OPTIMAL EXPERIENCES AND EXERCISE ADHERENCE: THE ROLE OF FLOW AND MOTIVATION

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By

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Abstract

The purpose of this study was three-fold: (1) to determine if there was a relationship between flow experienced by exercise participants, motivation to exercise, and exercise adherence; (2) to what extent is flow associated with exercise adherence; and (3) what are the differences (if any) in flow experienced and motivation to exercise among active versus less active exercise participants. The study used a cross-sectional quantitative survey design. A purposive sampling technique was used to recruit 100 individuals who participated in various physical activity programs within St. John's, NL (M_{age}= 27.8; 80% female). Exercise adherence was measured using the Sports Physical Activity Index (Sports PA) of the Baecke Questionnaire of Habitual Physical Activity. Predictor variables included flow experienced during exercise participation (Dispositional Flow Scale-2) and motivation to exercise (Motives for Physical Activities Measure-Revised). Results determined that flow did not have a strong relationship with physical activity adherence. Future research suggests examining other variables such as efficacy for flow and goal orientations. As this study was exploratory in nature, it is suggested that this study be replicated and expanded to examine athletes in highly competitive situations.

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Table of Contents

List of Tables

List of Abbreviations

1. Work PA = Work Physical Activity
2. Sport PA= Sport Physical Activity
3. Leisure PA = Non-Sports Leisure

List of Figures

CHAPTER 1: INTRODUCTION

Exercise adherence is one of the most highly researched and talked about phenomenon's in exercise and health related literature alike. In fact, many researchers such as Dishman and McAuley, to name a few have conducted much research on the exercise adherence process and factors which influence adherence. Exercise adherence has a direct impact on our lives and our overall health as there are many health benefits associated with physical exercise. While most people are cognizant of the benefits of physical activity, attempting to get sedentary individuals to commence exercising and active individuals to maintain exercising has proven to be problematic (Dishman, 1994). Obesity rates continue to rise in Canada, with Newfoundland reporting the highest levels. In fact, with respect to Canada in 2008 as a whole, reports of height and weight of 17.2% of Canadians ages 18 and older were classified as obese (Statistics Canada, 2009). Additionally, from 2003-2008, obesity among men and women increased from 16.0% to 18.3% and 14.5% to 16.2% respectively (Statistics Canada, 2009). Finally, in a study of overweight individuals, 58.6% of men and 43.5% of women were at an increased health risk due to their weight (Statistics Canada, 2009). As obesity rates are a continuing problem in society, it is important to determine why individuals live sedentary lifestyles and explore the corresponding motives towards exercise among physically active individuals.

There are many factors that can determine one's participation in physical activity and adherence to a particular exercise regime. As motivational characteristics are one of the crucial determinants in commencing or continuing a particular activity, the state of flow can also influence one's motives. Flow is a state of consciousness where one becomes totally absorbed in what one is doing, to the exclusion of all other thoughts and emotion (Jackson & Csikszentmihalyi, 1999). Although exercise adherence, motivation and flow have all been studied extensively, there has yet to be a study that has examined all three variables and their relationships to one another. Furthermore, many theories have been used to study exercise adherence such as the Transtheoretical Model and Protection Motivation theory; however, flow has not been one of them. It has been suggested that highly motivated individuals experience high instances of the flow state (Kowal & Fortier, 1999). Additionally, self-motivation was consistently found to have a positive association with physical activity. Dishman and Sallis (1994) and Grove and Lewis (1996) reported that participants involved in an exercise program (i.e. circuit training) did experience flow and that the flow states generally increased as the exercise was prolonged. However, it is not known if a relationship exists among flow, motivation and exercise adherence. Therefore, this study is unique in that it seeks to determine the relationships between exercise adherence, flow and motivation. The objective is to examine the possible instances of flow in the course of exercise participation in addition to what motivates people to engage in exercise.

Gaps in the Literature

As exercise adherence and motivation are both significant concepts in the field of sport and exercise psychology, it is no wonder that there exists a considerable amount of literature in these areas. The state of flow, however, has not been studied as extensively. Flow, a very positive psychological state that typically occurs when a person perceives a balance between the challenges associated with a situation and his or her capabilities to accomplish or meet these demands (Jackson et al., 1998, p.358), is a state aspired to by elite athletes (Jackson, 1992, 1995, 1996) but also one that can be enjoyed by non-athletes (Marsh et al., 1999, p. 344). Motivation, one of the most salient and examined factors in sports and exercise settings alike is also an important area of discussion as people can be motivated to be physically active, both intrinsically or extrinsically. Although many motivators exist, it was determined from Kowal and Fortier's (1999) study that swimmers who were motivated in a self-determined manner had the highest instances of flow; suggesting that intrinsic forms of motivation may facilitate the flow experience. Lastly, exercise adherence (or the ability to adhere to a particular exercise regime) is also a heavily discussed issue in sport and exercise literature as many people as 50% who commence an exercise regime resign within 6 months despite the numerous physical and psychological benefits. It is evident from the literature that flow, exercise adherence and motivation have all been studied extensively. However, from an exercise adherence perspective, research on the flow state in physical activities is minimal. Specifically, there is an absence in the literature pertaining to the interrelationships among flow, motivation and exercise adherence. Therefore, there is a necessity to

examine these three factors and their interrelationships in order to conclude if influences exist.

The state of flow has been examined in different ways in exercise research. Specifically, Jackson et al. (1998) determined that perceived ability had the most substantial correlations with flow with regards to swimming, triathlon, cycling and track and field. Furthermore, Csikszentmihalyi and Nakamura (1989) determined that there is a need for the challenges and skills to be reasonably high prior to experiencing a flow-like experience. Therefore, athletes who have confidence in their abilities should be expected to experience a challenge/skills balance, although the challenge of a particular activity may be high (Jackson et al., 1998). Bassi et al. (2003), in his study to investigate the quality of experience and risk perception associated with high-altitude rock climbing, determined that flow was the most frequently reported experience among the rock climbers and Grove and Lewis (1996) reported that participants involved in circuit training did experience flow and that the flow states generally increased as the exercise was prolonged. However, there is limited research examining the effect of the state of flow on adhering to a particular exercise regime. This study will attempt to uncover this area as I believe that one's motives and psychological state is directly related to our adherence to exercise.

CHAPTER 2: LITERATURE REVIEW

The following chapter will discuss various factors of motivation and its corresponding attributes, a range of theories of exercise adherence and a description of the theory of flow. A review of the literature of the previously mentioned factors is then provided. Finally, the relationships amongst these factors will be discussed.

Factors of Exercise Adherence

Adhering to an exercise program poses many dilemmas in terms of developing a healthy lifestyle. In fact, research has determined that approximately half of the participants who enroll in a supervised exercise program withdraw within 6 months (Dishman, 1988). Reasons cited for the discontinuation of exercise include injury, lack of direction, unrealistic goals, inability to slowly progress within an exercise program, lack of professional guidance, lack of support (Downs & Hassenblas, 2005), and unreal expectations with regards to weight loss (Sullivan, 1998). There are numerous factors of exercise adherence that have been identified and are categorized as the following: personal attributes, environmental factors and physical activity characteristics (Dishman, 1990). With regards to physical activity characteristics, Dishman and Sallis (1994) discovered that self-motivation, prior program participation, and social support from spouse and family were consistently documented as having a positive association with physical activity. On the contrary, perceived lack of time and perceived effort demonstrated a negative association with physical activity. Many of the above reasons for

lack of exercise adherence are related to motivation. Thus, research has found that motivation is a key factor in determining exercise adherence which is discussed in the following section.

There are many factors to consider when examining exercise adherence. There exist numerous motives and personality traits that are associated with exercise adherence; these factors are important to examine in terms of exercise adherence among the general population. The following section will discuss these factors.

There are many reasons as to why people decide to participate in various types of exercise and it is essential to review these individual motives in order to create strategies to promote prolonged exercise adherence. Motives are unique and specific to the individual and therefore differ from person to person. These could include health reasons, desire for fitness, weight control (Weinberg & Gould, 2003), personal appearance, socializing (Weinberg & Gould, 2003), wanting to feel better in general, increased energy and goal commitment (Gillett, 1988 & Sheppard, 1985).

There are numerous individuals who additionally exercise for self-presentational purposes, which is the process by which people attempt to control and monitor how they are perceived and evaluated by others (Leary et al., 1999; Schlenker, 1980). Although, interestingly enough, these individuals appear to exercise less frequently than individuals who exercise for health/fitness reasons (Culos-Reed et al., 2002; Frederick et al., 1993). People may also be motivated to exercise based on self-presentational strategies (Conroy et al., 2000). Specifically, research has determined that exercise has physical and self-presentational benefits (Martin et al., 2006; Martin et al., 2000). In fact, it was found that

people who exercised were ranked highest with regards to personality and physical appearance. Additionally, people who exercise primarily for self-presentational purposes engage in dangerous behaviours (such as lifting weights beyond their limit) and may be inclined to use anabolic steroids. Finally, self-handicapping, defined as actions or choice of performance setting that provides the person with an excuse for failure and an opportunity to accept credit for success, is related to exercise motives (Berglas et al., 1978). Ommundsen (2001) determined that individuals may believe that by not trying hard, their behaviour may be less related to low ability. Therefore, by withdrawing effort and reporting self-handicapping strategies such as making excuses, individuals can avoid the negative emotions and therefore portray themselves as being equal to others and consequently protect their self-esteem.

Motivation

In order to adequately comprehend the reasons as to why certain individuals engage in different types of activities or portray themselves in a particular way, we must focus predominantly on the factors that guide their behaviour - their motives. Motivation is one of the most valued and centralized theories in the field of sport and health psychologies due to its biological, cognitive and social regulation properties (Ryan & Deci, 2000). Therefore, this theory is of great importance in understanding the reasons as to why individuals behave the way they do.

Motivation is not a one-dimensional theory, as we must comprehend the individual differences of people and the many types of stimuli which produce reactions from these individuals. There are many reasons as to why individuals can be motivated. The activity or behaviour may contain elements that the individual may personally desire and therefore deem intrinsically valuable or it may be purely based on external circumstances. Comprehending whether individuals engage in a behaviour due to their interests or values or due to external characteristics is significant in every culture and provides a basis as to how people come to understand the behaviour of themselves and the people around them (deCharms, 1968; Heider, 1958; Ryan et al., 1989). The following sections will discuss these two types of motivation: intrinsic and extrinsic.

Intrinsic Motivation

According to the Self-Determination Theory (Deci & Ryan, 1985; 2002; Ryan & Deci, 2000). motivational processes are best understood as a continuum of internalizations ranging from non-controlling to highly controlling forms of regulation. As non-self-determined forms of extrinsic motivation function to control behaviour, self-determined intrinsic motivation supports behaviour (Medic et al., 2007). Intrinsic motivation has been defined as the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn (Deci & Ryan, 2000). In addition, they are activities that people do naturally and spontaneously when they follow their inner interests (Deci, 1975).

The Cognitive Evaluation Theory (Deci & Ryan, 1985) is a sub-theory within the Self-Determination Theory that specifies factors that explain variability in intrinsic motivation (Deci & Ryan, 2000). It deals with social and environmental factors that facilitate intrinsic motivation by using language that reflects the assumption that intrinsic motivation, being inherent, will be catalyzed when individuals are in conditions that are conducive (Deci & Ryan, 2000). The theory states that social-contextual events such as feedback, communication and rewards that are related towards feelings of competence during an action can increase intrinsic motivation for that particular action (Deci & Ryan, 2000). In addition, optimal challenges, promoting feedback and freedom from demeaning challenges were found to facilitate intrinsic motivation (Deci & Ryan, 2000). Intrinsic motivation has been studied with a variety of variables, specifically, competence and autonomy. The following sections will discuss these various relationships.

Intrinsic Motivation and Competence

It has been determined by previous studies that positive feedback enhances intrinsic motivation relative to no feedback (Boggiano et al., 1979; Deci, 1971) and that negative feedback decreases intrinsic motivation relative to no feedback (Deci et al., 1972). As a result, Deci and Ryan (1980) suggested that events such as positive feedback that are related to effectance (competence) provide satisfaction of the need for competence, therefore increasing intrinsic motivation. Contrarily, events such as negative feedback that convey competence prevent the need for competence which as a result, undermines intrinsic motivation (Deci & Ryan, 2000). Additionally, intrinsic motivation

is likely to be present in situations that permit satisfaction of the needs for autonomy and competence. These types of circumstances are characterized as being informational (Deci et al., 1980). Although perceived competence is essential for motivation, perceived autonomy is compulsory for intrinsic motivation (Deci & Ryan, 2000).

Intrinsic Motivation and Autonomy

There have been many studies that have showed the relationship between intrinsic motivation and competence. For instance, research has supported the concept that autonomy is essential to intrinsic motivation by showing that other events such as threats (Deci & Cascio, 1972), surveillance (Lepper & Greene, 1975), evaluation (Harackiewicz et al.,1984), and deadlines (Amabile et al., 1976) led to a decrease in intrinsic motivation (Deci & Ryan, 2000). In contrast, providing choice (Zuckerman et al., 1978) and acknowledging people's inner experience (Koestner et al., 1984) augments intrinsic motivation and increases people's confidence in the performance in their activities (Tafarodi et al., 1999). The following section will discuss another form of motivation: extrinsic motivation.

Extrinsic Motivation

Extrinsic motivation is another important type of motivation as it is difficult to find an activity that is purely intrinsic. Extrinsic motivation is defined as behaviours that are considered a means to an end (Deci et al., 2000). Similarly, it refers to the performance of an activity in order to attain some separable outcome (Deci & Ryan, 2000). The primary

goal for extrinsic motivation is to gain awards and avoid punishment. Extrinsic motivation has been classified into two different types of motivation: self-determined extrinsic motivation, which is when an individual engages in a particular activity due to personal choice, and non-self-determined extrinsic motivation, which is present when an individual places pressure on themselves in order to perform an activity or when they believe their behaviours are controlled by various external factors (Kowal & Fortier, 1999).

Various theories have been used to predict and explain exercise adherence. Additionally, many of these theories contain the construct of motivation. Theories such as the Transtheoretical Model, Theory of Reasoned Action and Theory of Planned Behaviour, Protection Motivation Theory, Social Cognitive Theory, Reversal Theory and the Self-Determination Theory have all been researched in conjunction with exercise adherence. The following section will therefore discuss these theories and their relationships to exercise adherence.

Theories of Exercise Adherence

Transtheoretical Model

The Transtheoretical Model (Prochaska & DiClemente, 1983) suggests that the relative strength of intrinsic or extrinsic motives to exercise has been found to change across many stages: the preparation stage (individual is considering exercise as a potential activity), the action stage (exercise has been performed for less than 6 months) and the maintenance stage (exercise has been performed for more than 6 months)

(Prochaska et al., 1983). In the preparation and action stages, extrinsic motives appear to be stronger whereas in the maintenance stage, intrinsic motives are more prominent (Ingledew et al., 1998). People who begin to exercise based on extrinsic motivations are less likely to continue with the particular activity if this remains the sole motivator (Ryan et al., 1997; Wankel, 1993). Although extrinsic motives are essential when one is deciding whether or not to partake in a particular exercise regime, intrinsic motives are crucial for adherence (Jouper & Hassmén, 2009).

Theory of Reasoned Action and Theory of Planned Behaviour

According to the Theory of Reasoned Action (Ajzen et al., 1980; Fishbein et al., 1975), what one's intentions are (or are not), otherwise known as behavioural intentions, are one of the primary causes of behaviour. An individual's behavioural intentions are thereby influenced by their attitudes of the particular behaviour and their evaluation of other people's opinions. It is important to consider these factors as they can be important predictors of behaviour (Trafimow, 2009). Much of this theory consists of various types of salient beliefs which are defined as beliefs which are first thought of upon being asked an open-ended question (Sutton et al., 2003). Salient behavioural beliefs (attitudes with regards to the potential consequences when performing the behaviour) predict one's attitude of the behaviour, whereas salient normative beliefs (beliefs about the views of significant others) aid in determining their viewpoints of important individuals and their motivation to comply with their ideals (Sutton et al., 2003). In addition, salient control

beliefs (beliefs with regards to the aspects that may facilitate or impede the performance of the specific behaviour) are thought to predict perceived behavioural control (Sutton et al., 2003). Consequently, our intentions towards exercise adherence are directly related to our actual behaviour.

An extension of the Theory of Reasoned Action is the Theory of Planned Behaviour (Ajzen, 1985). This theory accounts for a third variable in determining intention, otherwise known as perceived behavioural control (Sirur et al., 2009). Therefore, the belief of one's skills, abilities, willpower, time and support that are required in order to adhere to a particular activity, strengthens ones intention and in turn their actions to adhere to the particular exercise (Sirur et al., 2009). In terms of exercise adherence, the more one perceives their skills, abilities, willpower, time and support to be suitable for participating in exercise, the more likely they will adhere to an exercise regime.

Protection Motivation Theory

The Protection Motivation Theory (Rogers, 1983) states that adherence to a prescribed activity is determined by an individual's overall appraisal of threats and coping (Sirur et al., 2009). A threat appraisal requires an individual to decide whether the decision to not engage in a particular activity creates a threat to their health and mobility. An appraisal of threat can be greatly influenced by various intrinsic and extrinsic factors (e.g., not participating in an activity and doing leisurely activities instead). An appraisal of coping permits the individual to focus on the various threats that could increase or

decrease the possibility of an adaptive response. Adherence to an exercise activity is based on many factors. According to this theory, an individual's chances of adhering to an activity are increased if the individual believes that adherence will improve his or her skills in that particular activity (response efficacy), if the individual believes that he or she is capable of adhering to the practice (self-efficacy) and if the individual determines there are few response costs (e.g., fatigue) (Sirur et al., 2009).

Social Cognitive Theory

The Social Cognitive Theory (Bandura, 1986) states that an individual's belief that they are capable of adhering to a particular activity is an important concept which can influence other concepts that influence adherence (Sirur et al., 2009). An individual's self-efficacy will influence their outcome expectations from adhering to the activity which would as a result, influence their overall adherence. The Social Cognitive Theory suggests that there are many factors which influence short-term goal setting: positive perceptions of self-efficacy, outcome expectations and sociocultural factors. In addition, positive perceptions are present in higher attainable goals toward adherence (Sirur et al., 2009).

Reversal Theory

The Reversal Theory (Apter, 1989) states that individuals are inherently inconsistent and that they reverse back and forth between opposing states of mind called meta-motivational states (Keele-Smith & Leon, 2003). There are four opposing pairs of

meta-motivational states which are mutually exclusive: telic and paratelic, mastery and sympathy, negativistic and conformist and autic and alloic (Apter, 1989). Although these states are mutually exclusive, one is still capable of being in a paratelic and autic state. Additionally, the Reversal Theory provides a great way of understanding exercise adherence. For instance, individuals who exercise in the paratelic state will find difficulties adhering to exercise regularly if they do not enjoy the activity they are currently partaking in (Keele-Smith et al., 2003).

