

PHYSICAL ACTIVITY AND QUALITY OF LIFE EXPERIENCED BY PARTICIPANTS OF  
A WHEELCHAIR BASKETBALL TOURNAMENT

By

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To my wife, Leah.

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Abstract of Thesis Presented to the Graduate School  
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Quality of life is a construct that has different meanings for researchers in various disciplines. Within the medical field, QOL is conceptualized as the presence or absence of symptoms while those in physical or occupational therapy might evaluate the ability to complete functional tasks of daily living. Within psychology researchers emphasize subjective assessments of well-being or happiness or how individuals interpret their own lives, goals, achievements, and subjective evaluations.

My study used a subjectively oriented approach to examine physical activity and subjective assessments of life quality with 26 individuals with physical disabilities. The participants completed the Physical Activity Scale for Individuals with Physical Disabilities (PASIPD) and a semi-structured interview focused on the physical activity experiences and the role those experiences played in their subjective evaluations of the participants' lives. The physical activity for persons with disability model and Dijkers' conceptualization of subjective quality of life served as sensitizing concepts during the analysis phase. Grounded theory analyses revealed that participants of a wheelchair basketball tournament perceived a number of psychological, social, and health benefits associated with physical activity involvement. These

experiences in turn allowed the participants to develop self-efficacy beliefs and expectations that facilitated future involvement in their chosen physical activities. By all accounts the participants in this sample were generally very active and appeared to experience subjective well-being.

## CHAPTER 1 INTRODUCTION

In recent years there has been increased focus on the importance of quality living (Hays, Hahn, & Marshall, 2002; Ware, 2000). In fact, an informal search of Medline (Pubmed) data base using the search terms “quality-of-life” (QOL) resulted in 65,522 hits involving all publications focused on human beings while an identical search on the Psychinfo data base resulted in 13,506 publications. This research attention is justified because quality-of-life is an important predictor of diverse outcomes including physical and mental health, happiness at work and satisfaction in interpersonal relationships (Deiner, 2000).

In able-bodied samples, subjective well-being, a psychological construct related to subjective QOL, has been shown to be correlated to various specific domains in a person’s life (Rejeski & Mihalko, 2001). Variables such as age, education level, social class, income, marital status, employment, religion, leisure, life events, social skills, and health all can affect happiness, although most effects are small (Argyle, 1999). The strongest effects are seen from marriage, occupational status, leisure, health, and social skills. Others have suggested that since humans have an instinctual urge to belong, developing and maintaining close relationships with others plays a role in happiness (Myers, 1999). Additionally, it has been posited that when people report well-being, they will often compare themselves to others. The level of reported well-being may depend on whether comparisons were made to others who are better or worse off than the individual (Schwarz & Strack, 1999).

The focus of this thesis is on quality-of-life with individuals with physical disabilities. As will be shown there is a plethora of published studies focused on QOL with able-bodied individuals. However, only recently have researchers extended this line of inquiry to individuals with physical disabilities. Additionally, there is no one accepted definition of the QOL construct

and researchers have struggled to extend conceptual and theoretical frameworks to individuals with physical disabilities. In chapter one I will review important conceptual definitions in the QOL literature. This review will be followed by a discussion of theoretical frameworks of quality of life that are relevant to this thesis. This discussion will be followed by a review of literature and the rationale and specific purposes of this thesis. To begin however it is important to precisely characterize study population and offer specific definitions of what it means to be physically disabled.

### **Study Population**

There are an ever-increasing number of adults in the United States who have some form of disability. According to the United States Bureau of the Census the number of people who report disabling conditions is approximately 54 million while approximately 26 million report conditions that significantly impact one or more activities of daily living (McNeil, 1997). In addition, there are roughly 11,000 reported spinal cord related injuries each year (Spinal Cord Injury Information Network, 2003). With such large numbers of individuals who report disabling conditions it becomes important to precisely characterize what it means to be physically disabled.

The term disability can have several meanings. According to Mosby's Medical, Nursing, and Allied Health Dictionary (5<sup>th</sup> ed.), disability is the loss, absence, or impairment of physical or mental fitness. Impairment is defined as any negative change in function or structure that interfere with ordinary activities as a result of bodily or mental abnormalities. (Mosby's Dictionary, 1998). It may also be defined as when the physical capacity to move, coordinate movement, and perform physical activities is significantly impacted.

According to the World Health Organization, the terms impairment, disability, and handicap are distinctly different (Block, Griebenaaw, & Brodeur, 2004). Impairment refers to

any loss or abnormality of structure or function in the body. An individual with paralysis of the lower extremities would be considered to have an impairment. If that same person is prevented or restricted from executing a task or activity, or is otherwise functionally limited as a result of their impairment, they would be said to have a disability. This person would be considered to be handicapped if accommodations were not made in order to allow the person to live a normal life. For example, this individual would be handicapped if steps were not taken at the work place such as building ramps or making the restrooms wheelchair accessible.

Recently the term activity has replaced disability. Activity refers to the type and level of functioning displayed at the individual level. For instance it could refer to a person's ability to take care of him or herself, walking, or communicating (Hays et al., 2002). Also, the term handicap has been replaced by participation. Participation describes the level and degree of a person's involvement in life situations. An individual's level of participation can be affected by personal or environmental factors (Block, Griebenaauw, & Brodeur, 2004).

Types of disabilities vary from physical to developmental, congenital to acquired, and mild to severe. For example, an individual with multiple sclerosis is said to have a congenital physical disability because they are born with their disability. A common acquired physical disability is spinal cord injury, which may result, from among other things, a spinal tumor or a car accident. The focus of this thesis will be on patterns of physical activity and subjective QOL for individuals with physical disabilities who have either acquired their disability or were born with their condition.

### **Conceptual Issues in the Study of Quality of Life**

The definition of quality of life has undergone tremendous debate in recent years (Fayers, Hand, Bjordal, & Groenvold, 1997; Rejeski & Mihalko, 2001; Dijkers, 2005). At the broadest level, QOL researchers and theorists can be characterized by their focus. One group of

researchers would classify QOL as being the presence versus the absence of various disease states or symptoms (Fayers et al., 1997). For instance, an individual with terminal cancer and the inability to carry on tasks of daily living would be considered to have low QOL. Conversely someone who is relatively healthier would be classified as high QOL. This objective classification of QOL is called health-related QOL or “health status” and individuals in the medical community generally use these terms interchangeably and focus on the effects that illness or disability has on an individual’s ability to function independently (Rejeski & Mihalko, 2001).

According to Duggan and Dijkers (2001), the domains within health related QOL (HRQOL) encompass variables such as disease symptoms, treatment side effects, cognitive functioning, handicap, and impairments among others. In other words an individual who exhibits disease symptoms, or has a handicap would be thought to have low HRQOL. On the other hand, one would assume that someone with no observable symptoms, exhibiting no treatment side effects, and possessing no impairments, disabilities, or handicaps has a high HRQOL. From this perspective, most of the research conducted on HRQOL employs quantitative measures and one of the most utilized measures of health status is the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36; Ware, Kosinski, & Keller, 1994). As will be shown this perspective downplays an individuals’ subjective appraisal of their life situation and is therefore distinct from the way psychologists view this construct.

Another way quality of life is defined is through assessing an individual’s level of functioning. According to Kaplan (1994), quality of life can be objectively defined in terms of behavioral functioning. He called this idea the Ziggy Theorem, based on a cartoon that suggested that the meaning of life was “doin’ stuff” (Kaplan, 1994, p. 451). Placed in the

context of healthcare, Kaplan suggested that the goal of health professionals should not only be to extend people's lives, but also to make their lives worth living by maintaining each individual's ability to function. Kaplan gives the example of possible treatments for prostate cancer. In the past doctors would have aggressively treated the tumor with radiation or surgery. In many cases this could lead to impotency and incontinency, which may lead to decreased ability to function normally (Kaplan, 1994.) If the doctors applied the Ziggy Theorem, they would have taken the patient's preference into consideration, which might mean avoiding aggressive treatment.

In order to assess functioning and QOL, Kaplan and Anderson developed the quality of well-being scale (QWB; Kaplan & Anderson, 1988.) The QWB scale assesses well-being at a specific time point so the patient is giving their health status for one particular day. This instrument classifies functioning on scales of mobility, physical activity, and social activity. Additionally, the QWB scale contains a list of possible symptoms that a patient can choose from as the most undesirable for them (Kaplan, 1994). Once a patient has been classified in an observable health state the next step is to place them on a scale of wellness from 0-1.0 (with 0 indicating death and 1.0 indicating good health with no symptoms). In order to achieve this, the health states are weighted according to ratings obtained from human value studies. These weights provide quantification for the relevant importance of "doin' stuff" (Kaplan, 1994).

The final piece of the puzzle in the Ziggy Theorem is the duration in a particular state of health. One year in a state of health that has been assigned a weight of 0.5 is equivalent to one half of a quality adjusted life year (QALY). Basically the QWB scale takes a rating of well-being from a specific point in time and applies it to a longer duration of time assuming that the individual will remain in that health state for the longer duration. Conceptually, one QALY

equals one year of life without any functional limitations related to health. When applied correctly the QWB scale should quantify medical treatment or health activities in terms of how many QALYs it generates or retains.

A third group of QOL researchers would define QOL based upon subjective indicators. For instance, mainstream psychologists have defined quality of life as “a conscious judgment of satisfaction with one’s life” (Rejeski & Mihalko, 2001, p. 23). From this perspective one’s judgment of their quality of life is based largely on one’s values and experiences and is entirely subjective. Many authors have used subjective indices of quality of life interchangeably with terms such as subjective well-being, affect, and happiness (Berger & Motl, 2001). For instance, Duggan and Dijkers (2001) stated that an individual’s objective characteristics do not always correspond with their subjective experience. They conceptualized subjective QOL as how well a person’s expectations coincide with their achievements or one’s level of satisfaction with these expectancies. Therefore, if someone’s reality falls short of his or her dreams or goals, they will have a negative emotional and cognitive reaction and therefore be less satisfied with their quality of life. If there is congruence between one’s goals and achievements, they will react more positively and experience increased life satisfaction. These authors make the assumption that, if there is a gap between expectations and achievement, the individual will try to bring a balance between the two by changing their objective circumstance, or adjusting their expectations (Duggan & Dijkers, 2001). For example, a person with a physical disability may be unable to perform certain tasks such as bed transfers. This may have a negative impact on their quality of life. In order to increase subjective QOL they can adjust their expectations and consider the ability to perform a bed transfer less important than other tasks that they are able to complete. An alternative would be to change their circumstance so that they can perform a bed transfer.

This could be done by increasing muscular strength in their upper body, so that they can lift themselves out of their chair with greater ease.

An individual who is assessing his or her own subjective QOL may use an internal or external benchmark for comparison. A person may have a well-developed notion of how they feel their life should unfold and they might have established a timetable for certain major life events to occur. This timeline may serve as an internal benchmark from which assessments about subjective QOL can be made. They may have decided they would be married by age 25 and start a family by age 30. If these events do not occur as expected as a result of their disability, they will more than likely assess their subjective QOL lower than if events occurred the way they wanted them to. Persons with physical disabilities may use able-bodied individuals, other individuals with the same disability, or others with a different disability as their external benchmark (Duggan & Dijkers, 2001).

Overall, Duggan and Dijkers' (2001) concept of subjective QOL can be divided into three components. Those three components are achievements, expectations, and evaluations. The achievement component has been the focus of objective QOL research, with attention paid to marital status, number of days restricted from activity, income level, physical capabilities, etc. Researchers employing the subjective definition have previously only highlighted the subjective reactions, or evaluations. Evaluations can include satisfaction with marriage, happiness, self-esteem, depression, etc (Duggan & Dijkers, 2001). These authors' concept of subjective QOL is among the first to include expectations along with achievements and evaluations. Expectations are defined as goals, values, desires, aspirations, or any other variable that may affect how achievements are evaluated. For instance, an individual's evaluation of their income level will

likely be influenced by the value they place on wealth or possessions. If they place a high value on wealth, then their lack of it may be evaluated negatively.

Diener's (1984) theory of subjective well-being is similar to the subjective definition of quality of life. In fact, using a benchmark for comparison, whether internal or external, would be considered a cognitive judgment of one's life. This would constitute the life satisfaction component of subjective well-being (Diener, 1984). Additionally, one trademark of subjective well-being is that it revolves around an individual's own beliefs on what they feel is important to their happiness, not what the researcher determines is important (Diener, Emmons, Larsen, & Griffin, 1985).

The subjective approach to quality of life allows the individual to appraise their quality of life both emotionally and cognitively. That is to say, a person may feel happy and be able to tell him or herself that the circumstances of their life are great, when someone else may view those same circumstances as undesirable. Each individual takes into account their own experiences, thoughts, and emotions when rating their quality of life. Specifically, for individuals with disabilities, the subjective definition allows them to place importance on achievable goals and their own expectations of what the "good life" should be like while de-emphasizing goals that are unattainable, other peoples' views, and societal expectations.

It is difficult to say which definition most adequately describes the QOL construct for individuals with disabilities. Intuitively it seems obvious that level of functioning would play an important role in quality of life for this population. It could be argued that the ability to provide oneself with basic care, perform the tasks of everyday living, and be physically active figure heavily into how a person rates their life quality. While the ability to perform those tasks would not necessarily guarantee that someone views their life positively, the inability to perform those

tasks should have stark negative effect on how a person views their quality of life. For persons with physical disabilities, improvements in their ability to function and perform basic living tasks could have beneficial consequences for their quality of life.

Based upon this line of reasoning, adopting or integrating the subjective well-being and level of functioning conceptual approaches to quality of life may be appropriate to fully capture the experience of individuals with disabilities. Lower levels of functioning may be associated with lower levels of QOL, but only if the individual feels that performing daily living tasks is important to their happiness. For these reasons, I will adopt a definition of QOL that includes level of functioning as well as subjective indicators for this thesis. Throughout this thesis I will continue to use the terms and concepts adopted by particular researchers who study quality of life from the various disciplines previously described. However, when referring to this concept in reference to data from my participants I will refer to this construct as subjective quality of life (SQL) because this term reflects the conceptual and methodological approach adopted here.

### **Theoretical Models of Quality of Life for Individuals with Physical Disabilities**

In the following section I will review theoretical frameworks that are relevant to this study. These frameworks seek to integrate individual differences in disability with relevant socio/environmental variables in an effort to explain choices in behaviors. The first framework is the international classification of functioning, disability and health (ICF) model (World Health Organization, 2001). The next model discussed will be the attitudes, social influences, and self-efficacy model (ASE; De Vries, Dijkstra, & Kuhlman, 1988), which attempted to predict health behaviors by determining the attitudes, social influence, and self-efficacy towards those behaviors. Finally, I will explain the physical activity and disability model (PAD), which combines the framework of the ICF model with themes from the ASE model (van der Ploeg, van der Beek, van der Woude, & van Mechelen, 2004).

The ICF model is used as a tool in rehabilitation medicine and research as well as for health, educational, and social policy (Stucki, 2005). It was developed and endorsed by the 54<sup>th</sup> World Health Assembly in May 2001 (Stucki, 2005). The original intent of the ICF model was to provide a unified language for classifying health domains and organizing information on health status, with the ultimate goal of providing a common framework to measure health outcomes (Stucki, 2005; Perenboom & Chorus, 2003; van der Ploeg et al., 2004).

