a convenience sample to collect data they hope will be representative of the population. Nonrandom sampling is useful when the researcher can choose individuals from a selected group who are easy to recruit (Creswell, 2009). A weakness of convenience sampling is the risk that the result will not accurately reflect the total population. Convenience, as opposed to random, sampling was appropriate due to the challenges of recruiting adults with spina bifida. Accordingly, readers cannot assume the findings of this study would be similar for adults with other physical disabilities. The contact of potential participants for this study was through the social network sites of the SBAA.

Quantitative research studies require a certain level of confidence in the accuracy and validity of the measured constructs. Power analysis is a key component in predicting the accuracy and validity of study results. Statistical power is “the probability that effects that actually exist have a chance of producing statistical significance” (Tabachnick & Fidell, 2013, p. 11). The power analysis is a calculation of the required sample size for a study, providing an estimation of the anticipated effect, the variability of such effect, the desired great alpha level, and the desired power. To estimate the sample size in the present study, I conducted a power analysis, considering precise factors specific to statistical power, confidence intervals, and effect size. The G*Power 3.1.9.2 application (Faul, Erdfelder, Lang, & Buchner, 1992) enabled sample size calculation. This statistical software allows researchers to calculate a general power analysis and determine appropriate sample sizes (Faul et al., 1992). To determine the sample size in using linear multiple regression analysis, I used the set parameters of .95% for power and .05 for the alpha level.

The suggested power for quantitative research was 0.90 or higher (Schoenborn & Heyman, 2008). Sample size influences power, in that as the sample size increases, so does the power of the study. An alpha level of .05 indicates the probability of committing a type I error (rejecting a null hypothesis that is true); if the null hypothesis is true, an alpha level of .05 is the probability of wrongly rejecting it (Frankfort-Nachmias & Nachmias, 2008). The G*Power calculation showed an estimated 119 participants for conducting a linear multiple regression (fixed effects, statistical power of .95, alpha of .05, three predictors).

Procedures for Recruitment, Participation, and Data Collection

Participant recruitment occurred through the SBAA, an organization serving children and adults diagnosed with spina bifida. Formed in 1973, SBAA (2019) is the only national voluntary health agency specially dedicated to enhancing the lives of individuals with spina bifida. SBAA provides research, education, advocacy, and service. The organization comprises a network of 20 chapters by state or region, with involvement in more than 125 support communities nationwide (SBAA, 2019). I contacted the clinical director of the SBAA for permission to recruit participants through the National Resource Center on Spina Bifida. The clinical director indicated the organization's interest and willingness to assist with recruitment pending approval from the Walden University Institutional Review Board (IRB). I created a recruitment flyer to advertise on the SBAA social network pages. The SBAA posted a brief invitation on all of its social network pages, including Facebook, Twitter, and Instagram. Social media posts contained information on the purpose of the study, participation criteria, and my contact information. The recruitment flyer had a direct link to the SurveyMonkey survey, which participants could click to review and agree to the informed consent, and then proceed to the survey. Participants did not receive compensation to complete the survey.

Data collection was anonymous, with no personal information collected from participants, such as their names and addresses. However, the survey required participants to provide general demographic information, such as age, gender, physical disability, and the use of an assistive device for mobility. The method of coding surveys was a further means to safeguard sensitive information. I entered and saved all data on a password-protected computer; only my dissertation committee and I have access to the data.

In line with the ethical standards regarding informed consent, participants received information about the nature and purpose of the study, possible risks, benefits, confidentiality, and expected time to complete the survey. Before starting the survey, participants read about and acknowledged their understanding of the estimated administration time for completion of the surveys (approximately 20 minutes). Individuals affirmed their understanding that participation was voluntary; also, they had the right to withdraw from the study or decline to continue to participate at any time after they had begun the study. Participants could also choose not to take part if they anticipated any kind of discomfort or risks.

Electronic access to the informed consent form and surveys was through the SurveyMonkey website. The five surveys were the sociodemographic survey, the SCI-ESES, MPAM-R, the BREQ-2, and the PADS-R, combined into a single link for participants to click and complete. The single-survey format made the process more efficient and less time-consuming and frustrating for adult participants. The survey remained open until 150 individuals had completed it, a quantity chosen based on the power analysis. Because some surveys could have been invalid (e.g., extreme values, erratic and unusual response sets, missing values, etc.), the number of online surveys collected was higher than that indicated by the power analysis. I entered all data into the IBM SPSS program for statistical data analyses. Research data are password-protected and available only to the dissertation committee members and myself.

Instrumentation and Operationalization of Constructs

Based on the hypothesis, I assessed three predictor variables (exercise self-efficacy, self-determination, and gender) and one criterion variable (exercise). Measurement of exercise self-efficacy was with the SCI-ESES, with self-determination assessed using the BREQ-2. Data on age, gender, and questions related to the participants' disability came from a sociodemographic survey. I measured the level of exercise and physical activity with the PADS-R, and which motives were important for exercising among this population using the MPAM-R. A detailed description of the instruments used to measure these constructs follows.

Sociodemographic survey. The sociodemographic survey included questions regarding participants' age, sex, perceived social support, perception of disability severity, and how much they connect their identity to the physical challenges of their disability. The survey served as a control variable that would have an impact on the dependent variable.

SCI-ESES. This self-report, Likert scale (Kroll, Kehn, Ho, & Groah, 2007) is a way to assess individuals' confidence in their ability to exercise. The measurement includes 10 items, with Likert-scale responses ranging from 1 = *not at all true*, 2 = *rarely true*, 3 = *moderately true*, and 4 = *always true* (Kroll et al., 2007*).* A sample statement is "I can be physically active or exercise without the help of a therapist or a trainer." Total scale scores range from 10 to 40, with lower scores indicating a lesser degree of self-efficacy and higher scores indicating a greater degree of self-efficacy.

Building upon Kroll et al.'s (2007) assessment of 368 adults with spinal cord injuries, Nooijen et al. (2013) analyzed the reliability and validity of the SCI-ESES using a sample of 53 adults with spinal cord injuries. Across the two studies, the internal consistency generated an alpha value of 0.92 in the larger sample of 368 participants (Kroll et al., 2007) and an alpha value of 0.87 in the smaller sample of 53 subjects (Nooijen et al., 2013). The reliability of the 10-item scale is 0.89 (Kroll et al., 2007). The SCI-ESES is a reliable instrument with high internal consistency and scale integrity. Content validity, in terms of face and construct validity, is satisfactory (Kroll et al., 2007).

BREQ-2. The BREQ-2 is a 19-item, self-report, Likert-type scale used to assess individuals' intrinsic and extrinsic motivation to exercise (Markland & Tobin, 2004). The BREQ-2 is a widely used measure of the continuum of extrinsic and intrinsic motivation in exercise psychology. The BREQ-2 has five subscales—amotivated, external, introjected, identified, and internal regulation of exercise behavior—based on Deci and Ryan's (1985) self-determination theory. Amotivation is no motivation to exercise; extrinsic motivation includes three regulations, external, introjected, and identified; and intrinsic motivation has one regulation, intrinsic. Extrinsic motivation applies to individuals who are motivated to obtain rewards, reduce guilt, feel forced to exercise, or value the benefits or importance of exercise with no enjoyment (Deci & Ryan, 1985). Intrinsic motivation applies to individuals motivated by fun, enjoyment, and satisfaction. The statements in the questionnaire pertain to motivating factors or influential sources of the decision to exercise. The BREQ-2, a revised version of the BREQ, applies to both exercisers and nonexercisers (Mullan, Markland, & Ingledew, 1997).

Scoring on the BREQ-2 is on a 5-point scale ranging from 0 = *not true for me* to 4 = *very true for me* (Markland & Tobin, 2004). The amotivation subscale consists of four items, with extrinsic motivation comprising seven items and intrinsic motivation having eight. Examples of pertinent questions for each subscale are “I don’t see why I should have to exercise” (amotivation), “I exercise because other people say I should” (external regulation), “I feel guilty when I don’t exercise” (introjected regulation), “I value the benefits of exercise” (identified regulation), and “I exercise because it’s fun” (internal regulation). The questionnaire takes 10 to 15 minutes to complete. High scores on the subscale of external regulation indicate a higher level of external regulation; in turn, high scores on the scale of internal regulation of exercise indicate a greater degree of intrinsic regulation.