Flow

Although there are many theories which aim to describe the exercise adherence process which include motivation as a construct, there is one theory in particular that has been studied extensively in sports and exercise settings alike. This theory is formally known as "flow." The following sections will discuss this theory, its characteristics and its role in exercise and non-exercise settings. The following section will discuss the history of the theory of flow.

History of Flow

In order to attempt to unravel the many pieces of the "flow puzzle," it is important to consider how this theory originated and the knowledge derived from this theory. Prior to 1975, Mihaly Csikszentmihalyi, the founder of flow, was in the midst of studying male painting artists as a part of his doctoral research. The painters would spend hours upon hours, day after day painting and appeared to be completely immersed in the activity. The

paintings in their completed form were not expected to generate much, if any, revenue nor were rewards present. Therefore, why did the painters exert so much effort into their paintings if they would receive next to nothing in return? What was motivating these painters to paint? These questions plagued Csikszentmihalyi as he felt that all human behaviours happened for a reason; no matter how complex these behaviours might be (Csikszentmihalyi & Csikszentmihalyi, 1988).

Despite much of societal research at the time being directed towards the explanation of behaviour in terms of rewards or external values, Abraham Maslow, a highly acclaimed American Psychologist known for his development of the Hierarchy of Human Needs, appeared to have made a breakthrough to this mystery. Maslow's research played on much of the highly acclaimed condition of intrinsic situations (self-rewarding) as he coined the term "self-actualization" as a need to discover one's potentialities and limitations through intense activity and experience. Although this provided great insight into why the painters experienced so much enjoyment from painting, many questions were still left unanswered: (1) Do all activities contain an intrinsic component?; and (2) Is everyone capable of experiencing intrinsic motivation? While these questions are ambiguous in nature, it is clear that individuals create enjoyment in and of the activity itself. After much research and observation, this autotelic experience formed the foundation of the development of a theory, known as flow (Csikszentmihalyi & Csikszentmihalyi, 1988).

What is Flow?

In order to accurately define flow, one must be cognizant of the comparable areas related to the theory, specifically happiness and enjoyment. Although every human being has different goals and objectives throughout his or her own life, there are two goals that seem universal: to enjoy life and be happy. However, to what degree can we accurately define enjoyment and happiness? Enjoyment is the gratification experienced by a particular event or stimulus which results in feelings of well-being and increased maturity. Happiness on the other hand is even more multifaceted as generations have tried to uncover its underlying meaning. It is characterized by a range of positive emotions which are the result of the quality of our lives. Subsequently, it is not something that happens but a condition that must be prepared for (Csikszentmihalyi, 1990). Although happiness and enjoyment are not easily understood, one thing remains clear: they are both highly internalized structures. External forces have no bearing on the degree of happiness we experience in our lives, rather, happiness is largely based on how we interpret and give meaning to our experiences (Csikszentmihalyi, 1990). It is when we gain complete intrinsic control of ourselves that we have the best chance at being happy and experience flow.

Flow is "a state of consciousness where one becomes totally absorbed in what one is doing, to the exclusion of all other thoughts and emotion" (Jackson & Csikszentmihalyi, 1999, p. 5). It also "predicts that experience will be most positive when a person perceives that the environment contains high enough opportunities for action (or

challenges), which are matched with the person's own capacities to act (or skills)" (Csikszentmihalyi & LeFevre, 1989, p. 2). Consequently, the complete opposite can occur. If your skills are greater than the task at hand, boredom is likely to occur whereas if the task at hand exceeds your skills or capabilities, anxiety is likely to occur. In both of these cases, performance is expected to decrease (Weinberg & Gould, 2003).

Specifically, individuals should partake in activities that are best suited to their own capabilities. For example, if a beginner chess player (i.e., low skill) is placed in a tournament with Master Chess players (i.e., high challenge), the player will likely experience anxiety. In contrast, if an avid mountain climber (i.e., high skill) climbs a mountain with minimal challenges in terms of incline and terrain (i.e., low challenge) he or she may experience boredom. However, if an individual participates in an activity with challenges that match his or her skill level (e.g., beginner chess player participating in a beginner tournament or avid mountain climber climbing Mount Everest), the experience is more likely to facilitate the experience of flow (i.e. an optimal experience). Additionally, if a person has just started to play tennis, ideally the first goal is to learn how to hold on to a racquet. As their skills become more developed and they have learned to hold on to the racquet, they may become bored with this skill and want to move on. Consequently, attempting to hit the ball over the net is a logical progression. However, if one does not know how to hold on to a racquet properly and attempts to hit the ball over the net, anxiety or frustration is likely to occur as there is an imbalance of the task and skill. It is when there is a balance of the skill and task at hand that flow is likely to occur. Moneta and Csikszentmihalyi (1996) state that the theory of flow

represents the person as a system that acts according to three integrated "teleonomies" (i.e. motivational systems): the genetic teleonomy, the cultural teleonomy and the teleonomy of the self. The genetic teleonomy corresponds to seeking pleasure and goals that are genetically programmed in a person's organism, such as eating and being healthy or sexually satisfied. The cultural teleonomy consists of seeking and maintaining social and economical success such as achieving a certain academic standard. The teleonomy of the self leads to reorganization and growth in the order and complexity of consciousness, which the person experiences as enjoyable and rewarding even in the absence of concomitant genetic and cultural prompt or reinforcement such as feedback. Therefore, the theory of flow states that optimal conditions for subjective experiences occur when the person is primarily driven by the teleonomy of the self. That is, when an individual participates in an activity for intrinsic reasons (e.g., enjoyment of the activity itself), he or she will perceive the experience to be optimal, and flow is likely to result from the experience. Hence, flow requires both a combination of mental and physical skills.

It is most probable that everyone at some point has experienced flow, whether it was planned or occurred by chance. Although there is no definite way to predict the incidence of flow, we are able to familiarize ourselves with the characteristics that are directly and indirectly related to flow. An explanation of these characteristics will now be discussed.

Key Characteristics of Flow

In order to achieve a state of flow, several characteristics of either the individual, activity and or person-environment interaction need to be considered. There are many characteristics consistent with the theory of flow. These characteristics include 1) A balance of Challenge and Skills, 2) Complete Absorption in the Activity, 3) A Loss of self-Consciousness, 4) Clear Goals and Unambiguous Feedback, 5) Concentration on the Task at Hand, 6) Sense of Control, 7) Merging of Action and Awareness, 8) Autotelic experience and 9) Transformation of Time and Effortless Movement. Specifically, these characteristics will be discussed based on two components: 1) the individual and 2) the activity. The following section will discuss these characteristics.

Individual Characteristics

When activities create such an immense amount of enjoyment that during participation, anything external to the activity does not seem to matter and is considered irrelevant, complete absorption is apparent. This is known as *Complete Absorption in the Activity*. Specifically, the individual is completely absorbed in the activity and is only concerned with the present components of the activity itself. For example, an individual who is playing violin at a concert may become so absorbed in the activity that they are unaware of the audience to the point of being surprised when the audience applauds at the end of the musical piece. Additionally, the individual who has just learned to play tennis may enjoy the game so much that they are oblivious to the nearby noise of construction

or other sounds due to this complete involvement. This characteristic is important for exercise adherence in that the individual is able to participate freely in any activity without the fear of any distractions. Consequently, it is these activities that produce immense amounts of enjoyment (Weinberg & Gould, 2003).

During the activity, concern for the self disappears during flow as the person becomes one with the activity. This is known as the *Loss of Self-Consciousness*. Specifically, there is no differentiation between the person participating in the activity or the activity itself. The absence of preoccupation with the self does not mean the individual is unaware of what is happening in their mind or body, but rather the individual is not focusing on the information normally used to represent to oneself who one is (Jackson & Marsh, 1996); the individual is merely concerned with the activity they are participating in. For example, the tennis player may become so immersed in the activity that they feel as though their racquet has become an extension of their own body. This characteristic is important for exercise adherence in that participating in an activity feels natural to the individual and not a chore. Additionally, this enables us to set on a whole new journey of self-discovery as we become immersed in this deep psychological condition (Csikszentmihalyi, 1990). Through this involvement, we are capable of reaching needed depths as we discover ourselves further.

While participating in activities, individuals develop such a sense of control that they are not actively aware of control (not thinking about the control present or lack of control) nor are they concerned with lacking control. This is known as *Sense of Control*.

The thought of accomplishment or failure is not present and individuals are merely concerned with the participation in the activity. A sense of exercising control is experienced, without the person actively trying to exert control (Jackson & Marsh, 1996). For example, the tennis player is not concerned with their opponent but rather is just focused on hitting the ball in the desired spot. This characteristic is important for exercise adherence in that individuals are not concerned about their success in the activity, but are merely enjoying participation. It is the ability to develop a sense of control in activities that is likely to result in superior performances and permit individuals to believe that they are the ultimate determinants of their actions (Weinberg & Gould, 2003).

While completely absorbed in the activity, the individual is aware of their own actions but not of the awareness itself. This is known as *Merging of Action and Awareness*. Involvement becomes so deep that it becomes spontaneous or automatic (Jackson & Marsh, 1996). It is a type of subconscious feeling that if it is made conscious can disrupt the experience as thoughts become diverted away from the task at hand. For example, when the tennis player is playing tennis, they do not need to consciously think about how to hit the ball as it appears to be a natural process. This characteristic is important for exercise adherence in that individuals are not preoccupied with their technique or form in an activity and are merely participating. It is at this point where the absorption is so prominent that actions in the activity appear to be spontaneous and they no longer view themselves as separate from the actions they are performing (Csikszentmihalyi, 1990; Weinberg & Gould, 2003).

While immersed in the activity, there appears to be either an increase or decrease in the amount of time spent in the activity. This is known as *Transformation of Time and Effortless Movement*. In fact, the objectivity of time and clocks is rendered irrelevant during the activity (Csikszentmihalyi & Csikszentmihalyi, 1990). For example, the tennis player may be so immersed in the game that they may not realize they have been playing for two hours when in fact they were only scheduled to play for an hour. This characteristic is important for exercise adherence in that individuals will participate longer in an activity as opposed to watching the clock for the time pass by.

Complete concentration is critical while experiencing flow. This is known as *Concentration on the Task at Hand.* When concentration is at its highest, information irrelevant to the task is not processed, leaving only information relevant to the task at hand to be addressed. Consequently, total concentration is one of the most frequently mentioned flow dimensions (Csikszentmihalyi, 1990). This "concentration" or "focusing" is especially important in order to effectively complete an activity. For example, the tennis player is only focused on playing the game and ignores anything that is not part of the activity, such as the spectators. This characteristic is important for exercise adherence in that it permits the individual to fully focus on the activity in which they are participating and to dismiss everything external to it. It is the structure that this concentration creates that enables external forces to be dismissed.

Certain individuals are capable of experiencing flow-like states more readily if they possess particular traits. Specifically, the autotelic experience (or personality)

consists of a group of traits which are thought to facilitate intrinsic motivation in particular activities. Additionally, the autotelic trait encompasses concentration abilities, autonomy, self-confidence, an internal locus on control, a focus on process and challenge and low levels of self-consciousness (Grove et al., 1996). Individuals who possess the autotelic trait also tend to be internally driven and therefore participate in activities for intrinsic reasons. Additionally, individuals who possess the autotelic trait may be more likely to remain involved in exercise due to their intrinsic motivation.

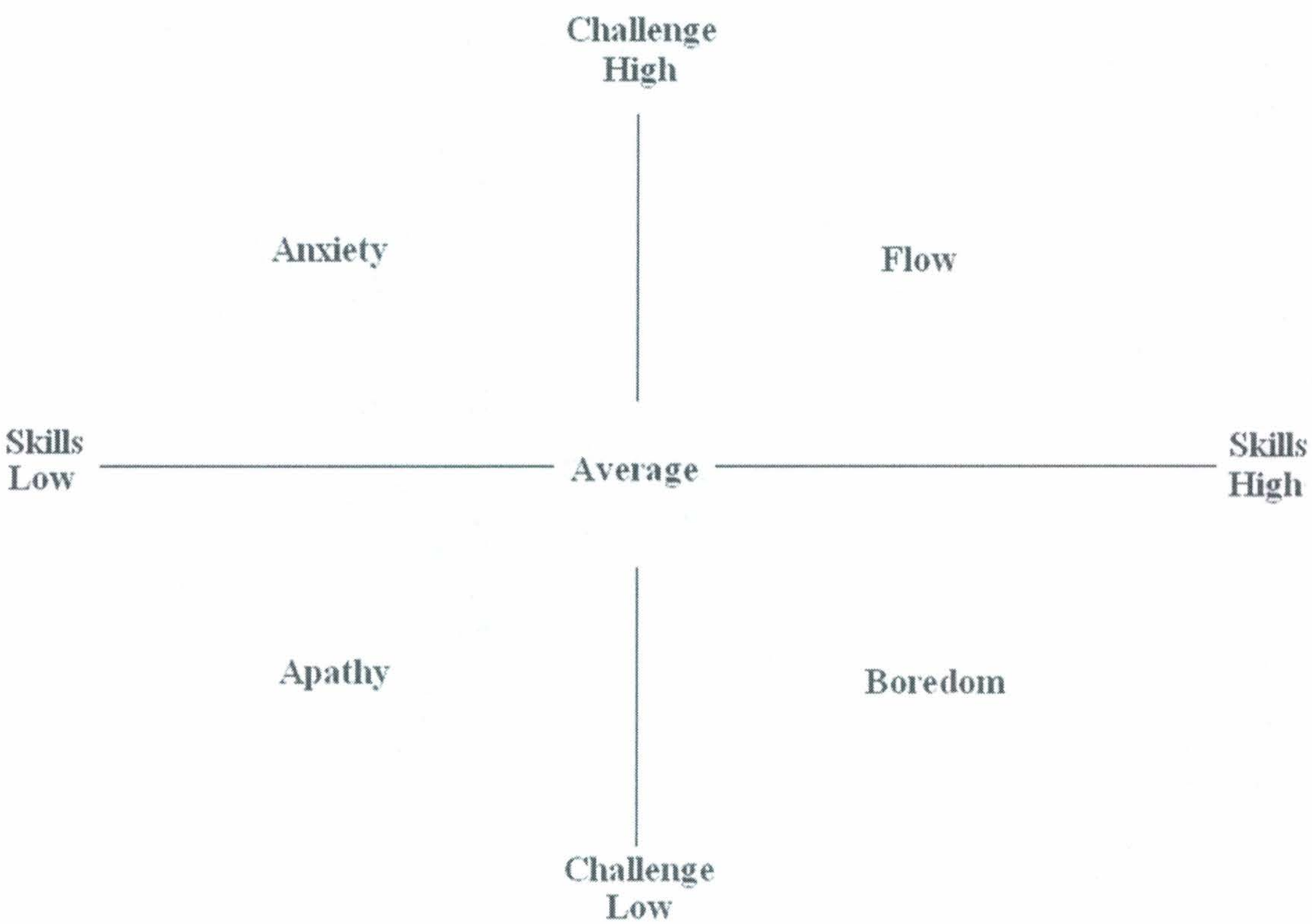
Activity Characteristics

As previously discussed during the flow experience, the person perceives a balance between the challenges of a situation and one's skills, with both constructs operating at a personally high level (Jackson & Marsh, 1996). This is known as *Challenge-Skill Balance*. Csikszentmihalyi and Csikszentmihalyi (1988) describe this characteristic as occurring when a person's skill is at just the right level to cope with the situational demands. Consequently, individuals who do not possess the appropriate skills for the activity chosen will likely deem the activity meaningless and when an individual's skill level surpasses the activity that they are engaged in, their self and their potential cannot be realized. Additionally, this is also true when the characteristics of an activity surpass the individual's skill level. To clarify, one can assume that there are challenge-skill quadrants (See Figure 1). The vertical line represents challenges and the horizontal line represents skills. The top right quadrant represents the flow state, the top left

quadrant represents anxiety, the bottom right quadrant represents boredom and the bottom left quadrant represents apathy. In activities where the challenge of the activity is high and so are the skills of the individual, we experience a sense of well-being such as flow. Keeping in line with the previous example, let us assume that an individual has just learned how to hit the tennis ball over the net. After practicing this skill a few times, he or she may progress to attempting to hit the ball over the net five times in a row and so on. Since this activity is comparable with his or her skill level, the individual is likely to experience flow. In activities where the challenge of the activity is high and the skills of the individual are low, anxiety is likely to occur. Even though the individual has just learned to hit the ball over the net, attempting to put different kinds of spins on the ball may be quite difficult for the player and the individual would likely become frustrated and experience anxiety. In activities where the challenge of the activity is low and the skills are high, boredom is likely to occur. Since the tennis player has learned to hit the ball over the net, learning how to hold on to a racquet again would be boring since they have already mastered that task. Additionally, in situations where neither skills nor challenges are present to a significant level, a feeling of low energy levels and apathy is likely present and flow is not expected to occur (Jackson & Csikszentmihalyi, 1999, p. 37). This characteristic is important for exercise adherence in that the challenge of the activity in which an individual is participating in must correspond with the skill level the individual possesses in order for a flow experience to occur. It is when the balance of challenges and skills are at an equilibrium that individuals are happiest and flow experiences are imminent (Csikszentmihalyi, 1990; Weinberg & Gould, 2003). However,

although a low challenge and low skill situation can create a flow experience, a true flow-like experience is evident when there is a match between high challenge and high skill involved. This characteristic can be applied to exercise adherence in that individuals may adhere more to exercise when they experience flow during these activities, and flow is more likely to occur in activities which meet individuals current skill level.

Figure 1. A Flow Model



(Figure adapted from Weinberg & Gould, 2003 reprinted from Kimiecik & Stein, 1992).

Goals and feedback are essential when involved in an activity. When participating in a particular activity, the individual knows exactly what to do and how to do it and he or she is completely focused on what they are doing. Goals are clearly defined (either set in advance or developed out of involvement in the activity) which gives the person in flow a strong sense of what he or she is going to do (Jackson & Marsh, 1996). This is known as *Clear Goals and Unambiguous Feedback*. Immediate and clear feedback is received, usually from the activity itself, which permits the individual to judge if he or she is succeeding in the set goal (Jackson & Marsh, 1996). For example, the goal of the tennis player may be to hit the ball over the net and is immediately provided with feedback if the ball does not go over the net. This characteristic is important for exercise adherence in that it permits the individual to determine if they are succeeding in the particular activity or not. It is this sense of clarity that enables individuals to experience thoroughly enjoyable activities (Csikszentmihalyi, 1990; Weinberg & Gould, 2003). This characteristic can be applied to exercise adherence in that individuals frequently establish goals prior to activity participation and it is through participation that they receive clear and immediate feedback of their progress. The following section will discuss the significance of flow.