As shown in Figure 1-1, the ICF model views disability and functioning in the context of personal and environmental factors (Ustun, Chatterji, Bickenbach, Kostanjsek, & Schneider, 2003; van der Ploeg et al., 2004; Stucki, 2005). Van der Ploeg et al. (2004) suggested that the presence of the environmental and personal factors indicates that an individual's functioning is dynamic in that it can change depending on the environmental factors. To understand this changing relationship between functioning and environment, further explanation of the ICF model is necessary.

Contextual factors, such as environmental and personal factors, along with functioning and disability make up the two parts into which information is organized in the ICF model (Perenboom & Chorus, 2003). To begin, contextual factors can include environmental barriers such as a lack of ramps and personal factors such as education level. These factors play a role in individual's ability to function and the types of activities they choose to participate in. For instance, someone who has been educated on the health benefits of exercise and instructed how to perform specific exercises may be more likely to start an exercise program than someone who did not receive the same information. Additionally, if the place where the individual wants to exercise has ramps and is accessible, then the likelihood of that person following through on a program might be greater than if there were not an accessible facility.

As shown in the figure above, the functioning and disability element is broken down into three sections labeled body, activity, and participation. The body component concerns itself with body functions and structures. Impairment refers to a loss or deviation from normal body functions and structures (van der Ploeg et al., 2004). For example, a person would be considered to have impairment if they either lost a leg to amputation, or lost use of their leg due to paralysis. The activity component refers to the ability to perform a task one is functionally capable of doing and is distinct from the participation component, which refers to whether or not one chooses to play such activities. The participation portion of the ICF model refers to taking part in activities and may also include social behaviors. Likewise, the individual may be capable of executing a task, but their ability to perform that task in a social setting, such as wheelchair basketball, may be inhibited by environmental factors such as transportation to and from practice, cost of chair built for basketball, or simply the absence of a wheelchair basketball team in the community.

Environmental factors include social and physical settings as well as the attitudes of other people (van der Ploeg et al., 2004). The social environment can impact a person's functioning through infrastructure, which could include accessible sidewalks and buildings, laws and regulations that provide and maintain an accessible physical environment, and attitudes towards disability that can influence the kind of behavior is expected from an individual. An individual with a disability may exhibit higher functioning and participation if they live in an environment that is physically accessible and one in which they are encouraged to be active. On the other hand, if that individual lives in a place where they encounter physical barriers or are not expected to be active due to their disability, they will be at risk for lower functioning and participation.

The final dimension of the ICF model is personal factors. Personal factors can include demographic variables such as gender, race, age, and education as well as their coping style and

past experience (van der Ploeg et al., 2004). As has been mentioned before, there is a relationship between disability and functioning and contextual factors such as the environment and personal factors. Age is one personal factor that may have an impact on a person's functioning, as is lifestyle. An active individual who acquires an injury may decide to pursue an active lifestyle post-injury sooner than someone who was not active simply because they were active before their injury (Wu & Williams, 2001).

The ICF model is a broad and multidimensional tool that is used to assess health status in persons with and without disabilities. It has utility in rehabilitation settings as well as research. Clinicians can use this tool to assess the impact of disability on an individual's ability to function while researchers can use this model in order to provide results in a more uniform manner.

Another theoretical model is the physical activity for people with disability model (PAD; van der Ploeg et al., 2004). The PAD model combines the ICF framework with elements of the attitude, social influence and self efficacy model (ASE; De Vries, Dijkstra, & Kuhlman, 1988) to create a new model that shows which variables determine physical activity behavior of individuals with disabilities (van der Ploeg, 2004). In order to explain the PAD model, however, it is important to first discuss the ASE model and its framework.

The attitude, social influence, and self-efficacy (ASE) model, developed by De Vries and colleagues (1988), combines the self-efficacy element of social learning theory (Bandura, 1977) with the attitude and subjective norms constructs from the theory of reasoned action (Fishbein and Ajzen, 1975). These three psychosocial determinants of behavior are considered to be the most important (van der Ploeg et al., 2004). In the ASE model (See Figure 1-2), behavior results from intention to engage in a particular behavior. The intention towards a certain behavior is determined by a combination of self-efficacy, attitudes, and social influence towards a behavior

(De Vries et al., 1988). Self-efficacy towards a behavior refers to the confidence an individual has in their own ability to perform that behavior. For instance, if an individual with a disability was not confident they could push themselves a mile up steep terrain because he had never accomplished this task this person would be said to have low self-efficacy for that task. Their lack of self-efficacy would then lessen the intention to push themselves for a mile, and would ultimately determine whether or not they would perform that behavior. Additionally, attitudes towards behavior can affect intentions and engagement in a specific task and refer to what an individual thinks about a certain behavior for them. Using the example from above, if an individual with a disability thinks that pushing for a mile in their wheelchair is good for him because it provides exercise then that would strengthen his intentions and increase the likelihood of that behavior.

Finally, subjective norms, or social influence, also have an impact on behavior intentions. Subjective norms are often socially influenced and may include what family, friends, or doctors think about a certain behavior as well as how society regards that behavior. Physical activity for individuals with disabilities, for instance, has become more popular recently as old stigmas about disabled individuals have been shed. When an expectation exists for a specific behavior, whether it's smoking less or exercising more, then there is a better chance that an individual will be persuaded to engage in that behavior.

In the ASE model, external variables can also influence activity behavior. These variables are similar to personal factors in the ICF model, and can include age, gender, race and socio-economic status. Their influence on behavior can only occur through one or more of the three determinants of behavior listed above (van der Ploeg et al., 2004). The last part of the ASE model takes into account the presence or absence of barriers and skills. As with the ICF model,

barriers can consist of any obstruction in the environment or personal life, which limit the performance of a behavior. Skills can be conceptualized as actual control over a behavior and is different from perceived control, or self-efficacy (De Vries et al., 1988). For example, an individual might have high self-efficacy that they can push a mile in their wheelchair, but they may not have the physical strength or endurance required to do so.

In summary, the ASE model is a tool for determining behavior or behavior change. The authors took the self-efficacy component, borrowed from Social Learning theory (Bandura, 1977) and combined it with attitudes and subjective norms from Fishbein and Ajzen's (1975) theory of reasoned action (Fishbein and Ajzen, 1975; DeVries et al., 1988). This model has recently been adapted by van der Ploeg et al. (2004) and included in their PAD model, which will now be explained.

Van der Ploeg and colleagues first introduced the physical activity for people with a disability (PAD) model in 2004. Their goal was to develop a model that described how physical activity behavior, determinants of behavior, and functioning of persons with a disability were related (See Figure 1-3). They used the ICF model as a means of describing functioning and disability and combined it with elements of the ASE model that described factors that determined physical activity (van der Ploeg et al., 2004).

As was mentioned in the previous section, the ICF model has three levels of functioning consisting of body structures and function, activity and participation. The PAD model views physical activity within each of these domains, while at the same time, showing the benefits of physical activity at each level. Consider this example of an individual with paraplegia: having use of their upper body falls under the body structures and functions domain. Physical activity can result in improved muscle power in the upper body and increase cardiopulmonary function

as well (van der Ploeg et al., 2004). That in turn will make activities such as pushing a wheelchair easier. The participation domain is impacted by physical activity through improvements in functioning. According to the authors of the PAD model, improved functioning will result in better performance in real-life situations and in social situations (van der Ploeg et al., 2004).

Another similarity between the ICF and PAD models is the domain of environmental factors. The PAD model uses this domain differently from the ICF model in that the PAD model seeks to explain what environmental factors determine physical activity behavior. Social influence and environmental barriers and facilitators are the primary determinants of physical activity behavior within this domain (van der Ploeg et al., 2004).

There are some differences between how social influence works between able-bodied people and persons with disabilities. Family and friends are the primary source of social influence on physical activity for able-bodied individuals. Individuals with disabilities, however, are more likely to be influenced by health professionals (van der Ploeg et al., 2004). This difference is important because if a link between physical activity and quality of life is established and published in the future, such information will become available to health professionals who can then recommend exercise or other forms of physical activity to individuals with disabilities as a way to improve to their quality of life.

Barriers or facilitators in the environment can also impact physical activity behavior for individuals with disabilities. Barriers are those things in the environment that reduce the amount of physical activity behavior. They can range from poor transportation and a lack of accessible equipment to a lack of assistance, distress with physical activity with non-disabled individuals present, and season. Facilitators are often viewed as opposite to barriers and they typically

increase the amount of physical activity. Examples of environmental facilitators are an accessible park or gym nearby, access to the proper equipment, or knowing other physically active individuals (van der Ploeg et al., 2004).

Another determinant of physical activity behavior are personal factors. Personal factors encompass demographic, biological, cognitive, and behavioral variables. The PAD model shows those personal factors that are most important for persons with disabilities. For example, a person's health condition, or ability to function, is an important personal factor that affects physical activity. Other personal factors are intention to be active, self-efficacy, attitude, and barriers and facilitators (van der Ploeg et al., 2004).

As with the environment, there are personal barriers and facilitators to physical activity behavior as well. Personal barriers include a lack of time, money and energy as well as low motivation and a lack of skills. Facilitators would be having sufficient time, money, and energy to participate in physical activity.

According to the authors of the PAD model, intention is the most important determinant of physical activity (van der Ploeg et al., 2004). Activity will not occur if there is no intention to pursue it, however the intention to become physically active alone does not predict activity behavior. The factors listed above, such as self-efficacy, barriers and facilitators help determine whether intention leads to action. The PAD model's specific intention was to show the different variables that play a role in physical activity behavior for persons with disabilities (van der Ploeg et al., 2004). In addition, it attempted to describe how physical activity behavior, its determinants, and functioning in persons with disabilities may be potentially related. The authors of the model suggested that future research should aim to demonstrate the practicality

and external validity of the PAD model. Another important area of interest is determining the most important personal and environmental barriers and facilitators to physical activity.

The three models discussed thus far all play a role in the exploration of physical activity behaviors and functioning among persons with disabilities. The ICF model is a broad and multidimensional tool that is used to assess health status in persons with and without disabilities. Clinicians can use this tool to assess the impact of disability on an individual's ability to function. The ASE model provides a foundation for examining the determinants of physical activity behavior. The PAD model incorporates both of these models in order to look at the relationships that may exist between functioning, determinants of activity, and physical activity behavior (van der Ploeg et al., 2004).

In this thesis I will use the PAD model in order to explore physical activity behavior among individuals with disabilities. This model provides a framework that enables the researcher to examine the roles of body structure and function, along with environmental and personal factors to ascertain levels of activity and participation. To my knowledge, it is also the only theoretical model that attempts to explain exercise behavior specifically within the disabled population.

### **Empirical Studies on the QOL Construct**

In the following sections I will review empirical studies focused on quality of life for individuals with various populations. These studies are organized generally around contextual/environmental, personality, and cultural factors that impact the quality of life construct. Following this part of the review will be studies that focus more specifically on physical activity and quality of life.

In their study on individuals with traumatic brain injury and attitudes towards disability Snead and Davis (2002) defined quality of life as physical and mental health and operationalized

this construct using the Rand-36, which combines scales of physical health, mental health, and global health to measure quality of life (Hays, 1998). The participants were 22 men and 18 women, the majority of which had suffered either a traumatic brain injury (TBI) or a stroke. Their ages ranged from 20 to 66 with close to half living at home and the rest living with family, friends, or in community homes. Potential participants were excluded if they did not have the capacity to self-report. The participants completed surveys concerning attitudes towards disability, acceptance of disability, community integration and quality of life. Family members or other caregivers filled out surveys measuring functional independence and assessing function.

They found that better quality of life was positively related to greater acceptance of disability and a positive attitude towards disability. The authors also linked positive attitudes about oneself to more self-confidence and seeking out others' company as well as more active lifestyles (Snead & Davis, 2002). This is important because it suggests that encouraging individuals with TBI to have more positive attitudes about their disability may lead them to become more active.

Snead and Davis (2002) admitted they were limited in the fact that they could not determine which variables acted as catalysts for improving attitudes, acceptance, and quality of life. They suggested that qualitative research could improve understanding of how these attitudes are developed and influenced.

Differences in quality of life between individuals are predicted by several different factors (Berger & Motl, 2001). According to Diener, Oishi, and Lucas (2003) an individual's personality is moderately to strongly correlated with subjective well-being. They reached this conclusion after years of research indicated that external factors had only a modest impact on reported subjective well-being (Deiner, Suh, Lucas, & Smith, 1999). Additionally, research has

shown that SWB does not change over time, it returns to stable levels after major life events, and a strong relationship exists with stable personality traits (Diener et al., 2003). More specifically, extraversion and neuroticism are the two personality traits that exhibit the strongest relationship with subjective QOL. Generally speaking, extraverts are outgoing, sociable, comfortable in social situations and generally happier than introverts. In contrast, neurotics are anxious, depressed, they often feel self-conscious, and are typically unhappier. Since extraversion and neuroticism provided the strongest correlations to affect, the authors suggested that these two traits could provide the link between personality and subjective well-being (Diener, Oishi, & Lucas, 2003).

Others have noted that personality might also interact with the environment and impact self-reported SWB. Kette (1991) found that extroverted prisoners report lower levels of happiness than introverted prisoners. This finding was counter to previous research that stated that extroverts are generally happier than introverts (Diener et al., 2003). Since then researchers have suggested that higher levels of positive affect are correlated with trait-congruent behaviors and trait-incongruent behaviors are correlated with higher levels of negative affect (Diener et al., 2003). Essentially people are happier when they engage in activities that better suit their personality traits.

Other factors influencing differences in quality of life are socio-demographic characteristics and contextual and situational factors (Berger & Motl, 2001). Socio-demographic characteristics can include age, education, marital status, gender, income, social class and social relationships (Berger & Motl, 2001). Emotion, stress, and physical health are the contextual or more situation based factors that are associated with quality of life.

Another important factor that impacts quality of life is recreation (Slater & Meade, 2004). Studies in the general population have shown that recreation is more important than job status, health, and finances in determining life satisfaction. This suggests that promoting a lifestyle that places an emphasis on recreational activity could influence an individual's quality of life.

Many researchers examining quality of life or one of its related concepts such as life satisfaction or subjective well-being note the relative stability of this construct over time (Lucas, Clark, Georgellis, & Diener, 2004). Subjective well-being is affected for less than 3 months by most major life events (Suh, Diener, & Fujita, 1996). Heady and Wearing (1992) posited that individuals have set points for SWB. According to their theory, when a person encounters an event they will have an initial reaction, but will soon return to a baseline level of happiness while an individual's baseline is determined by their personality (Heady & Wearing, 1992). This precept has guided much of the research done on SWB (Diener, Suh, Lucas, & Smith, 1999).

