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**THE INFLUENCE OF MOTIVATION AND BARRIERS
ON STAGES OF EXERCISE BEHAVIOR CHANGE**

by
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Thesis Submitted to the
School of Graduate Studies and Research
in Partial Fulfillment of the Degree of
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Achievement Stems from Perseverance & Dedication

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ABSTRACT

Many studies over the past decade have shown considerable support for the use of stages of change to understand exercise behavior (Cardinal, 1997; Marcus & Simkin, 1994). Although much research has been conducted in this area, few studies have combined a well developed theoretical framework in order to better understand exercise behavior change (see Courneya et al., 1998 for a discussion on this subject). The present study attempted to do so by applying a solid theoretical motivational framework, namely, self-determination theory (SDT; Deci and Ryan, 1985) with stages of exercise behavior change. This study also examined the relationship between exercise barriers and stages of change. A questionnaire, composed of several validated scales that assessed exercise behavior, exercise intentions, different forms of exercise motivation, and exercise barriers was administered to 74 employees of an electric power commission. Based on their exercise behavior during the past three months and their exercise intentions during the next three months, participants were placed in one of the following 6 stages: *Stage 1* - sedentary individuals who want to maintain their sedentary behavior (n = 11; 15%); *Stage 2* - sedentary individuals who want to increase their exercise behavior (n = 14; 19%); *Stage 3* - moderately active individuals who want to maintain their exercise behavior (n = 8; 11%); *Stage 4* - moderately active individuals who want to increase their exercise behavior (n = 17; 23%); *Stage 5* - active individuals who want to maintain their exercise behavior (n = 11; 15%); or *Stage 6* - active individuals who want to increase their exercise behavior (n = 13; 17%). Results from a one-way MANOVA and follow-up one-way ANOVA indicated that intrinsic motivation towards accomplishment and intrinsic motivation towards stimulation were significantly higher for individuals in the higher stages than in the lower stages. These results are in line with our hypothesis and SDT and support the use of a motivational theory to better understand exercise behavior change. These findings are discussed in light of research and theory on motivation and stage models, practical implications are addressed and future research is suggested.

CHAPTER I

Introduction

Research on physical activity determinants has increased considerably in the last two decades. This wealth of research has encouraged national agencies such as the U.S. Department of Health and Human Services (USDHHS, 1990, 1996) and the Canadian Fitness and Lifestyle Research Institute (CFLRI, 1996a) to take a stand and support the importance of physical activity and highlight the need for an increase in physical activity participation in North Americans. An accumulative amount of research has shown that regular involvement in physical activity provides a multitude of physiological and psychological benefits (see Bouchard, Shephard, & Stephens, 1994; Powers & Dodds, 1997; Scully, Kremer, Meade, Grham & Dudgeon, 1998; and USDHHS, 1996 for reviews). For instance, physical activity plays a predominant role in decreasing the chances of cardiovascular and coronary heart disease by influencing important risk factors such as stroke, high blood pressure, atherosclerosis, hypercholesterolemia and obesity (Bijen, Mosterd, & Casperson, 1994; Blair, 1995, 1996; Cox, 1997; Elrick, 1996; Folsom, Arnett, Hutchinson, Liao, Clegg & Cooper, 1997; Hardman, 1996; Smith, MacIntosh, Vaananen & Franden, 1995). Regular physical activity involvement has also been found to lower the incidence of osteoporosis, non-insulin dependent diabetes mellitus and different types of cancer (Drinkwater, Grimston, Raab-Cullen & Snow-Harter, 1995; Swain, 1995; Wood, 1994). Moreover, numerous studies have shown that physical activity brings about psychological benefits such as lower depression (North, McGullagh & Tran, 1990; Morgan, 1994) and anxiety (Petruzzello, Landers,

Hatfield, Kubitz, & Salazar, 1991; McAuley et al., 1996), and improved mood (Koltyn, 1997; Yeung, 1996) and self-esteem (Dunn & Dishman, 1991; McAuley, 1994).

During the last two decades, the increase in population awareness of the benefits of exercise has contributed to some increase in physical activity participation. In a survey administered to Canadians in 1981, 62% of the population reported low levels of activity compared to 35% in 1995 (CFLRI, 1996b). Additionally, data from a Behavioral Risk Factor Surveillance System in the United States showed that between 1986 and 1990, inactivity decreased by 4% across the population (Casperson & Merritt, 1995). Though these statistics show slight improvements in physical activity participation in the general population, it is important to point out that the majority of the population is still not active enough to attain the recommended level of regular physical activity to receive health benefits. Current research shows that even if individuals exercise more often than they used to, they do not necessarily engage frequently enough nor at an appropriate intensity and duration to attain the minimal requirement in order to receive effective long term benefits (CFLRI, 1996b; USDHHS, 1996, p4). In fact, only 37% of Canadians and 10-20% of American adults reach the recommended requirements of physical activity engagement which is accumulating 30 minutes of physical activity at a moderate or vigorous intensity at least every other day (CFLRI, 1996a; CFLRIb; USDHHS, 1996, p. 28). In addition, of those who do begin an exercise regimen, 50% will dropout within the first 6 months of involvement (Dishman, 1988). Thus, it appears as though most individuals face much difficulty in adopting and maintaining an active lifestyle. Understanding and explaining exercise behavior therefore remains an important issue for researchers entering the new millennium.

Due to the numerous advantages of maintaining an active lifestyle and to the fact that few individuals exercise at optimal levels in order to receive health benefits, many researchers over the years have examined the determinants of physical activity involvement (see Dishman, 1994; Sallis & Hovell, 1990, for reviews). In the early eighties, most of these studies used atheoretical approaches to look at the phenomenon of exercise adherence. Since these approaches were generally descriptive in nature, more theoretical perspectives were used thereafter. Both theory of reasoned action and planned behavior (TRA & TPB; Fishbein & Ajzen, 1975) and self-efficacy theory (SET; Bandura, 1977, 1997b) are examples of theories that are still used to this day to understand and explain exercise behavior. While these theories have been very helpful in advancing our understanding of what influences an individual to be active, they mostly viewed and studied exercise adherence as a static phenomena (i.e. active vs. inactive individuals). Thus, they did not consider the possibility that individuals may change progressively from being sedentary to adopting an active lifestyle. Since exercise behavior is not an all-or-nothing phenomenon, the idea of stages of change has been recently developed in order to assess the different levels that may differentiate the readiness individual to change his/her exercise behavior (Prochaska & DiClemente, 1983; Prochaska, Norcross & DiClemente, 1994). The transtheoretical model of stages of change is an example of a model whose primary purpose is to identify stages that represent the intentions of the individual toward exercising (in some stages) and also his/her current exercise behavior (Prochaska & Velicer, 1997). Since stages account for a breakdown of exercise behavior by accounting for certain characteristics such as intentions or current behavior, the idea of using stages of change as a means to better

classify individuals in their state of exercise readiness seems appropriate to better understand exercise behavior. Moreover, the need to incorporate a well-developed theoretical framework containing different perspectives with these stages was recently recommended by Courneya (1995) in order to attempt to fully understand the complexity of exercise behavior. Some studies attempted to do just that by incorporating other theories, such as the theory of planned behavior with stages, in order to better account for the process involved in the exercise behavior change (Courneya et al., 1997). However, few studies to date have looked at motivation to better understand how people move from one stage of change to another. This is surprising considering the substantial evidence showing that motivational theories can be effective in explaining and predicting various exercise behaviors (Biddle, 1995; Fortier & Grenier, in press; Oman & McAuley, 1993; Mullan & Markland; Pelletier et al., 1998; Rutherford, Corbin & Chase, 1992). Therefore, in the present study, Deci and Ryan's self-determination theory (1985) will be used to examine exercise behavior change. This theory should be very useful for understanding exercise behavior change since it proposes different types of motivation, accounts for the internalization of behavior and makes predictions about motivational consequences.