Significance of Flow

For many years, the foundations of happiness have been explored extensively in attempt to fully comprehend how one may achieve it and despite best efforts,

advancements have been minimal. Consequently, one thought was that the more material possessions and wealth one had attained, the happier in turn one would be, failing to consider any intrinsic facets at all. However, happiness is not something that happens and is certainly not the result of good fortune. It is independent of outside events and is based largely on our interpretations. If we are capable of controlling our inner experience and consciousness, we will in turn increase the quality of our lives, thus leading to happiness (Csikszentmihalyi, 1990). It is our ability to take charge of ourselves and our experiences that enables us to grasp a new sense of growth and maturity among ourselves. It is when we achieve flow that our well-being dramatically increases and we become distant from the many typical dilemmas of everyday life. Specifically, achieving flow is likely to increase our performance in activities consequently leading to increased happiness. It is the enjoyment that we get from exploiting our mental and physical capabilities in different directions that differentiates us from any other form of life (Jackson & Csikszentmihalyi, 1999). As flow is related to happiness and exercise inevitably leads to happiness, there exists an important relationship. Consequently, a relationship should exist between the flow experience and exercise adherence. Therefore, flow has the capability of creating positive feelings and enjoyment in activities that one did not deem possible.

Measurement of Flow

Due to the richness and complexity of flow and optimal experiences, measurements that are inclusive rather than exclusive are a necessity (Jackson & Marsh, 1996). Therefore, it is critical to develop a type of analysis which can accurately measure flow and its attributes. Although flow is a subjective state, many studies have employed a quantitative method of measurement in order to avoid limitations that are present during qualitative research such as the retrospective nature of interviews (Karageorghis et al., 2002). Among the most commonly used quantitative instruments are the Experience Sampling Method (developed by Csikszentmihalyi, Larson, & Prescott, 1977; Csikszentmihalyi & Larson, 1987; Hormuth, 1986; Larson & Csikszentmihalyi, 1983 (Csikszentmihalyi & LeFevre, 1989), the Flow State Scale (developed by Jackson and Marsh in 1996), the Privette Experience Questionnaire (developed by Bundrick, Privette & Thornton in 1999) and the Dispositional Flow Scale (developed by Ford, Jackson, Kimiecik & Marsh in 1998). The following is a discussion of the methods used for measuring flow.

Experience Sampling Method

The Experience Sampling Method (Csikszentmihalyi, Larson & Prescott, 1977) is a means for collecting information about both the context and content of the daily life of individuals (Csikszentmihalyi et al., 2007). In a study that employs the Experience Sampling Method, participants carry an electronic pager and Experience Sampling

Questionnaire booklet. Signals are sent to the pagers at random times throughout the day and participants are instructed to immediately fill out a section of the questionnaire pertaining to the physical context, social context, activities and thoughts and feelings present at the time of the signal.

This methodology has been used in several studies exploring the role of flow in sport (e.g., Fave & Massimini, 2003; Daniels et al., 1995). For example, Daniels et al., (1995) conducted a study to investigate the use of the Experience Sampling Method to measure flow among students enrolled in basketball activities. During a nine week period, a research assistant would enter the gymnasium once a week and interrupt activity to distribute the Experience Sampling Method questionnaires to participants. Upon completion of the questionnaires, participants resumed their activity. Results concluded that differences existed between apathy, boredom, anxiety and flow contexts. Moreover, students perceived the flow context to be the most enjoyable.

Additionally, Bassi et al., (2003) conducted a study to investigate the quality of experience and risk perception associated with high-altitude rock climbing by means of the Experience Sampling Method among six male rock climbers. Each climber carried an electronic pager that sent random signals five times a day for a week. Upon being signaled, climbers were asked to fill out a section of the Experience Sampling Method questionnaire which asked questions such as "What were you doing?" and "Please describe how you felt when you were beeped." Results concluded that climbing provided a potential source of flow and flow-like states. In fact, flow was the most frequently

reported experience among the rock climbers. Additionally, according to the literature on the Experience Sampling Method literature by Csikszentmihalyi and Larson (1977), five signals a day for a standard one week session are effective in portraying participants daily life and experience (Delle Fave et al., 2003).

Flow State Scale

The Flow State Scale provides a quantitative measurement of the eight dimensions of flow outlined by Csikszentmihalyi (1990) in sport and physical activity settings. The 36 item instrument forms eight sub-scales which represent the dimensions of flow. The dimensions measured include: 1) Challenge-Skill Balance, 2) Merging of Action and Awareness 3) Clear Goals and Unambiguous Feedback, 4) Concentration on Task at Hand, 5) Sense of Control, 6) Loss of Self-Consciousness, 7) Transformation of Time and 8) Complete Absorption in the Activity. Statements were developed based on the eight dimensions of flow (e.g. "I was challenged, but I believed my skills would allow me to meet the challenge" (Challenge-Skill Balance)) and respondents indicate the extent to which they agree with each statement on a 5-point Likert Scale (1="strongly disagree" and 5="strongly agree"). According to Jackson and Marsh (1996), The Flow State Scale has received initial psychometric support through confirmatory factor analyses, which confirmed the hypothesized nine-factor structure. Support was also demonstrated for a higher-order global factor; however the fit of the data was slightly better for the nine-

factor structure. Internal consistency estimates for the flow subscales were acceptable, ranging from .80 to .86 (Jackson et al., 1998).

The Flow State Scale has been used in a variety of sport-related studies including interventions to promote flow and sport performance (e.g., Fryer et al., 2002) and psychological determinants of flow (e.g., Ford et al., 1998; Fortier & Kowal, 1999). For example, Fryer et al., (2002) conducted a study to determine whether 1) music would promote flow and 2) if flow would therefore have a positive impact on netball (a non-contact sport similar to basketball) shooting performance. A single-subject, multiple baselines across-subjects design among three netball players was employed. In order to determine the degree to which participants experienced flow during shooting performance, the Flow State Scale (Jackson & Marsh, 1996) questionnaire was distributed to the participants. Upon completion of the questionnaire, participants were given an explanation of the flow state as described by Jackson and Marsh (1996) and were asked to recall the images and feelings they associated with their experiences of flow in sport. Participants were then instructed to select a piece of music to determine if the feeling associated with flow could be experienced through listening to the music. Finally, the selected music was played during a performance trial and participants were assessed using the Flow State Scale. Results concluded that music intervention resulted in an improved score and that the music intervention increased the degree to which participants experienced flow. However, changes in flow were not always consistent with changes in performance. In addition, the authors acknowledged that a multi-method approach may be more suitable in order to gain an accurate understanding of flow.

Additionally, Jackson et al. (1998) conducted a study to examine possible psychological correlates of flow in a sample of 398 athletes partaking in a World Masters Games open to all performers with no qualifying standards. Therefore, the skill level varied greatly as some participants were world-ranked competitors while others viewed themselves as recreational participants. The participants for this study were selected from four main sports: 1) swimming, 2) triathlon, 3) cycling and 4) track and field. In addition to using the Flow State Scale to assess the athletes, the Trait Flow Scale, based on Jackson and Marsh's Flow State Scale which is designed to assess the trait component of flow, was used during this study. Specifically, the Trait Flow Scale assesses the frequency with which respondents report experiencing flow in general during sport participation. Results concluded that relationships exist between flow and perceived sport ability, anxiety, and an intrinsic motivation variable.

Privette Experience Questionnaire

The Privette Experience Questionnaire elicits a narrative description of a personal peak performance, defined operationally as "functioning at your best" (Bundrick et al., 1999, p.5 & Privette, 1999). This questionnaire contains 47 descriptive items/questions in a Likert-type format. In addition, the questionnaire was developed based on unstructured self-reports and literature concerning peak experience, peak performance and flow. The Privette Experience Questionnaire has been used in several studies examining the experience of flow. For example, Grove and Lewis (1996) conducted a study to examine

the hypnotic susceptibility and prior experience as correlates of flow-like states during exercise by means of the Privette Experience Questionnaire among 96 participants who regularly attended circuit training classes at a university gymnasium. A subset of ten items was derived from the Privette Experience Questionnaire in order to assess the flow-like states. Participants completed the ten item flow questionnaire on two different occasions as they moved to other exercises. Participants were then instructed to assess their heart rate each time they answered dimensions of the flow scale. Results concluded that flow-like states were apparent during circuit training. Psychometric studies (Privette & Bundrick, 1987) supported reliability and construct validity and provided an identifiable factor structure (Thornton et al., 1999).

Dispositional Flow Scale

The Dispositional Flow Scale measures a particular individual's dispositional propensity to experience flow (Borie, 2005 & Jackson & Marsh, 1996). It consists of 36 items based on the eight dimensions of flow cited by Csikszentmihalyi (1990) to measure the frequency in which individuals distinguish experiences in flow in a particular activity. The Dispositional Flow Scale is based on a previous validation of Jackson and Marsh's (1996) Flow State Scale which measures flow experiences in a particular activity. Items on the Dispositional Flow Scale are based on a 5-point Likert Scale varying from "1" (never) to "5" (always). An example of a question assessing Challenge-Skill Balance is as follows: "I am challenged but I believe my skills will allow me to meet the challenge."

Additionally, each subscale is measured by four items (Jackson et al., 1998). Wanner et al., (2006) conducted a study to examine whether flow and dissociation were experienced across sports, recreational and pathological gambling in a sample of 511 college students. Results concluded that flow and dissociation lay on a continuum of subjective experiences across activity groups. According to Jackson and Eklund (2002) the item identification sample yielded mean item loadings on the first-order factor of .78 for the Dispositional Flow Scale-2. Additionally, reliability estimates ranged 81 to .90. In the cross-validation sample, mean item loadings on the first-order factor were .80. Reliability estimates ranged between.78 to .86.

Qualitative Interviews

The majority of current studies on flow in sport have utilized a quantitative paradigm. An exception is a study conducted by Sparkes and Partington (2003) aimed at how narrative practice (an approach that enables researchers to alternately focus on the "what's" and "how's" of meaningful social interaction) can provide insights into flow by means of semi-structured interviews among five white water canoers. Questions during the interview concerned topics such as background (social, educational, sporting career and current involvement), motivations for initial and current involvement in canoeing, demands and challenges involved in canoeing, positive experiences and moments, describing the canoeing subculture and involvement in other sport activities. Results

concluded that describing flow is a relational performance which requires the use of narrative skills during interviews.

Flow, Motivation and Exercise Adherence

Flow and motivation have long been studied together. As both are crucial elements to exercise adherence, it is important to understand the relationship among the three. The following sections will discuss the relationships between flow, motivation and exercise adherence as well as the differences in flow experienced amongst exercise participants versus sedentary participants.

Flow and Motivation

It has been determined that motivation has the capability to influence one's involvement in physical activity in a variety of ways (Cervello et al., 2006). It has been suggested that highly motivated individuals experienced high instances of the flow state (Kowal & Fortier, 1999). In addition, Kowal and Fortier determined from their 1999 study that swimmers who were motivated in a self-determined manner had the highest instances of flow, suggesting that self-determined forms of motivation may facilitate the flow experience. Moreover, situational motivation was found to be positively correlated with flow. Specific flow characteristics or dimensions have also been examined in terms of motivation. Kowal and Fortier (1999) concluded that Loss of Self-Consciousness and

Transformation of Time were less sensitive to different types of situational motivation (motivation levels reported during a specific situation) in comparison to the other flow characteristics most likely due to the indistinctness (or comprehension difficulties) of the other individual characteristics of flow.

Flow and Physical Activity

Research indicates that individuals often experience flow while participating in sport and physical recreational activities. The experience of flow has been found to be present in several sport and physical recreation contexts including netball (Fryer et al., 2002), swimming (Fortier & Kowal, 1999), basketball (Daniels et al., 1995), climbing (Bassi et al., 2003), circuit training (Grove & Lewis, 1996), sports at the World Masters Games (Ford et al., 1998) and canoeing (Sparkes & Partington, 2003). For example, Ford et al., (1998) concluded that perceived sport ability had the most substantial correlations with flow. Moreover, Bassi et al, (2003) concluded that climbing provided a great potential source for optimal experience, and in turn, flow. Specifically, the flow state was among the most commonly reported states among the climbers during the expedition. Grove and Lewis (1996) reported that participants involved in circuit training did experience flow and that the flow states generally increased as the exercise was prolonged. Particularly, participants who had more than six months of circuit training reported the most flow-like experiences. Finally, Sparkes and Partington (2003) concluded that flow experiences were imminent among the canoers and that describing

flow is a relational performance, which is primarily shaped by storytelling of the participants. However, the main purpose of these studies was not to determine whether participants experienced flow while participating in the sport or physical recreation activity, but to determine predictors and correlates of flow.

Within the context of flow and sport, research has primarily focused on the determinants of the flow experience. For example, sport psychologists have been interested in studying interventions that may increase the experience of flow, and subsequently performance. For example, Fryer et al., (2002) concluded that music interventions induced the flow state among some netball players. However, flow states were not always consistent with changes in performance. Nevertheless, flow was present among the players following the music intervention. Various psychological determinants of flow have been researched. These determinants have focused primarily on constructs associated with motivation theories including intrinsic motivation, perceived ability, and enjoyment. In Fortier and Kowal's (1999) study, they found that swimmers who participated in their activity for their own benefit experienced the highest amount of intrinsic motivation and in turn flow. In Ford et al.'s (1998) study, it was concluded that perceived sport ability had the most substantial correlations with flow. Finally, Daniels et al., (1995) concluded that the basketball players found the flow context to be the most enjoyable and they reported having the most control in the flow state.

Some research suggests that individuals are more likely to experience flow while participating in sports and recreation compared to other types of activities that require

less skill and challenge. For example, a study conducted by Delespaul et al., (2004) explored the contextual and subjective determinants of flow with regards to activation in studying, and compared this with sports and watching television or listening to the radio. Forty-three undergraduate students completed the Experience Sampling Method questionnaire and at various moments 10 times a day, students evaluated the social context, activities and mood states. Results determined sports in a social context had the highest activation levels and lowest activation was associated with passive leisure when out in a social context. In addition, it was determined that study was highly challenging but low in perceived skills, sports was challenging and unrelated to skills and watching television or listening to the radio was low in challenges but high in skills. Therefore, the characteristics of engaging in an activity are intricate and are related to contemporaneous emotions and context. Despite the body of research examining the experience of flow in sports and recreation, there has been no research that has applied the theory of flow in an exercise adherence context.

Significance of the Study

The previous literature review has provided much information on various theories of exercise adherence, factors of motivation and the theory of flow. Although it is evident that motivation plays a vital role in exercise adherence, there has yet to be a study to determine the relationship between exercise adherence, motivation and flow. As previously stated, it has been suggested that highly motivated individuals experience high

instances of the flow state (Kowal & Fortier, 1999) and that self-motivation was consistently found to have a positive association with physical activity (Dishman & Sallis, 1994). Therefore, it is possible there exists a relationship among flow, motivation and exercise adherence. Consequently, this study will seek to uncover that relationship.

CHAPTER 3: METHODOLOGY

Research questions

This study attempted to determine if relationships existed among exercise adherence, motivation and flow. As a result, there were three questions which this study addressed: (1) Is there a relationship between flow experienced by exercise participants, motivation to exercise, and exercise adherence?; (2) To what extent is flow associated with exercise adherence?; and (3) What are the differences (if any) in flow experienced and motivation to exercise among active versus sedentary participants?

Participants, Sampling and Data Collection

Participants in this study consisted of (1) individuals who were members of various fitness and recreation complexes and groups throughout St. John's and (2) students attending Memorial University. The aim was to recruit individuals with a variety of physical activity levels ranging from being physically inactive to being very physically active. In order to be eligible to participate in this study, participants had to be 19 years of age or older. A purposive sampling technique, in which an expert uses judgment in selecting cases with a specific purpose in mind, was employed to collect data from participants in various recreation complexes throughout St. John's as well as students attending Memorial University (Neuman, 2007, p. 142). The intent was to accumulate

approximately 100 participants for this study. To recruit participants from fitness and recreation complexes and groups, I contacted the complex and groups to request permission to distribute questionnaires. When permission was obtained, I then distributed questionnaires at a convenient time for the organization. To recruit students at Memorial University, permission was sought from professors to distribute questionnaires to students in various classes. Questionnaires were distributed to students who were interested in completing the survey. Participants had the opportunity to either 1) complete the questionnaire and return to me in person or 2) take the survey and complete it at their convenience and return the survey in a self-addressed stamped envelope (mailed to School of Human Kinetics and Recreation) which was provided. Data collection took place in 2010.

Research Design

A cross-sectional quantitative survey design of exercise and sedentary participants was used in this study. Participants consisted of individuals in various exercise complexes throughout St. John's as well as students attending Memorial University. Cross-sectional analyzes are ideal in that studies are carried out in real-life settings using non-probability samples which therefore increases the external validity of the study (Frankfort-Nachimias et al., 2008). This study incorporated a self-administered survey design in which participants responded to three self-administered scales pertaining to motives to participate in exercise, questions to determine instances of flow and questions

regarding factors of exercise adherence. Additionally, participants completed a questionnaire containing socio-demographic information.

Variables, Measures and Instrumentation

Age, date of birth, gender, education, income and employment status were the socio-demographic variables in this study. Exercise adherence was the dependent variable in the proposed study, defined as the ability and dedication an individual has in adhering to a particular exercise regime. According to the Public Health Agency of Canada (2011), adults (age 18-64) should be active 2.5 hours a week to achieve health benefits. Exercise adherence, conceptualized as level of physical activity, was measured using the Baecke Questionnaire of Habitual Physical Activity (Baecke et al., 1982). This questionnaire consists of 16 questions that separates physical activity into 3 distinct domains: (1) Work Physical Activity (Work PA), (2) Sport Physical Activity (Sport PA) and (3) Non-sports leisure (Leisure PA). Participants are asked to respond to statements using a 5-point Likert-type scale; with the exception of a couple of statements related to types of sports played. The Work PA domain consists of 8 statements: 1) one statement is related to main occupation as categorized by amount of physical activity associated with the occupation (1 = low activity occupations such as studying and office work; 5 = high activity occupations such as construction work); and 2) seven statements related to frequency of sitting, standing, walking, lifting and sweating during hours of work. A Work PA index is calculated as a mean score among these 8 items and thus scores can

range from 1 to 5. The Sport PA domain consists of four sets of questions related to participation in sport. The set of questions form one item of the index. Participants are first asked whether or not they play a sport. If the participant does play a sport, then they are asked to indicate their two most frequently played sports (open-ended question), the amount of time per week that the sports are played (<1 hour (weighted score of 0.5), 1-2 hours (weighted score of 1.5), 2-3 hours (weighted score of 2.5), 3-4 hours (weighted score of 3.5), >4 hours (weighted score of 4.5) and the proportion of the year in which the sports are played regularly (< 1 month (weighted score of 0.04), 1-3 months (weighted score of 0.17), 4-6 months (weighted score of 0.42), 7-9 months (weighted score of 0.67), >9 months (weighted score of 0.92). Based on the type of sport indicated, the research determines the intensity of sport in terms of average energy expenditure (Baecke et al., 1982; Durnin & Passmore, 1967): 1) low intensity sports with an average energy expenditure of 0.76 MJ/h (e.g., bowling, golf); 2) middle intensity sports with an average energy expenditure of 1.26 MJ/h (e.g., dancing, badminton, swimming, tennis); and 3) high intensity sports with an average energy expenditure of 1.76 MJ/h (e.g., basketball, rowing, rugby). A sport intensity item is then calculated based on summing the product of the intensity, time, and proportion questions for both sports. Subsequently, this is then translated into a 5-point Likert score ($\geq 12 = 5$; 8 to $< 12 = 4$; 4 to $< 8 = 3$, 0.01 to $< 4 = 2$; $0 = 1$). Next, participants are asked to respond to three statements: 1) "In comparison to others my own age I think my physical activity during leisure is…" (1 = Much less; 5 = Much more); 2) "During leisure time I sweat" (1 = never, 5 = very often); and 3) "During leisure time I play sports" (1 = never, 5 = very often). A Sport PA index is

calculated as a mean score among these 4 items and thus scores can range from 1 to 5. Leisure PA deals with questions with regards to mode of transportation to school and work, and frequency of television watching, walking and cycling. A Leisure PA index is calculated as a mean score among these 4 items and thus scores can range from 1 to 5. A total physical activity score is calculated as the sum score of the three indices thus allowing a total score from three (minimum) to fifteen (maximum). According to Hertogh et al. (2008), the validity of the Modified Baecke Questionnaire is fair-to-moderate. It was also determined that the questionnaire can correctly classify individuals as low or high active, but does a poor job for moderately active individuals. The construct validity of the questionnaire has been assessed in comparison to doubly labeled water, which is considered the gold standard measure in terms of energy expenditure; the total activity index of the Baecke yielded correlation coefficients of .68 against doubly labelled water (Philippaerts et al., 2001). Other investigators have also found good construct validity for the Baecke when compared to the doubly labeled water technique ($\rho = 0.54$; Hertogh et al., 2008). The scale has proven to have good test-retest reliability; indicating good repeatability after 5 and 11 months among men and women aged 20-70 years (Pols et al., 1995). Test-retest correlation coefficients ranged between .65 and .89, and relative validity was tested by comparing the questionnaire to a four times repeated 3-day activity diary with correlations of .56 among men and .44 among women (Pols et al., 1995).