For instance, Lucas et al. (2004) found evidence that suggested that the set point could be altered. If set point theory were correct participants would have an initial reaction to unemployment but would return to their baseline levels within 2 years. The data, which was obtained from a longitudinal study in Germany, indicated that unemployment created a new baseline level of life satisfaction (Lucas et al., 2004). The decline in life satisfaction for these participants remained stable at the lower level even after employment was regained. The authors suggested that their findings were not totally inconsistent with set point theory, but considered the possibility that there are only a few life events powerful enough to alter the set point for life satisfaction.

Berger and Motl (2001) suggested that quality of life is a global assessment of life as whole rather than a focus on specific life domains. Thus, subjective QOL can be viewed as a

dynamic interplay between psychological, emotional, and physical health domains reviewed in previous sections. Other researchers, who see QOL as an umbrella term for multiple outcomes as it relates to health, have echoed this sentiment. (Rejeski & Mihalko, 2001). According to Diener subjective well being, a term closely related to quality of life (Rejeski & Mihalko, 2001) can be broken down into the smaller components of life satisfaction, satisfaction with important domains, positive affect, and low levels of negative affect (Diener, 2000). One common underlying assumption within subjective definitions of one's QOL is that individuals judge for themselves whether they are satisfied with their current circumstances or not. It is this subjective dimension of QOL that will be embraced within the current investigation because as will be discussed physical activity, recreation, and high levels of community integration are all associated with positive affective experiences and quality of life.

### **Measuring Quality of Life**

As discussed above quality of life researchers have produced many conceptual definitions and measurement instruments to assess this construct: Berger and Motl (2001) estimated that over 300 scales have been produced that measures quality of life. Because of the plethora of quality of life scales and due to the fact that my thesis will adopt a subjective approach to assessing this construct I will only review the psychometric characteristics of two widely used instruments: the SF-36 (Ware, Kosinski, & Dewey, 2000) and the Satisfaction with Life Scale (Diener, Emmons, Larson, & Griffin, 1985).

The Satisfaction with Life Scale is a five-item survey that includes statements such as, "In most ways my life is close to ideal," and "If I could live my life over, I would change almost nothing," (Diener, Emmons, Larson, & Griffin, 1985). Respondents give answers based on a 7-point Likert Scale, so scores can range from 5 to 35. The SWLS was shown to have adequate internal consistency ( $\alpha = .87$ ) and a two-month test-retest reliability ( $\alpha = .82$ ), and it has

convergent and divergent validity between a number of personality scales and other subjective well-being scales (Diener et al., 1985). The SWLS is a uni-dimensional measure and has been validated for a wide range of age groups (Pavot, Diener, Colvin, & Sandvik, 1991). Other QOL measures contain sub domains that measure work, self, primary social contacts, acceptance by others, recognition, and prestige (Landers & Arent, 2001). Pavot and Diener (1993) also demonstrated that self-reports correlated highly with reports made by peer, family members, and friends.

The SF-36 measures health related QOL by taking both mental and physical health and breaking each down into four scales for a total of eight scales ranging from 2 items to 10 items (Ware, Kosinski, & Dewey, 2000). The score for physical health is broken down into scales for physical function, role-physical (e.g. work activity or activities of daily living), bodily pain, and general health (Ware, Kosinski, and Keller, 1994). Likewise, mental health is measured on scales of vitality, social functioning, role-emotional (e.g. how emotions affect work or ADL), and mental health. These items are scored on a Likert scale, which range from 1-3, 1-5, or 1-6 depending on the specific item (Ware et al., 2000). The SF-36 has been shown to be valid and reliable measurement of HRQOL for the general population as principal component analysis confirmed the two-factor higher-order structure for this instrument across a range of samples (Ware et al., 2000). Because the SF-36 was designed and validated with able-bodied individuals it is generally not recommended for use with individuals with disabilities (Hayes, Hahn, & Marshall, 2002). However, recent recommendations in the literature have demonstrated how specific items on the SF-36 can be modified to be more pertinent for this group (Tate, Kalpakjian, Forchheimer, 2002).

The quality of well-being scale (QWB; Kaplan & Anderson, 1988) places individuals into categories based on their level of functioning and their symptoms. Functioning is measured on scales of mobility, physical activity, and social activity. Interviewers ask patients questions concerning their level of limitation for the previously mentioned scales in order to classify their objective level of functioning. Then patients are given a list of symptoms they might experience. The interviewer then asks the patient to choose the symptom they are experiencing that is most undesirable to them (Kaplan, 1994). To generate a score for wellness the weighted score for symptom is summed with the weighted scores for mobility, physical activity, and social activity along with 1. Possible scores range from 0 to 1, with zero indicating worst possible well-being (death) and a score of one meaning the individual is completely well. For example, a weight of 0 is given for no limitations across the three scales and for no symptoms. A person who has no limitations and no symptoms would score a one. The well-being score is then multiplied by a time component, usually years, to determine the duration of stay in various health states.

The weights assigned to states of functioning were obtained through cross-validation studies that demonstrated a high degree of accuracy ( $R^2 = 0.96$ ). Studies have also shown that these weights are stable over a one-year period and that they are consistent across an assorted groups of users (Kaplan, Bush, and Berry, 1978). Additionally studies have shown that the QWB scale is both valid and reliable in the general population (Kaplan, Bush, Berry, 1976). As with the SF-36, the QWB scale is considered “problematic” for individuals with disabilities due to its quantification of functioning (Hays et al., 2002, p. S7).

#### Health Risks for Individuals with Disabilities

In the following sections I will review literature that has shown that individuals with disabilities are at a greater health risk than those without disabilities (Cooper, Quatrano, Axelson,

Harlan, Stineman, Franklin et al., 1999; Rimmer & Wang, 2005). Additionally, I will review empirical studies that demonstrate links between physical activity and QOL for this population. This will be followed by a review and synthesis of the literature review and the scientific rationale for the present study.

Since individuals with disabilities are more likely to have activity limitations than their able-bodied peers, it is important to examine outcomes related to low physical activity levels. According to Healthy People 2010 those individuals who had activity limitations also reported more days of depression, anxiety, sleeplessness, and pain than persons who did not have any activity limitations (U.S.D.H.H.S, 2001). Also, there is more risk for secondary health conditions such as cardiovascular disease and diabetes. These trends demonstrate a need to further study the determinants and consequences of physical activity for individuals with disabilities since the negative consequence of an obese lifestyle have been widely documented. For instance, exercise has been shown to increase function as well as increase muscular strength and cardio-respiratory fitness in individuals with physical disabilities. (Blundell, Shepard, Dean, & Adams, 2003; Jacobs, Nash, and Ruminowski, 2001; Hicks, Martin, Ditor, Latimer, Craven, Bugaresti, & McCartney, 2003). Another physical outcome associated with exercise is a decrease in pain (Hicks et al., 2003; Fullerton, Borckardt, & Alfano, 2003). In addition, there is evidence that suggests that exercise is related to increased positive affect and decreased negative affect in middle-aged women and high school seniors while physical activity has social benefits as well (Brown, Ford, Burton, Marshall, Dobson, 2005; Block, Griebenaaw, & Brodeur, 2004; Leonard, 1998).

Rimmer and Wang analyzed data from a clinical trial that examined the effects of a health promotion program for people with physical and cognitive disabilities (2005). Before Rimmer

and Wang's (2005) study, most obesity data came from self-report surveys. Research has shown that estimates of obesity prevalence are much lower for self-report data than for those based on measured data (Flegal, Carroll, Ogden, & Johnson, 2002). Nevertheless, the rate of obesity for adults with disabilities was 66% higher than for able-bodied adults (Rimmer & Wang, 2005). Rimmer and Wang used measurements of body mass index (BMI) to determine whether individuals in their sample were overweight, obese, or extremely obese with a sample of 306. The authors obtained height and weight measurements in order to calculate BMI. Then they compared the prevalence of obesity from their sample to data collected previously for able-bodied adults and published self-report data for individuals with disabilities (Rimmer & Wang, 2005).

Results showed that there were higher rates of overweight, obese, and extremely obese individuals in the disability sample versus the able-bodied sample. The highest prevalence of obesity and extreme obesity occurred amongst those with arthritis and diabetes. Examination of race and gender revealed that females with disabilities are 4 times more likely than disabled males to fall into the extreme obesity category, while African American women with disabilities were at the greatest risk for obesity and extreme obesity (Rimmer & Wang, 2005).

Cooper et al. (1999) echoed the sentiment that persons with disabilities are at greater health risks than the able-bodied population. Part of this is due to the fact that physical inactivity occurs disproportionately among the disabled population. Aside from benefits in cardiovascular health, physical activity can also be beneficial by increasing muscular strength and flexibility. That will in turn improve the ability to perform activities of daily living (Cooper et al., 1999). Physical activity was also recommended for children with disabilities. Cooper and colleagues

(1999) felt that in addition to physical benefits, children would also benefit socially because sports can help develop self-esteem, social integration, and learning social and team skills.

Jacobs et al. (2001) used a circuit-training program for 10 men with SCI between the T5 and L1 levels and between the ages of 28 and 44. Prior studies of physical activity in this population used arm ergometry and wheelchair ergometry, which often caused injuries in the upper extremities and as a result, hindered the participants' abilities to perform activities of daily living. They also cited a lack of studies that reported both strength and endurance outcomes. As a result, Jacobs et al. proposed a 12-week circuit-training program as a safe and effective program for increasing cardio-respiratory endurance and muscular strength by targeting important muscle groups such as the upper trunk, shoulders, and upper back. These muscle groups were reported as especially weak for persons with paraplegia. In addition to strengthening muscles, the program also sought to stretch certain muscles to increase range of motion as well as stability and balance in the shoulders. The intensity of the workouts were based on the percentage of peak muscular effort required to push a wheelchair, depress and transfer body, and elevate and support the body during pressure relief. These activities were singled out because they are tasks that require the most muscular effort and generate the most pain and feelings of weakness among individuals with paraplegia (Jacobs et al., 2001). The participants took part in a 12-week training program that required them to attend 3 sessions per week. Each session lasted 40-45 minutes and combined weight training with arm cranking activities. Each individual would perform one set of exercise at each station before moving on to the next in this circuit program. All participants completed the 12-week program without any medical complications.

Their study found that the 12-week circuit-training program resulted in significant increases in cardio-respiratory endurance and muscular strength in individuals with paraplegia. Participants increased maximum oxygen uptake by an average of 30%, while the strength was improved 12-30% (Jacobs et al., 2001; Hicks et al., 2003). Although this study did not purposely test outcomes of function and well-being, informal exit interviews with participants revealed that several individuals reported greater ease performing daily activities that required upper body strength and endurance.

Hicks et al. (2003) examined the effects of an exercise-training program in individuals with SCI, looked at QOL outcomes in addition to gains in strength and function. They argued that because life expectancy for individuals with SCI is on the rise, rehabilitation goals should be shifted from prolonging life to enhancing quality of life and independence. Due to the fact that coronary heart disease is a leading cause of death among the SCI population, amendable risk factors such as inactivity have received more attention from researchers and health care professionals. Many previous studies, including Jacobs et al. (2001) have studied the effects of exercise on muscular strength and/or cardio-respiratory function, but none had looked at QOL outcomes. Hicks et al. (2003) predicted that their 9-month, twice a week training program for individuals with SCI would lead to increased muscular strength, enhanced exercise capacity, and improved quality of life.

Their study sample consisted of 34 men and women between the ages of 19 and 65. All participants had acquired an SCI at least one year before they enrolled in the study. The researchers randomly selected individuals to be placed in either the exercise group or a waiting-list control group and used several different instruments to measure the outcome variables. Heart rate and power output were measured using an arm ergometer while muscular strength was

trained and tested using a multi-station wheelchair accessible weight training system. The researchers employed a circuit-training program with the participants completing two sets of each exercise at the outset and increasing to three sets after four weeks. To assess QOL the authors employed the 11-item perceived quality of life scale that required some modifications in order to ensure item-content relevance (PQOL; Patrick, Danis, Southerland, & Hong, 1988) and surveys measuring stress, depression, physical self-concept, pain, and perceived health.

The results showed that a twice a week training program over the course of nine months lead to increases in muscular strength, arm ergometry performance, and several PQOL outcomes. Individuals in the exercise group reported less pain, less stress, greater satisfaction with physical functioning, lower levels of depression, and better quality of life than individuals in the control group. The authors speculated that improved exercise capacity and muscular strength over the nine month period could imply better functioning and greater ease of completing tasks of daily living than was possible at baseline. In addition to physical improvements, Hicks et al. also suggested that exercise should be used as a means to enhance psychological well-being in persons with SCI. They suggested that exercise affects PQOL by reducing pain, improving sense of control with regards to functioning, and social interactions (Hicks et al., 2003; Martin Ginis et al. 2003).

Fullerton et al. (2003) also studied role of pain in wheelchair users. They compared the onset and prevalence of shoulder pain in wheelchair users who were athletes to those who were not athletes. Extant literature has shown that shoulder pain is a prevalent problem in wheelchair users, with up to 78% of individuals with SCI reporting shoulder pain. Other researchers place that number closer to one third of paraplegics and a slightly higher number of quadriplegics (Curtis, Drysdale, Lanza, Kolber, Vitolo, & West, 1999; Sie, Waters, Adkins, & Gellman, 1992).

The reason that many wheelchair users experience pain in the shoulder is attributed to the new role of the shoulder as a weight bearing joint, something it was not designed to do (Taylor & Williams, 1995; Bayley, Cochran, & Sledge, 1987). Another cause of shoulder pain is thought to be muscle imbalance around the shoulder joint (Burnham, May, Nelson, Steadward, & Reid, 1993; Miyahara, Sleivert, & Gerrard, 1998). A question that arose was whether sports contributed to earlier onset and increased occurrence of shoulder pain or whether the increased strength and endurance of wheelchair athletes would help to prevent pain. The purpose of Fullerton et al.'s study was to compare onset and prevalence of shoulder pain in athletic and non-athletic wheelchair populations. The authors developed their own 20-item questionnaire to give to participants. They mailed the questionnaire, along with an informed consent form to 500 random individuals using the Virginia Spinal Cord Injury Registry. To gain more responses from athletes, they also published the questionnaire in a newsletter for a leading wheelchair sports organization. To qualify as an athlete for this study the individual must have: 1) trained at least 3 hours per week, 2) be involved in at least 3 competitions per year, and 3) had a wheelchair which had been modified for sports. Basketball was the most represented sport with 51% of the respondents. Athletes made up two-thirds of the sample, while the remaining third served as the comparison group.

Forty-eight percent of the subjects (N = 257) reported shoulder pain at the time of questionnaire completion. After dividing the group into athletes and non-athletes, the authors found that 66% of non-athletes reported pain, while 39% of athletes reported pain. Additionally, findings from this study contradicted earlier findings that quadriplegics had more shoulder pain than paraplegics.

Two major findings came out of the statistical analysis. The first was that athletes were less likely to have pain than non-athletes. This finding holds true across other variables such as age, level of injury, and number of years spent in a wheelchair. The second finding was athletes also have more years without shoulder pain after SCI than non-athletes. On average athletes had four more years without shoulder pain (Fullerton et al., 2003).

Before, it was thought that shoulder pain was due to overuse and it was predicted that the demands of wheelchair athletics would exacerbate this process. The study's results appear to contradict that prediction.