While acknowledging the importance of examining motivation towards exercise, it is of equal value to examine barriers to exercise in order to attempt to fully comprehend exercise behavior. Although many studies have examined exercise barriers (Ishee & Sagan, 1996; Leighton & Swerissen, 1995; Steindhardt & Dishman, 1989; Vanden et al., 1997), only a few have studied them with stages of change (Godin et al., 1994; Myers & Roth, 1997). In addition, based on the different exercise barriers identified in the

literature, there seem to be two general categories of barriers, namely internal barriers and external barriers. On one hand, internal barriers (see Pelletier et al., 1997 for more details) can be defined as internal reasons for not engaging in a behavior such as lack of motivation (i.e. amotivation). A contribution of this study was to propose a new amotivation taxonomy in the exercise context. Types of amotivations that hinder involvement in certain activities were examined, namely 1) amotivation because of capacity beliefs; 2) amotivation because of strategy beliefs; 3) amotivation because of effort beliefs; 4) amotivation because of time beliefs; and 4) amotivation because of global helplessness beliefs. On the other hand, external barriers (see Steindhardt & Dishman, 1989 and Yoshida et al., 1988 for more details) can be defined as environmental obstacles that hinder exercise participation such as lack of facility access or lack of social support. This study, therefore, attempted to extend the exercise barriers literature by examining internal and external barriers with stages of change. Thus, the general purpose of this study was to examine the influence of different forms of exercise motivation from self-determination theory (Deci & Ryan, 1985) as well as internal (i.e. amotivation) and external barriers on stages of exercise behavior change.

Organization of the remainder of this Thesis

The remainder of this thesis is organized into four chapters. The following chapter (Chapter II) contains an updated and revised review of the literature on stages of exercise behavior change, the determinants and theories of exercise behavior, motivation (i.e. self-determination theory) and exercise barriers. This chapter also contains a description of the present study, along with its suggested hypotheses and significance. Chapter III includes the article that was prepared for submission to the Journal of Sport Behavior. Finally, in Chapter IV, a general discussion including theoretical and practical implications and future research is proposed.

In addition, two appendixes are included in this thesis. Appendix A is comprised of the contribution of the two authors listed on the article for the Journal. In Appendix B, a copy of the questionnaire administered for this study is included.

CHAPTER II

Review of Literature

In this chapter, the review of literature is developed in 4 sections. The first section examines different stage models that classify individuals according to their state of exercise readiness to change. More specifically, Prochaska and DiClemente's (1986) and Godin et al.'s (1995) stage models will be reviewed since they are the most widely used in the area of stage models. The second section outlines the main theoretical models that have been used to understand and explain exercise behavior. To date, they are: the theory of reasoned action and planned behavior (Ajzen, 1985, 1991; Fishbein & Ajzen, 1975) and self-efficacy theory (Bandura, 1977, 1997b). The third section is on motivation. In this section, Deci and Ryan's (1985) self-determination theory will be presented. Next, internal (i.e. amotivation) and external exercise barriers will be examined as a mean of exploring the reasons why people in the different stages do not engage regularly in exercise. Finally, the purpose, hypotheses and significance of the present study will be discussed in the last section.

Stage Models

Much of the previous research on exercise adherence (see Dishman, 1994 for a review) attempted to dichotomize exercise behavior by examining the difference between active and sedentary individuals. More recently, however, researchers have recognized the process involved in acquiring a regular pattern of exercise behavior and have identified stages that people progress through, as they become more regularly active. According to Dishman (1990), there is a need for more dynamic models "that explain the various stages of participation in physical activity, and it is likely that different models may best explain different stages such as planning, adopting, maintaining, and returning to an activity pattern in supervised and free-living settings" (p.95). Accordingly, different stage models have been proposed over the past decade (Godin, Desharnais, Valois & Bradet, 1995; Myers & Roth, 1997; Prochaska & DiClemente, 1986) in order to better explain the process involved in acquiring and/or maintaining a regular pattern of exercise. The idea behind stage models is that exercise adherence is not an all-or-nothing

phenomenon but rather a series of steps through which individuals progress in order to engage more regularly in physical activity (Weinstein, Lyon, Sandman & Cuite, 1998a; Weinstein, Rothman & Sutton, 1998b).

The advantages of using stage of change models to further understand exercise behavior are plentiful (Laitakari, 1998). First, stages of change reflect more closely the reality of the natural process of exercise behavior. The identification of various steps or stages provides a sense of realism concerning the pattern of the exercise adoption process. Secondly, this approach focuses on individuals as opposed to grouping inactive and active people in two big melting pots. Thus, the stages approach offers a more individualistic or “person-centered” approach towards encouraging people to adhere to exercise (Laitakari, 1998). Thirdly, using stages also offers order and direction. Stages direct the practitioner to identify the stages which the individual has attained and also provides order to which the practitioner can understand and organize the assessment, planning and guidance of the client. Researchers and practitioners may then tailor their work in order to better understanding the breakdown of exercise behavior. For example, intervention programs that applied stages of change were able to target the characteristics of the individual more effectively than those that merely dichotomizing (inactive vs. active) exercise behavior (Cardinal, 1997a; Herrick, Stone, & Mettler, 1997; McConnaughy, DiClemente, Prohaska & Velicer, 1989; Weinstein et al., 1998b). Thus, it would appear that using stage models to understand the steps that individuals go through in order to adopt a regular pattern of exercise is advantageous and seems to be a promising avenue for future research in the exercise domain.

Two recent and practical stage models that appear to be helpful to researchers and practitioners interested in understanding and predicting exercise behavior change are Prochaska and DiClemente's stages of change model (1983, 1986; Prochaska & Velicer, 1997) and Godin et al.'s stages in the process of adherence to exercise (1995).

Stages of Change (TTM)

Prochaska and Diclemente's (1983; Prochaska & Marcus, 1994) stages of change model posits that individuals progress through a series of stages during the process of changing their behavior. More specifically, individuals are classified in different stages of change according to their state of readiness for action, that is their readiness to change their current behavior (Prochaska & Velicer, 1997). This model was originally designed to understand the stages individuals go through when they want to cease an unhealthy behavior, such as to stop smoking (Prochaska & DiClemente, 1986; Prochaska et al., 1988). More recently, this model has been validated and applied to understand the stages of adopting positive, healthy behaviors, such as exercise (Cardinal, 1997b; Marcus et al., 1992a; Marcus, & Simkin, 1993; Prochaska, & Velicer, 1997). Since then, this model has gained popularity and support from both researchers and practitioners in the physical activity domain (Armstrong et al., 1993; Cardinal, 1997a; Gorely, & Gordon, 1995).

The stages of change model is part of a larger theoretical framework called the transtheoretical model (TTM) developed by Prochaska and DiClemente (1983, 1986). In addition to postulating different stages, TTM also incorporates separate constructs, namely processes of change, self-efficacy, decisional balance and temptation. However, only stages of change will be explained in this section. The other four constructs will be

discussed in the next section on the determinants and theories of physical activity involvement.

TTM is characterized by five stages of change that refer to the assessment of readiness to change, in this case, their willingness to change their exercise behavior (i.e. from inactive to active). The five stages are as follows: 1) Precontemplation (do not currently exercise and have no intention of taking action within the next 6 months); 2) Contemplation (do not currently exercise but have the intention of taking action within the next 6 months); 3) Preparation (exercise some but not regularly and have the intention to take action within the next 6 months); 4) Action (have started to exercise regularly within the last 6 months); 5) Maintenance (have been exercising regularly for more than 6 months). These stages represent levels through which individuals may progress in order to engage regularly in physical activity. This model is dynamic in nature, in the sense that individuals can improve or relapse through this continuum of stages at various rates and times. Prochaska and Velicer (1997) state that changes are not brought about in a linear fashion, instead, individuals can easily drop a stage before progressing back again. It is also possible that some progress slowly between the stages while for others, changes may occur more easily or rapidly.

Many studies in the exercise field have shown considerable support for the use of these stages to better understand exercise behavior (Armstrong et al., 1993; Cardinal, 1997). For instance, Marcus and Simkin (1993) found that there were significant differences in physical activity participation levels between the different stages. More specifically, it was revealed that employees who were inactive or did not indicate participating in any activity (51%) were classified in the precontemplation or

contemplation stage, whereas those who were occasionally or regularly active (49%) were classified in the preparation, action or maintenance stage. The different stages, therefore, seem effective in breaking down into categories individuals according to their level of exercise participation. Also, Gorely and Gordon's study with older adults (1995) showed that individual's exercise frequency differed across the stages of change.