Flow and motivation were the independent variables in this study. Flow is defined as a very positive psychological state that typically occurs when a person perceives a balance between the challenges associated with a situation and his or her capabilities to

accomplish or meet these demands (Csikszentmihalyi, 1990). Jackson and Marsh (1996) developed the Flow State Scale which measures people's level of flow in a specific activity. The Flow Trait Scale (Jackson et al., 1998) was developed as a parallel trait version of this state instrument. The theory of flow states that the autotelic personality can explain why some people are more likely to experience flow than others. Thus the Flow Trait Scale was developed using the same items that are reworded to assess participant's dispositional assessment of the dimensions of flow in relation to their general experiences rather than an assessment of flow in relation to a specific experience. The Flow Trait Scale was subsequently renamed the Dispositional Flow Scale. Modifications were made to this original version in order to improve the measurement of some of the flow dimensions resulting in the current version called the Dispositional Flow Scale-2 (Jackson et al., 2002). This scale consists of 36 items based on the nine dimensions of flow cited by Csikszentmihalyi (1990) to measure the frequency of flow experiences in a chosen physical activity and in general. It consists of nine subscales: Challenge-Skill Balance (e.g.: "I am challenged but I believe my skills will allow me to meet the challenge", Clear Goals (e.g. "I know clearly what I want to do"), Unambiguous Feedback (e.g. "I am aware of how well I am performing"), Sense of Control (e.g. "I feel in total control of what I'm doing"), Autotelic (e.g. "I love the feeling of that performance and want to capture it again"), Merging of Action and Awareness (e.g. Things seem to be happening automatically"), Concentration on the Task at Hand (e.g. "My attention is focused entirely on what I am doing"), Transformation of Time (e.g. "The way time passes seems to be different from normal") and Loss of Self-

Consciousness (e.g. "I am not concerned with what others may be thinking of me"). Items are rated on a 5-point Likert Scale varying from "1" (never) to "5" (always), with higher values indicating more flow. Subscales are computed by the average of the four respective items. A total scale score is obtained by summing the item-average dimension scores. The Dispositional Flow Scale-2 demonstrates good construct validity in terms of its factor structure and acceptable internal consistency with alpha levels on the subscales ranging from .78 to .92 (Marsh & Jackson, 1999; Jackson & Eklund, 2002; Jackson et al., 2008).

Intrinsically motivated activities are defined as activities that individuals find interesting and would participate in the absence of operationally separable consequences (Deci & Ryan, 2000). Contrarily, extrinsic motivation is defined as the performance of a particular activity in order to attain a separable outcome (Ryan & Deci, 2000). Motivation to be physically active was measured using the Motives for Physical Activities Measure-Revised (Ryan et al., 1997) which determines reasons for participating in particular exercise activities. This scale is a revision of the Motives for Physical Activity Measure (Frederick & Ryan, 1993) and it was based on pilot testing of items (factor analysis and construct studies) on two different samples. The scale consists of 30 items which form five general motive subscales for participation in an activity: Interest/Enjoyment (7 items; e.g., "Makes me happy"), Competence (7 items e.g., "Like physical challenges"), Appearance (6 items e.g., "To define muscles, look better"), Fitness (5 items; e.g., "To improve cardiovascular fitness") and Social (5 items e.g., "To be with others in activity"). Each of these items is rated on 7-point Likert scales. The

items range from "1" (not at all true for me) to "7" (very true for me) with higher scores indicating a higher level of truth with the specific statement. Sub-scale scores are calculated as the mean score of all items within each sub-scale. Evidence of the reliability and validity of the factors demonstrates a clear factor structure of the scale items, internal consistency (alphas above .87 for each subscale) and differential relations with both choice of sport/exercise activities and associated outcomes (Frederick & Ryan, 1993; Ryan et al., 1997).

Data analysis

All participants were provided with an identification code (i.e., no identifying information was entered into the data base). Responses to all survey items were entered and analyzed in SPSS 17.0. First, data was screened for missing and invalid data points, and assumptions for performing parametric tests were tested. Descriptive statistics were conducted on socio-demographic and study variables. Next, correlations were conducted to determine bivariate and partial correlations between exercise adherence, motivation, and flow. Finally, a series of multiple regressions and analysis of variance models were conducted in order to determine 1) the relation between flow experienced by exercise participants, motivation to exercise, and exercise adherence, 2) the extent to which flow is associated with exercise adherence, and 3) to identify differences in flow experienced and motivation to exercise among active versus sedentary participants.

Ethical considerations

The nature of this study was non-threatening and posed minimal risk to the participants involved. The danger existed in that a survey question may have triggered unpleasant memories and generated negative emotions for the participants. However, the questions posed likely did not cause any negative feelings for the participants. Due to the fact that participants in this study were required to complete three questionnaires, the time dedication may have resulted in a stressful response. Although this study did not pose much harm, it also did not pose many benefits either. During the completion of certain questionnaires, participants may have acquired new information about their participation in physical activity and may or may not have changed their participation habits based on this information. Since all participants in this study were 19+ years of age, competence was assumed. Additionally, participants volunteered to complete a survey. Participants were also told that their participation was voluntary and that if they decided to not complete the questionnaires, there were no repercussions, penalty or harm. Participants were permitted to withdraw from the study at any time. In addition, confidentiality and anonymity of the participants and their information was ensured. Participants were also told that their information would not be used for any other purpose other than for the study and that their information would be kept in a locked cabinet throughout the research process. Upon completion of the research, data will be erased or destroyed.

CHAPTER 4: RESULTS

The following chapter will discuss the results of the study. Sample descriptives will be discussed proceeded by correlation results of flow, physical activity and motivation. Regression results are presented which determined the association between exercise adherence, motivation and flow, while controlling for socio-demographic variables. Finally, a series of independent t-tests are presented which determined differences in the experience of flow and motivation among active versus less active participants.

Sample Descriptives

There were 100 (n = 100) participants in this study who ranged in age from 19-58 (M = 27.8; SD = 9.05). Moreover, 80% (n = 80) were female and 20% (n = 20) were male. Sixty-eight percent (n = 68) of participants reported being a student while 30% (n = 30) were not students. Fifty-seven percent (n = 57) were employed full time, 32% (n = 32) were employed part time, 8% (n = 8) were unemployed/homemaker and 1% (n = 1) were retired. In terms of education level achieved, 4% (n = 4) of participants had attained a high school certificate or equivalent, 38% (n = 38) had some post-secondary education (post-secondary not completed), 15% (n = 15) had a certificate or diploma from a community college or trade school, 34% (n = 34) had a university degree and 9% (n = 9) had obtained a graduate degree. With regards to annual household income, 19% (n = 19) of participants reported less than $10,000, 14% ($n$ = 14) reported $10,000-19,999, 10% ($n$

= 10) reported $20,000-29,000, 4% ($n$ = 4) reported $30,000-39,000, 9% ($n$ = 9) reported $40,000-49,000, 6% ($n$ = 6) reported $50,000-59,000, 10% ($n$ =10) reported $60,000-79,999, 6% ($n$ = 6) reported $80,000-99,999 and 18% ($n$ = 18) reported over $100,000.

Physical Activity

Exercise adherence, conceptualized as level of physical activity, was measured using the Baecke Questionnaire of Habitual Physical Activity (Baecke, Burema & Frijters, 1982). This questionnaire consists of 16 questions that seperates physical activity into 3 distinct domains: (1) Work Physical Activity (Work PA), (2) Sport Physical Activity (Sport PA) and (3) Non-sports leisure (Leisure PA). The Work PA domain consisted of 8 statements. One statement is related to main occupation as categorized by amount of physical activity associated with the occupation (1 = low activity occupations such as studying and office work; 5 = high activity occupations such as construction work). In terms of intensity of participants' occupation, 91% (n = 91) people were classified as low intensity, 8% (n = 8) as middle intensity and 1% (n = 1) people were classified as high intensity. Additionally, seven statements related to frequency of sitting, standing, walking, lifting and sweating during hours of work were provided (see Table 1). A Work PA index was calculated as a mean score among these eight items and thus scores can range from 1 to 5. The means of the Work PA statements were as follows. With regards to the question "What is your main occupation? ", M = 1.2. In terms of the question "At work I sit", M = 3.9. With respect to the question "At work I stand", M =

2.9. With regards to the question "At work I walk", M = 3.0. In terms of the question "At work I lift heavy loads", M = 2.0. With respect to the question "After work I am tired", M = 2.9. In terms of the question "At work I sweat", M = 2.0. With regards to the question "In comparison of others of my own age I think my work physical activity is much heavier, etc", M = 1.9. This population had a mean Work PA score of 1.76 (SD = .40; $z_{skewness}$ = 3.71; $z_{kurtosis}$ = 2.19) indicating that as a whole, the respondents did not receive much physical activity within their occupations.

Table 1: Descriptive Statistics for Work Physical Activity

	***M* (*SD*)**	**Z_{Skew}**	**Z_{Kurt}**
At work I sit[a]	3.9 (.98)	-4.48	2.26
At work I stand[a]	2.9 (.99)	0.65	-1.01
At work I walk[a]	3.0 (1.02)	0.73	-1.01
At work I lift heavy loads[a]	2.0 (1.03)	4.51	1.62
After work I am tired[a]	2.9 (1.03)	-0.90	0.33
At work I sweat[a]	2.0 (.91)	2.82	0.27
In comparison of others of my own age I think my work physical activity is…[b]	1.9 (.80)	2.22	-0.19

[a] 1 = never; 5 = always

[b] 1 = much lighter; 5 = much heavier

The Sport PA domain consisted of four sets of questions related to participation in sport/physical activity. Ninety-nine percent (n = 99) people reported participating in sport, physical activity or exercise in comparison to 1% (n = 1) people who did not participate in physical activity. According to the Baecke Questionnaire of Habitual Physical Activity (Baecke et al., 1982), participant's activities are classified in terms of

average energy expenditure (1 = low intensity, 2 = middle intensity, 3 = high intensity). Of the most frequently participated activity reported by participants, 6% (n = 6) were classified as low intensity, 74% (n = 74) were classified as middle intensity and 20% (n = 20) were classified as high intensity. Furthermore, 21% (n = 21) participated in running, 31% (n = 31) participated in hiking/walking, 20% (n = 20) were classified as participating in cardio/weights/gym, 3% (n = 3) participated in yoga/pilates, 6% (n = 6) participated in aerobics and 13% (n = 13) participated in individual sports/activities. On average, participants reported participating in their most frequently participated physical activity 3-4 hours per week during 7-9 months of the year. Of the second most participated in activity, 7% (n = 7) were classified as low intensity, 76% (n = 76) were classified as middle intensity and 13% (n = 13) were classified as high intensity. With regards to the type of physical activity that was stated as the second most in participated activity, 8% (n = 8) of participants participated in running, 17% (n = 17) participated in hiking/walking, 26% (n = 26) participated in cardio/weights/gym, 4% (n = 4) participated in yoga/pilates, 15% (n = 15) participated in competitive sports, 8% (n = 8) participated in aerobics and 18% (n = 18) participated in individual sports/activities. On average, participants reported participating in their second most frequently participated physical activity 1-2 hours per week during 4-6 months of the year. A sport intensity item was then calculated based on summing the product of the intensity, time, and proportion questions for both sports and translated into a 5-point Likert score. On average, the sample had a sport intensity score of 3.0 (SD = .72) indicating that they were moderately physically active. Next, participants were asked to respond to 3 statements: 1)

"In comparison to others my own age I think my physical activity during leisure is…" (1 = Much less; 5 = Much more); 2) "During leisure time I sweat" (1 = never, 5 = very often); and 3) "During leisure time I play sport" (1 = never, 5 = very often). In comparison to others their own age, participants reported being about the same in terms of physical activity during leisure time (M = 2.5, SD = 1.07; $z_{skewness}$ = 1.51; $z_{kurtosis}$ = -1.34). Participants often sweated during their physically active leisure time (M = 3.59, SD = 1.01; $z_{skewness}$ = 1.30; $z_{kurtosis}$ = -.45). Finally, participants often played sports during their leisure time (M = 3.66, SD = .97; $z_{skewness}$ = -.94; $z_{kurtosis}$ =-1.23). A Sport PA index was calculated as a mean score among these 4 items and thus scores could range from 1 to 5. This sample had a mean Sport PA score of 3.18 (SD = .41; $z_{skewness}$ = -1.44; $z_{kurtosis}$ = .06) indicating that as a whole, the respondents were moderately active during their leisure time.

Leisure PA deals with questions with regards to mode of transportation to school and work, and frequency of television watching, walking and cycling. Participants responded to four statements related to frequency of watching television and walking and cycling during leisure time (i.e., active transportation) as well as the number of minutes that one walks and/or cycles per day to and from work, school and shopping (see Table 2). A Leisure PA index was calculated as a mean score among these 4 items and thus scores could range from 1 to 5. This sample had a mean Leisure PA score of 1.27 (SD = .56; $z_{skewness}$ = .40; $z_{kurtosis}$ = -1.25) indicating that as a whole, the respondents were not very physical active during their leisure time. Finally, a total physical activity score was calculated as the sum score of the three indices thus allowing a total score from three

(minimum) to fifteen (maximum). On average, participants had a mean total physical activity score of 6.23 (*SD* = .93) and this variable was not significantly skewed ($z_{skewness}$ = 12) or kurtosed ($z_{kurtosis}$ = -0.85).

Table 2: Descriptive Statistics for Leisure Physical Activity

	***M* (*SD*)**	**Z_{Skew}**	**Z_{Kurt}**
During leisure time I watch television[a]	3.2 (.91)	.49	-.58
During leisure time I walk[a]	3.2 (1.01)	.05	-.77
During leisure time I cycle[a]	1.8 (1.03)	4.40	.19
Minutes/day walking/ cycling to and from work/ school/ shopping	2.9 (1.38)	0	-2.55

[a] 1 = never; 5 = very often

[b] 1 = <5 minutes; 2 = 5-15 minutes; 3 = 15-30 minutes; 4 = 30-45 minutes; 5 = >45 minutes

Flow

Flow was operationalized in this study using the Dispositional Flow Scale-2 (Jackson et al., 2002). This scale consists of 36 items based on the nine dimensions (4 items per sub-scale) of flow cited by Csikszentmihalyi (1990) to measure the frequency of flow experiences in chosen physical activity in general. It consists of nine subscales: 1) Challenge-Skill Balance, 2) Clear Goals, 3) Unambiguous Feedback, 4) Sense of Control,

5) Autotelic, 6) Merging of Action and Awareness, 7) Concentration on the Task at Hand, 8) Transformation of Time and 9) Loss of Self-Consciousness. Subscales are computed by the average of the four respective items. Please refer to Table 3 for the descriptive statistics of the items and sub-scales. The most frequently experienced flow items include "I know what I want to achieve " (M = 4.1; SD = .80), "I have a sense of control over what I am doing" (M = 4.1 ; SD = .71), "I really enjoy the experience of what I am doing" (M = 4.1 ; SD = .74), "The experience leaves me feeling great" (M = 4.1; SD = .81), and "The experience is extremely rewarding" (M = 4.1; SD = .81). In terms of the frequency of the experience of the nine dimensions flow, the sample, on average, reported them in the following rank order (highest to lowest): 1) Autotelic, 2) Clear Goals, 3) Sense of Control, 4) Challenge-Skill Balance, 5) Unambiguous Feedback, 6) Merging of Action and Awareness 7) Concentration on the Task at Hand, 8) Transformation of Time, and 9) Loss of Self-Consciousness. A total scale score was obtained by summing the item-average dimension scores (1 = no experience of flow; 45 = frequent experience of flow). On average, this sample experienced a mean Total Flow score of 32.9 (SD = 4.21; $z_{skewness}$ = -1.35; $z_{kurtosis}$ = .94) indicating that participants experienced moderate levels of flow during their most frequently participated physical activity.