Taub et al. (1999) interviewed 24 male college students with physical disabilities about their physical activity experiences. Previous research showed that individuals with disabilities often have their physical competencies and skills questioned by others (Higgins, 1980). Others have suggested that physically disabled individuals are stigmatized and devalued because their bodies do not conform to normative standards (Hahn, 1988). In order to manage the effects of stigma, individuals with disabilities can engage and become proficient in behaviors that they are not expected to do well in (Taub et al., 1999). Taub and colleagues set out to investigate how participation in sport and physical activity can help manage stigma in individuals with physical disabilities (1999).

They interviewed 24 male students with a variety of physical disabilities ranging from paralysis to cerebral palsy. The participation level of the sample also varied from occasionally lifting weights to being a member of a wheelchair basketball team, but each participant averaged two sessions of physical activity per week. Also, with the exception of the wheelchair basketball players, most physical activity was done in integrated settings alongside able-bodied peers (Taub et al., 1999).

The authors chose a qualitative approach because they felt it was the most appropriate tool to explore perceptions and lived experiences of their participants. They analyzed the tape-recorded interviews using techniques introduced by Bogdan and Biklen (1992). The researchers developed agreed upon codes for organizing and interpreting the data. Physical competence and bodily appearance emerged as two primary themes and sources of stigma management.

The authors reported two ways in which physical competency assisted in stigma management. The first was through demonstration of physical skill. Participation in sport and physical activity gave individuals the opportunity to counter perceived stereotypes that persons with disabilities are incapable of playing sports. The second part of physical competency was demonstration of a healthy body. Over half of the participants revealed that they felt they looked healthier as a result of physical activity. This helped contradict the perception that disabled persons were sick or weak. Nearly all of the participants felt that they were able to influence the attitudes of others towards them through demonstration of physical competence.

Bodily appearance was the second means by which individuals with disabilities could counter prevailing negative stereotypes through physical activity. One way this was accomplished was through demonstration of a muscular body. Some respondents felt that physical activity helped them develop muscular physiques, which compensated for negative assumptions other held about the disabled body (Taub et al., 1999). In addition to demonstrating a muscular body, respondents also reported that physical activity allowed them to demonstrate a liberated body. Sports enabled them to show others that their wheelchair does not constrain them. One person stated that he enjoyed swimming because he was free of his wheelchair when he was in the water (Taub et al., 1999).

Ultimately sports and other physical activities allowed this sample of college men with physical disabilities the opportunity to shed common perceptions about the abilities of wheelchair users and others with physical disabilities. For most of the respondents, involvement in sport alone was more important than type and intensity level of activity. They believed that their involvement in sport could alter negative stereotypes other had about persons with disabilities. Taub et al. (1999) recommended that future research should examine the physical activity experiences of females as well as people in other age groups with disabilities.

Other researchers have suggested that sport and recreational activity represented a way in which individuals with disabilities could improve physical and social self-perceptions (Blinde & McClung, 1997). Improvements in physical self-perception may be achieved through physical activity because individuals can perform tasks and activities that they or others may have considered impossible for them. In addition, sport and recreational activity occur within a social context, thus enabling active individuals to boost their social self-perceptions. One study examined the impact of sport and recreational activity physical and social self-perceptions of individuals with disabilities (Blinde & McClung, 1997). They used qualitative methods in order to allow the participants the chance to talk about what they felt was the most important aspects of their activity experiences.

The sample included 11 women with a mean age of 31.5 years and 12 men with a mean age of 26.2 years. Fifteen members of the sample were college students and the rest were recruited from the local community. The study consisted of individuals with a wide variety of physical disabilities ranging from cerebral palsy and paralysis to muscular dystrophy. A majority indicated that they had limited participation in recreational activities prior to the study. After consenting to be a part of the study, participants could choose from a number of offered

recreational activities. These activities included swimming, horseback riding, weight lifting, tennis, fishing, and walking. The authors assigned participants to able-bodied partners for the duration of the program. Most of them remained in the program for 5 to 10 weeks. Graduate students conducted interviews with the participants two weeks after they completed the recreational program.

Results of the interviews showed improvements in physical self-perceptions similar to that of Taub et al. (1999). These physical changes resulted in psychological gains as well. Individuals in the sample were able to experience their body in new ways through swimming and horseback riding. Respondents described the feeling as “less restrictive” and “barrier-free” (Blinde & McClung, 1997, p. 333). Additionally some respondents felt increased sense of self as a result of feeling stronger and fitter due to their recreational activity.

Another important outcome of this study was increased perceptions of the social self. This was done by expanding social interactions and experiences and initiating social activities in contexts outside of recreational activity. Respondents reported that the recreational activity program gave them the opportunity to get out and meet new people. In addition to meeting other people with disabilities, there was also the chance to interact positively with able-bodied individuals. Also, participation resulted in increased confidence in social skills, which led to greater motivation to go out and meet other people.

Other research studying the impact of physical activity and individuals with disabilities examined the impact of exercise on positive and negative affect (Giacobbi, Hardin, Frye, Hausenblas, Sears, & Stegelin, 2006). Giacobbi et al. (2006) also assessed personal variables such as personality and time since injury in order to determine who would experience the greatest emotional benefits on days of increased exercise.

The study included 13 females and 35 males with physical disabilities. The research team recruited potential participants at sporting and community events and gave instructions about the surveys used. Participants filled out surveys assessing personality, daily life events, mood, and activity for eight consecutive days. Then they were required to mail in their completed surveys to the primary researcher (Giacobbi et al., 2006).

Statistical analyses revealed several important findings. First, positive affect was associated with increased positive events and fewer negative events. Additionally, there was a significant positive relationship between exercise and positive affect and a negative relationship between exercise and negative affect. More importantly, the effects of exercise on positive mood were seen despite the occurrence of positive or negative daily life events. Finally, personality moderated the effects of physical activity on affect. Individuals that showed higher levels of Neuroticism were more likely to have more positive affect and less negative affect on days that they exercised more. However, this same moderating relationship was not seen in extroversion nor for the length of time after injury (Giacobbi et al., 2006).

Giacobbi et al.'s (2006) study showed that exercise could have a positive impact on mood regardless of daily life events for individuals with disabilities. This study provides more support to the notion that exercise and physical activity should be encouraged among persons with physical disabilities.

In the literature reviewed, it was shown that exercise increased strength and functioning in children (Blundell et al. 2003) and adults (Jacobs et al., 2003; Hicks et al., 2003), as well provided important psychological and social benefits (Blinde & McClung, 1997; Taub et al., 1999; Giacobbi et al., 2006). In addition to improving muscular strength and functioning, exercise can also increase cardiovascular fitness as well as decrease shoulder pain. Physical

activity can also result in important social and psychological gains as well and have a positive impact on the way individuals view their bodies and also provide a means to counter negative stigma regarding their bodies and physical abilities (Taub, Blinde, & Greer, 1999; Blinde & McClung, 1997). Exercise can also provide a means in which social skills are developed and practiced (Blinde & McClung, 1997). Finally, physical activity can have an impact on mood despite daily life events (Giacobbi, Hardin, Frye, Hausenblas, Sears, & Stegelin, 2006). As discussed, all of these benefits of exercise and physical activity are associated with subjective well being and improved quality of life.

With all this evidence demonstrating the importance of exercise in the lives of individuals with physical disabilities it is imperative that researchers continue examining the antecedents and consequences of physical activity with this population. Due to an apparent lack of qualitative research in the area, it is essential that we obtain a fuller understanding of concepts such as quality of life and how they relate to physical activity and individuals with disabilities. Individuals with disabilities stand to gain the most from regular physical activity and it is important that the physical and mental benefits of physical activity be explored in an in-depth manner.

### **Purpose**

The purpose of this thesis will be to use a mixed method approach to explore the role physical activity plays in quality of life for individuals with physical disabilities. Quantitative methods will be used to categorize individuals as more versus less physically active, while qualitative interview methods will be used in order to obtain a richer understanding of how individuals with disabilities describe their quality of life and subjective activity experiences. A secondary purpose will be to compare individuals who are more active with those who are less active in their descriptions of daily life events and physical activity involvement.

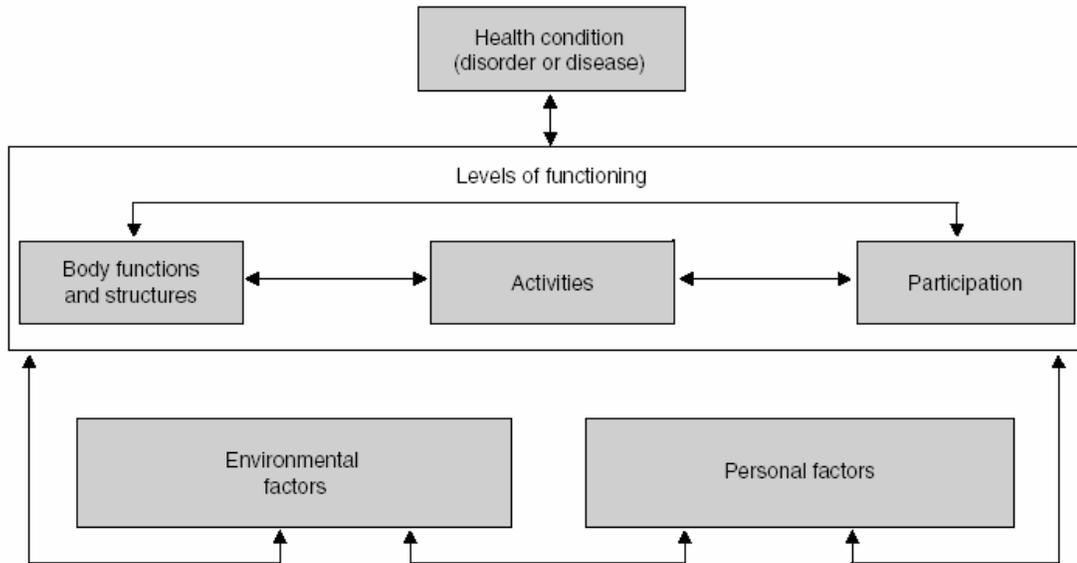


Figure. 1-1. The model of Functioning and Disability (ICF model) from the International Classification of Functioning, Disability and Health (Reproduced from the World Health Organization).

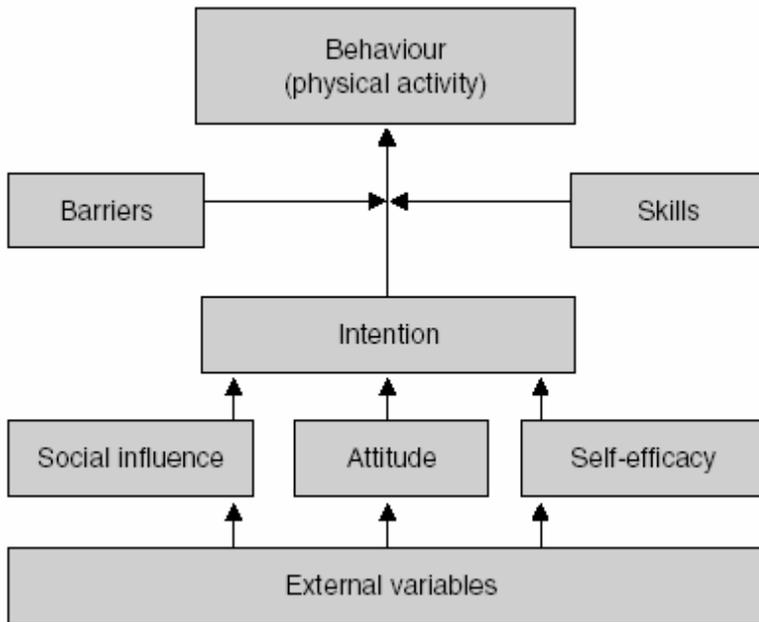


Figure.1-2. The attitude, social influence, and self-efficacy (ASE) model. (Reproduced from DeVries et al., 1988).

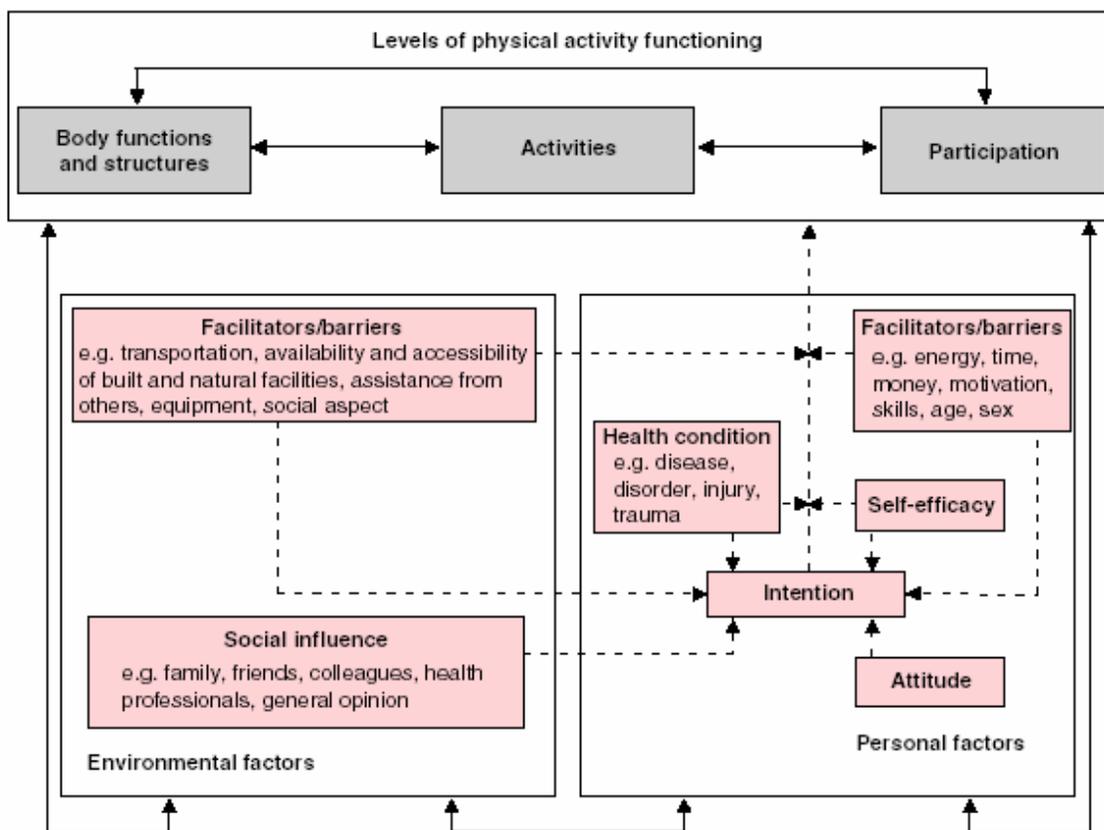


Figure. 1-3. The Physical Activity for people with Disability Model (van der Ploeg et al., 2004).