While the TTM appears to be successful in classifying individuals in the different stages of change, results from Marcus et al.'s study (1992b) revealed that although the physical activity participation levels differed from one stage to another, seven percent of individuals could not be placed into any stage. A plausible explanation for this finding is that the stages identified by Prochaska et al. (1988) may not be complete enough to classify all the individuals into stages.

Indeed, recently, some have criticized the transtheoretical model. For one, Bandura (1997a, p.8) states "The first two stages are differences in degree of intention...". Subsequent stages are simply gradations of regularity or duration of behavioral adoption rather than differences in kind, as a genuine stage theory would require." According to Bandura (1997a), stage models should entail qualitative transformation of oneself when progressing through different stages rather than simply an improvement in one's amount of participation, described in the TTM. For example, the only difference between the action stage (have started to be regularly active for at least six months) and the maintenance stage (sustained regular exercise involvement for more than six months) is the maintenance of regular physical activity behavior that has been sustained in the past 6 months. As such, the distinction between the stages should

elaborate on real individual changes instead of merely stating the different sustainability of regular exercise participation.

The transtheoretical model of stages of change may then offer limited information as to the level of intention of individuals across the different stages. Since intention is only measured in the first three stages, does this automatically imply that differing levels of intention cannot occur in the later stages such as preparation, action and maintenance? Is it possible that the individual in the maintenance stage may have the intention to increase his/her level of physical activity? Thus, a lack of consistency exists in the measurement of the degree of intention across the different stages. To account for this limitation, an alternative stages of change model was proposed by Godin et al. (1995).

Stages in the process of adherence to exercise

Since intention has repeatedly been shown to be a good predictor of exercise behavior, Godin et al. (1995) developed a new method to classify individuals into stages. Based on the theory of reasoned action and planned behavior (Fishbein & Ajzen, 1975; Ajzen, 1985, 1991), Godin et al. (1995) developed five stages of change called “stages in the process of adherence to exercise”. These stages are based on two dimensions, namely exercise behavior/habit and exercise intentions in order to classify individuals in each stage. These stages are the following: 1) Stage 1 - sedentary individual with a low intention to exercise at least three days a week in the next six months; 2) Stage 2 - sedentary individual with a high intention to exercise at least three days a week in the next six months; 3) Stage 3 - moderately active individual (those who exercised at least once per month but no more than 2 times per week during the past 3 months) with a low intention to exercise at least three days a week in the next six months; 4) Stage 4 -

moderately active individual with a high intention to exercise at least three days a week in the next six months; and 5) Stage 5 - very active individual (those who exercised at least 3 times per week during the last 3 months) with a high intention to exercise at least three days a week in the next six months. More recently, some researchers (Myers & Roth, 1997) classified individuals into exercise stages based on their intentions to decrease, maintain or increase their exercise behavior. This distinction seems to better characterize individuals in the stages and thus provides a clearer pattern of exercise behavior change. Perhaps future research should add this component (i.e. intention to decrease, maintain or increase exercise behavior) in order to better define the characteristics that distinguishes between individuals in the different stages and hence better explain the process involved in adopting or maintaining a regular pattern of exercise.

Determinants and Theories of Physical Activity Involvement

In order to better understand why people adopt and maintain different exercise behaviors, much research over the past 2 decades has been devoted to examining the determinants of physical activity involvement (see Marcus & Sallis, 1997 for a review). Most of the determinants can be classified into three general categories: 1) personal attributes such as past program participation, motivation, health locus of control, self-efficacy, education level; 2) environmental factors such as social support and facility access; and 3) physical activity characteristics such as activity intensity and choice of activity type (Dishman, 1993, 1994). Although the identification of different factors related to physical activity involvement has made an important contribution to understanding exercise adoption and maintenance, the use of theories offers a more comprehensive description and explanation of the effect of certain determinants on

exercise behavior. Thus, many different theories have been used in the past years to explain exercise behaviors (see Glanz et al., 1997; Taylor, 1995 for reviews). From the numerous conceptual approaches utilized, the theory of reasoned action and planned behavior (TRA; Fishbein & Ajzen, 1975; TPB; Ajzen, 1985, 1991) and self-efficacy theory (SET; Bandura, 1977, 1997b) have guided most of the research on exercise behavior. In the following section, each theory will be described and the major findings will be discussed.

Theory of Reasoned Action and Planned Behavior

The theory of reasoned action [TRA] and planned behavior [TPB] have been used to predict a multitude of health behaviors, such as smoking cessation (Orbell, Hodgkins, & Sheeran, 1997), self-breast examination (Godin & Kok, 1996) and exercise (Hausenblas, Carron, & Mack, 1997). According to these theories, an individual's intention to adopt a behavior (e.g., exercise) is the most important predictor of that behavior (Fishbein, & Ajzen, 1975). In turn, intention is determined by both attitudes towards the behavior and subjective norms. Attitude refers to the feeling of favorableness or unfavorableness towards the behavior and is influenced by two factors: 1) individual's beliefs about the consequences (likelihood vs. unlikelyhood) of the behavior and 2) the evaluation of those consequences (positive vs. negative). Both of these are considered as behavioral beliefs. Thus, the assessment of the perceived consequences of behavior as well as the positive or negative evaluation of each of these consequences are weighted accordingly. For example, if one perceives more positive than negative consequences of exercising, then one will have more positive attitudes towards exercise, which will

increase exercise intention and thus increase the chances of the individual regularly exercising (i.e. the behavior).

Subjective norms refer to perceived social influences to engage or not in the behavior, meaning that other people's expectations may influence one to perform or not to perform the behavior. Thus, attitude and subjective norms are the factors that influence intention, which in turn influence one to perform or not perform a behavior. More recently, Ajzen (1985) contended that these were not the sole predictors of behavior since not all behaviors are controllable. Thus, acknowledging the fact that a person's perceptions of control over the desired behavior is an important predictor of behavior, Ajzen added this component to the previous model and proposed the theory of planned behavior (TPB). Perceived behavioral control can be defined as the perceived ease or difficulty of performing a behavior. Hence, TPB assumes that to predict intention and behavior, perceived behavioral control as well as attitudes and subjective norms must be evaluated.

Over the past years, many studies in the area of exercise psychology have used the theory of reasoned action and planned behavior to guide their research (Courneya et al., 1998). The work of Godin and colleagues has been geared towards verifying this theory (Godin, 1993, 1994; Godin & Gionet, 1991; Godin & Kok, 1996; Godin, Valois & Lepage, 1993). During his recent review of 21 studies that applied the TRA and TPB in the exercise field (Godin, 1993), he found that attitudes and subjective norms through intentions were good predictors of exercise behavior. In conjunction with these findings is the work of Blue (1995). According to her recent critical review of 23 studies that assessed both TRA and TPB in the exercise domain, TPB seemed to offer a promising

framework for the study of exercise behavior. Intentions and perceived behavioral control seemed to be the main predictors of adopting or maintaining a regular exercise regimen. More recently, Hausenblas, Carron and Mack (1997) conducted a meta-analysis of TRA & TPB studies on exercise behavior in order to examine statistically the utility of these theories. It was found that intention ($ES = 1.09$) and perceived behavioral control ($ES = 1.01$) had a considerable effect on exercise behavior. In turn, it was revealed that attitude had a large effect on intention to exercise ($ES = 1.22$), whereas subjective norms had a relatively small effect on intention ($ES = .56$). Finally, perceived behavior control had a moderate effect on intention ($ES = .97$). These results indicate that intentions to perform a behavior and its antecedents, mainly attitudes and perceived behavioral control are important predictors of exercise behavior.

Self-Efficacy Theory

Since 1977, Bandura's self-efficacy theory has also contributed much insight into the inquiry on exercise behavior. He posits that behavior is the reflection of one's perception of confidence toward performing the behavior, meaning that the more one feels confident towards the behavior or perceives himself/herself to have the capacity to engage in the behavior, then the more one is likely to perform the behavior. Three main concepts are developed within this model: 1) self-efficacy expectancy, which is the level of confidence that one has in his/her ability to perform a specific behavior (e.g. exercise 3 times a week for 3 months); 2) outcome expectancies, which are the beliefs regarding the perceived consequences of engaging in the behavior; and 3) outcome value, which reflects the degree of personal importance of the consequences of engaging in the behavior.