Table 3: Descriptive Statistics of Dispositional Flow Scale-2

	M (*SD*)	Z_{Skew}	Z_{Kurt}
Challenge – Skill Balance	3.8 (5.7)	-1.13	0.35
I am challenged but I believe my skills will allow me to meet the challenge	3.6 (.90)	-.268	1.495
My abilities match the challenge of what I am doing	3.8 (.70)	-.196	1.03
I feel I am competent enough to meet the demands of the situation	4.0 (.66)	-1.02	1.08
The challenge and my skills are at an equally high level	3.6 (.79)	-1.8	1.01
Merging of Action and Awareness	3.5 (.59)	-1.08	1.58
I do things correctly without thinking or trying to do so	3.6 (.71)	-.84	-.26
Things just seem to happen automatically	3.4 (.86)	-.79	.52
I do things automatically, without thinking too much	3.6 (.75)	-1.43	1.63
I do things spontaneously and automatically without having to think	3.4 (.82)	-1.28	-.36
Clear Goals	4.0 (.66)	-3.15	1.68
I know clearly what I want to do	4.0 (.76)	-1.56	-.30
I have a strong sense of what I want to do	4.0 (.75)	-.94	-.97
I know what I want to achieve	4.1 (.80)	-2.78	.26
My goals are clearly defined	3.9 (.89)	-2.81	1.55
Unambiguous Feedback	3.8 (.67)	-2.80	1.24
It is really clear to me how I am doing	3.7 (.83)	-.64	-1.01
I am aware of how well I am doing	3.8 (.79)	3.74	3.74
I have a good idea about how well I am doing while I am involved in the task/activity	3.9 (.72)	-2.15	1.10
I can tell by the way things are progressing how well I am doing	3.8 (.81)	-1.98	1.17

	M (*SD*)	Z_{Skew}	Z_{Kurt}
Concentration on the Task at Hand	3.4 (.76)	-.91	.67
My attention is focused entirely on what I am doing	3.5 (.93)	-1.49	-.28
It is no effort to keep my mind on what is happening	3.4 (.92)	.33	-.95
I have total concentration	3.4 (.94)	-1.497	-.28
I am completely focused on the task at hand	3.5 (.90)	-1.48	-.03
Sense of Control	3.9 (.65)	-1.59	.63
I have a sense of control over what I am doing	4.1 (.71)	1.97	.39
I feel like I can control what I am doing	4.0 (.67)	-1.71	1.17
I have a feeling of total control over what I am doing	3.8 (.79)	-.80	-.77
I feel in total control of my actions	3.9 (.78)	-1.13	-.62
Loss of Self-Consciousness	3.2 (.94)	.09	-.77
I am not concerned with what others may be thinking of me	3.3 (1.17)	-1.12	-1.38
I am not concerned with how others may be evaluating me	3.3 (1.03)	-.26	-1.01
I am not concerned with how I am presenting myself	3.0 (1.03)	.66	-.72
I am not worried about what others may be thinking of me	3.2 (1.10)	-.44	-1.44
Transformation of Time	3.3 (.76)	-2.19	1.50
Time seems to alter (either slows down or speeds up)	3.4 (1.00)	-1.93	.22
The way time passes seems to be different from normal	3.3 (1.02)	-1.39	-.93
It feels like time goes by quickly	3.5 (.88)	-.99	1.17
I lose my normal awareness of time	3.2 (.88)	-.48	.07
Autotelic Experience	4.1 (.71)	-2.29	-.12
I really enjoy the experience of what I am doing	4.1 (.74)	-1.87	-.27
I love the feeling of what I am doing and want to capture	3.9 (.89)	-2.64	.56

	M (*SD*)	Z_{Skew}	Z_{Kurt}
this feeling again			
The experience leaves me feeling great	4.1 (.81)	-2.32	-.63
The experience is extremely rewarding	4.1 (.81)	-1.73	-1.57

Note: Items are rated on a 5-point Likert Scale varying from "1" (never) to "5" (always), with higher values indicating more flow.

Motivation

Motivation to be physically active was measured using the Motives for Physical Activities Measure-Revised (Ryan et al., 1997) which determines reasons for participating in particular exercise activities. The scale consists of 30 items which form 5 general motive subscales for participation in an activity: Interest/Enjoyment (7 items), Competence (7 items), Appearance (6 items), Fitness (5 items) and Social (5 items). Each of these items is rated on 7-point Likert scales. The items range from "1" (not at all true for me) to "7" (very true for me) with higher scores indicating a higher level of truth with the specific statement. Sub-scale scores are calculated as the mean score of all items within each sub-scale. Please refer to Table 4 for the descriptive statistics of the items and sub-scales. The most frequently experienced motivation items included "Because I want to be physically fit" ($M = 6.3$; $SD = 1.03$), "Because I want to maintain my physical health and well-being" ($M = 6.3$; $SD = 1.11$), "Because I want to have more energy" ($M = 6.2$; $SD = 1.01$), "Because I want to maintain my physical strength and live a healthy life" ($M = 6.1$; $SD = .89$) and "Because it makes me happy " ($M = 6.1$; $SD = 1.08$). The rank order (highest to lowest) of the motivation sub-scales for this sample were as follows: 1)

Fitness, 2) Interest/Enjoyment, 3) Appearance, 4) Competence, and 5) Social. A total motivation score was calculated by summing the item-average dimension scores. On average, this sample experienced a mean Total Motivation score of 26.9 (*SD* = 4.18; $z_{skewness}$ = -.65; $z_{kurtosis}$ = -1.01) indicating that on average participants reported a moderate level of motivation to participate in physical activity.

Table 4: Descriptive Statistics of Motives for Physical Activities Measure-Revised Scale

	***M* (*SD*)**	**Z_{Skew}**	**Z_{Kurt}**
Interest/Enjoyment	5.6 (1.19)	-3.99	2.08
Because it's fun	5.4 (1.41)	-4.95	3.27
Because I like to do this activity	5.8 (1.32	-4.95	4.47
Because it makes me happy	6.1 (1.08)	-5.79	-5.15
Because I think it's interesting	5.4 (1.59)	-3.50	.03
Because I enjoy this activity	5.8 (1.40)	-5.95	4.64
Because I find this activity stimulating	5.7 (1.39)	-3.81	-.38
Because I like the excitement of participation	4.9 (1.81)	-2.09	.1.72
Competence	5.4 (1.22)	-2.56	-0.74
Because I like engaging in activities that physically challenge me	5.4 (1.53)	-3.80	1.16
Because I want to obtain new skills	5.2 (1.54)	-2.55	.-75
Because I want to improve existing skills	5.3 (1.44)	-2.40	-1.23
Because I like the challenge	5.5 (1.51)	-4.64	1.92
Because I want to keep up my current skill level	5.5 (1.37)	-3.19	-.46
Because I like activities which are physically challenging	5.4 (1.51)	-4.17	1.12
Because I want to get better at my activity	5.7 (1.38)	-4.20	1.13

	M (*SD*)	Z_{Skew}	Z_{Kurt}
Appearance	5.6 (1.37)	-5.76	3.95
Because I want to lose or maintain weight so I look better	6.0 (1.40)	-7.61	7.38
Because I want to define my muscles and look better	5.8 (1.45)	-5.73	3.31
Because I want to improve my appearance	5.9 (1.48)	-7.03	5.54
Because I want to be attractive to others	5.3 (1.75)	-4.51	1.02
Because I want to improve my body shape	5.9 (1.57)	-6.43	3.78
Because I will feel physically unattractive if I don't	4.4 (1.97)	-1.24	-2.29
Fitness	6.3 (.86)	-9.37	16.17
Because I want to be physically fit	6.3 (1.03)	-7.56	7.67
Because I want to have more energy	6.2 (1.01)	-4.99	1.92
Because I want to improve my cardiovascular fitness	6.0 (1.34)	-7.75	8.80
Because I want to maintain my physical strength to live a healthy life	6.1 (.89)	-10.62	17.13
Because I want to maintain my physical health and well-being	6.3 (1.11)	-10.84	19.21
Social	4.0 (1.55)	-0.85	1.34
Because I want to be with my friends	4.1 (1.86)	-.86	-2.13
Because I like to be with others who are interested in this activity	4.5 (1.91)	-1.28	-2.02
Because I want to meet new people	4.2 (1.80)	-1.10	-1.85
Because my friends want me to	2.6 (1.78)	4.25	.18
Because I enjoy spending time with others doing this activity	4.3 (1.98)	-.88	-2.46

Note: Items are rated on a 7-point Likert Scale varying from "1" (not at all true for me) to "5" (very true for me), with higher values indicating level of truth with the specific motivation statement.

Bivariate Analysis

In order to measure the strength of the relationship between socio-demographic variables (gender and age) to physical activity (work physical activity, sport physical activity, leisure physical activity, and total physical activity) flow (Total Flow and subscales: Challenge-Skill Balance, Merging of Action and Awareness, Clear Goals, Unambiguous Feedback, Concentration on the Task at Hand, Sense of Control, Loss of Self-Consciousness, Transformation of Time and Autotelic Experience) and motivation (total motivation and subscales: Interest/Enjoyment, Competence, Appearance, Fitness and Social), a series of Pearson correlation coefficients were conducted.

Socio-Demographics

Gender was significantly positively associated with work physical activity (r = .256, $p < .05$; small effect: r = .017) meaning that males experienced higher work physical activity levels. In terms of the experience of flow, gender had a small (r = .013) but significant and positive relation with Challenge/Skill Balance (r = .250, $p < .05$) suggesting that males participate in physical activity where the challenge meets their current skill level. Males also reported greater scores of Total Flow in comparison to females (r = .209, $p < .05$; large effect: r = .043). In terms of motivation, gender was significantly positively related with Interest/Enjoyment (r = .273, $p < .01$) and Competence (r = .349, $p < .001$); however the effects were small. This suggests that males participate in physical activity for their own interest/enjoyment and to improve on their own knowledge/skill base. Finally, gender was also significantly positively

associated with Total Motivation (r =.217, p <.05; medium effect: r = .035) suggesting that males experienced greater levels of motivation. Age was significantly negatively associated with total physical activity (r = -.222, p < .05; medium effect: r = .030) meaning that as age increased, physical activity decreased. Age was also significantly positively related with the Challenge/Skill Balance dimension of flow (r = .217, p < .05; medium effect: r = .035) signifying that as age increased, so did the need to find activities that met the skill level of the individual participant.

A series of Spearman correlation coefficients were calculated to determine the strength of the relationship between socio-demographic variables (employment status, education and income) to physical activity, flow and motivation. Employment status was significantly positively associated with leisure physical activity (r = .242, p < .05; small effect: r = .017) signifying that people who were employed experienced less physical activity during their leisure time (i.e., less active transportation). In terms of the relation with flow, employment status was significantly negatively associated with Challenge-Skill Balance (r = -.224, p < .05; medium effect: r = .028), Merging of Action and Awareness (r = -.244, p < .05; medium effect: r = .028) and Autotelic Experience (r = -.219, p < .05; medium effect: r = .031). This suggests that as employment status increased, the ability for one to seek activities that match their current skill level decreased, as did the ability of one being completely absorbed in an activity and the ability to experience intrinsic enjoyment. Employment status was also significantly negatively related to Total Flow (r = -.227, p < .05); medium effect: r = .030) suggesting that as employment status increased, Total Flow decreased. Additionally, education was

significantly negatively associated with the Social motivation sub-scale (r = -.210, p < .05; large effect: r = .040) suggesting that as education increased, the conception of participating in physical activity for social purposes decreased. Finally, contrary to the belief that higher rates of exercise behaviour have been correlated with increased socioeconomic standing (Rhodes et al., 1999, p. 399), income was not significantly related to Work PA, Leisure PA, Sport PA or Total PA.

Physical Activity

Pearson correlations were conducted to determine the relation between Work Physical Activity (Work PA), Sport Physical Activity (Sport PA), Leisure Physical Activity (Leisure PA), and Total Physical Activity (Total PA). Total PA scores were significantly positively associated with Work PA (r = .515, p < .001; small effect: r < .001), Sport PA (r = .716, p < .001; small effect: r < .001) and Leisure PA (r = .757, p < .001; small effect: r < .001) meaning that people with high levels of work, sport and leisure physical activity also had high levels of total physical activity. Sport PA was significantly positively associated with Leisure PA (r = .289, p < .01; small effect: r = .004) suggesting that people who are physically active in sport are also physically active in their leisure time due to similar interests. Work PA was not significantly associated with either Sport or Leisure PA.

Physical Activity and Flow

In terms of the relation between physical activity and the flow sub-scales, Sport PA was significantly positively associated with Clear Goals ($r = .223$, $p < .05$; medium effect: $r = .027$) and Autotelic ($r = .234$, $p < .05$; medium effect: $r = .021$) suggesting that clear goals are clearly evident in higher levels of sport physical activity, conceivably due to the highly competitive nature of sports, as well as signifying the highly psychological aspect of sports. In contrast, Leisure PA was significantly negatively associated with Merging of Action and Awareness ($r = -.214$, $p < .05$; medium effect: $r = .034$) and with Concentration on the Task at Hand ($r = -.213$, $p < .05$; medium effect: $r = .035$). These associations suggest that since leisure physical activity is generally participated in at a low intensity, one cannot reach optimal psychological levels which result in total immersion in the activity. Additionally, due to the less intense nature of leisure physical activities, concentration levels are low.

Physical Activity and Motivation

In terms of the relation between physical activity and motivation sub-scales, Work PA was not significantly associated with motivation. Sport PA ($r = .282$, $p < .01$; small effect: $r = .034$) and Total PA ($r = .281$, $p < .05$; small effect: $r = .01$) were significantly positively associated with the Interest/Enjoyment motivation subscale suggesting that people participated in sport for their own satisfaction and that people generally participated in physical activity for their own pleasure. Similarly, Sport PA ($r = .361$, $p < .001$; small effect: $r < .001$) and Total PA ($r = .247$, $p < .05$; small effect: $r = .024$)

were significantly positively associated with the Competence motivation subscale suggesting that higher levels of competence are associated with sport participation and that people partake in physical activity to further develop their pre-existing skills, qualities, etc. Finally, Sport PA was also significantly positively associated with the Fitness motivation sub-scale ($r = .214$, $p < .05$; medium effect: $r = .034$). Sport PA was the only form of physical activity that was significantly positively associated with Total Motivation ($r = .299$, $p < .01$; small effect: $r = .004$) suggesting that people tend to be motivated the most in sport participation compared to work or leisure physical activity.

Flow

Pearson correlations were conducted to determine the relation between Total Flow scores and the sub-scale scores of the nine dimensions of flow. Total Flow was significantly positively associated with all nine dimensions of flow: Challenge-Skill Balance ($r = .760$, $p < .001$; small effect: $r < .001$); Merging of Action and Awareness ($r = .638$, $p < .001$; small effect: $r < .001$); Clear Goals ($r = .734$, $p < .001$; small effect: $r < .001$); Unambiguous Feedback ($r = .789$, $p < .001$; small effect: $r < .001$); Concentration on the Task at Hand ($r = .754$, $p < .001$; small effect: $r < .001$); Sense of Control ($r = .807$, $p < .001$; small effect: $r < .001$); Loss of Self-Consciousness ($r = .433$, $p < .001$; small effect: $r < .001$); Transformation of Time ($r = .475$, $p < .001$; small effect: $r < .001$); and Autotelic ($r = .693$, $p < .001$; small effect: $r < .001$).

In terms of correlations among the flow subscales, the Challenge-Skill Balance dimension of flow was significantly positively associated with five other dimensions of

flow: Merging of Action and Awareness Total (r = .443, p < .001; small effect: r < .001); Clear Goals Total (r = .585, p < .001; small effect: r < .001); Concentration on the Task at Hand (r = .643, p < .001; small effect: r < .001); Sense of Control (r = .549, p < .001; ; small effect: r < .001); and Autotelic (r = .583, p < .001; small effect: r < .001). In addition to the positive association with the Challenge-Skill Balance dimension, the Merging of Action and Awareness sub-scale was significantly positively associated with all other flow dimensions: Clear Goals (r = .323, p < .01; small effect: r < .001) suggesting that people become immersed in an activity when they have goals set; Unambiguous Feedback (r = .454, p < .001; small effect: r < .001) meaning that people may become immersed in activity when they are aware of how they are attaining their goals; Concentration on the Task at Hand (r = .325, p < .01; small effect: r = .001) suggesting that when people become immersed in an activity, they may have higher levels of concentration; Sense of Total Control (r = .521, p < .001; small effect: r < .001) signifying that people may become immersed in activity when they exhibit complete control; Loss of Self-Consciousness (r = .302, p < .01; small effect: r = .002) suggesting that as people become immersed in an activity, they have less negative thoughts and uncertainties; Transformation of Time (r = .286, p < .01; small effect: r = .004) meaning that as people become immersed in an activity, time seems to slow down or speed up; and Autotelic (r = .328, p < .01; small effect: r = .001) suggesting that as people become immersed in an activity, they experience much enjoyment.

In addition to its positive association with the Challenge-Skill Balance and Merging of Action and Awareness dimensions of flow, the Clear Goals subscale was also

significantly positively associated with Unambiguous Feedback ($r = .789$, $p < .001$; small effect: $r < .001$) and Concentration on the Task at Hand ($r = .560$, $p < .001$; small effect: $r < .001$) meaning that people who established goals for an activity had higher levels of concentration; Sense of Control Total ($r = .653$, $p < .001$; small effect: $r < .001$) signifying that people may feel more in control in an activity when they have goals set and Autotelic Total ($r = .530$, $p < .001$; small effect: $r < .001$). The Unambiguous Feedback dimension of flow was significantly positively associated with Concentration on the Task at Hand ($r = .557$, $p < .001$; small effect: $r < .001$) meaning that people may experience higher concentration levels when they are aware of how they are doing; Sense of Control ($r = .652$, $p < .001$; small effect: $r < .001$) suggesting that people may feel more in control when they are aware of how they are doing; Transformation of Time ($r = .206$, $p < .05$; large effect: $r < .05$); and Autotelic ($r = .548$, $p < .001$; small effect: $r < .001$). The dimension of Concentration on the Task at Hand was significantly positively associated with Sense of Control ($r = .566$, $p < .001$; small effect: $r < .001$) suggesting that people may experience higher levels of concentration when they felt they were in complete control of the activity; Transformation of Time ($r = .331$, $p < .01$; small effect: $r < .001$) meaning that people may feel time sped up or slow down when they experience great concentration; and Autotelic ($r = .429$, $p < .001$; small effect: $r < .001$) meaning people who experienced intrinsic enjoyment in an activity also experienced high concentration levels. Sense of Control was significantly positively associated with Loss of Self-Consciousness ($r = .234$, $p < .05$; medium effect: $r = .02$) meaning that people who experienced total control in an activity may have also been free of negative thoughts

about themselves; Transformation of Time ($r = .274$, $p < .01$; small effect: $r = .006$) suggesting that people who experience total control in an activity also feel that time is altered; and Autotelic l ($r = .510$, $p < .001$; small effect: $r < .001$) suggesting that people who experience total control may also experience intrinsic enjoyment in the activity. Finally, the Transformation of Time flow subscale was significantly positively associated with Autotelic ($r = .274$, $p < .01$; small effect: $r = .006$) suggesting that people who experience an alter in time in physical activity are also experiencing intrinsic enjoyment.

Flow and Motivation

Pearson correlations were conducted to determine the relation between Total Flow and subscale scores and Total Motivation and its corresponding sub-scales. Total Flow was not significantly associated with the Appearance or Social motivation subscales; however, Total Flow scores were significantly positively associated with Interest/Enjoyment ($r = .517$, $p < .001$; small effect: $r < .001$) suggesting that people with high levels of flow also participated in physical activity for their own interest; Competence ($r = .489$, $p < .001$; small effect: $r < .001$) suggesting that people with high levels of flow may also participate in physical activity for their own benefit; and Fitness ($r = .216$, $p < .05$; medium effect: $r = .037$) meaning that people with high levels of flow may also participate in physical activity for fitness reasons. Total Flow and Total Motivation scores were significantly positively associated ($r = .358$, $p < .01$; small effect: $r = .001$) suggesting that people with high levels of flow also experience high levels of motivation.