## CHAPTER 2 METHODS

### **Participants**

The participants included 12 male and 14 female adults between the ages of 18 to 54 ( $M = 31.12$ ,  $SD = 10.75$ ) who all reported one or more condition(s) that impacted their daily living (e.g., spina bifida, cerebral palsy, T-11/12 paraplegia, bi-lateral amputee, etc.). The sample consisted of 20 Caucasians, 1 Asian American, 4 African-Americans, and one individual reported being mixed racial and ethnic background. The participants reported a variety of health conditions including specified and unspecified paraplegia ( $N = 14$ ), bi-lateral or single amputee ( $N = 3$ ), cerebral palsy ( $N = 2$ ), quadriplegia ( $N = 1$ ), spina bifida ( $N = 1$ ), chronic pain ( $N = 1$ ), complete fusion of the spine ( $N = 1$ ), and 3 individuals did not specify why they used a wheelchair. Twenty-five of the twenty-six participants were either active in wheelchair basketball at the time of the interview or had been previously. Twenty-two individuals from the sample gave a specific time period for their participation. The average time playing wheelchair basketball by those who reported specific times was 9.03 years and ranged from 26 years to 3 months. Some participants reported participation in other activities such as swimming, road racing, wheelchair tennis, darts, and pool. The median age of the sample was 29 and consisted of 10 individuals between 18 and 24, 6 were 25 to 34, 6 aged 35 and 44, and 4 individuals who were 45-54. The breakdown of the age variable was done according Center for Disease Control guidelines (Center for Disease Control and Prevention, 2005).

### **Measures**

*The Physical Activity Scale for Individuals with Physical Disabilities (PASIPD)*. The PASIPD is a 13-item scale developed and validated to measure physical activity, health, and

function for individuals with physical disabilities (Washburn, Zhu, McAuley, Frogley, & Figoni, 2002). This instrument consisted of five subscales: home repair/lawn and garden work, housework, vigorous sport and recreation, moderate sport and recreation, and occupational activities. The PASIPD requested respondents to indicate how often during the past seven days they participated in various activities at home and outside the home as never, seldom (1-2 days/week), sometimes (3-4 days/week), or often (5-7 days/week) and on average how many hours a day they participated (<1hour, 1 but <2 hours, 2-4 hours, >4 hours. With regard to the occupational item 13, the response categories include <1 hour, 1 but < 4 hours, 5 but < 8 hours,  $\geq$  8 hours. Scores for the PASIPD are computed by multiplying the average hours per day by an estimated MET value based upon the intensity of the activity; this scoring procedure results in a mathematically maximum score of 199.5 and estimated MET values for each of the five factors and a total score. Washburn et al. (2002) demonstrated preliminary evidence of the construct validity of the PASIPD and the five latent factors using factor analytic and correlational analyses.

Their data also resulted in total PASIPD scores of  $24.6 \pm 14.6$  for individuals aged 51 and younger and  $16.5 \pm 13.4$  for those older than 51. The mean total score for males on this measure was  $20.5 \pm 15.1$  while the average for females was  $19.9 \pm 13.5$ . Finally, individuals who self-reported no activity at all had a mean of  $13.2 \pm 12.1$ , those who reported moderate activity had a mean of  $19.8 \pm 12.7$ , and individuals who self-reported extreme activity had a mean score of  $30.7 \pm 14.0$ . These means will allow me to group participants for this thesis by their level of activity. With regard to males and female participation in vigorous sport and physical activity the two groups were virtually the same scoring an average MET hours/day of  $2.9 \pm 6.6$  and  $2.7 \pm 6.7$  for males and females respectively.

*Interview Guide.* An interview guide was developed for the purposes of this study (See Appendix A). Although an interview guide was used during all interviews, a semi-structured approach was used as the flow of conversation dictated the questions asked to the participants. The interview questions focused on the following: (a) the nature and etiology of the participants' disabilities, (b) occupational or school related questions, (c) perceived benefits of physical activity, (d) motives that sustain involvement in physical activities. Probes were used throughout the interviews to encourage the participants to expand upon specific ideas, experiences, and incidents that highlighted their physical activity experiences. The author and another graduate student conducted all interviews, which lasted between 30 to 90 minutes.

*Procedure.* A purposive sampling procedure was used in an effort to recruit physically active individuals with physical disabilities. The participants were recruited with help from a member of the research team who facilitated a wheelchair basketball tournament at the Lakeshore foundation in Birmingham Alabama (Dr. Brent Hardin in the Department of Kinesiology). During this tournament individuals familiar with this member of the research team were approached and asked to participate in this study. I conducted 14 of the interviews while a graduate student advisee of Dr. Hardin interviewed the remaining 12 participants. Institutional approval was obtained from the University of Florida Institutional Review Board (IRB) prior to data collection.

### **Data Analysis**

Grounded theory procedures guided the present analysis (Charmaz, 2000). The author used open- and focused-coding of interview text, the use of memos, constant comparisons, sensitizing concepts, and the development of theory (Charmaz, 2000). The following data analytic procedures were followed in this investigation:

1) All interviews were transcribed verbatim by multiple coders that included the author and two researchers with training and experience using qualitative data analysis at the University of Alabama Birmingham. During this stage of the coding process, participants' quotations were coded as raw data themes and stored for future analysis and discussion between the authors. Throughout the interview and open-coding process my advisor supervised and provided guidance concerned with this project.

2) The research team next engaged in focused coding procedures whereby the most frequently mentioned raw data themes were sorted and grouped according to their common properties (Charmaz, 2000). This involved making connections and distinctions between the motives and perceived benefits reported by our participants and how these perceived benefits impacted subjective well-being. The process of focused coding also facilitated the comparison process described below.

3) A constant comparative method was used that allowed the author to make comparisons between the participants' experiences (a) reported by different participants, (b) within participants about descriptions of the same and different experiences (c) with important experiences reported by different participants. Additionally, consistent with the purposes of this study, the constant comparative method allowed for direct comparisons between males and females, individuals in different age groups, and between those who were more versus less active.

4) Sensitizing concepts served as "points of departure" from which to organize, interpret, and extend previous stress and coping research findings (Charmaz, 2000, p. 515). As noted by Charmaz (2000) "Sensitizing concepts offer ways of seeing, organizing, and understanding

experience; they are embedded in our disciplinary emphases and perspectival proclivities” (p. 51)

5). Sensitizing concepts also offer researchers a way to make sense of qualitative data in a manner consistent with the extant literature. In the present study the PAD model by van der Ploeg, van der Beek, van der Woude, and van Mechelen (2004) as well as Dijkers’ conceptualization of subjective QOL served as sensitizing concepts. In this way I interpreted my combined quantitative and qualitative data by using important constructs in the PAD model (e.g., facilitators/barriers, social influences, health conditions, self-efficacy, intention, and attitudes) as well as components of subjective QOL (e.g. values, achievements, and evaluations) during my analysis.

*Issues of Trustworthiness.* Several sources of trustworthiness were developed in this study. First, multiple coders examined the raw data independently and discussed similarities and differences in the coding of the participants’ experiences. Second, the author, a fellow graduate student, and the author’s thesis advisor explored multiple interpretations and discrepant findings during structured research discussions (Sparkes, 1998). The use of a research group has also been described as a way to establish credibility and dependability of qualitative data (Dale, 1996). Third, an individual trained in qualitative research methods performed an independent audit on a select group of coded quotations. This individual independently coded the determinants and benefits of physical activity and found agreement with 61% of the codes completed by the author. The independent coding comprised identifying blocks of quotes by labeling it with one of the higher order themes. Once this was completed, the author then compared the results to his own system of coding. Finally, the participants’ direct quotations are presented along side

contextualized descriptions of the participants' experiences are presented to allow readers to judge for themselves the trustworthiness of the data (Sparkes, 1998).

## CHAPTER THREE RESULTS

The purpose of this thesis was to explore the role that physical activity plays in the quality of life for individuals with physical disabilities. A secondary purpose was to use the constant comparative method commonly employed by grounded theorists (Charmaz, 2000) to explore differences in motives and perceived benefits between individuals who were more active versus those who were less active, males and females, and age groups. To achieve these purposes, 26 individuals were administered the PASIPD and interviewed about their physical activity experiences. What follows is a presentation of the results broken up into three sections. The first section summarizes the descriptive quantitative findings from the PASIPD. The second section describes the higher-order and first order themes derived from the interview text. Finally, the third section presents a grounded theory that represents a theoretical integration of the results observed here with previous models of physical activity and subjective QOL.

### **Descriptive Statistics**

The focus of this thesis included determining activity levels of the participants. The PASIPD broke down activity level into several different categories. These categories were physical activity, household activity, lawn and garden activity, caring for another person, and work activity. Physical activity was broken down further into the subscales reported by Washburn et al. (2002) that included a total score, home repair/gardening, housework, vigorous sport, light/moderate sport, and occupational activities. This latter category includes general wheeling not intended for exercise. The participants' total scores on this measure ranged from 6.20 and 71.22 for both males and females while the average for the entire sample was 36.34 (SD = 15.28). The PAD model suggested previously that an individual's gender played a role in their participation in physical activity. An independent samples t-test was then performed in order to

compare differences between males and females on the total PASIPD score. The results of this test proved non-significant  $t(24) = .48, p = .64$ . The subscale scores representing vigorous sport and light/moderate sport were well above the averages reported by Washburn et al. (2002) in their validation study and ranged from 2 to 42.57 and 0 and 23.15, respectively. In contrast, the participants in this sample reported less activity with regard to occupation as the means here were ~ one standard deviation below those reported by Washburn et al. (2002). In short, the participants in the current study were relatively active as they reported participation in moderate and vigorous sport activities and had higher total scores than Washburn et al. (2002) as shown in Table 3-1.

### **Interview Results: Higher Order Themes**

*Psychological Benefits.* The results of the coding process described above are shown in appendix B. As shown, 5 higher-order themes (psychological benefits, physical health, social influences, social opportunities, and increased overall quality of life) were defined by 16 more specific first-order themes. The psychological benefits higher-order theme was defined by the first-order themes of cognitive benefits (N = 10), emotional benefits (N = 15), behavioral benefits (N = 8), and self-perception (N = 15). Ten participants mentioned that they benefited cognitively from participation in physical activity. One participant, a 21 year-old male who scored a 47.97 on the PASIPD, said,

I've actually developed a pretty good mental strength through basketball. You really have to stay focused and concentrate and like doing it back to back has not only helped me physically but mentally to get through a whole 40 minutes of basketball.

In addition a 43 year old female who scored a 30.75 on the PASIPD stated, "I don't know I guess more specific to basketball I guess than in general, but the ability to get better at something and learn new skills. I thought, I wasn't sure that was possible, you know."

Still another participant received cognitive benefits from physical activity saying, "...I've learned a lot of like really life lessons, you know from like winning and losing and...I've just learned a lot about sports but also about how to communicate with others." For these three participants, physical activity provided them a means to learn new skills and become mentally strong.

Another psychological benefit was that some participants felt better emotionally (N = 15) as a result of physical activity. In this analysis, statements by participants were coded as "emotional benefit" if there was mention of increases in positive affect (i.e. happiness), decreases in negative affect, or stress relief. A 35 year old female with a PASIPD score of 51.49 said, "That [water skiing], I think is just relaxing, you know its more of a relaxing type sport, you go out there and you just enjoy yourself and it really just a fun thing." Another participant who benefited emotionally was a 51 year-old female who had the highest score on the PASIPD with a 71.22. She stated, "I played rugby, softball. It was a good way to deal with the rage and um, the depression and all the stuff that came with it." A third participant, a 24 year-old female with a 35.6 on the PASIPD, added, "And the marathon now...it's more of a release for me. I can go out and push 20 miles a day and it's such a stress reliever for me, I just feel good afterwards." From the interview responses, it appeared that physical activity was a good way to reduce stress and depressive symptoms, as well as a source of fun for over half of the participants.

A third psychological benefit, behavioral benefits, was identified when participant mentioned a change in their day-to-day behavioral or health, routines. For instance, the 51 year-old female who had the highest PASIPD score for this sample felt that through physical activity she developed the will to not quit, which forced her to be more creative.

Just...I guess my desire not to give up. You know? There's a lot of things I can't do and that's real aggravating. But um...I painted the bottom part of my house by adapting rollers

and brushes and things so that I didn't have to bend and...so I tend to be a bit more creative with the things I'm doing. Innovative.

She also added, "Well I'm a smoker. So when I'm playing tennis or working out I'm not smoking. So that's a nice way to keep myself busy so I don't smoke."

Another participant, a 21 year-old female who played college basketball and scored a 52.69 on the PASIPD, said, "Um, I think my ability to adapt to pretty much any environment and to pretty much anybody." A 24 year-old female basketball player (PASIPD = 16.59) added, "So it's helped me translate a lot more responsibilities into 'alright, that's how hard I work at basketball, I got to work that hard for school and other stuff.'"

Finally, a marathoner and former college basketball player (PASIPD = 35.6) reported that athletics helped her become more outgoing. In fact, she revealed that she would have declined an interview before she became active in sports.

I used to be a really, really shy person as a kid when I was a kid. And through athletics I've been like...I can sit here and have this conversation with you, like a complete stranger, I don't know you. When I was younger I would have been like, No, I'm not doing an interview.

In all, eight participants reported changes in behavior as a result of their sport and physical activity participation ranging from improved work ethic and adaptability to smoking less and being more outgoing.

The fourth and final psychological benefit was labeled improved self-perception. This label referred to interviewees who viewed themselves differently as a result of participating in athletics or physical activity. Some participants discovered attributes about themselves that they were previously unaware of prior to their activity experiences. One example is of a 22 year-old female with a PASIPD score of 35.33. She had one leg amputated as a result of a tumor when she was eleven years old and transferred to her current school for the sole reason to play wheelchair basketball.

So, um, just...it's [basketball] really changed my self concept, my uh, you know my, what I think other people see of me and also what I see in myself. I think I am a lot more disciplined and I...I look at myself more now...a lot of times before, it's not that I ever really didn't like myself. I didn't mind. But a lot of times I felt like other people just were like, 'Oh there's that poor one-legged girl.' Or you know, something like that. And so for me that's really changed and in a lot of ways that helps your self-esteem too.

Another participant who became more extroverted after playing basketball was a 38 year-old male with cerebral palsy (PASPID = 25.17). He stated, "It's changed me a lot. I was just very introverted before going to college. And I saw all these different things. I saw people going through the same experience I was and it just opened me up." A 36 year-old male (PASIPD = 46.42) who, as a former athlete and current youth sport director, witnessed the positive impact of sports. He stated "you know it's a self confidence kind of thing and to me you get a lot of that through athletics." This sentiment was echoed by another female college basketball player and Paralympic swimmer (PASIPD = 47.05), aged 20, who said, "Athletics provides a sense of confidence."

Sport and physical activity also allowed some responders to see themselves in a different light. For example, one 47 year-old male who was a two-time world champion water skier and current basketball player said, "I came from a pretty small town, so that's when I really found out that I was more of a natural athlete than I knew because I had never had those opportunities when I was living in my small town." When asked about the impact of basketball on his life another 54 year-old male with a PASIPD score of 21.57, stated, "Certainly, to a degree it was my identity. It's given me an outlet for physical activities, I've made a lot of wonderful friends over the years and here now I am just down here enjoying the games" A total of 15 individuals cited changes in self-perception as one of the benefits of an active lifestyle. These changes came in the form of improved self-confidence, improved self-esteem, and identifying oneself as an athlete.