Empirical support for the role of self-efficacy expectancy in predicting exercise behavior has been documented in many studies (McAuley, Wraith & Duncan, 1991; Rodgers & Brawley, 1993; Sallis et al., 1986). Although outcome expectancy and outcome value are good predictors of exercise (Desharnais, Bouillon & Godin, 1986; Skinner, Wellborn & Connell, 1990), self-efficacy expectancy has been shown to be the strongest predictor of behavior (Bandura, 1986; Maddux, 1991). For instance, Poag-DuCharme and Brawley (1993) examined the use of self-efficacy in explaining exercise involvement of beginners and experienced participants in both organized and free-living types of activities. Findings from two studies showed that improvements in individual's intentions and engagement were positively associated with their level of self-efficacy.

Although these findings indicate that self-efficacy is a good predictor of exercise behavior, when compared to other models, such as that of the theory of reasoned action and planned behavior, conflicting findings appear as to which determinant is the best predictor of exercise behavior. Some authors (Dzewaltowski, 1989; Dzewaltowski et al., 1990) have found that self-efficacy is the most prevalent predictor of exercise behavior. Others, however, have identified intention as being the predominant determinant. For instance, Fortier and Grenier's (in press) prospective study on the determinants of exercise adherence with 40 regular members of a fitness gym found that individual's future intentions towards exercising was the most influential factor on adherence. Thus, at present, it is not clear which determinant (i.e. self-efficacy or intention) is the most important predictor of exercise behavior. Although they are most likely both very important to understand exercise behavior, it is also possible that other factors such as

motivation may account for variations in exercise behavior. However, not many studies have attempted to examine motivation with exercise behavior.

Other Constructs from the Transtheoretical Model

As mentioned previously, in addition to specifying stages of change, the TTM includes four other constructs, namely, processes of change, decisional-balance, self-efficacy and temptation to account for why people are in the different stages of change. Through many studies with smokers, Prochaska and colleagues (1994) narrowed ten processes of change that are useful for individuals in order to move through the different stages. These overt or covert activities were proposed to explain how individuals progress through the stages of change: consciousness raising, self-liberation, dramatic relief, environmental reevaluation, helping relationship, stimulus control, counterconditioning, social liberation, self-reevaluation, and reinforcement management (for detailed explanation of these processes see Prochaska & Velicer, 1997). The first five are classified as experiential or cognitive processes followed by the last five which are more behavioral processes (Prochaska & Velicer, 1997). According to these authors, experiential processes are used mostly by individuals that are in the first stages of exercise behavior change since they need to become aware of the importance of exercise before they can actually commit to the behavior. The individuals who exercise occasionally or regularly will use behavioral processes to ensure the continuity of the behavior.

Based on Janis and Mann's (1968) model of decision making, decisional balance was also incorporated into the TTM. The idea behind decisional balance is that the weighing of pros and cons for participating in an activity will determine whether one will

actually adhere to an activity or not. More specifically, it is predicted that one has to acknowledge a greater number of advantages (pros) than disadvantages (cons) of exercise in order to participate regularly in physical activity. A study, conducted by Herrick et al. (1997), showed that individuals in the lower stages of change identified more cons than pros for exercising, whereas, the individuals in the higher stages of change identified more pros than cons. Therefore, within TTM, pros and cons seem to be effective in further breaking down exercise behavior through the stages.

The concept of self-efficacy was also integrated into the TTM. Self-efficacy, which refers to one's confidence in his/her ability to perform, is predicted to increase as one moves through the stages (Prochaska et al., 1994). Studies have shown that low exercise self-efficacy is characteristic of individuals in the lower stages of change compared to individuals in the higher stages who have greater feelings of self-efficacy (Marcus et al., 1992a; Herrick et al., 1997). Gorely and Gordon (1995) found that self-efficacy increased linearly from precontemplation to maintenance, meaning that as individuals adhered to exercise on a more regular basis, one's confidence level towards exercise increased as well. Marcus et al. (1992b) also attempted to test the ability of self-efficacy measures to differentiate individuals according to their stages of readiness to change. Findings revealed that self-efficacy was significantly related to the different stages of change and, more specifically, that self-efficacy increased through the stages.

Although TTM has had some success in explaining and predicting exercise behavior, Courneya (1995) noted the following:

The application of a larger theoretical framework would have the advantage of including other theoretically relevant variables not included in the TTM. Moreover, the selection of a coherent and well-developed theoretical framework, as opposed to a collection of constructs from different theories, has the added advantage that it specifies relationships among the constructs rather than solely between the constructs and the stage of readiness.

Accordingly, researchers (Courneya, 1997; Courneya et al., 1998; Lee, 1993) have recently combined the TPB with the stages of change concept from TTM. Specifically, Courneya and colleagues (1998) conducted a study that examined the relationship between TPB variables and stages of change. It was found that intention, attitudes and perceived control could predict exercise stages. Future research should continue this trend and incorporate other theoretical concepts with stages of change in order to establish relationships between different concepts and stages of change in order to have a better understanding of exercise behavior.

One concept that would seem to be relevant in this regard, is motivation. Although motivation has been found to explain exercise behavior, not many studies have used such an approach to study exercise behavior change. Using a motivational approach would allow us study the “why” of exercise behavior change using an alternative approach than SET and TPB. Accordingly, the general purpose of the study is to examine stages of exercise behavior change from a motivational perspective. More specifically, Deci and Ryan’s self-determination theory (1985) will be used to better understand the characteristics of people in the different stages of exercise behavior change.

Self-Determination Theory

A motivational theory that has been widely used in the past decade is Deci & Ryan's (1985) self-determination theory (SDT). This motivational theory relies on the explanation of human needs as basic sources of motivation that enable individuals to make choices in their daily lives (Deci & Ryan, 1985). These fundamental needs, the needs for competence, autonomy, and relatedness are postulated to be the sources of motivation.

The use of SDT for this particular study is pertinent for several reasons. First, in order to truly understand the "why" of exercise behavior change, we need to know the underlying reasons behind human motivation. SDT attempts to explain just that with its concept of energization. Energization refers to the basic human needs, mentioned previously, that lead people to engage in certain behavior. These needs are the foundation of why goals are motivating since they are antecedents to motivation in the sense that they are energizers of behavior. By doing so, this approach brings us a step closer to truly understanding the underlying reasons of exercise participation by considering how and why people initiate and are thus able to sustain certain behaviors.

Secondly, contrary to other theories that offer a unitary conception of motivation, Deci and Ryan (1985) suggest that there are different types of motivation that differ in the degree in which the behavior is self-determined. The three main types are: 1) intrinsic motivation (3 types); 2) extrinsic motivation (3 types); and 3) amotivation. The breakdown of different forms of motivation allows for a more refined explanation of the qualitative aspects of human functioning by classifying these forms on their degree to which they are self-determined.

Thirdly, SDT addresses the internalization process that could explain the regulation of behavior through the stages. As Mullan & Markland (1997) best describe it, internalization is: “the process by which individuals come to regulate acts which are not initially intrinsically interesting by transforming regulation by external contingencies into regulation by internal processes” (p.350). Since behavioral regulation varies along the self-determined continuum, it is assumed that as people internalize the regulation of behavior, they become more regularly active and hence progress through the stages.

Fourth, this theory also makes predictions about the consequences of motivation. According to Deci and Ryan (1985), the different types of motivation lead to different consequences. Specifically, more self-determined types of motivation lead to more positive outcomes (i.e. exercise maintenance) while less self-determined types of motivation lead to more negative outcomes (i.e. non-adoption of exercise). Thus, this theory may lead us to better understand exercise behavior.

Finally, SDT has been proven to be a valuable approach to understanding the complexities of exercise behavior since much research has been conducted in different spheres of life, such as education (Fortier, Vallerand & Guay, 1995; Pelletier, Tuson & Haddad, 1997; Vallerand, 1997; Vallerand, Fortier & Guay, 1997), including sport and exercise (Brière, Vallerand, Blais, & Pelletier, 1995; Oman, & McAuley, 1993; Pelletier, Fortier, Vallerand & Brière, 1998; Rutherford, Corbin, & Chase, 1992). Thus, SDT provides a strong theoretical framework for studying motivation and exercise behavior.