In terms of correlations among the flow subscales, the Challenge-Skill Balance dimension of flow was significantly positively associated with the Interest/Enjoyment motivation subscale ($r = .517$, $p < .001$; small effect: $r < .001$) suggesting that people will generally select activities that match their current skill level which in turn promotes enjoyment; Competence ($r = .608$, $p < .001$; small effect: $r < .001$) implying that people are likely more competent in their activity participation when their skills meet the challenge of the activity; and the Fitness subscale ($r = .359$, $p < .001$; small effect: $r < .001$) signifying that people want to become physically fit in activities that match their current skill level. The Challenge-Skill Balance dimension of flow was not associated with the Appearance or Social motivation subscales. Merging of Action and Awareness was significantly positively associated with Interest/Enjoyment ($r = .317$, $p < .01$; small effect: $r = .002$) signifying that when people become immersed in activity, they may experience greater enjoyment; and Competence ($r = .287$, $p < .01$; small effect: $r = .004$). The Merging of Action and Awareness dimension of flow was not associated with Appearance, Fitness or Social motivation subscales. The Clear Goals dimension of flow was significantly positively associated Interest/Enjoyment ($r = .321$, $p < .01$; small effect: $r = .001$) meaning that people may experience more enjoyment in an activity when they have goals set; Competence ($r = .346$, $p < .001$; small effect: $r < .001$) suggesting that people who set goals may do so to improve on their own skills; and the Fitness motivation subscale ($r = .324$, $p < .01$; small effect: $r = .001$) meaning that people who participate in physical activity for fitness purposes, may also establish goals. Thus, Clear Goals was not associated with the Appearance or Social motivation subscales.

Unambiguous Feedback was significantly positively associated with Interest/Enjoyment ($r = .356, p < .001$; small effect: $r < .001$) meaning that people who participated in physical activity for their own enjoyment may also be aware of their progress throughout the activity; Competence ($r = .423, p < .001$; small effect: $r < .001$); and the Fitness motivation subscale ($r = .261, p < .01$; small effect: $r = .009$) meaning that people who engaged in physical activity for fitness purposes may also have been aware of how well they were doing in the activity. Again, this dimension of flow (Unambiguous Feedback) was not associated with appearance or the social motivation subscales. The flow dimension of Concentration on the Task at Hand was significantly positively associated with Interest/Enjoyment ($r = .365, p < .001$; small effect: $r < .001$) suggesting that people who participated in physical activity for their own enjoyment also experienced higher levels of concentration; and Competence ($r = .431, p < .001$; small effect: $r < .001$) meaning that people who participated in physical activity for their own benefit also experienced high levels of concentration. This dimension of flow was not associated with the Appearance, Fitness or Social motivation subscales.

Sense of Control flow subscale was significantly positively correlated with Interest/Enjoyment ($r = .416, p < .001$; small effect: $r < .001$) meaning that people who experience total control, also participated in physical activity for their own interest/enjoyment and Competence Total ($r = .340, p < .01$; small effect: $r < .001$) suggesting that people who experience total control also participated in physical activity to better themselves; however, this flow dimension was not associated with the Appearance, Fitness or social motivation subscales. The flow dimensions of

Transformation of Time and Loss of Self-Consciousness were not correlated with any of the five motivation subscales. Finally, the Autotelic dimension of flow was not associated with the Appearance or Social motivation subscales but was significantly positively associated with Interest/Enjoyment ($r = .622$, $p < .001$; small effect: $r < .001$) suggesting that people who participate in physical activity for their own enjoyment also experience intrinsic enjoyment; Competence ($r = .515$, $p < .001$; small effect: $r < .001$) suggesting that people who participate in physical activity for their own benefit also experience intrinsic enjoyment; and Fitness ($r = .310$, $p < .01$; small effect: $r = .002$) suggesting that people who participate in physical activity for fitness reasons also experience intrinsic enjoyment. Total Motivation was significantly positively associated with the following dimensions of flow: Challenge-Skill Balance ($r = .490$, $p < .001$; small effect: $r < .001$); Clear Goals ($r = .306$, $p < .01$; small effect: $r = .003$); Unambiguous Feedback ($r = .311$, $p < .01$; small effect: $r < .001$); Concentration on the Task at Hand ($r = .283$, $p < .01$; small effect: $r = .006$); Sense of Control ($r = .254$, $p < .05$; small effect: $r = .014$); and Autotelic ($r = .401$, $p < .001$; small effect: $r < .001$). Thus, for this sample, people are more motivated to participate in activities that meet their current skill level, possibly due to the decreased chance of failure. These results may also suggest that people who have high motivation towards participation in physical activity also set goals, are aware of how well they were doing during participation, have higher concentration levels; have greater sense of control in an activity and experience intrinsic enjoyment. Total Motivation was not associated with the Merging of Action and Awareness, Loss of Self-Consciousness or Transformation of Time dimensions of flow.

Motivation

Pearson correlations were conducted to determine the relation between the five motivation subscales as well as the subscales and Total Motivation. Interest/Enjoyment motivation subscale was positively associated with Competence ($r = .764$, $p < .001$; small effect: $r < .001$); Fitness ($r = .267$, $p < .01$; small effect: $r = .008$); and Social ($r = .401$, $p < .001$; small effect: $r < .001$). This suggests that people who participate in physical activity for their own interest may do so for their own benefit or for fitness or social reasons. The motivation subscale of Competence was significantly positively correlated with Appearance ($r = .212$, $p < .05$; medium effect: $r = .037$); Fitness ($r = .445$, $p < .001$; small effect: $r < .001$); and Social ($r = .369$, $p < .001$; small effect: $r < .001$). These correlations suggest that people who participated in physical activity for their own benefit may also participate to be more physically attractive, for fitness purposes and for social reasons. With the exception of Competence, Appearance as a motivator to participate in physical activity was only significantly positively associated with Fitness ($r = .647$, $p < .001$; small effect: $r < .001$) signifying that people who participated in physical activity for appearance purposes may also do so for fitness reasons. No other correlations between motivation subscales were found in this sample. Total Motivation scores were significantly positively related to all five motivation subscales: Interest/Enjoyment ($r = .717$, $p < .001$; small effect: $r < .001$); Competence ($r = .807$, $p < .001$; small effect: $r < .001$); Appearance ($r = .569$, $p < .001$; small effect: $r <$

.001); Fitness (r = .654, p < .001; small effect: r < .001); and Social (r = .649, p < .001; small effect: r < .001).

Flow's Association with Exercise Adherence: Regression Analysis

Considering that physically activity leisure participation was the main focus in terms of exercise adherence in terms of the interrelationship between exercise adherence, flow and motivation, the following analyses focused on sport physical activity rather than work, leisure or total physical activity. To determine the association between exercise adherence (sport physical activity), motivation and flow, while controlling for socio-demographic variables, a series of hierarchical linear regressions were conducted. Multiple regression analyses were utilized to examine the main dependent variables (sport physical activity) and predictor variables (socio-demographics, Total Motivation and Flow). With Sports Physical Activity (Sport PA) as the outcome variable, the socio-demographic variables (gender and age) were entered in the regression model first, Total Motivation was entered next, and the third step of the model entered Flow (Total Flow or one of the nine dimensions of flow). Thus, socio-demographic variables and motivation were controlled for in the models.

To determine the relationship between sport physical activity participation and Total Flow experienced, a hierarchical linear regression model was computed (Table 5). Results from Step 1 indicated that sport physical activity was not significantly associated with gender but was negatively associated with age meaning that as age increased (β = -.240, $p \leq .05$), participation in sport physical activity decreased. Socio-demographic

variables explained 7.1% of the variance in total anxiety. Step 2 of this model revealed that greater motivation ($\beta = .323$, $p \leq .01$) was related to greater participation in sport physical activity, and accounted for 9.9% of the total variance. After controlling for gender, age and motivation, Total Flow was not significantly related to sport physical activity and only accounted for 1.9% of the variance in this outcome variable. Overall, this regression model explained 14.9% of the total variance within sports participation.

Table 5: Hierarchical regression analysis of Sport PA and Total Flow and controlling for socio-demographics and motivation

Variable	**Beta**	***β***	***F***	***df***	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			3.16*	2,83	.071	.048	.071
Gender [a]	.089	.089					
Age	-.011*	-.240*					
Step 2			5.58**	1,82	.170	.139	.099
Motivation [b]	.158**	.323**					
Step 3			4.71**	1,81	.189	.149	.019
Flow [c]	.014	.152					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] 1 = no experience of flow; 45 = frequent experience of flow

To determine the relationship between sport physical activity participation and the Challenge/Skill Balance dimension of flow, a hierarchical linear regression model was computed (Table 6). Results from Step 1 indicated that sport physical activity was not significantly associated with gender or age. Results from step 2 indicated that sport

physical activity was positively associated with Total Motivation ($\beta = .327$, $p \leq .01$) and explained 9.9% of the variance. Results from step 3 indicated that sports physical activity was not significantly associated with the Challenge-Skill Balance dimension of flow and only contributed 1.2% to the explained variance. Overall, this regression model explained 12.6% of the total variance within sports participation.

Table 6: Hierarchical regression analysis of Sport PA and the Challenge-Skill Balance dimension of Flow controlling for socio-demographics and motivation

Variable	**Beta**	***β***	***F***	***df***	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			2.40	2,87	.052	.030	.052
Gender [a]	.105	.107					
Age	-.008	-.188					
Step 2			5.20**	3,86	.154	.124	.101
Motivation [b]	.158**	.327**					
Step 3			4.21**	4,85	.165	.126	.012
Challenge-Skill Balance [c]	.089	.131					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] "1" (never) to "5" (always), with higher values indicating more flow

To determine the relationship between sport physical activity participation and the Merging of Action and Awareness dimension of flow, a hierarchical linear regression model was computed (Table 7). Results from step 1 indicated that sport physical activity was not significantly associated with gender or age. Results from step 2 indicated that

sport physical activity was positively associated with total motivation ($\beta = .327, p \leq .01$) and explained 10.1% of the variance. Results from step 3 indicated that sport physical activity was not significantly associated with the Merging of Action and Awareness dimension of flow and did not contribute anything to the explained variance. Overall, this regression model explained 11.4% of the total variance within sports participation.

To determine the relationship between sport physical activity participation and the Clear Goals dimension of flow, a hierarchical linear regression model was computed (Table 8). Results from step 1 indicated that sport physical activity was not significantly associated with gender or age. Results from step 2 indicated that sport physical activity was positively associated with motivation ($\beta = .328, p \leq .01$) and explained 10.3% of the variance. Results from step 3 indicated that sport physical activity was positively associated with the Clear Goals dimension of flow ($\beta = .215, p \leq .05$) and explained 4.2% of the variance. Overall, this regression model explained 15% of the total variance within sports participation.

Table 7: Hierarchical regression analysis of Sport PA and the Merging of Action and Awareness dimension of Flow controlling for socio-demographics and motivation

Variable	**Beta**	***β***	***F***	***df***	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			2.40	2,87	.052	.030	.052
Gender [a]	.105	.107					
Age	-.008	-.188					
Step 2			5.20**	3,86	.154	.124	.101
Motivation [b]	.158**	.327**					
Step 3			3.86**	4,87	.154	.114	.000
Merging of Action and Awareness [c]	.004	.006					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] "1" (never) to "5" (always), with higher values indicating more flow

Table 8: Hierarchical regression analysis of Sport PA and the Clear Goals dimension of Flow controlling for socio-demographics and motivation

Variable	**Beta**	***β***	***F***	***df***	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			2.02	2,87	.044	.023	.044
Gender [a]	.099	.101					
Age	-.008	-.171					
Step 2			4.94**	3,86	.147	.117	.103
Motivation [b]	.159**	.328**					
Step 3			4.94***	4,85	.189	.150	.042
Clear Goals [c]	.130*	.215*					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] "1" (never) to "5" (always), with higher values indicating more flow

To determine the relationship between sport physical activity participation and the Unambiguous Feedback dimension of flow, a hierarchical linear regression model was computed (Table 9). Results from step 1 indicated that sport physical activity was not significantly associated with gender or age. Results from step 2 indicated that sport physical activity was positively associated with motivation (β = .331, p <.001) and explained 10.4% of the variance. Results from step 3 indicated that sport physical activity was not significantly associated with the Unambiguous Feedback dimension of flow and only explained 2.4% of the variance. Overall, this regression model explained 13% of the total variance within sports participation.

Table 9: Hierarchical regression analysis of Sport PA and the Unambiguous Feedback dimension of Flow controlling for socio-demographics and motivation.

Variable	**Beta**	β	F	df	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			1.89	2,87	.042	.020	.042
Gender [a]	.091	.091					
Age	-.008	-.171					
Step 2			4.89**	3,86	.146	.116	.104
Motivation [b]	.160**	.331**					
Step 3			4.33**	4,85	.169	.130	.024
Unambiguous Feedback [c]	.097	.163					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] "1" (never) to "5" (always), with higher values indicating more flow

To determine the relationship between sport physical activity participation and the Concentration on the Task at Hand dimension of flow, a hierarchical linear regression model was computed (Table 10). Results from step 1 indicated that sport physical activity was not significantly associated with gender but was negatively significantly associated with age meaning that as age increased (β = -.215 , p <.05), participation in sport physical activity decreased. Age explained 6.3% of the variance. Results from step 2 indicated that sport physical activity was positively associated with motivation (β =.314, p < .01) and explained 9.4% of the variance. Results from step 3 indicated that sport physical activity was not significantly associated with the Concentration on the Task at Hand dimension of flow and only explained 2.2% of the variance. Overall, this regression model explained 14% of the total variance within sports participation.

To determine the relationship between sport physical activity participation and the Sense of Control dimension of flow, a hierarchical linear regression model was computed (Table 11). Results from step 1 indicated that sport physical activity was not significantly associated with gender or age. Results from step 2 indicated that sport physical activity was positively associated with motivation (β =.327, p < .01) and explained 10.1% of the variance. Results from step 3 indicated that sport physical activity was not significantly associated with the Sense of Control dimension of flow and only explained 1.7% of the variance. Overall, this regression model explained 13.2% of the total variance within sports participation.

Table 10: Hierarchical regression analysis of Sport PA and the Concentration on the Task at Hand dimension of Flow controlling for socio-demographics and motivation.

Variable	**Beta**	***β***	***F***	***df***	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			2.93	2,87	.063	.042	.063
Gender [a]	.102	.104					
Age	-.010*	-.215*					
Step 2			5.33**	3,86	.157	.127	.094
Motivation [b]	.153**	.314**					
Step 3			4.62**	4,85	.178	.140	.022
Concentration on the Task at Hand [c]	.084	.159					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] "1" (never) to "5" (always), with higher values indicating more flow

Table 11: Hierarchical regression analysis of Sport PA and the Sense of Control dimension of Flow controlling for socio-demographics and motivation.

Variable	**Beta**	***β***	***F***	***df***	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			2.40	2,87	.052	.030	.052
Gender [a]	.105	.107					
Age	-.008	-.188					
Step 2			5.20**	3,86	.154	.124	.101
Motivation [b]	.158**	.327**					
Step 3			4.37**	4,85	.171	.132	.017
Sense of Control [c]	.082	.135					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] "1" (never) to "5" (always), with higher values indicating more flow

To determine the relationship between sport physical activity participation and the Loss of Self-Consciousness dimension of flow, a hierarchical linear regression model was computed (Table 12). Results from step 1 indicated that sport physical activity was not significantly associated with gender or age. Results from step 2 indicated that sport physical activity was positively associated with motivation (β =.330, p < .01.) and explained 10.4% of the variance. Results from step 3 indicated that sport physical activity was not significantly associated with the Loss of Self-Consciousness dimension of flow and did not contribute anything to the explained variance. Overall, this regression model explained 10.9% of the total variance within sports participation.

Table 12: Hierarchical regression analysis of Sport PA and the Loss of Self-Consciousness dimension of Flow controlling for socio-demographics and motivation.

Variable	Beta	β	F	df	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			2.07	2,88	.045	.023	.045
Gender [a]	.101	.103					
Age	-.008	-.171					
Step 2			5.06**	3,87	.149	.119	.104
Motivation [b]	.160**	.330**					
Step 3			3.75**	4,86	.149	.109	.000
Loss of Self-Consciousness [c]	-.006	-.013					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] "1" (never) to "5" (always), with higher values indicating more flow

To determine the relationship between sport physical activity participation and the Transformation of Time dimension of flow, a hierarchical linear regression model was computed (Table 13). Results from step 1 indicated that sport physical activity was not significantly associated with gender or age. Results from step 2 indicated that sport physical activity was positively associated with motivation (β =.345, p =.001) and explained 11.2% of the variance. Results from step 3 indicated that sport physical activity was not significantly associated with the Transformation of Time dimension of flow and did not contribute anything to the explained variance. Overall, this regression model explained 11.9% of the total variance within sports participation.

Table 13: Hierarchical regression analysis of Sport PA and the Transformation of Time dimension of Flow controlling for socio-demographics and motivation.

Variable	Beta	β	F	df	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			2.09	2,87	.046	.024	.046
Gender [a]	.097	.099					
Age	-.008	-.175					
Step 2			5.39**	3,86	.158	.129	.112
Motivation [b]	.169***	.345***					
Step 3			3.40**	4,85	.158	.119	.000
Transformation of Time [c]	.006	.011					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] "1" (never) to "5" (always), with higher values indicating more flow

To determine the relationship between sport physical activity participation and the Autotelic dimension of flow, a hierarchical linear regression model was computed (Table 14). Results from step 1 indicated that sport physical activity was not significantly associated with gender or age. Results from step 2 indicated that sport physical activity was positively associated with motivation (β =.327, $p < .01$) and explained 10.1% of the variance. Results from step 3 indicated that sport physical activity was not significantly associated with the Autotelic dimension of flow and only explained 2.6% of the variance. Overall, this regression model explained 14.1% of the total variance within sports participation.

Table 14: Hierarchical regression analysis of Sport PA and the Autotelic dimension of Flow controlling for socio-demographics and motivation.

Variable	Beta	β	F	df	R^2	R^2_{adjust}	$R^2\Delta$
Step 1			2.40	2,87	.052	.030	.052
Gender [a]	.105	.107					
Age	-.008	-.188					
Step 2			5.20**	3,86	.154	.124	.101
Motivation [b]	.158**	.327**					
Step 3			4.65**	4,85	.197	.141	.026
Autotelic [c]	.100	.175					

[a] 1 = male, 0 = female
[b] 1 = low motivation to be physically active; 35 = high motivation to be physically active
[c] "1" (never) to "5" (always), with higher values indicating more flow

Active versus Less Active Participants in the Reporting of Flow and Motivation

Participants were divided into two groups (active and less active) based on the Total Physical Activity scores (for respondents with complete scores) being below and above the 50th percentile. Respondents in the less active/sedentary group (n = 42) on average scored 5.46 (SD = .517; SE = .080) on the Total Physical Activity index (1 = sedentary, 15 = highly active) and scores ranged from 4.13 to 6.13. Respondents in the active group (n = 42) on average scored 6.99 (SD = .541; SE = .084) on the Total Physical Activity index and scores ranged from 6.25 to 8.38.