In all, 26 out of 26 participants reported some sort of psychological benefit from participating in sports and other physical activity. Some responders reported that they felt better emotionally because they were able to relieve stress, release aggression, increase their level of endorphins, or participate in an activity they viewed as enjoyable. Others reported they received cognitive benefits and were able to learn to concentrate and stay focused, stay positive, and learn about new sports. As reported, many of the participants found that physical activity impacted their thoughts, feelings, and behaviors which included improved work ethic, the ability to adapt to people and places, decreased smoking behavior, and more outgoing towards strangers. Finally, over half (N = 15) of the participants reported that their self perceptions were changed due to sports and physical activity.

*Physical Health.* The second higher-order theme derived from the interview data was physical health. Physical health was coded as any statement that referred to the health benefits of physical activity. This theme was further broken down into physical fitness and preventing health risks. The interviews revealed that half of the participants (N = 13) cited physical health as a benefit of physical activity.

A 47 year-old male basketball player and former champion water skier (PASIPD = 36.16) said, “Um, again the physical part of it has kept me, I know, in a lot better shape than I would have been had I not done those sports.” A 39 year-old female who scored a 30.81 on the PASIPD added, “Yeah, it helps keep you young, it helps keep you healthy and at this point in my life it’s not something that I am willing to give up yet.” In addition, a 22 year-old female basketball player stated, “Since I’ve started playing basketball I’ve gotten in *so* much better shape.” A 31 year-old female who scored only a 6.2 on the PASIPD also received health benefits from exercise saying, “...Since I was lifting all of the time it really helped, so I’ll

definitely keep lifting to make sure I'm not developing any kind of shoulder problems and for basketball..." Finally, a 36 year-old youth director and former athlete said, "I mean I look at myself now I train 4 or 5 days a week primarily doing it for health reasons, lower my cholesterol, lose some weight."

As the selected quotes have shown, several of the participants value the physical health aspect of their physical activity experience. They listed benefits such as staying in shape, preventing shoulder injury, sleeping better, and preventing wear on the body.

*Social Influences.* The third higher order theme to emerge from the interview data was social influences (N = 11). Eleven of the participants revealed important people in their lives that either introduced them to sports or encouraged them to participate. These findings were consistent with the previously described work by van der Ploeg et al. (2004) and their PAD model. For instance, participants were influenced by family, friends, disabled peers, and health professionals to initiate and adhere to physical activity behaviors. It should be noted that the social influences theme includes only those persons who introduced the participants to physical activity and sports. Individuals who continue to influence responders in the form of a role model were coded under social opportunities. This was done to remain more consistent with the PAD model.

For example, one 46 year-old male who scored a 29.94 on the PASIPD and currently coached the same basketball team he used to play for said, "I had met a guy when I was in the hospital...So he told me about it, so when I got out of the hospital I went out and visited a couple of practices and try to play a little bit with the folks there." A 21 year-old female basketball player with a PASIPD score of 40.86 spoke about the influence of her brothers saying, "It was never, 'Oh, Emily can't play.' It was always, 'That's my sister and she's going to play with us.'"

For a third participant, it was her future coach who introduced her to wheelchair basketball. This 35 year-old female who scored a 51.49 on the PASIPD discussed her introduction to the sport.

I lucked out, when I was doing my rehabilitation, there was a gentleman there that competed internationally and he's actually our coach now for the women's team, and he introduced me to basketball and then to a school that had a program, and you know it all works out.

*Social Opportunities.* In addition to social influences, social opportunities, which comprised the fourth higher order theme, were made available for our participants within physical activity contexts. In fact, 23 participants in this sample mentioned social opportunities as being a benefit of physical activity. These social opportunities included valued interactions with others, being able to connect and form relationships with others including able-bodied persons, having the opportunity to go to college, and travel opportunities.

The 46 year-old male coach quoted above said, "It's a very nature bridge to the able-bodied world. People are comfortable to say, 'tell me about your basketball.'" Another example of sport playing a role in the interaction between participants and able-bodied peers comes from a 21 year-old female basketball player (PASIPD = 40.86) who had the chance to speak to a classroom of children. She said, "I think it was really cool for me to speak to them and kind of show them that people with disabilities can still be active." A 20 year-old male basketball player added, "And so from the social aspect it's like the campus looks at us not as a group of guys in wheelchairs who are just in wheelchairs. They look at us as a basketball team."

That same individual made several comments about the social aspect of wheelchair basketball, including the opportunities for education and travel.

But basketball and athletics has given me a chance to, you know, have a lot of my education paid for. It's taken me all over the world...And that's really something that the majority of, you know my friends in high school, they're in school doing whatever they do, and they may be working, but they're not college athletes. And that's...basketball as been the savior of my life. It's been the single most important thing.

A 38 year-old male with cerebral palsy and a PASIPD score of 25.17 spoke about why he enjoyed team sports as opposed to individual sports.

Um, I think because, for me, it's a team sport. You have to...the people on the court have to get along together. At least there has to be some form of cooperation. I like that aspect of doing that. Being part of a team, cooperating, talking to each other.

Another participant mentioned that she made friends through basketball. This 21 year-old female with a PASIPD score of 52.69 said, "I mean I have like a lot of connections and friends you know through being exposed to wheelchair sports."

In some cases, participants have found other disabled peers to be role models. A 29 year-old male who scored a 59.47 on the PASIPD said, "After I met guys and they were doing stuff...jobs that I didn't think that disabled people would." Later in the interview he stated, "Then when I started playing sports I met a lot of people that were doing incredible things...they had families...I thought I wasn't going to have all that." In other cases, the participants had the chance to be a role model to children with disabilities. The director of the youth center quoted earlier said, "it's about creating people and really in helping raise people's expectations about what they can do and that's one of the neat things through sport I think."

In this section I have presented interview quotes to lend support to the posited higher-order theme of social opportunities. The social opportunities higher-order theme was defined social interaction, opportunities for education and travel, and either being a role model or being exposed to a role model. Twenty-three of the twenty-six individuals in this sample reported a social opportunity benefit.

*Increased Overall subjective QOL.* The final higher-order theme that emerged was increased overall subjective QOL. While most of the previously discussed themes have focused on specific factors or components of the subjective QOL construct, this theme included quotes in

which the respondents discuss their overall happiness in more general terms over their lifetime. These descriptions also tended to be longer and more vivid than other responses.

For instance, when asked if sports improved her quality of life this 31 year-old female with a score of 36.87 on the PASIPD discussed how basketball and the school she attended impacted her life.

When I got hurt I was in this horrible 16 inch chair with push handles and arm rests and brakes and all sorts of horrible things because I didn't know any better, but then when I went to Illinois an met all these other wheelchair athletes I discovered the whole wonderful world of well moving, really nice, lightweight well-fitted wheelchairs and so, if I hadn't had that I think life would be harder just because I'd be in a bigger chair with more junk on it which means it would be harder to push around and so I think absolutely in just learning and just seeing the impact of strength and how much of a difference that makes, the stronger you are the easier everything is.

As can be seen from the quote, this person's life was greatly impacted by her participation in sports. More specifically, the culture in place already at the school and the athletes there introduced her to new equipment that made her life easier than it was before she arrived.

A 47 year-old basketball player who operates a not-for-profit program that teaches water skiing to children with disabilities provided another powerful quote.

So I know it changes people's lives. That's the great thing that sports does right there. Not only does it make you healthier, mentally it can change your life...like I said, sports is probably the single most important thing or has been the single most important thing since I've been injured. If I could turn back the hands of time, I'd still be sitting here in this chair. I wouldn't change a thing. Because I know it's made my life so much better.

This quote exemplified just how powerful an impact physical activity, in this case sport, can have on an individual's life. This particular individual was so profoundly affected by his participation in sport that he began to view his paralysis as a positive life change. Another male participant aged 46, and a former basketball player at the highest level of wheelchair basketball shared a similar sentiment.

I've had a, not that I want to die right now, but if I died right now, I could truly say that I'm satisfied with you know, I've been able to compete on an international level, I've been able to win national championships athletically, I have 2 incredible kids, great wife, good job, I live in a place where I'm happy.

### **Proposed Grounded Theory**

In the previous section, I discussed the higher-order themes that emerged from the data and provided quotes from the interview text to provide context to my observations and conclusions. In this section I will propose a grounded theory of the role physical activity plays in the quality for life for individuals with physical disabilities and why the participants in this sample maintained involvement in physical activity behaviors. This portion of the analysis represents a second more deductive analysis typically conducted by grounded theorists and involves making links between previous theory and research and the findings observed here (e.g., sensitizing concepts). Another purpose of this section is to elaborate more specifically about how the major higher-order themes are related to one another and other outcomes such as quality of life. In other words, it is important here to explicate theoretically whether the higher-order themes are related to one another and other variables in a causal, correlational, or bi-directional manner. For the purposes of this discussion it appears warranted to introduce Bandura's (1986, 1997) notion of triadic reciprocal causation adapted graphically in Figure 3-1. This view uses the term causation to refer to "functional dependence between events" (Bandura, 1997, p. 5) and considers human agency and behavior to operate within an interdependent structure of causal mechanisms. Indeed one can find clear examples of triadic reciprocal or perhaps even quadratic or polynomial causation in the previously described ICF and PAD models. Simply put, individuals' choices to engage in physical activity behaviors are determined by environmental contingencies (e.g., opportunities, resources, accessible facilities, supportive others), and personal factors that Bandura describes as cognitive, affective, and biological events; for my

purposes I will expand this latter category (biological events) to include overall functional capabilities and health. It is this interaction between the person and the environment that dictates behavior as part of a larger interdependent system of variables.

In the present study reciprocal causation was reflected in how the participants began involvement in various physical activity behaviors, the enjoyment, personal satisfaction, or other benefits they perceived from these behavioral choices, with future decision making processes. In other words, the perceived benefits of physical activity influenced behavioral choices to sustain these behaviors that then lead to other benefits and continued participation. Now that conceptual clarity has been established about how the higher-order themes are related to one another and with other important constructs, my grounded theory will be discussed along with extensive participant quotations as support.

My observations and the participants quotations' about environmental and personal factors largely confirmed predictions of the PAD model (van der Ploeg et al., 2004). However, the grounded theory being proposed here extends the PAD model by incorporating the major psychological, physical health, and social benefits discussed by the participants in this study. The double arrows within Figure 3-2 represent the reciprocal nature between the physical health, social, and psychological benefits of physical activity behavior with the initiation and maintenance of these behaviors over time. What follows is an explanation for each of the pathways and exemplar quotations that offer support for my synthesis of research.

As shown in Figure 3-2, boxes A and B represent the major elements within the PAD model. Within the present study these determinants of physical activity behavior included environmental and personal factors respectively. With regard to the role of environmental factors in physical activity, the participants' quotations revealed that environmental factors

included persons who introduced participants to adaptive sport or physical activity (i.e. social influences), the social aspects of the sports participants chose to participate in, and the availability of facilities and programs that facilitated or helped to sustain involvement. In the PAD model, social influences are a separate construct from environmental facilitators. These are referred to as facilitators because they increase the likelihood of participation in sports by making sports more fun and by providing a place to participate. In contrast, perceived barriers could include a lack of available facilities, lack of assistance from others, or physical activity that does not lend itself to social opportunities.

As was reported in the previous section, many of the participants in this investigation reported social influences and benefits as a result of their participation in physical activity and sport. In the context of this investigation, social influences are considered an environmental factor that facilitates physical activity for persons with disabilities as per the PAD model (van der Ploeg et al., 2004). For instance, one woman, who scored a 51.49 on the PASIPD and was 35 at the time of the interview, spoke briefly about how she became involved in wheelchair sports saying, “I lucked out, when I was doing my rehabilitation, there was a gentleman there that competed internationally and he’s actually our coach... and he introduced me to basketball.” Another female basketball player, who was 21 years old and scored a 40.87 on the PASIPD, spoke about her family saying, “It was never, ‘Oh, Emily can’t play.’ It was always, ‘that’s my sister and she’s going to play with us.’” Finally, one last female basketball player, aged 21 years with a PASIPD score of 52.69, mentioned her doctor saying, “I got exposed to wheelchair sports because my doctor at Johns Hopkins.” Eleven of the twenty-six participants mentioned the person who influenced them to become physically active.

The interview data also revealed that many of the participants found that they enjoyed the social aspect of physical activity. For one male basketball player who competed at the highest level of wheelchair basketball, the social aspect of the game is what drew him to the sport. He said, “I love, I mean to me like athletics, as far as that I enjoy being around the team more than I do the actual sport.” Another male basketball player from a lower division team said, “I like that aspect of doing that...being part of a team, cooperating, talking to each other.” The availability of a nearby facility encouraged this 51 year-old woman with a PASIPD score of 71.22 to become more physically active, saying, “Fortunately I was in an area here in Birmingham that has Lakeshore and I was encouraged early on to go into chair sports.” In all, there were twenty-three individuals from the sample who cited a social opportunity as a direct result of their sport involvement. The social opportunities and benefits played an important role in decisions to initiate and maintain physical activity participation.

Another construct discussed within their PAD model is personal factors. As shown in Figure 3-2 (paths 1 and 2), personal factors within the current study interacted with environmental factors as part of the physical activity experience for our participants. Personal factors included an individual’s health or level of injury, their attitude towards exercise, self-efficacy expectations and other personality constructs, and personal facilitators and barriers such as energy, time, money, motivation, age, and gender. Within the present investigation neither age nor gender emerged as important within the analysis. Essentially these two variables were not significant in this investigation nor were there any differences in participation or level of activity between males and females or individuals within different age strata.

There was evidence, however, that the other personal factors may have played roles in the activity levels of specific individuals. Some of our participants perceived personality factors as

important within physical activity. One man, aged 46 years and a PASIPD score of 29.94 said, “I think having that type of personality, being a bit of a competitor and a battler made it more likely that I was going to be aggressive in my rehabilitation,” when asked if his personality helped him after his injury. These results are consistent with the predictions within the PAD model. All of the individuals from this sample reported a favorable attitude towards physical activity due to the benefits they gained from it. These benefits have been reported earlier in this chapter.

Other personal factors discussed by participants included level of injury or condition, and self-efficacy. In this investigation level of injury or condition, was assessed by asking individuals why they used a wheelchair. Answers varied, but most of the participants with a spinal cord injury indicated that their level of injury did not limit function in their hands or arms. Others reported congenital conditions such as cerebral palsy, spina bifida, or did not specify their injury. No one reported that his or her condition or injury limited hand or arm function, which appears to be reflected in the higher than average levels of physical activity reported by the participants in this sample.

There are a range of other participant quotations that support the linkages between the constructs shown in Figure 3-1. For instance, this sample included several elite wheelchair athletes whose goals included making future Paralympic basketball teams. For instance, one man said, “My main goal now is to get a gold medal,” as he discussed his chances of making the next Paralympic team. In addition to such high-reaching goals, others mention exercise-related goals, as well as future educational and occupational goals. In order to achieve these goals the participants must have perceived and therefore experienced the social, physical, and psychological benefits of physical activity. Additionally, the quotes discussed above also reflect a sense of self-efficacy beliefs about the participants’ ability to achieve these goals.