While SDT is composed of two subtheories, namely cognitive evaluation theory (CET; Frederick & Ryan, 1995) and organismic integration theory (OIT; Deci & Ryan,

1985), only the latter will be discussed in the following section since it is most relevant to the present study.

Organismic Integration Theory

This part of self-determination theory accounts for the different forms of motivation, the internalization process as well as the consequences of motivational types. Essentially, this subtheory is concerned with the different forms of motivation and behavioral regulation that display varying degrees of self-determination on a continuum of behavioral regulation. Subsequently, varying consequences reflect each of these motivational types.

Types of motivation and the internalization process. Deci and Ryan (1985) posit that motivation can be broken down into three general concepts, specifically, intrinsic motivation, extrinsic motivation and amotivation. These types of motivation can be displayed on a self-determination continuum as they differ in the degree to which behavior is internally regulated (i.e. whether the behavior is self-determined - performed out of choice) or externally regulated (i.e. non self-determined behavior - controlled by external factors). A process called “internalization” can explain this regulation of behavior along the continuum (from externally to internally regulated behavior). Essentially, internalization occurs when former extrinsic sources of motivation are taken into the self to become more self-determined. It is a proactive process where external regulations are transformed into regulation by the self (Ryan, 1993). In the following section, the different types of motivation and the internalization process will be explained starting with the most non self-determined form of motivation, amotivation leading towards the most self-determined form of motivation, intrinsic motivation.

At the least self-determined end of the continuum is the concept of amotivation. This type of motivation is characterized by a lack of motivation (intrinsic or extrinsic). It is somewhat similar to the notion of learned helplessness (Abramson, Seligman, & Teasdale, 1978; Dweck & Leggett, 1988) because it entails that the individual believes that he/she has no control over the behavior. There is a lack of regulation since the behavior has neither purpose nor meaning. More recently, the idea of amotivation has been developed by Pelletier et al. (1997b). Specifically, they proposed a taxonomy of 4 different types of amotivation in order to understand why people do not engage in a behavior (in their study, they were environmental behaviors). The four types are: amotivation because of capacity beliefs; amotivation because of strategy beliefs; amotivation because of effort beliefs; and amotivation because of global helplessness beliefs. These will be discussed in more detail in the section on exercise barriers.

Moving along the self-determination continuum is the concept of extrinsic motivation. Extrinsic motivation is defined by the involvement in an activity as a means to an end (Vallerand, 1997). People who exercise solely for the praise that they receive from their peers or because of pressure that they have from their spouse instead of inherently enjoying the activity represent typical examples of extrinsically motivated individuals. Deci and Ryan further develop this type of motivation by breaking it down into three forms, from the least self-determined to the more self-determined, they are: 1) external regulation; 2) introjected regulation; and 3) identified regulation.

External regulation is the least self-determined type of extrinsic motivation since it implies that the behavior is regulated through external means such as rewards, praise, constraints or the avoidance of negative outcomes. In this case, individuals exercise for

external reasons. For example, a woman who exercises because people around her think it is important to do so would be considered externally regulated towards the activity.

With introjected regulation, the individual performs a behavior because he/she would feel guilty otherwise. Therefore, the individual relies less on the original external form of control and relies more on the new internal source of control, which can be represented by feelings of guilt or anxiety. The individual would then exercise in order not to feel bad, since the self is internalizing the externally regulated behavior. It is to be noted though that even if introjected regulation is the first attempt at internalization, only partial internalization occurs since motivation is internal but not self-determined (i.e. do not engage for the pleasure or satisfaction derived from the activity itself).

Successful internalization occurs with identified regulation, the most self-determined type of extrinsic motivation. At this point, behavior is undertaken because of its value and importance to the self. Regulation of behavior becomes completely internal to oneself as one freely chooses to engage in the behavior because he/she values the behavior as important and values its benefits. In this case, one has completely internalized the behavior since he/she performs the behavior because of personal importance to the self. Hence the behavior is internalized but still extrinsically motivated (because it is not performed for the pleasure or satisfaction). An example of this an individual with health problems who adheres to an exercise program because he/she values the activity as important for his/her own health, therefore chooses freely to engage in the program.

At the most self-determined end of the continuum is the concept of intrinsic motivation. Intrinsic motivation can be defined by the involvement in an activity for the

sheer pleasure or satisfaction derived from participation. For example, intrinsically motivated individuals engage in exercise for the fun or enjoyment that they receive from the activity itself. Following the work of Deci and Ryan (1985), Vallerand et al. (1992) developed the idea of intrinsic motivation by identifying three different forms, namely intrinsic motivation towards knowledge, intrinsic motivation towards accomplishments and intrinsic motivation towards experiencing stimulation.

Intrinsic motivation to know refers to engaging in an activity for the pleasure and the satisfaction that one experiences through learning, exploring or trying to understand something new (Vallerand, 1993, 1997). An example of this type of intrinsic motivation is: “I like exercising for the pleasure of discovering new skills”. Intrinsic motivation to accomplish focuses on engaging in an activity for the enjoyment experienced while attempting to surpass oneself or to accomplish or to create something new. An example of intrinsic motivation towards accomplishment would be an individual who exercises because of the pleasure he or she feels while executing difficult movements or trying to master a particular skill. Finally, intrinsic motivation to experience stimulation refers to an individuals who engages in an activity in order to experience pleasant sensations associated mainly with one’s senses (e.g. sensory and aesthetic pleasure). Rock climbers or skydivers, who engage in their activities because they seek the sensory excitement received from the activity, predominantly display this type of intrinsic motivation.

To recapitulate, since both self-determination theory and stages of change show patterns of an underlying continuum, one might assume that as behavioral regulation/internalization occurs, one progresses through the stages. Hence, when combining these theories, it is assumed that the internalization of behavior occurs when

people progress through the stages of change. More specifically, in the lower stages of change, the behavior is externally regulated whereas in the higher stages of change, the behavior is internally regulated since it is now valued as important to oneself. Hence, by acknowledging the internalizing process, a more comprehensive understanding of the state of readiness to change can be established. Although SDT has been used to understand exercise behavior, only one study to our knowledge has explored the relationship between the different types of motivation and stages of exercise behavior change (Mullan & Markland, 1997). It was shown in their study that self-determination increases from the lower to the higher stages of change. More specifically, it was found that those in the action and maintenance stages of change were more self-determined (intrinsic motivation and identified regulation) than those in the preceding stages. These preliminary results seem to show that SDT could be useful in understanding exercise behavior change.

With the support of past studies on motivation and exercise, the assessment of motivation with stages of exercise behavior change may offer a more detailed view of the process of those who engage in exercise. More specifically, to understand the motivation of the individual as he/she progresses through the stages of change may give insight into the differences regulation of behavior that occur in individuals classified in the different stages of exercise behavior. Indeed, a study examining the relationship between the different types of motivation and stages of change opens a new avenue of research. This, in turn, should allow for better predictions of exercise adherence.

Motivational consequences. Organismic integration theory also addresses the issue of motivational consequences. More specifically, it is hypothesized that the

different types of motivation lead to different outcomes (Deci & Ryan, 1985). These consequences can be of three main types, affective, cognitive or behavioral (Vallerand, 1997). In the context of the present study, only behavior (i.e. exercise behavior) as a consequence of motivation will be studied.

Deci and Ryan (1985) posit that the progression on the continuum of self-determination, from non self-determined types of motivation towards more self-determined types of motivation leads to more positive consequences. Thus, it is suggested that intrinsic motivation and identified regulation will more likely lead to positive outcomes whereas introjected regulation, external regulation and especially amotivation will lead to more negative consequences. Support for this affirmation has been found in numerous studies in different life domains (see Vallerand, 1993, 1997a for reviews). In general, these studies show that the more self-determined types of motivation lead to greater interest, satisfaction, enjoyment and persistence in the activity.

In the sport context, similar findings have been obtained indicating that self-determined athletes have more positive outcomes than their less self-determined counterparts. (Brière et al., 1995; Pelletier et al., 1995). Recently, researchers have been specifically interested in examining the relationship between motivation and physical activity persistence as an outcome (e.g. Frederick et al., 1996; Frederick & Ryan, 1994; Pelletier et al., 1998). The general findings conclude that self-determined participants have more positive emotions, persist longer and remain involved in their activity longer in contrast to their less self-determined counterparts. In a study conducted by Oman and McAuley's (1993) examining the relationship between intrinsic motivation and exercise

behavior, they found that intrinsic motivation was significantly associated with program attendance with individuals enrolled in a community aerobic exercise program.