BREQ-2 is a valid and reliable instrument (Mullan et al., 1997; Wilson, Rodgers, & Fraser, 2002). Wilson, Rodgers, Fraser, and Murray (2004) assessed the reliability and validity of the scale with a sample of 276 university students, 98 men and 178 women. The internal consistency yielded an alpha value above 0.75 in the BREQ-2 ($\alpha = 0.91$ for intrinsic regulation, $\alpha = 0.79$ for identified regulation, $\alpha = 0.75$ for introjected regulation, $\alpha = 0.78$ for external regulation, and $\alpha = 0.88$ for amotivation). The alpha coefficients indicated that the BREQ-2 presents with adequate internal reliability (Wilson et al., 2004).

Scoring the BREQ-2 entails computing the Relative Autonomy Index by multiplying each subscale score and summing the weighted scores (amotivation [-3], external regulation [-2], introjected regulation [-1], and identified regulation [+2]). RAI indicates overall self-determination, with positive scores representing greater self-determination (intrinsic motivation) and low scores indicating nonself-determination (extrinsic motivation).

MPAM-R. The MPAM-R is a 30-item, self-report, Likert scale measuring five motives for engaging in physical activity: fitness, appearance, competence, social, and enjoyment (Ryan et al., 1997). Responses are on a 3-point scale of 1 = *not at all true for me*, 2 = *true for me*, and 3 = *very true for me* (Ryan et al., 1997). There are five items specific to *fitness* and *social* motives, six items for *appearance* motive, and seven items for *competence* and *enjoyment* motives, as follows: Fitness refers to increased energy level and feeling strong; social refers to be with friends or meet new people; appearance refers to exercising to be physically attractive or to achieve or maintain a specific weight; competence refers to acquiring a new skill or challenging oneself; and enjoyment refers to fun, happiness, and stimulation. Examples of pertinent questions for each subscale are "Because I want to be physically fit" (fitness); "Because I enjoy spending time with others doing this activity" (social); "Because I want to lose or maintain weight so I look better" (appearance); "Because I like engaging in activities that physically challenge me" (competence); and "Because I like the excitement of participation" (enjoyment). The enjoyment motive was not applicable to the present study, the first in which a researcher explored specific reasons for exercising among adults with a diagnosis of spina bifida.

MPAM-R is a valid and reliable instrument (Ryan et al., 1997; Sibley, Hancock, & Bergman, 2013; Vancampfort et al., 2017). Sibley et al. (2013) analyzed the reliability and validity of the scale using 155 participants, 89 women and 66 men. The internal consistency yielded an alpha value above 0.78 (α = 0.83 for fitness, α = .78 for social, α = 0.87 for appearance, α = 0.89 for competence, and α = 0.92 for enjoyment). The alpha coefficients showed that the MPAM-R presents with adequate internal reliability (Ryan et al., 1997).

PADS-R. The PADS-R is an 18-item, self-report, Likert scale measuring a person's level of physical activity and exercise in the previous week (Kayes et al., 2007). The original PADS included 26 items (Rimmer, Riley, & Rubin, 2001). The PADS-R provides information about the frequency (number of days a week) and duration (daily hours) of participation in the specific activity performed. Frequency responses range from 1 (*much less than usual*) to 5 (*much more than usual*).

The questionnaire includes six subscales—exercise, leisure-time physical activity, general activity, therapy, employment, and wheelchair use—each representing a dimension of physical activity. If individuals do not participate in any of the subscales, they move on to the following subscale. The exercise, leisure-time physical activity, and therapy subscales each have one item. The general activity subscale includes eight items, with three for the employment subscale and four for the wheelchair use subscale. Assessing scale responses entails multiplying the average hours per day for each item by a metabolic equivalent value associated with the intensity of the activity, with the ratings from the subscales summed to produce a total score. A higher score indicates a greater level of physical activity. In the present study, the statistical analyses occurred using the full-scale scores. The measure takes approximately 20 minutes to administer (Kayes et al., 2007). Participants with a diagnosis of multiple sclerosis reported it to be easy to understand and complete, enabling them to accurately represent their physical activities (Kayes et al., 2007).

Kayes et al. (2007) assessed the reliability and validity of the scale using 293 individuals with a diagnosis of multiple sclerosis and 83 individuals with a stroke (Kayes et al., 2007). Test-retest reliability, the intra-class coefficient, yielded an alpha value above 0.87. The instrument also underwent analysis in a cross-sectional study involving 287 participants with multiple sclerosis (203 women and 84 men) ages 18 to 80 years (Anens et al., 2017). The internal consistency generated poor alpha values at 0.37 to 0.65 (Washburn, Zhu, McAuley, Frogley, & Figoni, 2002).

Data Analysis Plan

I analyzed the data using the SPSS software program. Checking for the accuracy of the software data entailed comparing the information entered into SPSS to the data from the original survey. Data analysis included examining means, standard deviations, and medians to identify skewness, search for outliers, and detect missing data. I tested the hypothesis using multiple regression analysis, an assessment that enabled me to evaluate specific associations between exercise and each independent variable. A 5% level is appropriate to quantify the statistical significance of the verification of the hypothesis ($p < 0.05$).

The research question and hypothesis for this study were as follows:

RQ: Do exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida?

H_0: Exercise self-efficacy, self-determination, and gender do not predict exercise among individuals with a diagnosis of spina bifida.

H_a: Exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida.

Although the research hypothesis focuses on self-efficacy, self-determination, and gender, I conducted preliminary analyses (bivariate correlations) to assess if other variables, such as age, were associated with the criterion variable (exercise). Variables with statistically significant associations with exercise were part of the multiple regression analysis.

Threats to Validity

Validity is the extent to which a concept accurately measures what it should measure. According to LaCoursiere (2003), "Validity is defined as a concept of logic characteristics of arguments which must be carefully distinguished from the truth" (p. 25). External validity means that research findings apply to the real world. If the findings apply to several experiments, settings, people, and times, external validity is high; if the study is not replicable in different situations, external validity is low. External validity pertains to generalizability, or the extent to which research results apply to other populations, settings, treatment variables, and measurement variables (Creswell, 2009). Internal validity pertains to the main effect of the primary interest, and external validity centers on the interaction with the exposure of the primary concern.

Threats to Internal Validity

Several threats to internal and external validity could arise within research studies. Internal validity threats in the current study included selection and mortality. Regarding selection, participants had different characteristics, such as age, gender, ethnicity, socioeconomic status, and exercise status (i.e., exercisers and nonexercisers); however, all had a diagnosis of spina bifida. Obtaining demographic information about each participant minimized threats to internal validity. In terms of mortality, participants could have dropped out during the time they were completing the survey for various reasons, such as fatigue or hunger, due to the length of time to complete several surveys at once. A larger sample size was a means to account for dropouts. The current research is a correlational study, which does not allow for the determination of causality. A nonrandom sample reduced the external validity of the study.

Threats to External Validity

The pivotal threat to external validity in the current study, aligned with one of the aforementioned internal validity concerns, was the interaction of selection (cf. Creswell, 2009). Complete data on the target population are unavailable. The convenience of selecting adults with spina bifida who are engaged with the SBAA is not a representation of, and thus not generalizable to, the general population of people with spina bifida. What this means is that the results may not apply to every person with a diagnosis of spina bifida. Readers cannot assume the results will be the same for adults with other physical disabilities.

Ethical Procedures

Walden University's IRB reviewed the proposal to ensure ethical conduct. A researcher must meet ethical guidelines and take precautions in studies using human participants. In this study, there was minimal risk to the participants. However, to ensure that participants had any support they may have needed before, during, and after survey engagement, each individual received the contact information of both the university and me. Further, the consent form included all the necessary details about the study so that the participants could understand the full nature of the research before they agreed to participate. Finally, I secured and will maintain all study materials for 5 years, with subsequent destruction per Walden University policy. Only my committee members and I have access to the data.

Summary

The purpose of this quantitative cross-sectional, correlational survey research was to investigate what motivates individuals with spina bifida to exercise. I examined whether exercise self-efficacy, self-determination, and gender predicted exercise in individuals with a diagnosis of spina bifida, based on the foundation of self-determination theory. The SBAA facilitated the recruitment of participants for the study. Participants completed the survey on SurveyMonkey, a web-based data collection service, following links provided on the SBAA social media recruitment posts. Data analysis entailed running multiple regression analyses in SPSS with three predictors: exercise self-efficacy, self-determination, and gender. All surveys in the current study were self-reported using Likert-type scales. Surveys are cost-effective and enable the investigation of a large pool of participants, thus making this data collection instrument the most suitable for the current study. The five instruments used in this study were the sociodemographic survey, SCI-ESES, BREQ-2, MPAM-R, and the PADS-R. I took measures to protect participants' privacy as well as to ensure that no harm came to any individual, thus conducting the study in an ethical manner. Informed consent, ethical guidelines for the research, and the IRB submission for approval were essential in the development of the study.