Differences in the Experience of Flow

To determine differences in flow experienced among active versus less active respondents, a series of independent t-tests were computed. Group differences were determined in terms of Total Flow experienced as well as each of the nine flow sub-scales. Prior to conducting the analyses, the assumptions of this test were investigated. The assumption of normality was determined with the Kolmogorov-Smirnov test (Field, 2005). Levene`s test for testing homogeneity of variance was performed to determine if the variance between the two groups was roughly equal (Field, 2005). Table 15 illustrates the results of these assumption tests as well as the descriptive statistics and t-tests. According to the Kolmogorov-Smirnov normality test, the following flow subscales were not normally distributed: Challenge-Skill Balance for less active participants ($D_{(38)} = .15, p < .05$) and active participants ($D_{(40)} = .159, p < .05$); Clear

Goals for less active participants ($D_{(38)} = .203, p < .001$) and active participants ($D_{(40)} = .142, p < .05$); Unambiguous Feedback for active participants ($D_{(40)} = .184, p < .01$); Concentration on the Task at Hand for active participants ($D_{(40)} = .176, p < .01$); Transformation of Time for active participants ($D_{(40)} = .147, p < .05$); and Autotelic Total for active participants ($D_{(40)} = .146, p < .05$). According to Levene's Test, Loss of Self-Consciousness was the only flow subscale that violated the assumption of Homogeneity of Variance ($F_{(1, 76)} = 4.962, p < .05$) among active versus less active participants. The highest to lowest flow subscale totals for active participants were as follows: Autotelic, Clear Goals, Sense of Control, Unambiguous Feedback, Challenge/Skill-Balance, Merging of Action and Awareness, Concentration on the Task at Hand, Transformation of Time and Loss of Self-Consciousness. The highest to lowest flow subscale totals for less active participants were as follows: Sense of Control, Autotelic, Clear Goals, Unambiguous Feedback, Challenge/Skill Balance, Merging of Action and Awareness, Transformation of Time, Concentration on the Task at Hand and Loss of Self-Consciousness.

Table 15: Descriptive Statistics and T-Tests of Active versus Sedentary Exercise Participants in the Reporting of Flow

Flow Dimensions		**Less Active/ Sedentary**				**Active**				
	Levene`s Test $F_{(df1, df2)}$	**K-S** $D_{(df)}$	**n**	***M* (*SD*)**	***SE***	**K-S** $D_{(df)}$	**n**	***M* (*SD*)**	**SE**	$t_{(df)}$
Total Flow	$.63_{(1,76)}$	$.078_{(38)}$	38	32.0 (4.72)	.77	$.10_{(40)}$	40	33.6 (4.18)	.66	$-1.50_{(76)}$
Challenge	$.03_{(1,76)}$	$.159_{(38)*}$	41	3.6 (.59)	.09	$.15_{(40)}*$	41	3.9 (.59)	.09	$-1.73_{(80)}$
Merging	$.19_{(1,76)}$	$.109_{(38)}$	42	3.6 (.56)	.09	$.12_{(40)}$	41	3.5 (.63)	.10	$.41_{(81)}$
Clear	$1.11_{(1,76)}$	$.203_{(38)***}$	41	3.9 (.75)	.12	$.14_{(40)*}$	42	4.1 (.57)	.09	$-1.69_{(81)}$
Unambiguous	$1.21_{(1,76)}$	$.136_{(38)}$	41	3.7 (.71)	.11	$.18_{(40)**}$	42	3.9 (.63)	.10	$-1.63_{(81)}$
Concentration	$.73_{(1,76)}$	$.118_{(38)*}$	42	3.3 (.85)	.13	$.18_{(40)***}$	41	3.5 (.68)	.11	$-1.45_{(81)}$
Sense	$.60_{(1,76)}$	$.117_{(38)}$	42	3.9 (.71)	.11	$.11_{(40)}$	41	4.0 (.65)	.10	$-.91_{(81)}$
Loss	$4.96_{(1,76)*}$	$.111_{(38)}$	42	3.2 (1.08)	.17	$.13_{(40)}$	42	3.3 (.81)	.13	$-.31_{(82)}$
Transformation	$1.67_{(1,76)}$	$.131_{(38)}$	41	3.3 (.66)	.010	$.15_{(40)*}$	42	3.3 (.88)	.14	$.08_{(81)}$
Autotelic	$2.14_{(1,76)}$	$.134_{(38)}$	42	3.9 (.80)	.12	$.15_{(40)*}$	41	4.2 (.62)	.10	$-2.18_{(77.20)*}$

* = $p < .05$; ** = $p < .01$; *** = $p < .001$;

According to the Independent Samples Test, Autotelic total was the only subscale that was significant ($t_{(77.20)} = -2.19$, $p < .05$; small effect: $r < .001$). Active participants ($M = 4.2$, $SD = .62$) compared to less active participants ($M = 3.9$, $SD = .80$) experienced a higher Autotelic dimension of flow suggesting that active participants experience more intrinsic qualities during physical activity participation. Although not statistically significant, with regards to Total Flow, active participants ($M = 33.6$, $SD = 4.18$)

compared to less active participants ($M = 32.0$, $SD = 4.72$) experienced a higher Total Flow suggesting that active participants may experience more flow during physical activity.

Again, although not statistically significant, active participants compared to less active participants reported greater flow among the following dimensions: Challenge/Skill Balance, Clear Goals, Unambiguous Feedback, Concentration on the Task at Hand, Sense of Control, Loss Self-Consciousness and Transformation of Time. This suggests that active exercise participants, compared to people who adhere to less exercise, may participate in more physical activities that match their current skill level; set clearer goals prior to physical activity participation; are more aware of their progress in physical activity; and during physical activity participation may have better concentration, experience higher levels of control, only focus on activity participation and are not preoccupied with other unrelated thoughts and experience an alter in time. Less active participants reported greater Merging of Action and Awareness and Loss Self-Consciousness dimensions of flow compared to active participants. Although these results were not statistically significant they may suggest that less active participants ($M = 3.6$, $SD = .56$) compared to active participants ($M = 3.5$, $SD = .63$) experienced a higher Merging of Action and Awareness.

Differences in the Experience of Motivation

To determine differences in exercise motivation reported among active versus less active respondents, a series of independent t-tests were computed. Group differences

were determined in terms of Total Motivation experienced as well as each of the five motivation sub-scales. Prior to conducting the analyses, the assumptions of this test were investigated. The assumption of normality was determined with the Kolmogorov-Smirnov test (Field, 2005). Levene`s test for testing homogeneity of variance was performed to determine if the variance between the two groups was roughly equal (Field, 2005). Table 16 illustrates the results of these assumption tests as well as the descriptive statistics and t-tests. According to the Kolmogorov-Smirnov normality test the following flow subscales were not normally distributed: Interest/Enjoyment for active participants ($D_{(42)} = .161$, $p < .01$); Competence for active participants ($D_{(42)} = .166$, $p < .01$); Appearance for less active participants ($D_{(39)} = .201$, $p < .001$) and for active participants ($D_{(42)} = .155$, $p < .05$); and Fitness for less active participants ($D_{(39)} = .202$, $p < .001$) and active participants ($D_{(42)} = .184$, $p = .001$). According to Levene's Test, Interest/Enjoyment was the only motivation subscale that violated the assumption of Homogeneity of Variance ($F_{(1, 79)} = 8.039$, $p < .01$) among active versus less active participants. The highest to lowest motivation totals for active participants were as follows: Fitness, Interest/Enjoyment, Competence, Appearance and Social. The highest to lowest motivation levels for less active participants were as follows: Fitness, Appearance, Interest/Enjoyment, Competence and Social. Although the results were fairly predictable and conformed to societal ideals (how society values exercise), there were some unexpected results. For instance, the highest motivator for both active and less active participants was Fitness suggesting that although active and less active participants do not participate in the same amount of physical activity, they do participate in physical activity

for the same reason - mainly for health purposes. The second highest motivators for active and less active participants were Interest/Enjoyment and Appearance respectively. Thus, people who are more physically active may tend to participate in more physical activities for their own pleasure whereas people who are less physically active may tend to only participate in physical activity if they feel they are physically unattractive. This finding suggests that active participants experience more intrinsic motivation with regards to physical activity in comparison to less active participants who appear to be more extrinsically motivated with regards to physical activity.

Table 16: Descriptive Statistics and T-Tests of Active versus Sedentary Participants in the Reporting of Motivation

Flow Dimensions		**Less Active/ Sedentary**				**Active**				
	Levene`s Test $F_{(df1, df2)}$	**K-S** $D_{(df)}$	**n**	***M* (*SD*)**	***SE***	**K-S** $D_{(df)}$	**n**	***M* (*SD*)**	**SE**	$t_{(df)}$
Total Motivation	.029 (1,79)	.112 (39)	39	5.2 (.83)	.13	.105 (42)	42	5.6 (.82)	.13	2.32 (78.41)
Interest/enjoyment	8.04 (1,79)**	.106 (39)	41	5.0 (1.41)	.22	.161 (42)**	42	6.0 (.83)	.13	3.89 (64.49)
Competence	.801 (1,79)	.122 (39)	42	4.9 (1.26)	.19	.166 (42)**	42	5.9 (1.17)	.18	-3.52 (81.54)
Appearance	1.14 (1,79)	.201 (39)***	40	5.7 (1.26)	.20	.155 (42)*	42	5.7 (1.30)	.20	.071 (80)
Fitness	.049 (1,79)	.202 (39)***	42	6.2 (.86)	.13	.184 (42)***	42	6.4 (.69)	.11	-.87 (82)
Social	1.50 (1,79)	.105 (39)	39	3.9 (1.37)	.22	.064 (42)	42	4.1 (1.68)	.26	-.66 (79)

* = $p < .05$; ** = $p < .01$; *** = $p < .001$

According to the Independent Samples Tests, active and less active participants differed significantly different in terms of Total Motivation ($t_{(78.41)} = -2.32, p < .05$;

medium effect: $r = 25$, $p < .001$). Active participants ($M = 5.6$, $SD = .82$) compared to less active participants ($M = 5.2$, $SD = .83$) experienced a higher Total Motivation suggesting that active participants are more motivated to participate in physical activity. Similarly, differences among the two groups were significant in terms of Interest/Enjoyment ($t_{(64.49)} = -3.89$, $p < .001$; large effect: $r < .44$, $p < .001$) and Competence was significant ($t_{(81.54)} = -3.52$, $p = .001$; medium effect: $r < .36$, $p < .001$). Active participants ($M = 6.0$, $SD = .83$) compared to less active participants ($M = 5.0$, $SD = 1.41$) experienced a higher Interest/Enjoyment total suggesting that active participants participate more in physical activity for interest and enjoyment purposes. With respect to the Competence Total, active participants ($M = 5.9$, $SD = 1.17$) compared to less active participants ($M = 4.9$, $SD = 1.26$) experienced a higher Competence Total suggesting that active participants are more competent at performing specific skills during activity participation. Although not statistically significant, active participants compared to less active participants reported greater motivation among the Fitness and Social motivation subscales. This suggests that active participants may participate more in physical activity to maintain a healthy lifestyle and for social purposes. Less active participants compared to active participants reported greater Appearance motivation subscale scores suggesting that less active participants may participate more in physical activity to improve their body shape.

CHAPTER 5: DISCUSSION

Introduction

The purpose of this study was to determine whether or not people are experiencing flow during exercise participation as well as people's motives for exercising. The research questions were as follows: (1) Is there a relationship between flow experienced by exercise participants, motivation to exercise, and exercise adherence?; (2) To what extent is flow associated with exercise adherence?; and (3) What are the differences (if any) in flow experienced and motivation to exercise among active versus less active participants? The following sections will discuss the findings of this study as well as deliberate to the possible reasons for the results and their implication in sports and physical activity research and practice. The limitations of the study will then be discussed.

Gender, Flow and Motivation

This study uncovered some interesting results regarding gender, flow and motivation. In terms of the relation between gender and flow, gender was significantly positively related with the Challenge/Skill Balance dimension of flow (small effect size) suggesting that males may participate in physical activity where the challenge meets their current skill level. Also, gender was significantly positively related with Total Flow (large effect size) meaning that males experience more flow in comparison to females

during physical activity participation. Participants in this study were non-randomly selected and the majority of males participated in higher intensity physical activities. That is, the majority of males in this study reported playing basketball and other highly sport-oriented activities while the majority of females reported participating in aerobics, walking, cleaning and other medium intensity activities. Therefore, in the current study, males and females participated in two different categories of physical activity. The challenge of an activity correlating with your current skill level is important in higher intensity physical activities but may not be as important in less intense physical activities. Thus, in the current study, males and females were not homogeneous in terms of the intensity of their most frequent physical activities which is a potential explanation for the gender differences among reporting flow.

Several studies have investigated gender differences in the experience of flow among varsity athletes or in the participation of specific intense physical activities. Thus, in these studies, males and females are both participating in high-intense sport-related physical activities. For example, Hall et al., (2007) conducted a study to examine flow experiences following a variety of outdoor activities that were part of a study-abroad course. Ninety college students (55 females, 35 males; mean age = 20.30 ± 1.04 years) participated in this study while studying abroad in Australia for 3 weeks. Participants completed the Flow State Scale-2 (Jackson & Eklund, 2004) after the completion of three days of activities (rappelling (the controlled descent down a rope), canyoning and snorkeling). These results were then compared with the means published by Jackson and Eklund (2004) for exercise and sport activity. The mean flow score was higher for the

outdoor activities ($M = 4.11 \pm 0.44$ for hiking; $M = 4.15 \pm 0.47$ for rappeling and canyoning; and $M = 4.16 \pm 0.49$ for snorkeling when compared with scores reported for exercise ($M = 3.78 \pm 0.53$) and sport activity ($M = 3.78 \pm 0.50$). Similar results were found for the different dimensions of flow as measured by the Flow State Scale-2. Interestingly, there were no gender differences in terms of flow experiences. Thus, the experience of flow may be affected more by the type of physical activity one participates in rather than gender differences in these perceptions. Outdoor recreation, sports and other highly intense physical activities may afford the experience of flow more than lower intensity or indoor physical activities.

Gender differences in the experience of flow during physical activity were also not evident in a study conducted by Russell (2002) which examined qualitative and quantitative aspects of flow within a group of 42 college-age athletes (15 females, 27 males, mean age = 20.43) representing team sports (i.e., football, baseball, volleyball, softball and basketball; $n = 28$) and individual sports (swimming, track, wrestling and triathlon; $n = 14$). The athletes were interviewed about what factors they felt helped, prevented and disrupted flow occurrence. Results of the study indicated non-significant gender by sport interactions and non-significant main effects for the majority of the Flow State Scales as well as Total Flow. For the Merging of Action and Awareness dimension of flow, the interaction was non-significant as was the main effect for gender. However, there was a significant main effect for sport setting, indicating that team-sport athletes have a significantly higher level of Action-Awareness Merging then individual sport athletes. For the Concentration on the Task at Hand (concentration during physical

activity) subscale, there were trends towards significance on the gender and sport main effects and their interaction. Thus, Russell (2002) found that college athletes experienced flow factors similarly, regardless of gender or sport setting. Therefore, although the current study found that males have higher flow levels than females, other studies did not find gender differences. It is unclear in this study whether gender differences in reporting of flow was due to real gender differences in optimal experiences, gender differences in the type of physical activity participation or simply a sample bias.

The current study also found gender differences related to motivation to participate in physical activity. Gender was significantly positively related to the Interest/Enjoyment and Competence (participating in physical activity to better oneself) motivation subscales suggesting that males participate in physical activity for their own interest/enjoyment and to improve on their own knowledge/skill base. According to Dunning (1986), sports serve as a secondary reinforcer of masculine identity which may explain why males may participate in physical activity to better themselves. Gender was also significantly positively associated with total motivation (medium effect size) suggesting that males experienced greater levels of motivation to be physically active. This is in contrast to other studies exploring the role of motivation in exercise adherence which did not find any gender differences (Rodgers et al., 2002; Ryan et al., 1997). However, Kilpatrick et al., (2005) conducted a study to compare motivations for sport participation versus exercise among college students and it was determined that males had higher levels of motivation for challenge, competition, social recognition, strength and endurance in comparison to females. Similar to the experience of flow, motivation

may also be related to the type of physical activity one participates in (Kilpatrick et al., 2005). As previously discussed, the males in the current study reported participating in physical activities with a higher intensity which may suggest why their motivation levels were higher. Thus, although the current study found that males have higher motivation levels than females, the gender differences could be the result of gender differences in the type of physical activity participation or the non-random sampling technique employed resulting in non-equivalent groups in terms of the type of physical activity participation among males and females.

Age and Flow

This study also uncovered results regarding age and flow. Research on the inverse relationship between age and physical activity participation is well documented (Sallis, 2000). The current study supports this relation as age was significantly negatively associated with Total Physical Activity (medium effect size) meaning that as age increased, physical activity decreased. Age was also significantly positively related with Challenge/Skill Balance (medium effect size) signifying that as age increased, so did the ability to find activities that met the skill level of the individual participant. As one gets older, self-awareness may increase and thus the ability to match skill level with the challenge of an activity. Thus, the ability to find activities that match ones skill level may increase with age. Seongyeul (1988) conducted a study to investigate the relationship between life satisfaction and the flow experience among older adults. The respondents

were 16 male and 20 female newly immigrated Koreans over 60 years of age residing in the Chicago area. Of the 12 subjects who reported flow experiences, three participants said that their ability to have flow has increased with age; they can now concentrate more deeply on what they are doing because they are doing fewer things that broke up their concentration before and because of more free time. On the contrary, two subjects reported that this capability had been reduced because they feel physically weak and are easily fatigued. Thus, although the current study only found that age was related to the matching of challenge and skill dimension of flow, Seongyeul (1988) provides evidence that other dimensions of flow may increase with age (older people can now concentrate more deeply on the task at hand due to the fact that they are doing less of the things that disrupted their concentration before: Concentration on the Task at Hand). Future research is needed to determine how flow experiences change over the life course and how potential changes may impact physical activity adherence across the life span.

Relation Between Physical Activity Participation, Flow and Motivation

Flow and Sports/Physical Activity Participation

This study uncovered results regarding the association between physical activity participation and flow. In the current study exercise adherence, conceptualized as level of physical activity, was measured using the Baecke Questionnaire of Habitual Physical Activity (Baecke, Burema & Frijters, 1982) which separates physical activity into 3 distinct domains: (1) Work Physical Activity (Work PA; physical activity during

work), (2) Sport Physical Activity (Sport PA; participation in sport/physical activity) and (3) Non-sports leisure (Leisure PA; physical activity during transportation and in daily life). Leisure PA was significantly positively associated with Merging of Action and Awareness and Concentration on the Task at Hand. Additionally, Work PA was not significantly associated with motivation in terms of the relationship between physical activity and the motivation sub-scales. With regards to physical activity being associated with total flow and the nine dimensions of flow, very few significant associations were found in this study. Interestingly, Sport PA was found to be not significant with Total Flow. Also, Total PA didn't appear to have any relationship to flow. Reasons for this result could be due to the fact that Total PA includes Work and Sport PA and there may not always be interest or enjoyment in those types of activities. However, Total PA was related to Interest/Enjoyment.