More recently, results from Ryan et al.'s study (1997) among people who joined a fitness center showed that adherence was associated with more self-determined types of motivation. Similarly, Fortier and Grenier's (in press) prospective study conducted with 40 members of a fitness center showed that self-determined exercise motivation was a good predictor of exercise adherence. Finally, Pelletier et al. (1998) found that intrinsically motivated and identified athletes were more likely to persist in the activity for a longer period of time (2 year period) than their externally regulated or amotivated counterparts. Moreover, it was suggested that external and introjected regulation sources of motivation could enhance short-term involvement but that over time, intrinsic motivation and identified regulation were stronger predictors of persistence. Thus, multiple empirical research support the fact that self-determined participants are more likely to persist for longer periods of time in physical activity compared to the less self-determined participants.

In this section, types of motivation were described and discussed in order to further understand and explain people's motivation for adhering to and maintaining an exercise regimen. Though the inquiry into why people exercise is important, it is also of equal importance to understand why people do not exercise or why people are amotivated towards exercise. Indeed, a key element in the equation of understanding exercise behavior is the identification of exercise behavior change barriers.

Exercise Barriers

“Why don’t people exercise” and “what are the factors preventing them from being more active” are the questions that guide this section. In the past decade, a certain number of studies specifically examined exercise barriers (see Leighton & Swerissen, 1995; Steindhart & Dishman, 1989; Vanden et al., 1997 for examples). A recent study conducted by CFLRI (1996c) revealed that more than 50% of Canadians identified three major barriers to exercise: 1) lack of time; 2) lack of energy; and 3) lack of motivation (i.e. amotivation). Moderate barriers included: excessive cost, illness/injury and lack of facilities nearby. Additionally, in an attempt to determine if barriers differed between active and inactive individuals, results showed that nine barriers seemed to be more important for inactive individuals, the predominant ones being: lack of motivation, lack of energy, long-term illness or injury and lack of skill.

A few other studies examined the exercise barriers of different groups of exercisers and non-exercisers. Yoshida et al. (1988) examined the influence of social factors on perceived individual barriers (originating from within the person - internal such as lack of energy, motivation, need and health reasons) and perceived structural barriers (originating from outside the person - external such as lack of time due to work, cost/access and child care/family responsibilities). These perceived barriers were assessed between two groups: 1) inactive women who want to be active; and 2) active women who want to do more. Results from this study showed that both groups displayed the same hierarchy of perceived barriers, they are: 1) lack of time due to work, 2) health reasons, and 3) lack of energy, motivation and need. However, lack of energy,

motivation and need were perceived more often by the inactive individuals as being important exercise barriers.

Another Canadian study conducted by Godin et al. (1994), assessing the perceived barriers of high and low intenders, found that perceived difficulty to find time to exercise, lack of access, physical health problems, financial cost of exercising and difficulty finding an exercise partner were the strongest barriers to exercise. Since most of the participants in this study had a high intention to exercise, the barriers were the same for all participants.

More recently, Ishee & Sagan (1996) conducted a study on perceived barriers of sedentary, moderately active and very active women and found that lack of time, school/work, and laziness (i.e. lack of effort) were the most predominant barriers to exercise in all the groups. However, lack of motivation was identified as an important barrier specifically for those who were sedentary or moderately active. Similarly, Vanden et al. (1997) focused on factors that hinder the transition from a sedentary to a more active lifestyle (i.e. precontemplation to contemplation phase). It was found that “too much effort” (in terms of energy, fatigue and time) was the most frequently given reason for not exercising.

Finally, Myers & Roth (1997) attempted to assess different barriers across stages of change. Barriers items were grouped into 4 general categories: 1) time-effort; 2) physical effects; 3) social; and 4) specific obstacles to change. The results showed that the barriers varied systematically across the stages of change. For example, precontemplators perceived significantly more time-effort barriers than those in all the other stages. Thus there is evidence that barriers differ across stages of change.

Since the findings presented so far suggest that barriers may differ between inactive and active individuals, it would seem important to extend the results from these studies and to examine the existing barriers of individuals in the different stages of exercise behavior change.

Based on the different exercise barriers identified in the literature (Dishman, 1993; Godin et al. 1994; Ishee & Sagan, 1996; Steindhardt & Dishman, 1989), there seems to be two general categories of barriers, namely internal barriers and external barriers. Internal barriers can be defined as internal reasons for not engaging in a behavior, such as lack of motivation; whereas external barriers can be defined as environmental obstacles that hinder exercise participation, such as lack of facility access or lack of social support. The following sections will develop each of these types of barriers respectively.

Internal barriers. Pelletier et al. (1997) developed the notion of internal barriers by proposing different types of amotivation in order to understand why people lack motivation to engage in a particular behavior. More specifically, these authors identified four forms of amotivation that hinder people's involvement in certain activities, namely 1) amotivation because of capacity beliefs; 2) amotivation because of strategy beliefs; 3) amotivation because of effort/time beliefs; and 4) amotivation because of global helplessness beliefs. In this particular study, amotivation because of effort and time will be assessed as separate components since in the literature discussed previously, both effort and time have been shown to be independent barriers to exercise behavior.

First, amotivation because of capacity beliefs refers to people who do not exercise because they feel that they do not have the confidence or capacity to engage in the

behavior. An example would be someone saying: “I don’t exercise regularly because I lack confidence when it comes to exercise”. Capacity beliefs are also related to Bandura’s self-efficacy concept. At numerous occasions, self-efficacy has been studied within the stages of change (as mentioned previously in section on TTM). Since general findings (Marcus et al., 1992b, Herrick, Stone & Mettler, 1997 and others) showed that there were significant differences in the levels of self-efficacy (low self-efficacy to high self-efficacy) across the stages of change, capacity belief should therefore be an important barrier to assess with the different stages of change.

It was proposed by Pelletier et al. (1997) that strategy beliefs was another important barrier to the desired behavior. Amotivation because of strategy beliefs refers to individuals who do not exercise because they perceive that the strategy (i.e. exercise) is not effective to produce a desired outcome (e.g., lose weight). For instance, “I do not exercise regularly because I don’t think that exercising will benefit my health”. This concept stems from Bandura’s outcome expectancy belief since strategy beliefs refer to one’s perception that the strategy (i.e. exercise) is ineffective in producing the desired outcome. Based on past studies on outcome expectancy (Desharnais, Bouillon & Godin, 1986; Skinner, Wellborn & Conell, 1990), people’s perception of the effectiveness of the strategy to produce the desired outcome is important in order to predict one’s involvement. Therefore, the use of strategy belief is useful as a barrier to physical activity.

Thirdly, amotivation because of effort/energy beliefs refers to individuals who do not exercise because they believe that the behavior requires too much effort or energy. An example would be someone who does not exercise regularly because he/she can not

seem to make the effort to change his/her behavior. Lack of effort and energy were reported by many studies as major exercise barriers (CFLRI, 1996c; Godin et al., 1994; Ishee & Sagan, 1996). Thus, this type of internal barrier is deemed an important factor that hinders exercise participation.

The fourth type of amotivation proposed by Pelletier et al. (1997) is global helplessness beliefs. It represents a general state of amotivation, meaning that one does not perceive any contingencies between his/her behavior and subsequent outcomes. “I don’t feel that I have much control over my exercise behavior.” is an example of global helplessness beliefs. This is the only study to my knowledge that has investigated a new taxonomy of amotivation. Hence, it would be important to verify further these distinctions and to examine the different types of amotivations in the exercise context.

Finally, perceived difficulty to find time will also be assessed since it has been repeatedly identified in many studies as the number one exercise barrier (Godin et al., 1994; Ishee & Sagan, 1996; Steindhardt & Dishman, 1989). Thus, five categories will be used to classify the different forms of internal exercise barriers: 1) capacity beliefs; 2) effort beliefs; 3) strategy beliefs; 4) global helplessness beliefs; and 5) time.