Chapter 4 will present in detail the results of the study. Included in Chapter 4 will be quantitative and statistical analysis reports of the significant and nonsignificant findings. Along with descriptive statistics illustrated in tables, the effect sizes of the various predictor variables will also be part of the chapter.

Chapter 4: Results

Introduction

In this quantitative study, I focused on what motivates individuals with spina bifida to exercise. Men and women participants between the ages of 18 to 64 years and with a diagnosis of spina bifida took part. The study allowed me to assess if exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida.

The following hypothesis applied:

H_0: Exercise self-efficacy, self-determination, and gender do not predict exercise among individuals with a diagnosis of spina bifida.

H_a: Exercise self-efficacy, self-determination, and gender predict exercise among individuals with a diagnosis of spina bifida.

The dependent variable was exercise. The independent variables included exercise self-efficacy, self-determination, and gender.

This chapter begins with a description of the data collection process, including (a) data collection timeframe, response rates, and discrepancies, (b) demographic characteristics of the sample, (c) an analysis of the representativeness of the sample, and (d) results of basic univariate analyses. Also included are the results of the analyses testing main and additional hypotheses.

Data Collection

The following issues associated with data collection appear in this section: (a) data collection timeframe, response rates, and discrepancies, (b) demographic characteristics of the sample, (c) an analysis of the representativeness of the sample, and (d) results of basic univariate analyses.

Timeframe, Response Rates, and Discrepancies

After receiving approval from Walden University's IRB (approval number 11-21-19-0588181), I began the recruitment process by contacting the SBAA. The clinical director posted a brief invitation to members on the SBAA's Facebook social media page, including a recruitment flyer with the SurveyMonkey link to the online survey. Within 24 hours of the flyer's posting, 150 participants had initiated the survey; within 48 hours, 50 additional individuals had taken the survey; by the end of the week, there were 31 more responses.

A total of 231 individuals with spina bifida participated in the study. I removed two participants (ages 17 and 65 years) from the data analyses for not meeting the required 18 to 64 years age range. Furthermore, 49 participants left significant portions of the survey incomplete. After removing these cases, the final number of participants available for data analyses was 180. This number was more than the minimum sample size needed, as calculated by the G*Power software. There were various items with missing values, with one reaching five percent (first item on the MPAM-R). I computed values for the missing data with the Expectation-Maximization algorithm, as suggested by Tabachnick and Fidell (2013).

There were no discrepancies in data collection procedures. However, I changed the Likert scale for the BREQ-2 (*self-determination*) from five (0 = *not true for me*, 1 = *sometimes true for me*, 2 = *sometimes true for me*, 3 = *sometimes true for me*, and 4 =

very true for me) to three responses (1 = *not true for me*, 2 = *sometimes true for me*, and 3 = *very true for me*).

Demographic Characteristics of the Sample

Of the 180 participants, 44 (24.4%) were men and 136 (75.6%) were women. The mean age was 37.03 years (*M* = 37.03; *SD* = 10.55). Almost half of the participants (*n* = 89; 49.4%) reported being single, with 32 (17.8%) in a relationship, 50 (27.8%) married, and nine (5%) divorced. With regards to the perceived severity of their spina bifida disability, 23 respondents (12.8%) rated their spina bifida as mild, 87 (48.3%) moderate, 65 (36.1%) severe, and five (2.8%) very severe. Regarding feeling supported by family, six (3.3%) strongly disagreed, 12 (6.7%) disagreed, 86 (47.8%) agreed, and 76 (42.2%) strongly agreed. Only five participants (2.8%) indicated strongly disagreeing with having their friends' support; in turn, 18 (10.0%) disagreed, 110 (61.1%) agreed, and 47 (26.1%) strongly agreed. Finally, asked if they were satisfied with their lives, (4.4%) strongly disagreed, 41 (22.8%) disagreed, 106 (58.9%) agreed, and 25 (13.9%) strongly agreed.

Representativeness of the Sample

The number of adults diagnosed with spina bifida continues to grow (SBAA, 2019). In the United States, more than 197,000 adults have received a diagnosis of spina bifida (CDC, 2018). The National Spina Bifida Patient Registry (2019) reported 53% of women and 47% of men having spina bifida diagnoses. In this regard, there is a significant gender discrepancy, as women comprised three fourths of the sample. The mean age for adults living with spina bifida is 30 years (National Spina Bifida Patient Registry, 2019), which is less than the 37 years average for this study's sample. The CDC

(2018) reported 16% of the spina bifida population uses a cane, crutches, or walker, 46% uses a manual wheelchair, 29% uses a power wheelchair, and 3% uses a scooter as a form of mobility. Among participants in the current study, 96 (53.3%) used a wheelchair, 79 (43.9%) did not use a wheelchair, 15 (8.3%) used a power wheelchair, 82 (45.6%) used a manual wheelchair, and 92 (51.1%) used another assistive device for mobility. In comparing the sample to the population, more adults used a different mobility device. The population of adults using manual wheelchairs is like that of the current study. All in all, the most significant representativeness discrepancy between the sample in this study and the national statistics was gender composition.

Basic Univariate Analyses

The means and standard deviations for relevant variables in the study are as follows: exercise self-efficacy (M = 27.2; SD = 7.31), self-determination (M = 33.2; SD = 4.60), and exercise (M = 54.7; SD = 11.3). Age and gender statistics appear in the demographic characteristics section.

Results of the Statistical Analyses Testing the Study's Hypotheses

This section presents the results of statistical tests evaluating the study's hypotheses. Results appear according to main and additional hypotheses.

Main Hypothesis

The purpose of this study was to evaluate if exercise self-efficacy, self-determination, and gender predict exercise among adults with spina bifida. To achieve this objective, I conducted a standard multiple regression analysis. The demographic characteristics and univariate analysis sections show the means and standard deviations of these variables. I also ran bivariate correlations for these variables. Table 2 displays the means, standard deviations, and correlations for the following variables: gender, exercise self-efficacy (SCI-ESES), intrinsic motivation (BREQ-2), and physical activity (PADS-R). In the multiple regression model, exercise self-efficacy, self-determination, and gender were predictor variables and physical activity was a criterion variable. In running the standard multiple regression, I evaluated key test assumptions, as well. Bivariate correlations did not present any multicollinearity problems among predictor variables. I was able to corroborate this finding with the SPSS multiple regression collinearity assessment, which yielded tolerance values much higher than .10 and variance inflation factor values much lower than 10. Inspection of the Normal Probability Plot of the Standardized Residuals suggested no deviation from normality. The Scatterplot of Standardized Residuals, on the other hand, presented with a roughly rectangular shape with most scores accumulating near zero and all within the 3 to -3 range. The lack of values outside the 3.3 to -3.3 range indicates no outliers (cf. Tabachnick & Fidell, 2013). With the test assumptions met, I present the results of the multiple regression analysis in Table 3. Exercise self-efficacy and self-determination contributed to changes in the variance of physical activity; gender did not.

Table 2

Means, Standard Deviations, and Intercorrelations for Exercise and Gender, Exercise Self-Efficacy, and Self-Determination

Variable	*M*	*SD*	1	2	3	4
Physical activity/exercise	54.7	11.30	–	.-13*	.29*	.30*
Gender	1.75	.43	–	–	-.19*	-.17*
Exercise self-efficacy	7.2	7.31	–	–	–	.18*
Self-determination	33.2	4.60	–	–	–	–

Note. **p* < .05.

Table 3

Multiple Regression Analysis Summary for Gender, Exercise Self-Efficacy, and Self-Determination Predicting Physical Activity

Variable	B	*SE* B	β	*t*	*p*
Gender	-1.07	1.87	-.04	-0.57	.567
Exercise self-efficacy	0.38	0.11	.24	3.63	.000
Self-determination	0.64	0.18	.26	3.63	.000

Note. R^2 = .13 (*n* = 180).