Another important factor in subjective QOL is achievements. According to Dijkers (2005) achievements can include performances, relationships, status, health, and accomplishments. Some individuals in this sample reported achieving many athletic accomplishments and building lasting relationships through sports and activity. This 46 year-old basketball coach and former player said it, perhaps most eloquently.

I've had a, not that I want to die right now, but if I died right now, I could truly say that I'm satisfied with you know, I've been able to compete on an international level, I've been able to win national championships athletically, I have 2 incredible kids, great wife, good job, I live in a place where I'm happy.

Another middle-aged basketball player said, "And I've done, I've been on some U.S. teams and I've accomplished far more than I ever thought I could." This same man also forged lifelong friendships through basketball. He said, "Well I mean my best friend [has] been on the team as long as I can remember. I consider him my brother because of just all the years we've been together." Still another man spoke about the inspirational people he met saying, "Then when I started playing sports I met a lot of people that were doing incredible things...they had families...I thought I wasn't going to have all that."

Another form of achievement is developing or maintaining relationships. As I reported earlier in this chapter, twenty-three individuals from this sample cited social opportunities as a reason to participate in sports and exercise. These opportunities allowed them to form relationships such as meeting friends, influencing others, and being influenced by others. For instance a 38 year-old male with a PASIPD score of 25.17 said, "It's the 10 or 12 guys. Before basketball we're trading jokes with each other, or we're going out to dinner, or just talking at work." An example of influencing others was given by 21 year-old female who scored a 40.68 on the PASIPD. She said, "I think it was really cool for me to speak to them and kind of show them that people with disabilities can still be active...are still normal people you know."

Another example of a social relationship reported by the sample was meeting other individuals who were influential. A male aged 29 years with a PASIPD score of 59.47 said, “After I met guys and they were doing stuff...jobs that I didn’t think that disabled people would.”

Health was also important to many individuals in this sample as 13 out of 26 talked about physical fitness and health risk prevention. A female, aged 51 years with a PASPID score of 71.22 said, “It’s a good way to help with pain management, it helps strengthen my back and the muscles so that I am still able to walk.” A 36 year-old male who scored a 46.42 on the PASIPD added, “I mean I look at myself now I train 4 or 5 days a week primarily doing it for health reasons, lower my cholesterol, lose some weight.”

The final component of subjective QOL is subjective evaluations. Within the PAD model, subjective evaluations are the responses a person has to their achievements based on their expectations. If an individual achieved something they valued as important, then their evaluation would likely be positive. If they were unable to achieve something they perceived to be important, then they would evaluate the situation negatively. These evaluations can also be called life satisfaction, self-esteem, subjective well-being, and positive or negative affect.

Many of the more global evaluations came from older adults looking back on their lives, although younger participants did report positive affect and improved self-esteem. The 47 year-old man who is a basketball player as well as two-time champion water skier was one such person.

Like I said, sports is probably the single most important thing or has been the single most important thing since I’ve been injured. If I could turn back the hands of time, I’d still be sitting here in this chair. I wouldn’t change a thing. Because I know it’s made my life so much better.

A 35 year-old female made a similar statement. This woman, with a PASIPD score of 51.49 revealed the following view.

My quality of life I think is better now than it was before I got hurt. I do a lot more, I see a lot more, um, I couldn't say I would have done half of what I have done if I hadn't suffered a spinal cord injury.

This college aged female basketball player evaluated her activity experience in a positive way. She said, "I like the feeling you get from doing things ... I like feeling fit." A 29 year-old man added, "I feel like it [b-ball] gave me back a lot of self esteem."

In this chapter I reported descriptive statistics on the sample in addition to presenting higher and first-order themes that emerged from the interview data. I also provided quotations to lend more support to the themes. In the latter section of the chapter I proposed a grounded theory based in part on the PAD model (van der Ploeg et al., 2004), a subjective definition of QOL (Dijkers, 2003), and used Bandura's (1997) notion of triadic reciprocal causation. The grounded theory suggests that physical activity participation by individuals with disabilities is influenced by personal and environmental factors. Physical activity participation then plays a role in subjective QOL by increasing the opportunity to set and meet goals in a sport or exercise setting thus resulting in more favorable evaluations of those events. The results from this investigation will be discussed in further detail in the last chapter.

Table 3-1. Means and standard deviations for the PASIPD

Subcategory	Sample Mean	SD
Home Repair/Gardening	.16	.55
Housework	2.49	2.68
Vigorous Sport	18.62	13.68
Moderate Sport	5.33	5.53
Work not for Exercise	9.73	7.92
Total	36.34	15.28

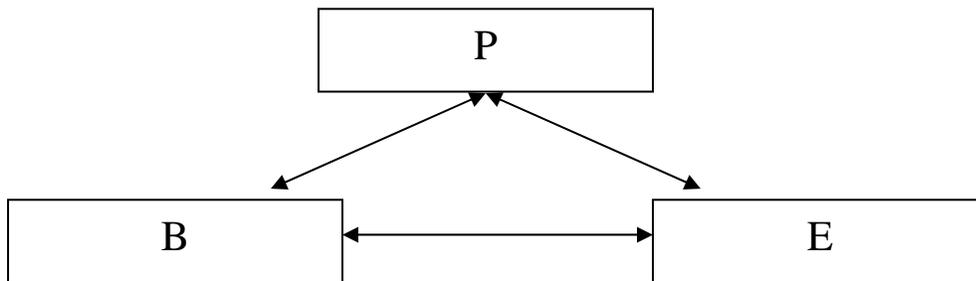


Figure 3-1. Triadic reciprocal causation adapted from Bandura (1997) representing the three major determinants of behavior. B represents behavior; P the internal cognitive, affective, and biological events; and E the external environment.

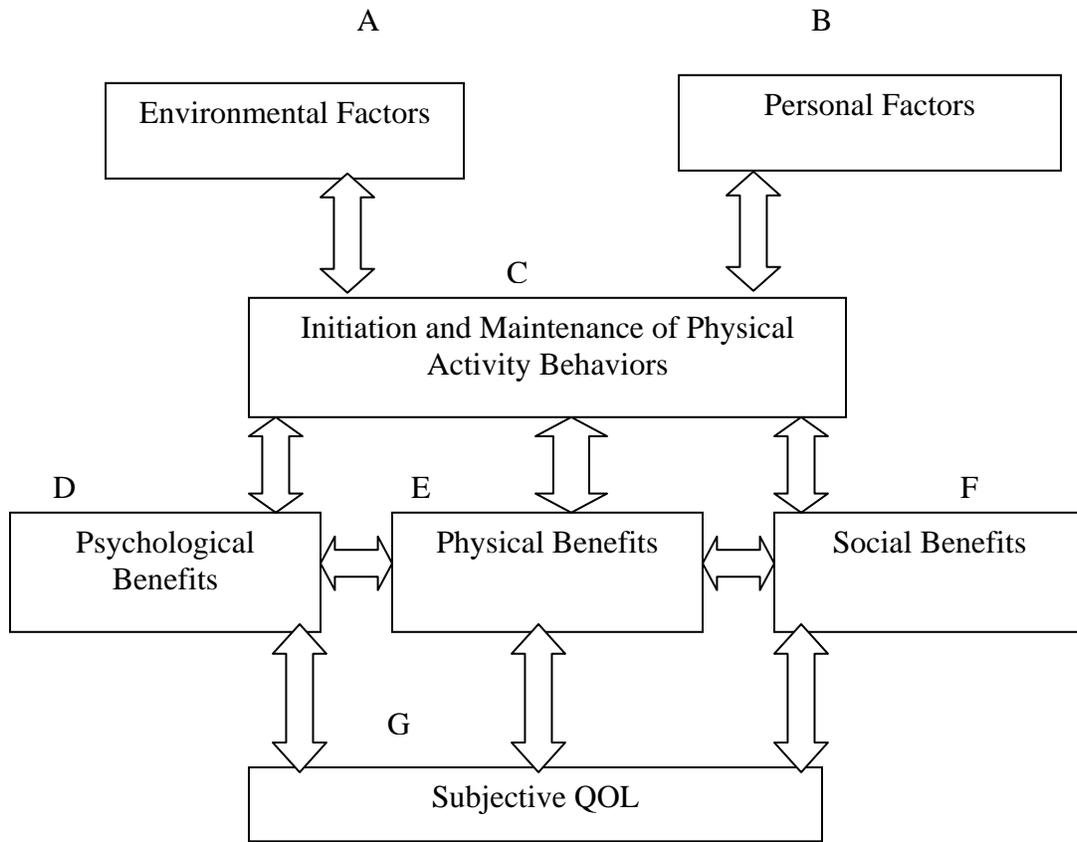


Figure 3-2. A grounded theory of the determinants of physical activity and the role it plays in subjective QOL.

## CHAPTER 4 DISCUSSION

### **Conclusion**

In this chapter I will summarize the findings of this exploration of the role of physical activity in subjective quality of life for individuals with physical disabilities. I will also discuss how the findings from this study contribute to and extend the extant literature. Finally, I will review study limitations and examine possible applications of the findings in real-world settings.

The purposes of the present study were to explore the role that physical activity plays in the subjective quality of life in individuals with physical disabilities. Also investigated were the determinants of physical activity and factors perceived by the participants that may have helped sustain their participation in physical activity. As shown in the previous chapter, the participants discussed a range of emotional, cognitive, and behavioral benefits from physical activity such as “feeling good,” staying focused, and developing a work ethic. In addition to these psychological benefits, the participants in this sample also reported social and physical health benefits. The social benefits reported included meeting friends, being able to spread a message, and positively influencing disabled peers, able-bodied peers, and children. The physical benefits included pain management, staying in cardiovascular shape, and developing muscle. In some cases these perceived benefits of physical activity also provided motivation for participants to continue their participation.

The findings from the present study suggest conceptual support for predictions put forth by Dijkers (2005). That is, the present study adds further specificity and clarity about the role that participation in physical activity plays in maintaining subjective quality of life. In Dijkers’ conceptualization, subjective QOL included achievements, goals, and subjective evaluations. Specifically, when individuals’ achievements meet or exceed their previously held goals or

values, they may evaluate those achievements in a positive manner. Conversely, if their achievements fall short of their set goals or values their evaluations may be considered negative. Thus in the present study a number of the participants reported positive evaluations, or psychological benefits, such as improved self-esteem, changes in self-concept, and the desire to share their achievements with other individuals with physical disabilities. Additionally participants described social and physical health benefits, or achievements, in the form of relationships, health, performances, and status again consistent with Dijkers' definition. Consequently, since the present sample reported greater frequency and intensity of leisure time physical activity than normative data reported by Washburn et al. (2002), it is likely the benefits derived from physical activity would be multi-dimensional and associated with a range of health, behavioral, or other lifestyle factors. Thus, when interpreting the findings from this study one needs to recognize the higher than average levels of physical activity participation reported by this sample.

A range of previously reviewed literature showed that subjective indicators of life quality such as positive and negative affect, life satisfaction, or other interpretations of one's life are often used to study people's lives. Further the approach adopted here was to focus on subjective quality of life from the perspectives of my participants. From Dijkers perspective subjective evaluations are considered reactions to achievements and can be either positive or negative, or emotional or cognitive depending on person, the situation, or the context. Thirteen participants interviewed for this study reported that their self-esteem was improved by their participation in wheelchair basketball while nearly the entire sample experienced psychological benefits associated with physical activity behaviors. The extensive and richly detailed quotations provided by the participants clearly suggest enhanced subjective quality of life associated with

participation in physical activity behaviors. One problem however is the data make it difficult to disentangle any differential impact the perceived social opportunities and benefits that resulted from participation in physical activity with those derived from physical activity itself. From either perspective, the participants in this sample, who were relatively active as indicated by the data reported about activity from the PASIPD, appeared to be happy, well adjusted, and experiencing positive subjective quality of life.

With regard to factors predicting physical activity by individuals with disabilities, the PAD model suggested that environmental factors and personal factors played a role in participation (van der Ploeg et al., 2004). Environmental factors included social influences and barriers and facilitators in the environment, while personal factors encompassed health condition, attitude, and barriers and facilitators in one's personal life (van der Ploeg et al., 2004). The findings from this investigation lend support to this model and suggest that social/environmental factors are implicated in decisions to initiate and sustain physical activity behaviors for individuals with physical disabilities. For instance, eleven participants from the sample spoke about the individuals who influenced them to become physically active such as doctors, coaches, and family members. Twenty-three of the participants interviewed reported that they gained tremendous satisfaction from the varied social aspects of their chosen sports. These social benefits included meeting friends, spreading a message, being a role-model, opportunities to travel, and receiving scholarships.

Another main construct in the PAD model that predicts activity behavior are personal factors. As previously stated, personal factors include self-efficacy, health condition, attitude toward the behavior, and personal facilitators and barriers such as available time, gender, age, and motivation. Factors such as age and gender did not appear to influence participation in

physical activity in this sample as no differences were observed in activity levels between gender or between age groups within the interview data. The lack of differences discerned within the interviews between these groups could be due to sampling issues (e.g., the highly active sample) or for other methodological reasons described below.

### **Practical Applications and Future Directions**

The results from this investigation offer practitioners several recommendations for practice. The first application could be at the policy level. While physical activity has been previously recommended for individuals with disabilities (Cooper et al., 1999), the reasons have been almost exclusively physical. In the future health professionals should also emphasize the social and psychological benefits of sport participation as suggested by the participants in this study and previous research (Giacobbi et al., 2006). A second more community or family oriented series of recommendations can be gleaned from the participants' reports about important influences that opened opportunities for physical activity. As demonstrated from the participant quotations, family members and caregivers of individuals with physical disabilities can play a facilitative role by encouraging, modeling, or actively persuading persons to be active. In contrast, it is highly possible that individuals could also encourage or model sedentary behaviors that could then influence individuals with disabilities to be inactive. While the findings here probably do not generalize to less active individuals, it would be interesting to examine how community or family based interventions could facilitate involvement in physical activity behaviors over time. Specifically, the participants initial involvement in physical activity behaviors were either encouraged or modeled by influential others and these experiences facilitated formation of initial self-efficacy beliefs regarding these activities which then perhaps allowed the participants to sustain these behaviors over time. An interesting theoretical and

applied question might involve who would be an effective role model or supportive other to encourage physical activity behaviors?

Another intriguing practical issue and potential set of research possibilities is offered through an interpretation of the present findings through a social-cognitive and/or self-efficacy explanation (Bandura, 1997). If Bandura's (1997) predictions are correct then a variety of possible social, family, and community interventions could effectively enhance self-efficacy beliefs and nurture motivated behavior in the physical activity domain.

### **Study Limitations**

There are several limitations from this study that should be acknowledged. First, the study sample was gathered using convenience sampling and comprised relatively active individuals recruited from a basketball tournament. Additionally, these individuals were pre-selected for physical activity due to being recruited at a basketball tournament. This may have led to the overwhelmingly positive evaluations of physical activity. Although results from the PASIPD data demonstrated a high degree of variability between individuals, the planned comparisons between active versus less active individuals could not be performed. Another design weakness was the single shot interview procedure with each participant. While the data did provide a unique perspective with which to examine the important influences for active participants, a more rigorous approach might be conducted to examine how and why individuals sustain their physical activity behaviors and health over time. For example, subsequent interviews could have been conducted to explore the possible reciprocal relationship between participation, benefits, and motives.