External barriers. Numerous studies have identified an extensive list of environmental factors that may be perceived as obstacles to exercise participation. Dishman (1993) identified a list of environmental barriers that have been documented as being the most strongly related to exercise participation. In Dishman’s review (1993), lack of social support and lack of facility access were the barriers that had been repeatedly documented as being important factors that hinder exercise involvement. Other studies (Godin et al., 1994; Myers & Roth, 1997) found social barriers and

access/cost to be important exercise barriers. Additionally, in a study assessing exercise barriers of sedentary, moderately active and active women (Ishee & Sagan, 1996), the most predominant barrier to exercise was lack of time because of school, work or family responsibilities. Tappe et al. (1989) found that weather was also an environmental factor that may influence one not to engage in exercise. Finally, other studies (Godin et al., 1994; Ishee & Sagan, 1996) showed that people did not exercise because of physical/health problems (e.g. injury, illness) and lack of interest. Thus, there will be six types of external exercise barriers: 1) social; 2) responsibilities; 3) climate; 4) access/cost; 5) lack of interest; and 6) physical/health. Although numerous studies have examined exercise barriers, few studies have looked at the barriers/amotivation of individuals with different patterns of physical activity (Myers & Roth, 1997). Thus, studying the barriers/amotivations of individuals who engage in different patterns of exercise (e.g., sedentary, moderately active and active) or those who do not exercise at all seems appropriate.

Thus, to further our knowledge of exercise behavior, this study will attempt to examine the internal (i.e. amotivation) and external exercise barriers within the different stages of change. This may give more insight into the different challenges of the individuals with different patterns of physical activity, which could in turn help to identify strategies that may reduce these obstacles.

The Present Study

Purpose

Acknowledging the fact that there is a limited number of studies assessing exercise motivation and barriers within a stage model, the aim of the present study was to

examine the influence of different forms of motivation from SDT (Deci & Ryan, 1985) and internal (i.e. amotivation) and external barriers on stages of exercise behavior change.

Hypotheses

In the present study, it was hypothesized that individuals in the higher stages of exercise behavior change would report higher levels of self-determined forms of exercise motivation (intrinsic motivation and identified regulation) and lower levels of non self-determined types of motivation (introjected regulation, external regulation and amotivation), whereas individuals in the lower stages of change would report higher levels of non self-determined types of exercise motivation and lower levels of self-determined types of motivation. These hypotheses were also based on organismic integration theory's predictions (see Vallerand, 1993, 1997) that self-determined types of motivation lead to positive outcomes (in this case maintenance of an active lifestyle), whereas non self-determined forms of motivation lead to negative consequences (in this case non adoption of exercise). These hypotheses are also based on the results of past research (Fortier & Grenier, in press; Oman & McAuley, 1993; Mullan & Markland, 1997; Ryan et al. 1997) that have shown that self-determined forms of exercise motivation foster exercise adherence.

With regards to exercise barriers, based on previous research (Godin et al., 1994; Ishee & Sagan, 1996; Myers & Roth, 1997), it is predicted that individuals in the lower stages of exercise behavior change will report significant higher levels of exercise barriers than individuals in the higher stages.

Significance

A study examining the influence of different types of motivation and barriers on stages of exercise behavior change is significant for several reasons. First, much research (Cardinal, 1997a; Courneya, 1997; Herrick, Stone, & Mettler, 1997; Prochaska & Velicer, 1997) has recognized that exercise behavior is a dynamic process that involves the progression of individuals through a series of stages. Compared to the previous all-or-nothing approach to explain exercise behavior change, stage models use a process-oriented approach that focuses on the sequence of behavioral movement that distinguishes various states of readiness to exercise behavior change. This approach offers a more realistic view of the process individuals go through in order to adopt and maintain regular patterns of exercise. The use of these stage models is supported by the U.S. Department of Health and Human Services who recommended that research should be geared towards “the assessment of determinants of various patterns of physical activity among those who are sedentary, intermittently active, routinely active at work, and regularly active” (USDHHS, 1996, p. 249). Likewise, King et al. (1992), highlighted the need to “identify and examine the stages of physical activity behavior”. Thus, by using and studying stages in this study, current research will be advanced in the hopes of better understanding the complexity of exercise behavior change.

Secondly, as Courneya (1995) clearly stated, there is a need for the application of larger, well-developed theoretical frameworks with stages of change models in order to demonstrate other possible relationships between the concepts initially proposed by Prochaska (1994). Thus by incorporating SDT with stages, it will offer additional variables that can be examined with stages of change and also specifies the relationship

between them. Additionally, the study of motivation has not been examined with stages models and may offer additional predictions of exercise participation compared to the other exercise adherence theories (SET, TRA & TPB) utilized to explain exercise behavior. Since SDT addresses unique issues that consider the source of motivation such as the energization of behavior, the regulation of behavior and motivational consequences, the incorporation of this theoretical framework with stage models is deemed very useful in order to better understand exercise behavior change. Thus, by applying notions of motivation and stages of change, practitioners may help guide exercisers or non-exercisers as they progress through the stages in order to adopt regular patterns of exercise.

Thirdly, identifying internal and external barriers within each stage may contribute additional knowledge as to the different types of barriers of sedentary, moderately active and very active individuals. Consequently, by understanding the hindrances of people in different stages, more personalized and effective interventions can be developed.

CHAPTER III

Presentation of the journal article

A journal article entitled *Influence of Motivation and Barriers on Stages of Exercise Behavior Change* is presented in this chapter and is being prepared for publication in the academic journal, *Journal of Sport Behavior*.

Running head: MOTIVATION, BARRIERS AND STAGES OF EXERCISE BEHAVIOR
CHANGE

**Influence of Motivation and Barriers on
Stages of Exercise Behavior Change**

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Abstract

The aim of the present study was to extend exercise behavior research by examining the influence of different types of motivation from self-determination theory (SDT; Deci & Ryan, 1985) and exercise barriers on stages of exercise behavior change. A questionnaire, composed of several validated scales that assessed exercise behaviors, exercise intentions, different forms of exercise motivation, and exercise barriers was administered to 74 employees of an electric power commission. Based on their exercise behaviors during the past three months and their exercise intentions for the next three months, participants were placed into one of the following 6 exercise stages: Stage 1 - sedentary individuals who want to maintain their sedentary behavior; Stage 2 - sedentary individuals who want to increase their exercise behavior; Stage 3 - moderately active individuals who want to maintain their exercise behavior; Stage 4 - moderately active individuals who want to increase their exercise behavior; Stage 5 - active individuals who want to maintain their exercise behavior; or Stage 6 - active individuals who want to increase their exercise behavior. A one-way MANOVA was conducted in order to determine motivation and barrier differences between the stages. Follow-up one-way ANOVAs indicated that intrinsic motivation towards accomplishment and intrinsic motivation towards knowledge were significantly higher for individuals in the higher stages than in the lower stages. These findings are discussed in light of research and theory on motivation and stage models and practical implications are addressed.

Introduction

The promotion of regular exercise is the focus of many public health interventions. This is not surprising since multiple studies (see Bouchard et al., 1994; Powers & Dodds, 1997 for reviews) have shown the numerous health benefits of regular physical activity and that only a third of North Americans exercise on a regular basis (U.S. Department of Health and Human Services [USDHHS], 1996). Recently, in order to better account for the phenomena of exercise adherence, researchers recognized that there is a process involved in acquiring a regular pattern of physical activity and identified different stages that people progress through as they become more regularly active (Prochaska & Marcus, 1994).

Although different stage models have been proposed (e.g., Godin, Desharnais, Valois & Bradet, 1995; Myers & Roth, 1997; Prochaska & DiClemente, 1986), they all have in common the fact that they reflect the reality of the natural process of exercise behavior instead of viewing exercise as an all-or-nothing phenomenon. They also offer a more individualistic approach to behavior change by identifying specific characteristics in the different stages, such as intention (Laitakari, 1998). Many studies over the past decade have shown considerable support for the use of stages to understand exercise behavior change (Cardinal, 1997; Courneya, Nigg & Estabrooks, 1998; Marcus & Simkin, 1994). Recently, Courneya (1995) highlighted the need to combine well developed theoretical frameworks with stage of change since other important relationships may be established with stages of change constructs. The present study shall attempt to do just that by incorporating a solid motivational framework, namely self-determination theory (SDT) with stages of change.