Additional Statistical Tests of Hypothesis

The core research question of the study involved the relationships between gender, exercise self-efficacy, self-determination, and physical activity/exercise. However, there were other variables included in the study for control and exploratory purposes. In this section, I present statistical analyses involving these variables. Bivariate correlation among physical activity/exercise, age, social support (family support and friend support), perceived severity of spina bifida, life satisfaction, and four subscales of the MPAM-R appear in Table 4. Here, it is relevant to note that physical activity was positively associated with all variables except for social support and perceived severity of the spina bifida.

Table 4

Intercorrelations for Exercise and Age, Severity, Support, Life Satisfaction, and the Four Subscales of the MPAM-R

Variable	1	2	3	4	5	6	7	8	9
Physical activity	–	.18**	.11	.01	.16*	.36**	.39**	.16*	.13*
Age	–	–	.03	-.08	-.04	.05	.05	-.11	-.05
Severity	–	–	–	.04	-.12	.03	.11	.03	.10
Support	–	–	–	–	.46**	.09	.07	.09	.18**
Life satisfaction	–	–	–	–	–	.06	.08	-.12	.12
Fitness (MPAM-R)	–	–	–	–	–	–	.73**	.57	.40**
Competence (MPAM-R)	–	–	–	–	–	–	–	.42**	.59**
Appearance (MPAM-R)	–	–	–	–	–	–	–	–	.32**
Social (MPAM-R)	–	–	–	–	–	–	–	–	–

Note. *p < .05; ** p < .01.

Based on the significant relationship between physical activity and these variables, I used an alternative multiple regression model, in which I entered age, the combination of the fitness and competence motives' scores (ComFit), exercise self-efficacy, and self-determination to predict physical activity. Table 5 presents this standard multiple regression.

Table 5

Multiple Regression Analysis Summary for Age, Exercise Self-Efficacy, Self-Determination, and Two Subscales of the MPAM-R (Competence/Fitness) Predicting Physical Activity

Variable	B	*SE* B	β	*t*	*p*
Age	0.19	0.07	.17	2.58	.011
Exercise self-efficacy	0.25	0.12	.16	2.11	.036
Self-determination	0.39	0.19	.16	2.09	.038
ComFit (MPAM-R)	0.43	0.15	.24	2.86	.005

Note. R^2 = .23 (n = 180).

Based on these findings, and although my primary interest was the relationship between physical activity and life satisfaction, I wondered what factors predict life satisfaction among individuals with spina bifida. I expected physical activity to contribute to the variance in the PADS-R scores. To test this, I ran a standard/simultaneous multiple regression. Table 6 presents the results of this multiple regression analysis to test if age, gender, perceived severity, social support, exercise self-efficacy, self-determination, and physical activity contributed to the prediction of life satisfaction. In order of relationship strength, social support, exercise self-efficacy, gender (being female), and physical activity all contributed positively to the variance in life satisfaction scores.

Table 6

Multiple Regression Analysis Summary for Age, Gender, Severity, Support, Exercise Self-Efficacy, Self-Determination, Physical Activity Predicting Life Satisfaction

Variable	B	*SE* B	β	*t*	*p*
Age	-.00	.04	-.04	-.582	.561
Gender	.30	.11	.18	2.77	.006
Severity	-.10	.07	-.10	-1.58	.117
Support	.23	.04	.39	5.64	.000
Exercise self-efficacy	.20	.01	.21	2.78	.006
Self-determination	-.02	.01	-.10	-1.43	.154
Physical activity	.01	.01	.17	2.37	.019

Note. R^2 = .57 (*n* = 180).

Chapter Summary

This chapter presented the results of the statistical analysis of the survey responses of 180 participants. The descriptive data showed a diverse sample of adults with regards to age, marital status, and perception of spina bifida severity. However, female participants outnumbered their male counterparts by a four to one ratio. A standard multiple regression analysis was appropriate to test the hypothesis of gender, exercise self-efficacy, and self-determination contribution to the prediction of physical activity. The results of this analysis indicated self-efficacy and self-determination predicted physical exercise, but gender did not. Beyond the main hypothesis, I ran bivariate correlations to test associations between other variables and physical activity. Based on these results, I performed a second multiple regression analysis to test if age, ComFit (aggregate between the *competence* and *fitness* subscales of the MPAM-R), exercise self-efficacy, and self-determination predict physical activity. All factors obtained betas reaching statistical significance. This alternate model accounted for a higher contribution to the prediction of physical activity beyond the main hypothesis. Finally, I ran a multiple regression to test if physical activity, among other variables, contributed to the prediction of life satisfaction. Social support, gender, exercise self-efficacy, and physical activity contributed to the prediction of physical activity.

Chapter 5 presents the key results from the study. The discussion includes implications for self-determination theory as a framework to understand what motivates individuals with spina bifida to exercise. The chapter also presents implications for the practice of professionals supporting the mental health needs of individuals with spina bifida.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

Grounded in the self-determination theory, this study was a means to identify factors that motivate adults with spina bifida to exercise. A cross-sectional correlational survey research design was appropriate to examine if exercise self-efficacy, self-determination, and gender predicted exercise. Individuals with spina bifida who were between the ages of 18 to 64 years with different levels of physical activity took part in the study. Participants completed five Likert-scale questionnaires. After discarding surveys with a high number of missing data, I used 180 cases for statistical analyses.

A multiple regression analysis to test the study's hypothesis indicated that higher levels of exercise self-efficacy and self-determination led to higher levels of physical activity. Gender did not predict physical activity. Further analyses with variables not tested in the main hypothesis yielded age and the competence and fitness scales of the MPAM-R as predictors of physical activity. Finally, physical activity, gender, self-efficacy, and perception of social support predicted life satisfaction. This chapter includes the interpretation of findings, limitations of the study, recommendations for further research, implications for social change, and the conclusion.

Interpretation of Findings

A discussion of the findings follows, presented in two major sections. The first section is specific to the main hypothesis on self-efficacy, self-determination, and gender as predictors of physical activity, with other variables not included in the main hypothesis also discussed. The second section includes a discussion of the relationship between exercise and life satisfaction.

Self-Efficacy, Self-Determination, and Gender as Predictors of Exercise

Exercise self-efficacy and self-determination predicted physical activity in adults with spina bifida. Self-efficacy's significant positive correlation with physical activity was consistent with several studies (e.g., Dyck et al., 2018; Ednie & Stibor, 2017b; Haegele, Kirk, & Zhu, 2018; Pauline, 2013). Individuals with strong self-efficacy are more likely to commit themselves, have positive feelings, overcome setbacks, and meet challenges (Bandura, 1977). It is possible, then, that study participants with higher levels of exercise self-efficacy had positive attitudes, which served as motivation to engage in and sustain physical activity. Self-efficacy likely buffers any barriers to exercising, as these individuals have the confidence to help them overcome challenges. A review of the literature on self-efficacy and exercise showed that individuals with high self-efficacy sustain positive energy and vitality while exercising, thus feeling less fatigued during physical activity (Lee, Arthur, & Avis, 2008). Results from the current study indicate that self-efficacy plays a critical role in exercise not only in the general population, but also among individuals with spina bifida.

Self-determination was a statistically significant predictor of exercise. This result is consistent with previous researcher's findings (Ersöz & Eklund, 2017; Jakobsen & Evjen, 2018). It is relevant to note that in the current study, I used the full-scale score of the instrument for computing self-determination. When using the full-scale score, self-determination equates to intrinsic motivation, which means that individuals who were internally motivated, as opposed to externally motivated or not motivated at all, reported being more physically active. Thus, self-determined adults with spina bifida are self-motivated and likely to feel in more control of their lives. The perception of control over exercise is likely relevant. As in the case of self-efficacy, the findings of the present study indicate the relevance of self-determination in exercising among adults with spina bifida.

Overall, the positive relationships shown in the present study among self-determination, self-efficacy, and exercise indicates the importance of self-determination theory as a framework for understanding the role of motivation in exercising. Although self-efficacy and self-determination are different concepts contributing significantly to the prediction of physical activity, both have an emphasis on autonomous behavior. According to self-determination theory, being able to choose one's amount of activity (as opposed to somebody else making that decision) is related to increased exercise (Deci & Ryan, 2008, 2011; Gourlan et al., 2016; Teixeira et al., 2012). In self-determination theory, autonomy is the perception of choice, facilitating the development of intrinsic motivation.

In the present study, I found the amount of physical activity among individuals with spina bifida associated with internal, as opposed to external, rewards and control. Deci and Ryan (2000) stated that autonomous motivation was more important than external control motivation. Participants with high levels of self-determination might exercise in an autonomy-supportive environment, exercising for themselves as opposed to proving something to others or responding to external rewards. Individuals experienced self-determination due to not feeling controlled or pressured. Controlled exercise that lacks personal choice can negatively affect self-determination. Individuals with autonomous motivation make their own choices and rules in exercising.