In terms of the relation with the dimensions of flow, participation in Sport PA was significantly positively associated with clear goals in physical activity (small effect size). This dimension of flow was not related to participation in physical activity at work or in physical activity participation in leisure. This suggests that clear goals in physical activity may be more evident in higher intensity levels of sport/physical activity conceivably due to the competitive nature of sports. Additionally, it's possible that an activity must possess a certain element of challenge in order to permit individuals to experience the state of flow; activities during Work PA or Leisure PA do not possess such a challenge (e.g., walking). Also, since this study was conducted among the general population of physically active people, it is possible that the flow experience is only present among

people who participate in more intense physical activities or who participate at a competitive level. Clear goals in physical activity are evident in higher intensity levels of sport physical activity because as activities become more physically demanding, one needs to set clearer goals in order to be successful in them. In fact, clearly defined goals were one of the most commonly reported psychological characteristics that athletes cited during high levels of physical activity (Stavrou et al., 2007). Sport PA was also significantly positively associated with Autotelic Total (being internally driven; small effect size) signifying the highly psychological aspect of sports. People who are internally driven participate in activities for the interest and enjoyment that the activities offer and as a result, frequently perform at high levels (Abuhamdeh et al., 2009). Clear goals in physical activity and Autotelic Total (being internally driven) were the only flow subscales that were significant in terms of an association with Sports PA. Another interesting result was the positive relation found between Clear Goals and the Autotelic flow subscales. People who possess an autotelic personality are driven internally and most likely establish clear goals in physical activities.

It is likely that the Challenge/Skill Balance subscale was not related because, as stated previously, it is possible that an activity must possess a certain element of challenge in order to permit individuals to experience the state of flow. Unambiguous Feedback (clear and direct feedback) may not have been related to physical activity participation as some activities may have taken place in a crowded or noisy environment (e.g., an aerobics class) which would render the participants incapable of receiving good and clear feedback. Merging of Action and Awareness (being cognizant of one's own

actions but not of the awareness itself), Concentration on the Task at Hand (the undivided attention to an activity), Sense of Control (control in an activity without the person actively trying to exert control), Loss of Self-Consciousness (only concern is participating in the activity and nothing else) and Transformation of Time (altering of time) may not have been significant as participant's may not have been completely absorbed in the activity in which they reported which would have permitted them to experience these characteristics. As participants in this study participated in physical activity primarily for recreational purposes, it is possible that they were not in a position to experience the flow characteristics as easily as someone who was participating at a competitive level. As stated by Stavrou et al., (2007), total commitment, clearly defined goals, feedback about how well an athlete is performing, concentration on performing the activity, task-relevant thoughts, sense of control and feelings of fun, confidence and enjoyment were among the most commonly reported psychological characteristics that that athletes mentioned during high levels of performance.

Motivation and Sport/Physical Activity Participation

It was found that motivation was strongly related to physical activity but not with flow. These results suggest that you need not necessarily need a high level of motivation in order to experience flow. This study also examined the association between exercise adherence and motivation. Sport PA was significantly positively associated with Total Motivation and the effect was small suggesting that people experienced the most

motivation to participate in sports physical activity as opposed to leisure or work physical activity. This result is not unexpected considering that Leisure PA measured people's physical activity levels in transportation and in their daily lives while Work PA was concerned with physical activity received during a work day. People are more likely to report high levels of intrinsic motivation as a result of sport and physical activity participation when they likely experience rushes of endorphins. Additionally, endorphin rushes are attributed to the flow state (Marr, 2001) and people who are intrinsically as opposed to extrinsically motivated tend to experience flow more frequently. For example, Tsorbatzoudis et al., (2006) conducted a study aimed at investigating the effect of motivational dimensions proposed by Pelletier, et al., in 1995, both on sport participation levels and on intention for continuing participation among adult recreational sport participants. Similar to the current study, Tsorbatzoudis et al provided evidence to suggest that increased motivation leads to increased participation. Hamer, Karageorghis, and Vlachopoulos (2002) have reported that introjected regulation (to attain or avoid an outcome (Beaumont, 2009)) and identified regulation (doing something that was personally important (Losier et al., 1999) were the only predictors of exercise dependence among endurance athletes, whereas intrinsic motivation (the inherent tendency to seek out novelty and challenges, to extend and exercise one's capacities, to explore, and to learn (Deci & Ryan, 2000) was shown to have no relationship with exercise dependence. Sport participation on a regular basis has been shown to have positive effects on physical health (Dishman, 1988; Martin & Dubbert, 1982; Paffenberger & Hyde, 1988; Paffenberger et al.,1986; Siscovick et al., 1985; Stephens et al., 1985); psychological

enhancement; stress reactivity; and mental well-being such as reduced depression, anxiety, tension and stress, and increased vigor and clear-mindedness (Bahrke & Morgan, 1978; Berger et al., 1988; Berger & Owen, 1983; Blumenthal et al., 1982; Folkins & Sime, 1981; McCann & Holmes, 1984; Morgan & Goldston, 1987; Prakasa, & Overman, 1986; Raglin & Morgan, 1987; Senkfor & Williams, 1995; Snyder & Kivlin, 1975; Thayer, 1987; Wilson, Berger, & Bird, 1981). Also, physical exercise has been suggested to have a positive impact on body-image, self-concept and to enhance self-esteem (Brown et al., 1982; Clough et al., 1989; Frederick & Ryan, 1993; Jasnoski et al., 1981; Parent & Whall, 1984; Prakasa, & Overman, 1986). This may perhaps further clarify reasons as to why participants in this study valued sport physical activity over leisure and work physical activity as sport physical activity offers a considerable amount of both physical and psychological benefits.

Extent of Flow's Association with Exercise Adherence

To determine the association between exercise adherence (sport physical activity (Sport PA), motivation and flow, while controlling for socio-demographic variables, a series of hierarchical linear regressions were conducted. After controlling for socio-demographic variables and motivation, flow had a minimal association with exercise adherence (Sport PA). Flow contributed minimally to the explained variance within Sport PA (less than 0% to 4.2%). The flow dimension Clear Goals was the only subscale that significantly predicted levels of physical activity after controlling for gender, age and total motivation to participate in exercise. Although individuals may participate in

physical activity for many reasons, goals (whether they are intrinsic or extrinsic) are almost always established prior to participation. Individuals are more likely to participate in physical activity more frequently when goals have been established. Additionally, it has been found that goal setting can be a tremendous performance enhancement tool (Locke et al., 1990). As developing goals are common and imperative to the success in physical activity, it is no surprise that Clear Goals significantly predicted levels of physical activity. Additionally, setting goals in physical activity is likely more common than experiencing any of the other complex flow dimensions.

Total Flow did not significantly predict Sports PA in this study and this is perhaps due to the limitations in the Baecke Questionnaire of Habitual Physical Activity and the Dispositional Flow Scale-2 which will further be discussed in the limitations section of the study. However, it is my opinion that the sample utilized in this study was the primary cause of this insignificant relationship. Participants in this study reported participating in low intensity activities such as walking which may not be physically and psychologically stimulating enough to permit a flow experience. Therefore, it is possible participants were not experiencing the flow experience as readily as if they had been participating in higher intensity activities. Additionally, the state of flow is quite common among competitive athletes and as this study examined individuals primarily participating in physical activities for recreational purposes, flow may not have been as present. Consequently, Total Flow may have significantly predicted physical activity had a sample of athletes participating in high intensity activities been used.

Motivation had a much stronger association with physical activity participation compared to flow and this is conceivably due to the participant's decreased ability to experience flow for reasons cited above. Within all of the regression models, motivation was a significant predictor of participation in Sports PA and explained a significant amount of the variance within participation (9.4% to 11.2%). While motivation and flow are two highly psychological components that were present in this study, it is possible that motivation was a stronger predictor of physical activity participation then flow due to the fact that the majority of participants in this study participated in their physical activities at a recreational level instead of a competitive level where the flow experience is a commonly reported state. For example, Jackson and colleagues (Jackson, 1995, 1996; Jackson et al., 1992) found that elite athletes experience flow at least some of the time during practice or competition and consider flow to be a significant part of their sport experience. Therefore, participants may not have been in a position to experience flow as easily.

This study determined many interesting relationships among variables and subscales. However, it also presented several unforeseen results; particularly, the fact that flow did not have much of an impact on the study outcomes. As flow is a highly psychological state, it is most likely to be present in high intensity activities or with people who participate in high intensity activities, such as athletes. As this study sampled a random group of individuals from various exercise and academic classes, it is likely that the sample were not participating in high intensity activities and therefore were not in a position to experience flow. Also, as attaining the flow state can be difficult,

comprehending it can prove to be even more complex. It is therefore possible that participants did not comprehend the questions of the Dispositional Flow Scale-2. Future research should contemplate the use of qualitative interviews.

The Experience of Flow and Motivation among Active versus Less Active Participants

Flow: Active versus Less Active Participants

Participants were divided into two groups (active/less active) based on the Total Physical Activity scores (for respondents with complete scores) being below and above the 50th percentile. This study conducted a series of independent t-tests to determine differences in flow experienced among active versus less active respondents. It is not surprising that the highest flow subscale total for active participants was Autotelic as physically active participants will experience high levels of intrinsic qualities during physical activity participation. Reasons for this result could be due to the fact that active people may be more internally driven as opposed to extrinsically driven. Ryan et al., (1997) also determined that intrinsic motivation remains a critical factor in sustained physical activity. Additionally, the Autotelic dimension of flow was the second highest flow subscale for less active participants and this is may confirm Ryan et al's., (1997) statement that intrinsic motivation remains a critical factor in sustained physical activity. Since there was little differentiation between active and less active people, it's not surprising that the Autotelic dimension of flow was significant for both groups. Other dimensions of flow may not have been significant due to sample and activity limitations

as stated previously. Therefore, although there is a slight difference in the amount of physical activity among the two groups, both groups feel internally driven and experience enjoyment during participation in the activity as well as the activity.

The Experience of Flow and Motivation Among Active versus Less Active Participants

This study conducted a series of independent t-tests to determine differences in motivation experienced among active versus less active respondents. Results found no significant differences among the reporting of motivation (total of the five subscales) to physical activity participation. Although there have been many studies conducted on the subject of exercise relapse, success in ameliorating long-term maintenance of physical activity has been minimal (Dishman, 1982, 1988a, 1988b; Martin & Dubbert, 1982, 1984). This is likely due to the fact that most exercise programs are designed for individuals who have elected to commence or continue in an exercise program while a substantial portion of the North American population can be classified as inactive or sedentary and who possibly have no intent in commencing exercise (Prochaska et al., 1994). Consequently, effective interventions must be directed to the needs of the sedentary population (Prochaska & Marcus, 1994). Therefore, this may explain the insignificant motivation results for less active participants. The current study found that Total Motivation and the five motivation subscales were all significant in terms of the

fact that active participants reported greater subjective perceptions of these motivations compared to less active participants.

It is important to consider that reasons cited by individuals as to why they participate in exercise may not be representative of actual motivations to exercise but could be used to describe some of the variance in behaviour (Koivula, 1999). Results from Koivula's study determined that physical, health, fun and enjoyment were the most significant reasons for participation in sport. Similarly, it was determined in this study that Interest/Enjoyment was an important factor for active participants. Enjoyment of sport participation has been determined to have substantial effects on exercise adherence (Wankel, 1993). Therefore, it is not surprising that the Interest/Enjoyment subscale was highly significant for active participants. Reasons for this result could be due to the fact that if you participate in a sufficient amount of physical activity to be considered an active participant, participating in an activity that interests you and that you enjoy is imperative due to the fact that if you plan to participate in a high amount of physical activity, it's important to enjoy what you're doing. Delespaul et al., (2004) also determined that unexpectedly, activation levels rose with lack of motivation.

Limitations

Although this study had many positive aspects to it, it also had many limitations. There were several limitations with the data collection. Missing data resulted due to many

of the respondents not answering all of the questions that were outlined in the background information sheet and the questionnaires. The sample also had several limitations. There was an uneven gender distribution in that 80% (n = 80) were female and 20% (n = 20) were male suggesting that the results cannot be generalized to males. This study attempted to determine differences in physical activity levels among active and sedentary participants. However, 99% (n = 99) participants reported participating in physical activity while only 1% (n = 1) participant reported not participating in physical activity. Therefore, comparisons were made between active and less active participants. According to the Baecke Questionnaire of Habitual Physical Activity (Baecke et al., 1982), participant's activities are classified in terms of average energy expenditure (1 = low intensity, 2= middle intensity, 3 = high intensity). However, examples of sports and their intensities were not provided for many sports or activities in the description of the questionnaire, leaving activities that were not mentioned to be subjectively assigned values.

An additional limitation of this study was using self-report questionnaires. As I was not directly observing participant's behaviour, it is uncertain if participants were accurately reporting their behaviour or if the participants had recall errors. Also, due to the fact that that this was a cross-sectional design, inferences about cause and effect of flow, motivation and physical activity levels could not be determined. It was difficult to accurately comprehend flow and its attributes among the participants as the participants may not have fully comprehended the nature of flow and therefore their answers may not have been representative of their actual behaviour and perceptions. Also, using a non-

random sampling technique cannot guarantee that the participants selected were representative of the population of exercise and non-exercise participants in St. John's.

Using the Dispositional Flow Scale-2 (Jackson et al., 2002), a scale which consists of 36 items based on the nine dimensions of flow, to measure the frequency of flow experiences in chosen physical activities and in general also caused problems for this study. As it is challenging to quantitatively measure flow, the questionnaire may have been difficult to comprehend as questions dealt with highly psychological aspects. Additionally, it is difficult to recall past flow experiences as it is primarily an "in the moment" experience. It is believed that using the Experience Sampling Method to measure the flow experience would have been more appropriate as this scale aims to measure physical activity in daily activities. Additionally, this study may have benefited from the use of qualitative interviews for flow in order to uncover the richness and depth of the flow experience.

Recommendations for Future Research

This study sought to determine relationships between flow, physical activity and motivation. Even though this study yielded many interesting results, there are some points that should be taken into consideration for future research. This study addressed three questions: (1) Is there a relationship between flow experienced by exercise participants, motivation to exercise, and exercise adherence?; (2) To what extent is flow

associated with exercise adherence?; and (3) What are the differences (if any) in flow experienced and motivation to exercise among active versus less active participants? Although this study examined relationships between flow, motivation and physical activity, it may be of interest to future researchers to examine what type of motivation (intrinsic/extrinsic) influences exercise adherence the most. Also, considering that the amount of explained variance of sports physical activity in this study was low and the fact that flow did not have a strong relationship with physical activity, it is recommended that other variables should be examined, such as efficacy for flow and goal orientations. In order to examine the flow experience in participants, the Dispositional Flow-Scale 2 was distributed to participants. Although this scale has much credibility, the Experience Sampling Method should be considered as this scale is better suited for physically active participants in general. Also, future researchers may want to consider using qualitative interviews as flow is a subjective experience and could perhaps be easier understood. The majority of the people in this study were from St. John's, NL. As Newfoundland has one of the highest obesity rates in the country, results cannot be generalized to other provinces. Therefore, it is suggested that future studies conduct this study in different provinces throughout Canada. Finally, it is recommended that studies be conducted with larger, random and more heterogeneous samples in order to further explore the relationship of flow and exercise adherence.

Recommendations for Practitioners/Guidelines to Achieving Flow

How does one achieve this unique condition of flow? Unfortunately, the answer is as complex as the theory itself. Due to flow's highly individualized nature, only general guidelines are capable of being provided and it is how the individual interprets and uses the guidelines that will determine the likely occurrence of flow. The following section aims to provide an understanding of these guidelines and its practical implications.

Establishing Order in Consciousness

In order to experience flow, we must first be able to control (to some degree) our consciousness. Consciousness can be defined as an "informational system that is capable of differentiating among a variety of stimuli, choose certain stimuli and focus selectively on them and store and retrieve information in a usable way" (Csikszentmihalyi & Csikszentmihalyi, 1988, p. 17). Additionally, consciousness is largely present when information that flows into our awareness is congruent with our goals. When this happens, the questioning of one's adequacy is absent; however when one does stop to think about oneself, positive feedback is overwhelming. Consequently, we need to be able to control what we consciously perceive by only paying attention to relevant stimuli which is congruent with our goals. For example, an individual playing tennis should try to control their thoughts and not think about anything negative such as losing the match. It is the ability to choose and select information that is positive and congruent with our

goals that we are able to take control of our consciousness and are more likely to experience flow, thus improving the overall quality of our lives (Csikszentmihalyi, 1990).

Making External Conditions Match our Goal

A second strategy in attempting to achieve flow is attempting to make external conditions match our goals. For instance, if we believe that intelligence is an important component to our happiness, we may support local education institutions or read more educational texts in order to gain intelligence. If we are unable to intrinsically create conditions to match our goals, we must attempt to modify external conditions. Our goals are then directly projected into our external conditions (Csikszentmihalyi, 1990, p. 43). For example, if the individual playing tennis wants to hit 5 balls over the net, they will position themselves properly and swing their racquet effectively in order to do so. However, if we cannot change our external conditions, we must modify ourselves internally by changing what is important to us.

Changing our Experience of External Conditions and Better Goals

Keeping in line with the previous example, if we are able to modify what we mean by intelligence, then we learn to understand that achieving intelligence is not always possible and that not achieving ultimate intelligence will not likely make us unhappy (Csikszentmihalyi, 1990). Therefore, it is the ability to change how we will

experience something to make it in line with our goals that we develop a sense of happiness. The following section will discuss some specific activity guidelines in terms of motivation, maintaining appropriate focus, optimal arousal/relaxation prior to the activity and confidence.

To do anything well a certain level of motivation must exist. Individuals can be motivated for a number of reasons, whether they are for personal reasons or are largely situational in nature. Nevertheless, motivation is a crucial component to experiencing flow as the more we are motivated to do something, the more likely we will be successful (Weinberg & Gould, 2003). During the activity, developing a narrow focus and staying in the present are critical components to achieving flow (Weinberg & Gould, 2003). We must be able to dismiss anything external and just focus on the present components of the activity as complete concentration will aid us in achieving flow. Therefore, this requires much mental activity. While some activities require you to be relaxed, others may require you to be the opposite. Our psychological preparation will play a great part in our ability to achieve success in an activity. Activities such as pre-match and pep talks are important for an athlete prior to a match. Whatever the activity, appropriate measures such as the amount and type of skill required should be taken into consideration (Weinberg & Gould, 2003). Finally, confidence and a positive mental attitude are salient factors, regardless of the person's abilities. Believing that you can succeed and meet the challenges at hand can create a sense of control amongst the individual, which in turn may lead to optimal experiences (Weinberg & Gould, 2003, p. 146). Therefore, individuals must be confident in their abilities prior to participation in an activity.

Conclusion

This study sought to determine relationships between flow, motivation and exercise adherence. However, contrarily to what one may have expected, flow did not have a strong relationship with physical activity adherence and therefore, did not have much of an impact on this study. Reasons for this could be the possibility that flow may be a highly psychological state that is perhaps a state almost exclusive to highly competitive participants participating in highly competitive activities. As participants in this study were representative of the general population of exercise people, it is quite likely that participants were not in a position to experience flow. As this study was exploratory in nature, it is suggested that this study be replicated and expanded to examine athletes in highly competitive situations.

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