### **Summary**

In summary, this mixed-method study explored the role of physical activity on the subjective quality of life in a sample of active wheelchair users. It provided rich qualitative descriptions of

the physical activity experiences and the perceived benefits of their participation as well as their motives to sustain participation. The present study also explored the reciprocal relationship between participation, perceived benefits, and motives to participate.

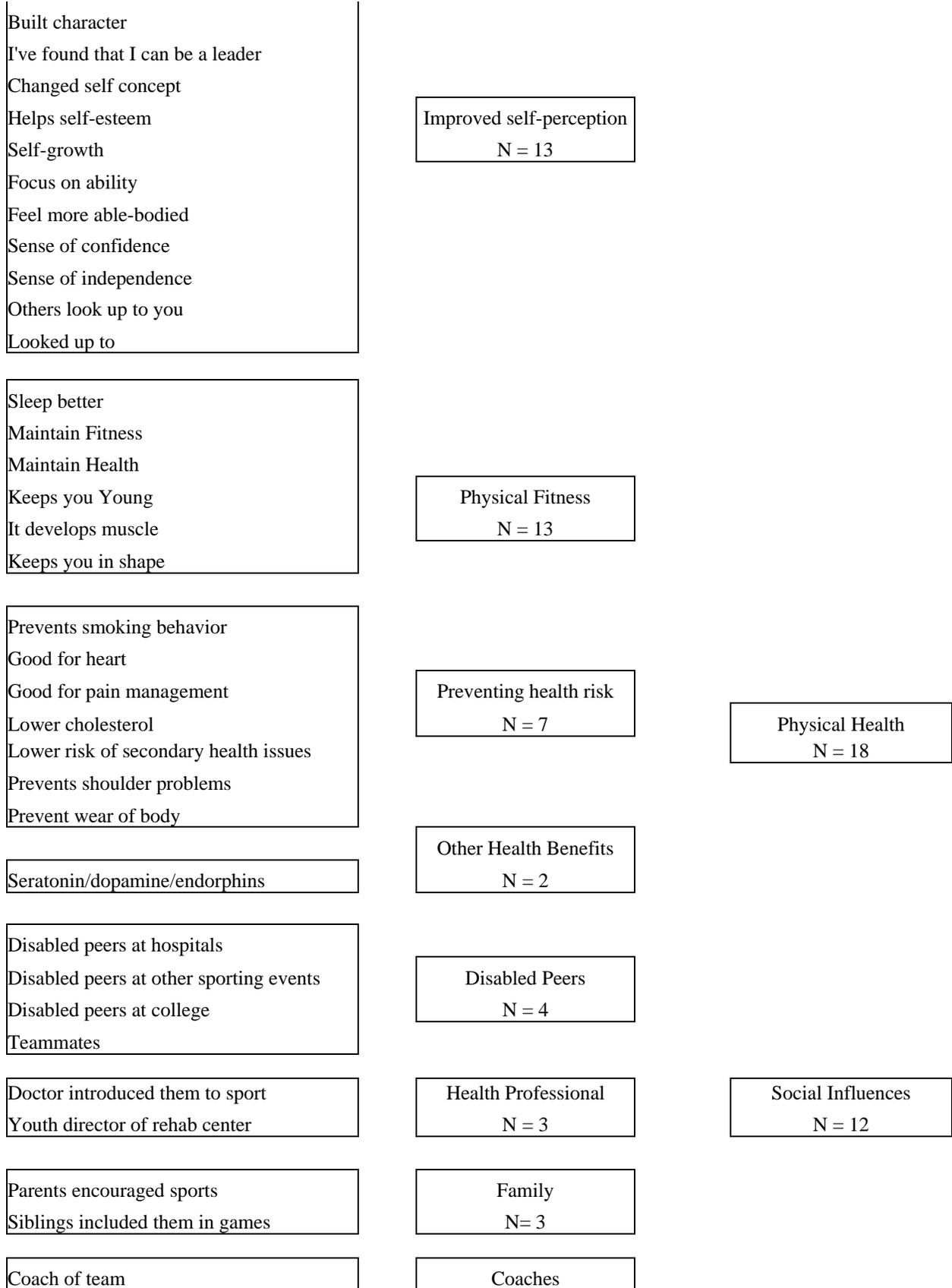
APPENDIX A  
INTERVIEW GUIDE

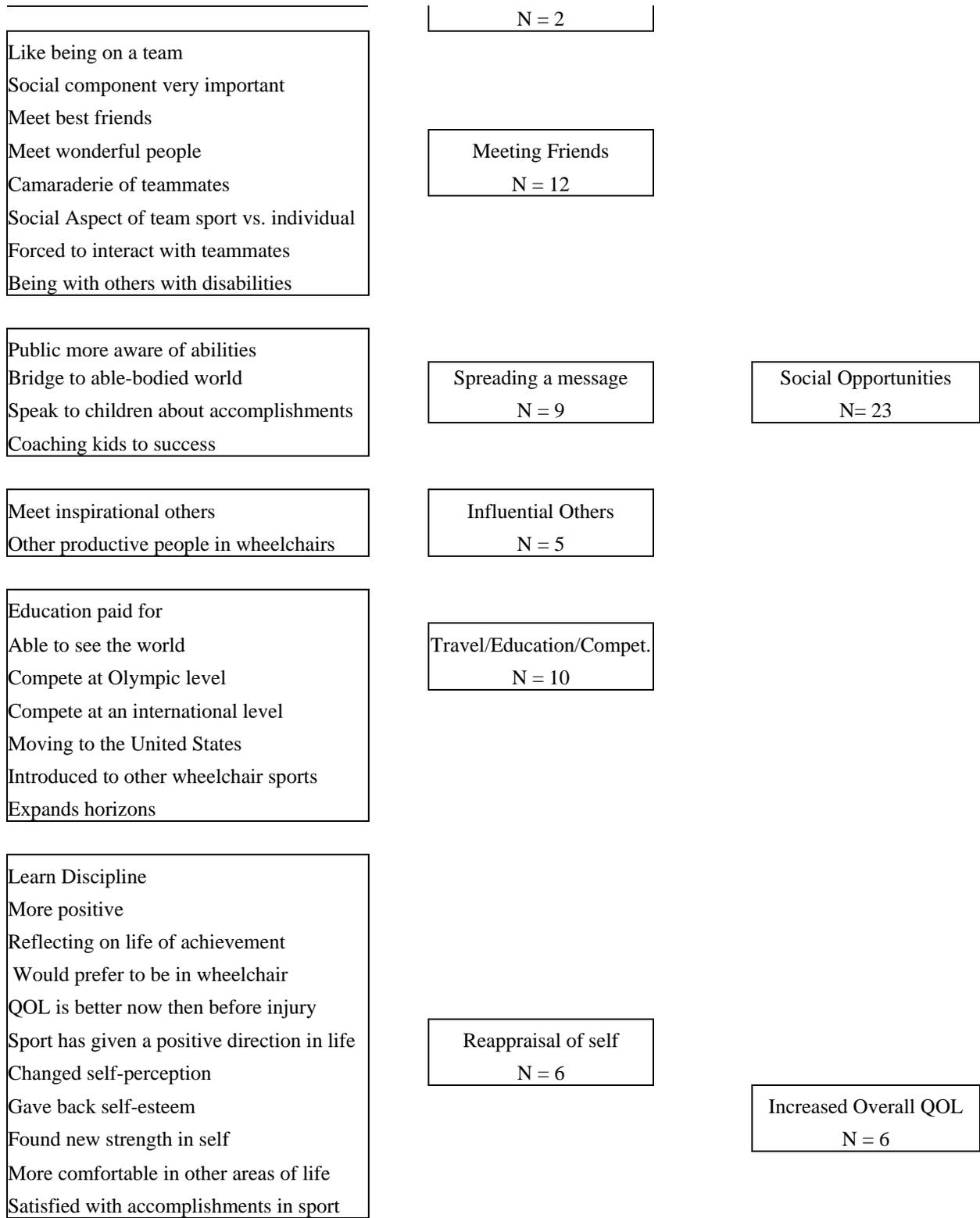
- I. Basic Demographic Questions
  - a. Age
  - b. Gender
  - c. Race/ethnicity
  
- II. Intermediate questions – this part of the interview will focus on your typical day.
  - a. Could you describe a typical day for yourself?
  - b. Tell me about your job (if appropriate).
    - i. What do you do?
    - ii. How long have you been in that occupation?
  - c. Describe some of the activities (hobbies, recreation) you enjoy during a typical day [besides work].
    - i. How long have you participated in that [those] activity[ies]?
    - ii. Why are those particular activities enjoyable to you?
  
- III. Physical Activity
  - a. What physical activities do you engage in regularly?
    - i. Could you please describe these activities?
    - ii. How often do you engage in \_\_\_\_\_?
    - iii. Do you compete? If so, how often?
    - iv. Could you tell me about your goals \_\_\_\_\_ (short or long term)?
  - b. Has participation in \_\_\_\_\_ impacted your life in any way? If so, how?
    - i. Potential probes include the following:
      - 1. How so?
      - 2. Could you tell me more about this?
      - 3. What was that like?
      - 4. Could you describe a specific time or incident where \_\_\_\_\_ occurred?
  - c. After having these experiences in sport and physical activity, what advice would you give someone?
  
- IV. Disability Specific Issues
  - a. Right now I'd like to learn more about your disability. Could you tell me about your disability?
    - i. How did \_\_\_\_\_ occur?
  - b. If this was an injury: What was your life like before \_\_\_\_\_?
  - c. What helps you manage or cope with \_\_\_\_\_?
  - d. Who is most helpful to you? How has he/she been helpful?
  
- V. Quality of Life

- a. Could you describe the most important lessons you learned about yourself after you experienced [your injury, illness, or disability]?
  - b. How have you grown as a person since you experienced this [disability, accident]?
    - i. If so, how?
  - c. Have you grown as a person since you became involved in wheelchair athletics?
    - i. Tell me about your strengths you discovered or developed through your sport/physical activity participation [dealing with your disability]?
    - ii. Tell me about your strengths you discovered or developed through sport or physical activity?
- VI. Is there anything that you might not have thought about before that occurred to you during this interview?

APPENDIX B  
THEMES FROM THE DATA

Raw Data Themes	First Order Themes	Higher Order Themes
Relieves aggression Good for disposition Fights depression Deal with rage Relaxing Relieves stress It's therapeutic Feel Good Keeps you positive and grounded More independence = more happiness	Emotional N = 12	
Competition is good Athletics teaches leadership Good mental strength Stay focused and concentrate Change life mentally It's Fun Gives you patience Develop trust Desire to not give up Feeling of accomplishment	Cognitive N = 10	
Work with others Depend on others Become more assertive More outgoing I can do anything anyone else can Ability to adapt Developed work ethic Showing that it can be done Perseverance Become less introverted Able to achieve goals increased control over life Increased ability to do things	Behavioral N = 8	Psychological Benefits N = 25
More outgoing		





APPENDIX C  
THE PHYSICAL ACTIVITY SCALE FOR PERSONS WITH DISABILITIES

Leisure Time Activity

1. During the past 7 days how often did you engage in *stationary activities* such as reading, watching TV, computer games, or doing handcrafts?

- a. Never (Go to question #2)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend in these *stationary* activities?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

2. During the past 7 days, how often did you *walk, wheel, push outside* your home *other than specifically for exercise*. For example, getting to work or class, walking the dog, shopping, or other errands?

- a. Never (Go to question #3)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend wheeling or pushing outside your home?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

3. During the past 7 days, how often did you engage in *light sport or recreational activities* such as bowling, golf with a cart, hunting or fishing, darts, billiards or pool, therapeutic exercise (physical or occupational therapy, stretching, use of a standing frame) or other similar activities?

- a. Never (Go to question #4)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend in these *light sport or recreational* activities?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

4. During the past 7 days, how often did you engage in *moderate sport and recreational* activities such as doubles tennis, softball, golf without a cart, ballroom, dancing, wheeling or pushing for pleasure or other similar activities?

- a. Never (Go to question #5)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend in these *moderate sport or recreational* activities?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

5. During the past 7 days, how often did you engage *strenuous sport or recreational* activities such as jogging, wheelchair racing (training), off-road pushing, swimming, aerobic dance, arm cranking, cycling (hand or leg), singles tennis, rugby, basketball, walking with crutches and braces, or other similar activities?

- a. Never (Go to question #6)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend in these *strenuous sport or recreational* activities?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

6. During the past 7 days, how often did you do any exercise *specifically to increase muscle strength and endurance* such as lifting weights, push-ups, pull-ups, dips, or wheelchair push-ups, etc.?

- a. Never (Go to question #7)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend in these *exercises to increase muscle strength and endurance*?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

#### Household Activity

7. During the past 7 days, how often have you done any *light housework* such as dusting, sweeping floors, or washing dishes?

- a. Never (Go to question #8)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)

d. Often (5-7 days)

On average, how many hours per day did you spend doing *light housework*?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

8. During the past 7 days, how often have you done any *heavy housework or chores* such as vacuuming, scrubbing floors, washing windows, or walls, etc.?

- a. Never (Go to question #9)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend doing *heavy housework or chores*?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

9. During the past 7 days, how often have you done *home repairs* like carpentry, painting, furniture refinishing, electrical work, etc.?

- a. Never (Go to question #10)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend doing *home repairs*?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

10. During the past 7 days, how often have you done *lawn work or yard care* including mowing, leaf or snow removal, tree or bush trimming, or wood chopping, etc.?

- a. Never (Go to question #11)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend doing *lawn work*?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

11. During the past 7 days, how often have you done *outdoor gardening*?

- a. Never (Go to question #12)

- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend doing *lawn work*?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

12. During the past 7 days, how often did you *care for another person* such as children, a dependent spouse, or another adult?

- a. Never (Go to question #13)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend *caring for another person*?

- a. Less than 1 hour
- b. 1 but less than 2 hours
- c. 2-4 hours
- d. More than 4 hours

#### Work – Related Activity

13. During the past 7 days, how often did you *work for pay or as a volunteer*? (Exclude work that mainly involved sitting with slight arm movement such as light office work, computer work, light assembly line work, driving bus or van, etc.)

- a. Never (Go to END)
- b. Seldom (1-2 days)
- c. Sometimes (3-4 days)
- d. Often (5-7 days)

On average, how many hours per day did you spend *working for pay or as a volunteer*?

- a. Less than 1 hour
- b. 1 but less than 4 hours
- c. 5 but less than 8 hours
- d. More than 8 hours

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Michael Stancil was born in Gainesville, Florida on July 1, 1980. Throughout his childhood he lived on the east and Gulf coasts of Florida. He received his Bachelor of Science degree in psychology in August of 2002 from the University of Florida. Michael began graduate school in the spring of 2004 where he met his wife Leah. They were married in Barbados in August of 2006 and currently reside in Columbia, South Carolina.