In the present study, gender did not predict exercise. In line with Costa, Hausenblas, Oliva, Cuzzocrea, and Larcan (2013), who reported that women exercised more than their male counterparts, a significant gender difference may be present. However, other studies have shown nonsignificant findings (Busing & West, 2016; Herrmann, 2015). Thus, the reason for the inconsistent findings in the literature regarding the relationship between gender and exercise remains elusive. One possibility is that differences in sample sizes, as well as the distribution of gender across studies, might be factors. Studies with a similar distribution of men and women in the sample are likely to result in statistically significant findings compared to studies with an unequal gender distribution (Teixeira et al., 2006). In the current study, there was a significant disparity between the number of male and female participants. Thus, it is difficult to make inferences regarding gender differences based on the unequal distribution in the study.

Other Variables Associated With Exercise

Based on statistically significant bivariate correlations with physical activity, I identified several variables for a multiple regression analysis. Age was one of the variables that predicted exercise. A few researchers have reported the same results as the current study: that older adults are more active than their younger counterparts (Batool et al., 2018; Ghaderi et al., 2018). However, other researchers (Burton & Turrell, 2000; Cho, Tung, Lin, Hsu, & Lee, 2017; Zaleski et al., 2016) have found a negative relationship between age and exercise, with younger adults exercising more than older adults. It is possible that differences in measuring exercise account for the discrepancies in findings.

Notwithstanding these differences, the significant finding of the relationship between age and physical activity in this study was interesting and thus required further discussion. Perhaps older adults begin with an easy exercise regimen that they slowly increase in intensity. The gradual increase in their routine is likely to contribute to their motivation. On the other hand, younger adults are likely to aim for quick progress within a short time, with failure to achieve their desired goals resulting in decreased motivation. Research indicates that older adults who were active in their youth remained motivated to continue physical activity as they aged (Seefeldt, 2012), perhaps because older adults valued the benefits of exercise. Another possibility is that motivation to exercise when young is due to external factors, yet as individuals age, they begin to embrace the intrinsic value of physical activity. Interestingly, in the present study, age was not associated with self-determination ($r = .004$, $p = .480$). Other possibilities for this study's results include younger adults' limited knowledge of the health-related benefits of exercise (Chen, 2013) and a lack of time to engage in physical activity (Lingling, Yiqun, & Lippke, 2020).

Younger adults might not be as motivated as their older cohorts. For example, in one study, younger adults who gave up easily were not motivated and did not see an improvement in health after 3 weeks of physical activity (Chen, 2013). Previous studies have been longer in duration, which could explain Chen's (2013) results. Chen's study lasted for 1 week, whereas the majority of similar studies have been between 2 to 3 weeks. Younger adults likely need more than 1 week to internalize the benefits of motivation and exercise. Accordingly, it is possible that the older adults in the present study exercised more based on higher intrinsic motivation and a better understanding of its health benefits. Further research is needed to clarify these age differences.

ComFit, the combination of the competence and fitness scales of the MPAM-R, contributed to the prediction of exercise. As such, those participants whose primary reasons for exercising were to feel competent and be in shape exercised more compared to those with other reasons, such as appearance and socializing with others. Competence motive is a form of intrinsic motivation, which is the highest level of self-determination (Mullan et al., 1997). Individuals who believe they are competent are more likely to achieve, enjoy, and continue the skills involved with exercise. Deci and Ryan (2000) reported that increasing and nurturing feelings of autonomy and competence in the physical activity domain increases the probability that individuals will adopt exercise into their lifestyle. Guedes and Netto (2013) suggested that motives related to enjoyment, competence, and fitness have more potential to foster devotion to exercise.

In line with Deci and Ryan's (1985) theory, as self-determination increases, individuals will become intrinsically motivated, leading to a rise in physical activity. Ingledew et al. (1998) found that when individuals attach some form of benefit to physical activity, they are more likely to be self-determined and exercise regularly. It is possible the individuals in this study with higher levels of self-determination and motives of competence and fitness also received more enjoyment from physical activity, which contributed to their persistence.

Relationship Between Exercise and Life Satisfaction

In Chapters 1 and 2, I discussed extant research supporting the benefits of exercise. Although not the primary focus on the present study, I was interested in knowing if the amount of exercise had any benefits for the sample of adults with spina bifida and thus included a life satisfaction item in the survey. Data analysis showed that exercise does, in fact, predict life satisfaction. This finding adds to accumulating evidence found in the literature (Magnusdottiri, 2017; Maher et al., 2013; Maher, Doerksen, Elavsky, & Conroy, 2014; Moreno-Murcia, Marcos-Pardo, & Huéscar, 2016) on the relevance of exercising in evaluating positive outcomes. For example, Maher et al. (2013) measured life satisfaction and physical activity by having participants keep a daily journal. The findings showed individuals' evaluated their satisfaction with life higher on days of greater physical activity. Furthermore, Maher et al. (2013) identified an interaction with age, with a stronger relationship between life satisfaction and physical exercise for older participants.

The aforementioned studies, however, involved participants without any physical disabilities. Exercise in relation to life satisfaction has not received significant study among individuals with spina bifida. Thus, it was important to expand the knowledge base on exercise and life satisfaction among this population. The more individuals engage in exercise, the greater their reported levels of life satisfaction. Physical activity helps to reduce life stress and strengthen feelings of well-being (Jennen & Uhlenbruck, 2004). Also possible is that motivational factors are involved in this relationship. Schneider and

Kwan (2013), for example, showed that self-determined motivation was related to better mental health, including satisfaction with life.

Gender also predicted life satisfaction in the present sample of adults with spina bifida, with female participants reporting higher levels of life satisfaction. Many researchers have identified a relationship between gender and life satisfaction (e.g., Checa, Perales, & Espejo, 2019), findings have often been nonsignificant (e.g., Jovanović, Joshanloo, Đunda, & Bakhshi, 2017). In a recent study combining data from 150 countries, Joshanloo (2018) found no significant gender differences in life satisfaction, thus supporting the gender similarities hypothesis. Interestingly, the same study showed that the relationship between gender and life satisfaction likely moderated by other variables, such as employment, education, and social support. Joshanloo included samples from the general population, with no information on ability/disability status. It is possible the variables that predict life satisfaction are different between the general and spina bifida populations. However, taking into consideration the significant gender disparity in the present study (i.e., very few men), caution should accompany interpretations.

Life satisfaction can be the result of positive experiences that motivate people to pursue and reach their goals. This study showed that exercise self-efficacy predicted life satisfaction, a finding congruent with prior studies (e.g., Cijsouw, Adriaansen, Tepper, Dijkstra, & Van Linden, 2017; Kobelt, Langdon, & Jönsson, 2018). Self-assured individuals believe they can engage in exercise across different challenging situations (Bölenius, Lämås, Sandman, Lindkvist, & Edvardsson, 2019), despite the severity of their disability. In a study of 100 individuals with spinal cord injuries, Hampton (2000) found exercise self-efficacy was related to life satisfaction. People with high physical activity self-efficacy perceived themselves as agents of their own health, which allows them to engage in positive, health-related behavior. Individuals with high self-efficacy either have or view themselves as having more opportunities, which positively influences their life satisfaction. According to Celik and Kocak (2018), high exercise self-efficacy promotes growth and skill development; in turn, individuals are happier and less focused on the negative aspects of their lives, thus leading to greater life satisfaction.

This study also showed that perceptions of social support predicted life satisfaction, a finding supported by other researchers (e.g., Altay, Çavuşoğlu, & Çal, 2016; Arpacı, Tokyürek, & Bilgili, 2015; Şahin, Özer, & Yanardağ, 2019). Social support enables a person to feel cared for, valued, and part of a network of communication and mutual obligation from family, friends, coworkers, neighbors, and others. It is essential to identify the perceived social support as well as who can provide encouragement to assist in the individual's overall satisfaction of life. Individuals who socialize with others and make friends may have a higher level of life satisfaction compared to those who refrain from establishing meaningful social relationships (Dumitrache, Rubio, & Rubio-Herrera, 2018). Life satisfaction perhaps comprises many different dimensions for different individuals at different stages of life; in other words, a person may need a social network to pass through life's stages.

Limitations of the Study

Notwithstanding the contributions of the present study, several limitations are apparent. The primary limitation is the inability to generalize the results of this study to the general population of adults with spina bifida. Due to participant recruitment from SBAA social network sites, the generalization of results is limited to members of this organization. Participants needed to be between the ages of 18 to 64 years, which excluded individuals younger than 18 or older than 64. The sample included significantly more female participants than male, a significant shortcoming that limits gender comparison and possible inferences. Data collection occurred within a week due to the rapid responses of participants. The study could have provided more equitable gender representation had the survey remained open for prospective male participants for several weeks.

The current study was a quantitative cross-sectional correlational survey design, which precludes inferring causality (Rohrer, 2018). Causality inferences are not possible in cross-sectional surveys, as they are with experimental and quasi-experimental designs (Rohrer, 2018). Thus, the findings of the present study can only show the association of the relevant variables. Furthermore, self-report measures are susceptible to social desirability bias, by which participants alter their responses to appear in a better light to the researcher (impression management) and to themselves (self-deception; Paulhus, 1984). Similarly, it is possible that participants inferred the researcher’s intent and modified their responses to confirm the hypothesis. Finally, measuring satisfaction with life with only one item limited the validity and reliability of this finding. However, as the inclusion of the life satisfaction variable was exploratory, future researchers should include full-scale scores to assess this and other variables.

Recommendations for Further Study

Although predictors of exercise have received extensive study among the general population, researchers had not explored the relationship of these variables on adults with spina bifida. With this study, I was the first to explore both exercise and life satisfaction factors as they relate to adults diagnosed with spina bifida. Scholars can build upon the results of this study to conduct further scholarly inquiry into the spina bifida community.

Researchers could extend the range of exercise predictors on adults with spina bifida. Future scholars could use the objective measurement devices, such as accelerometers or pedometers, to validate self-reports of exercise (Noah, Spierer, Jialu Gu, & Bronner, 2013; Rhudy & Mahoney, 2018). Because the present study included more female participants than male, additional inquiry is needed to assess the relationship between gender, exercise, and life satisfaction. The role of gender is an ongoing debate among scholars. In this regard, studies should include potential confounds in the relationship between gender and exercise. It is possible that men and women exercise based on different motivations.

Also necessary is research on factors mediating the relationship between age and exercise among individuals with spina bifida. Researchers could expand participants' age ranges to include adults over 64 years old. Fourth, more qualitative research would indicate why people with spina bifida choose to or not to participate in exercise. Future scholars could explore if motivational factors differ based on the specific physical disability. Researchers should consider more robust research designs, such as experimental and quasi-experimental. In addition, longitudinal studies may assist in understanding if the relationship between motivation and exercise changes over time.

Implications

With this study, I sought to understand the factors that contribute to exercise among individuals with spina bifida. In addition, I explored exercise as one of several factors associated with higher levels of satisfaction with life. In this section, I discuss the clinical and social change implications of the study's findings.

Clinical Practice

Health care professionals, including psychologists, social workers, mental health counselors, nurses, and physicians, come into contact with and provide care for adults with spina bifida. The main goal of these providers is to increase the health and well-being of individuals in this population. Therefore, it is worth considering how the results from the present study assist these professionals in better understanding the needs of adults with spina bifida.

First, the study's findings contribute to shifting cultural and social attitudes in viewing exercise as a relevant therapeutic strategy for individuals with spina bifida. Similar to persons with other physical disabilities, individuals with spina bifida may find themselves stigmatized as being incapable of regular exercise and other physical activities. Interestingly, this study showed that exercise contributed to increased life satisfaction, with levels of physical activity associated with exercise self-efficacy, self-determination, competence and fitness motives, and age. Based on self-determination theory and the results of this study, health care providers working with individuals with spina bifida should perhaps encourage this population to incorporate regular exercise into their schedules, thus increasing the patients’ self-efficacy and self-determination.

The findings in this study indicate that agency policies and funding should incorporate alternative methods, programs, and psychotherapeutic interventions to support the motivation of individuals with spina bifida in their short- and long-term exercise goals. Mental health professionals might want to include information on exercise in their intake paperwork, screening measures, and treatment plans and thus promote fitness and overall life and health satisfaction among individuals with spina bifida. Clinicians, physical therapists, and physicians could use the results of this study to develop workshops, webinars, and formal training, incorporating concepts and sociodemographics, such as self-efficacy, self-determination, age, social support, and competence and fitness motivation related to exercise and life satisfaction among individuals with spina bifida.

Social Change

Walden University (2020) defines social change as “a deliberate process of creating and applying ideas, strategies, and actions to promote the development of individuals, communities, organizations, institutions, cultures, and societies” (p. 1). Positive social change results from a positive vision and a strength-based approach. The results from this study will assist psychologists, behavioral scientists, and health care policymakers in implementing social change by understanding various motives and other psychological variables associated with exercise and life satisfaction. Findings may contribute to future research, whether quantitative, qualitative, or mixed-methods. The significant findings in this study should motivate and encourage scholars to conduct additional studies of this population as well as individuals with other physical disabilities.

Findings from this study could lead to positive social change by challenging negative attitudes and stereotypes regarding people with physical disabilities. People often perceive individuals with disabilities, and those with spina bifida specifically, as physically incompetent (Dionne et al., 2013). The stereotypes associated with a lack of physical ability for individuals with disabilities might influence how practitioners interact with this population. This stigma could also adversely affect the self-efficacy and self-determination of individuals with spina bifida. Effecting social change in the lives of this stigmatized population entails adopting a mindset in which physical activity, self-efficacy, and self-determination are an integral part of a healthy lifestyle for individuals with disabilities. Such an approach might contribute to decreased rates of cancer, obesity, cardiovascular disease, and diabetes and improved life satisfaction. Behavioral health clinicians, local agencies, support groups, and organizations working with the population of individuals with spina bifida should emphasize promoting healthy living. One way of encouraging health actions is to advocate for lifestyle changes to include increased physical activity. Therefore, the results of this study have the potential to effect positive social change by encouraging interventions to boost exercise and overall life satisfaction among the spina bifida community.

Conclusion

Researchers have consistently identified exercise as a powerful component of physical and psychological health, well-being, and quality of life. The specific way to motivate individuals to exercise, however, is less clear. To address this issue, I conducted this study to identify motivational factors that contribute to exercise and life satisfaction. The results of this research showed the predictors of exercise and life satisfaction in adults with spina bifida. Self-determination theory (Deci & Ryan, 1985) was an appropriate framework for understanding the relationship between psychological motivates and physical activity specific to exercise self-efficacy and self-determination. Individuals with high levels of these psychological variables are likely to exercise more based on feelings of autonomy associated with being in control of their physical activities.

I hypothesized that gender would also predict exercise; however, that was not the case. Sampling discrepancies likely contributed to this nonsignificant finding, as significantly more women than men completed the survey. Interestingly, the findings indicated several variables that, although not included in the main hypothesis, merit further consideration. Age and the competence and fitness scales emerged as predictors of physical activity. Findings from this study also showed that physical activity, gender, exercise self-efficacy, and perception of social support contributed to life satisfaction.

Based on these findings, practitioners interested in motivating their spina bifida patients to exercise may wish to stress the role of autonomous control over patients' physical activity routine. Although self-efficacy and self-determination might affect exercise, the correlational nature of the study does not allow such inference. Furthermore, it is quite feasible that exercise contributes to self-efficacy and self-determination—in other words, that increased levels of self-efficacy and self-determination are a psychological consequence of physical activity. As such, even if individuals initially exercise because of external motives, they might sustain activity due to intrinsically driven factors, internalizing the benefits of exercise over time. This supposition might also explain why older adults are more physically active than their younger counterparts.

Results from this study have implications beyond the individual and clinical levels of analysis. Knowledge based on this study has the potential to effect social change by reducing stereotypes about people with physical disabilities as being physically inactive. Practitioners should continue to assess physical activity patterns among all adults, refer to appropriate programs, advocate, and provide counseling on exercise. Future researchers can contribute a better understanding of the diverse and unique needs of people with physical disabilities. With these findings, scholars and clinicians can extend future inquiry to the predictors of exercise and life satisfaction among the spina bifida community.

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Appendix A: Permission to Use Scales

RE: Requesting permission
Professor A
Thu 9/12/2019 12:45 PM

Tasha,

You have my full support to use the MPAM in your study. It sounds like an important study addressing motives in an understudied population.

Good Luck!

Professor A

____

RE: Requesting permission to use the Physical Activity and Disability Scale (PADS)
Professor B
Mon 7/29/2019 8:04 AM

Hi Tasha,

Many thanks for touching base. You are welcome to use this scale for your research purposes. Please find attached relevant documents (including supplementary files which are referred to in the main paper) in case that is helpful.

I look forward to seeing how your research progresses.

With best wishes,

Professor B

____

RE: Requesting permission
Professor C
Sat 7/6/2019 4:42 PM

Dear Tasha,

Apologies for taking so long to reply. You are welcome to use any of the measures on the site.

Good luck with your research,
Professor C

SCI Exercise Self-Efficacy Scale

PsycTESTS Citation:
Kroll,T., Kehn, M., Ho, P.-S., & Groah, S. (2007). SCI Exercise Self-Efficacy Scale [Database record]. Retrieved from PsycTESTS. doi:https://dx.doi.org/10.1037/t67819-000

Instrument Type:
Rating Scale

Test Format:
The scale instructs respondents to indicate on the 4-point rating scale (1=not at all true, 2=rarely true, 3=moderately true, 4=always true) how confident they are with regard to carrying out regular physical activities and exercise.

Source:
Reproduced by permission from Kroll, Thilo, Kehn, Matthew, Ho, Pei-Shu, & Groah, Suzanne. (2007). The SCI Exercise Self-Efficacy Scale (ESES): Development and Psychometric properties. The International Journal of Behavioral Nutrition and Physical Activity, Vol 4.

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Appendix B: Sociodemographic Survey

- How old are you? (write in number of years) ________

- What is your gender? (circle your selection)
    1. Male
    2. Female

- What is your marital status? (circle your selection)
    1. Single
    2. In a relationship
    3. Married
    4. Divorced

- How would you rate the severity of your spina bifida disability?
    1. Mild
    2. Moderate
    3. Severe
    4. Very severe

- I feel supported by my family.
    1. Strongly disagree
    2. Disagree
    3. Agree
    4. Strongly agree

- I feel supported by my friends.
    1. Strongly disagree
    2. Disagree
    3. Agree
    4. Strongly agree

- I am satisfied with my life
    1. Strongly disagree
    2. Disagree
    3. Agree
    4. Strongly agree

Appendix C: SCI-ESES

Spinal Cord Injury Exercise Self-Efficacy Scale

ESES Rating Scale:

1 = not always true

2 = rarely true

3 = moderately true

4 = always true

I am confident….	**Rating:**
1) that I can overcome barriers and challenges with regard to physical activity and exercise if I try hard enough	1 2 3 4
2) that I can find means and ways to be physically active and exercise	1 2 3 4
3) that I can accomplish my physical activity and exercise goals that I set	1 2 3 4
4) that when I am confronted with a barrier to physical activity or exercise, I can find several solutions to overcome this barrier	1 2 3 4
5) that I can be physically active or exercise even when I am tired	1 2 3 4
6) that I can be physically active or exercise even when I am feeling depressed	1 2 3 4
7) that I can be physically active or exercise even without the support of my family or friends	1 2 3 4
8) that I can be physically active or exercise without the help of a therapist or trainer	1 2 3 4
9) that I can motivate myself to start being physically active or exercising again after I’ve stopped for a while	1 2 3 4
10) that I can be physically active or exercise even if I had no access to a gym, exercise, training or rehabilitation facility	1 2 3 4

Sum: ___________________

Appendix D: BREQ-2

Behavioral Regulations in Exercise Questionnaire-2

WHY DO YOU ENGAGE IN EXERCISE?

We are interested in the reasons underlying peoples' decisions to engage, or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

		Not true for me		**Sometimes true for me**		**Very true for me**
1	I exercise because other people say I should	0	1	2	3	4
2	I feel guilty when I don't exercise	0	1	2	3	4
3	I value the benefits of exercise	0	1	2	3	4
4	I exercise because it's fun	0	1	2	3	4
5	I don't see why I should have to exercise	0	1	2	3	4
6	I take part in exercise because my friends/family/partner say I should	0	1	2	3	4
7	I feel ashamed when I miss an exercise session	0	1	2	3	4
8	It's important to me to exercise regularly	0	1	2	3	4
9	I can't see why I should bother exercising	0	1	2	3	4

		Not true for me		Sometimes true for me		Very true for me
10	I enjoy my exercise sessions	0	1	2	3	4
11	I exercise because others will not be pleased with me if I don’t	0	1	2	3	4
12	I don’t see the point in exercising	0	1	2	3	4
13	I feel like a failure when I haven’t exercised in a while	0	1	2	3	4
14	I think it is important to make the effort to exercise regularly	0	1	2	3	4
15	I find exercise a pleasurable activity	0	1	2	3	4
16	I feel under pressure from my friends/family to exercise	0	1	2	3	4
17	I get restless if I don’t exercise regularly	0	1	2	3	4
18	I get pleasure and satisfaction from participating in exercise	0	1	2	3	4
19	I think exercising is a waste of time	0	1	2	3	4

Appendix E: MPAM-R

Motives for Physical Activity Measure-Revised

The following is a list of reasons why people engage in physical activity/sport. Please respond to each question (using the scale given) based on how true the response is for you.

1	2	3
Not at all true for me	Sometimes true for me	Very true for m

1. Because I want to be physically fit.
2. Because it's fun.
3. Because I like engaging in activities which physically challenge me.
4. Because I want to obtain new skills.
5. Because I want to look or maintain weight so I look better.
6. Because I want to be with my friends.
7. Because I like to do this activity.
8. Because I want to improve existing skills.
9. Because I like the challenge.
10. Because I want to define my muscles so I look better.
11. Because it makes me happy.
12. Because I want to keep up my current skill level.
13. Because I want to have more energy.
14. Because I like activities which are physically challenging.
15. Because I like to be with others who are interested in this activity.
16. Because I want to improve my cardiovascular fitness.
17. Because I want to improve my appearance.
18. Because I think it's interesting.
19. Because I want to maintain my physical strength to live a healthy life.
20. Because I want to be attractive to others.
21. Because I want to meet new people.
22. Because I enjoy this activity.
23. Because I want to maintain my physical health and well-being.
24. Because I want to improve my body shape.
25. Because I want to get better at my activity.
26. Because I find this activity stimulating.

27. Because I will feel physically unattractive if I don’t.
28. Because my friends want me to.
29. Because I like the excitement of participation.
30. Because I enjoy spending time with others doing this activity.

Thank you for taking part in the research

Appendix F: PADS-R

The Physical Activity Disability Survey-Revised

This questionnaire asks you questions about the types of **exercise** and **physical activities** you participated in over the **last week** and the time you spent doing these activities.

If you compared the activities you took part in over the **last week** to the activities you would take part in on a **typical week**, would you say you did (please circle):

Much less than usual	Less than usual	About the same as usual	More than usual	Much more than usual
1	2	3	4	5

1. EXERCISE

Did you exercise in the **last week**? Exercise is any activity you do on a regular basis for the primary purpose of increasing or maintaining fitness. Please note: this does not include activities you do for leisure or recreation.

YES		NO	

If NO, please go to question 2

If YES, what kind of exercise did you do?

Please list the exercise activities below that you did in the **last week** for the primary purpose of maintaining or improving your health and fitness. For each activity, indicate the activity type and intensity (using the keys below), how many days per week you did the activity, and how many minutes per day.

Activity types

A = Aerobic Exercise (aerobic activities are those exercises done for a sustained period of time that result in an increase in your heart rate and breathing rate, e.g., walking, jogging, attending an aerobics class, bicycling, etc.)
S = Strength Exercise (strength activities, e.g., lifting weights or using elastic bands or weight training machines, pilates, core body strengthening & stability, tai chi, etc.)
F = Flexibility Exercise (flexibility refers to activities that involve muscle stretching, e.g., yoga, etc.)

Intensity

L = Light activities - don't sweat or breathe heavily
M = Moderate activities - breathe a little harder and may sweat
V = Vigorous activities - breathe hard and sweat

Activity Type (A, S or F)	Activity	Days/ Week	Minutes/ Day	Intensity (L, M or V)

	Light	*Moderate*	*Vigorous*
Flexibility	*1*	*2*	*4*
Strength	*2*	*4*	*8*
Aerobic	*3*	*6*	*12*

Exercise Matrix

Activity Score (for each activity listed) = Days/week x Minutes/day x Exercise Matrix Score Total Exercise Score = sum of all Activity Scores

***SCORE 1** = ln(Total Exercise Score/60)+0.1)*

2. LEISURE TIME PHYSICAL ACTIVITY

Did you participate in any sports, recreational, or leisure time activities in the **last week**? These activities may not necessarily result in sustained increases in heart rate and breathing rate. Examples include hiking, boating, skiing, dancing, bowling, and sports activities.

YES		NO	

If NO, please go to question 3

If YES, what type of activities did you do?

Please list **the leisure time physical activities** below that you did in the **last week** for leisure or recreation. For each activity, indicate the activity type and intensity (using the keys below), how many days per week you did the activity, and how many minutes per day. **Do not list activities here that you have already listed previously in this questionnaire.**

Activity types

E = Endurance (endurance activities are leisure-time physical activities that you maintain for a sustained period of time that make you sweat and breathe a little harder than usual e.g., tramping/hiking, tennis, dancing, skiing, sports fishing, sexual activity, etc.)

NE = Non-Endurance (non-endurance activities are leisure-time physical activities that you might do in shorter bouts of activity and/or do not cause you to sweat and breathe a little harder e.g., boating, fishing by the jetty, bowling, etc.)

Intensity

L = Light activities - don't sweat or breathe heavily
M = Moderate activities - breathe a little harder and may sweat
V = Vigorous activities - breathe hard and sweat

Activity Type (E or NE)	Activity	Days/ Week	Minutes/ Day	Intensity (L, M or V)

	Light	*Moderate*	*Vigorous*
Non-endurance	*1*	*2*	*4*
Endurance	*2*	*4*	*8*

Leisure Time Physical Activity (LTPA) Matrix

Activity Score (for each activity listed) = Days/week x Minutes/day x LTPA Matrix Score

Total LTPA Score = sum of all Activity Scores

***SCORE 2** = ln(Total LTPA Score/60)+0.1)*

3. GENERAL ACTIVITY

3.1 From **Monday through Friday last week**, how many **waking hours a day** did you spend inside your home (please tick one)?

Less than 6 hours a day	4
6 to 8 hours a day	3
9 to 10 hours a day	2
11 to 12 hours a day	1
13 hours or more	0

3.1: *Less than 6 hours a day = 4*

6 to 8 hours a day = 3

9 to 10 hours a day = 2

11 to 12 hours a day = 1

13 hours or more = 0

3.2 On **Saturday and Sunday last week**, how many **waking hours a day** did you spend inside your home (please tick one)?

Less than 6 hours a day	4
6 to 8 hours a day	3
9 to 10 hours a day	2
11 to 12 hours a day	1
13 hours or more	0

3.2: *Less than 6 hours a day = 4*
6 to 8 hours a day = 3
9 to 10 hours a day = 2
11 to 12 hours a day = 1
13 hours or more = 0

***SCORE 3** = (3.1 + 3.2)/2*

3.3 During the **last week**, how many **hours a day** did you sleep, including naps?

	HOURS

3.4 During the **last week**, how many **hours a day** were you sitting or lying down (including work), but excluding sleeping?

	HOURS

***SCORE 4** = 24* **-** *(3.3 + 3.4)*

3.5 During the **last week,** did you do any **indoor** household activities, such as cleaning, food preparation, childcare activities, etc?

YES		NO	

If NO, please go to question 3.6

If **YES,** please list all the **indoor** activities that required some **physical activity** (e.g., cleaning, hanging washing, food preparation, etc.) that you did in the **last week.** Please also include here any physical activities you did as a part of your role as caregiver (e.g., parenting activities). For each activity, indicate how many days per week you did the activity and how many minutes per day. **Do not list activities here that you have already listed previously in this questionnaire.**

Activity	**Days/Week**	**Minutes/Day**

Activity Score (for each activity listed) = Days/week x Minutes/day

Indoor Activity Score = sum of all Activity Scores
***SCORE 5** = ln(Indoor Activity Score/60)+0.1)*

3.6 During the **last week** did you do any **outdoor** household activities, such as gardening, walking to and from shops, etc?

YES		NO	

If NO, please go to question 3.7
If **YES,** please list all the **outdoor** activities that required some **physical activity** (e.g., gardening, mowing lawns, walking to shops) that you did in the **last week**. For each activity, indicate how many days per week you did the activity and how many minutes per day. **Do not list activities here that you have already listed previously in this questionnaire.**

Activity	Days/Week	Minutes/Day

Activity Score (for each activity listed) = Days/week x Minutes/day
Outdoor Activity Score = sum of all Activity Scores

***SCORE 6** = ln(Outdoor Activity Score/60)+0.1)*

3.7 During the **last week,** did you climb any stairs at home?

YES		NO	

If NO, please go to question 3.8

3.7a If **YES,** how many flights of stairs do you have at home (one flight of stairs is 5-10 steps)?

	FLIGHTS

3.7b If **YES,** how many times a day did you climb these stairs in the **last week**?

	TIMES A DAY

Total Flights = 3.7a x 3.7b

***SCORE 7**:*	*No flights =*	*0*
	1-6 flights/day =	*1*
	7-10 flights/day =	*2*
	11+ flights/day =	*3*

3.8 How much assistance do you need to perform activities of daily living, such as dressing and bathing (please tick one)?

Without assistance	2
Some assistance	1
Full assistance	0

***SCORE 8**:*	*Without assistance =*	*2*
	Some assistance =	*1*
	Full assistance =	*0*

4. THERAPY

During the **last week,** did you receive physiotherapy or occupational therapy or another type of therapy that involves physical activity? **If you have already listed therapy-related activities previously in this questionnaire, DO NOT complete this section.**

YES		NO	

If NO, please go to question 5

How many days a week did you receive a therapy that involved physical activity in the **last week**?

	DAYS/WEEK

How long did each activity-based therapy session last?

	MINUTES

SCORE 9*:*	*No therapy =*	*0*
	1 session/week =	*1*
	2+ sessions/week =	*2*

5. EMPLOYMENT/SCHOOL

Are you currently employed, participate in any volunteer work, or do you attend school?

Employed/Attend School/Volunteer Work	
Not employed/Do not attend school/ Do not do any volunteer work	
Retired	

If you are NOT EMPLOYED, DO NOT ATTEND SCHOOL, DO NOT DO ANY VOLUNTEER WORK, or ARE RETIRED, please go to question 6

5.1 For most of your work/school day, do you:

Move around	2
Stand	1
Sit	0

***SCORE 10*:**	*Move around =*	*2*
	Stand =	*1*
	Sit =	*0*
	Not employed =	*0*

5.2 During the **last week** did you climb any stairs whilst at work/school?

YES		NO	

If NO, please go to question 5.3

5.2a If **YES,** how many flights of stairs do you have at work/school (one flight of stairs is 5-10 steps)?

	FLIGHTS

5.2b If **YES,** how many times a day did you climb these stairs in the **last week**?

	TIMES A DAY

Total Flights = 5.2a x 5.2b

SCORE 11:	*Not employed =*	*0*
	No flights =	*0*
	1-6 flights/day =	*1*
	7-10 flights/day =	*2*
	11+ flights/day =	*3*

5.3 During the **last week,** did you get any **physical activity** in your transportation to and from work/school (e.g., walking to work)?

YES		NO	

If NO, please go to question 6

If **YES**, please list all the transportation physical activity you did in the **last week** (e.g., walking or wheeling a wheelchair to and from work). For each activity, indicate how many days per week you did the activity and how many minutes per day. **Do not list activities here that you have already listed previously in this questionnaire.**

Activity	Days/Week	Minutes/Day

Activity Score (for each activity listed) = Days/week x Minutes/day

Transport Activity score = sum of all Activity Scores

SCORE 12 *= Not employed = 0*

No transport activity = 0
1 to 60 minutes/week = 1

61+ minutes/week = 2

6. WHEELCHAIR USERS

During the last week, did you use a wheelchair?

YES		NO	

If NO, stop this questionnaire

If **YES**, during the time that you were awake, how much time a day did you spend in your wheelchair in the **last week** (please tick one)?

All day	
Most of the day	
A few hours	

What type of wheelchair did you primarily use in the **last week** (please tick one)?

Manual	
Power	

If POWER WHEELCHAIR, stop this questionnaire

If **MANUAL,** did you push your own wheelchair at any time during the **last week**?

YES		NO	

If NO, stop this questionnaire

If **YES**, on average, how many minutes a day did you push yourself in your wheelchair in the **last week**?

Less than 60 minutes	
60 minutes or more	