The use of SDT for this particular study is pertinent for several reasons. First, much research has been conducted to support the use of the self-determination theory in the sport and exercise domain (Brière, Vallerand, Blais & Pelletier, 1995; Oman & McAuley, 1993; Pelletier, et al., 1997; Rutherford, Corbin & Chase, 1992). Of particular relevance is the fact that SDT has recently shown to be effective in explaining and predicting physical activity/persistence (Fortier & Grenier, in press; Frederick, Morrison & Manning, 1996; Frederick & Ryan, 1993; Pelletier et al., 1998). SDT also offers a refined explanation of the “why” of exercise behavior change since it proposes that human behavior is guided by fundamental needs: autonomy, competence and relatedness. These needs are seen as energizers of behavior, meaning that they are powerful sources of motivation that lead individuals to engage in a particular behavior (e.g. exercise behavior) that may satisfy their desire to be autonomous, competent and/or related to others. Finally, this theory deals with different types of motivation, their behavioral regulation and motivational consequences. By doing so, this approach could bring research a step closer to truly understanding the underlying reasons of exercise participation by considering how and why people initiate and are able to sustain these behaviors (Koestner et al., 1996).

Self-Determination Theory

According to SDT (Deci & Ryan, 1985, 1991), motivation can be broken down into three general concepts, specifically, intrinsic motivation, extrinsic motivation and amotivation. These types of motivation can be displayed on a self-determination continuum as they differ in the degree to which behavior is externally regulated (i.e. non self-determined behavior - controlled by external factors) or internally regulated (i.e.

whether the behavior is self-determined - performed out of choice). This regulation of behavior along the continuum can be explained by a process called "internalization". Essentially, internalization occurs when former extrinsic sources of motivation are transformed into internal sources of motivation.

At the least self-determined end of the continuum is the concept of amotivation. This type of motivation was originally defined as a lack of motivation (intrinsic or extrinsic) towards a behavior (Deci & Ryan, 1985). More recently, however, Pelletier et al. (1998) refined amotivation by proposing a taxonomy of four different types of amotivation that account for why people do not engage in a behavior. The four types are: 1) amotivation because of capacity beliefs which refers to people who do not perform a behavior because they feel that they do not have the confidence or capacity to engage in the behavior; 2) amotivation because of strategy beliefs which refers to individuals who do not perform a behavior because they perceive that the strategy (i.e. performing the behavior) is not effective to produce a desired outcome; 3) amotivation because of effort/time beliefs which refers to individuals who do not perform a behavior because they believe that the behavior requires too much effort/energy or that they do not make the time; and 4) amotivation because of global helplessness beliefs which represents a general state of amotivation, meaning that one does not perceive any contingencies between their behavior and subsequent outcomes. Although the concept of amotivation is particularly relevant in understanding exercise behavior and specifically why people do not engage regularly in exercise, Pelletier et al.'s study (1997) is the only study that examined this new taxonomy of amotivation. Furthermore, no study to date attempted to apply it to the exercise context. This was one of the purposes of the present study.

Next along the internalization continuum, is the concept of extrinsic motivation. Extrinsically motivated behaviors are performed as means to an end (Vallerand, 1997). According to Deci & Ryan (1985) there are three forms of extrinsic motivation, from the least self-determined to the more self-determined; they are: 1) external regulation; 2) introjected regulation; and 3) identified regulation. External regulation refers to behavior that is regulated through external means such as rewards, praise, constraints or the avoidance of negative outcomes. In this case, individuals exercise for external reasons. For example, a woman who exercises because people around her think it is important to do so would be considered externally regulated. The first attempt at internalization begins with introjected regulation. In this case, the former external source of control is replaced by internal pressures in the form of feelings of guilt or anxiety. Thus, the individual will exercise in order not to feel bad since the externally regulated behavior is being internalized by the self but not accepted as one's own, the internalization process is considered to be only partial (Koestner et al., 1996).

Successful internalization occurs with identified regulation, the most self-determined type of extrinsic motivation. At this point, behavior, although extrinsically motivated, is undertaken because of its value and importance to the self. Hence, regulation of behavior becomes internal to oneself as one freely chooses to engage in the behavior because he/she values the behavior as important and recognizes its benefits. An example of this is an individual with health problems that adheres to an exercise program because he/she values the activity as important for his own health, therefore chooses freely to engage in the program.

At the most self-determined end of the continuum is the concept of intrinsic motivation. Intrinsic motivation can be defined by the involvement in an activity for the sheer pleasure or satisfaction derived from participation. For example, individuals who engage in exercise for the fun or enjoyment that they receive from the activity itself would be intrinsically motivated. Following the work of Deci and Ryan (1985), Vallerand et al. (1992, 1993) developed the idea of intrinsic motivation by identifying three different forms, namely intrinsic motivation towards knowledge, intrinsic motivation towards accomplishments and intrinsic motivation towards experiencing stimulation (see Pelletier et al., 1995 for elaboration on these 3 forms of intrinsic motivation in the physical activity context). As the above taxonomy suggests, behaviors differ in the extent to which they are self-determined or controlled. Through the internalization process, individuals move from less internalized, controlled/non self-determined forms of behavior regulation (i.e. external regulation and introjected regulation) to more internalized, self-determined forms of behavior regulation (i.e. identified regulation and intrinsic motivation) (Pelletier et al., 1998).

In addition to identifying different forms of motivation and explaining the concept of internalization, SDT also addresses the issue of motivational consequences (Deci & Ryan, 1985). Specifically, it is predicted that the progression from non self-determined types of motivation towards more self-determined forms of motivation leads to more positive consequences. Empirical research in the sport/exercise domain support the fact that self-determined individuals have more positive outcomes such as greater sense of enjoyment and satisfaction compared to their less self-determined counterparts (Vallerand, 1993, 1997). Of particular relevance is the research that has shown these

types of relationships between the different forms of motivation and physical activity persistence (Fortier & Grenier, in press; Oman & McAuley, 1993; Pelletier et al., 1998). For instance, a study conducted by Ryan et al. (1997) among people who joined a fitness center showed that adherence was associated with motives focused on enjoyment and satisfaction (more self-determined motives) but not with motives focused on fitness or appearance (more non self-determined motives). These findings suggest that self-determined individuals tend to adhere to an exercise program more frequently than less self-determined individuals.

Thus, when combining self-determination theory and stage models, it would appear that the internalization of behavior occurs when people progress through the stages of change. More specifically, it would appear that there is a “shift in an individual’s motivational focus from extrinsic to intrinsic between the initial exercise adoption and adherence to a program of regular exercise” (p. 350, Mullan & Markland, 1997). Therefore, in the lower stages of change, the behavior would be externally regulated whereas in the higher stages of change, the behavior would become more internally regulated. Although SDT has been used to understand exercise behavior, only one study to our knowledge explored the relationship between the different types of motivation and stages of exercise behavior change (Mullan & Markland, 1997). It was shown in this study that self-determination increases from the lower to the higher stages of change. More specifically, it was found that those in the action and maintenance stages of change were more self-determined (intrinsic motivation and identified regulation) than those in the preceding stages of change. These preliminary results seem to show that SDT could be useful in understanding exercise behavior change, therefore,

more studies should be conducted to further these exploratory findings. Over and above studying motivation with stages, the present study will also examine amotivation with stages of change.

Exercise Barriers

Though the inquiry into why people exercise is important (i.e. motivation), it is of equal importance to understand the barriers to exercise behavior change. Based on the exercise barriers literature (Dishman, 1993; Godin et al. 1994; Ishee & Sagan, 1996; Steindhardt & Dishman, 1989), two main barrier themes seem to arise, namely, internal barriers and external barriers. Internal barriers can be defined as internal reasons for not engaging in a behavior, such as lack of motivation; whereas external barriers can be defined as environmental obstacles that hinder exercise participation, such as lack of facility access or lack of social support. Although many studies have examined these exercise barriers (Leighton & Swerissen, 1995; Steindhardt & Dishman, 1989; Vanden et al., 1997), few have looked at barriers in the different stages of change (see Godin et al., 1994; Myers & Roth, 1997 for exceptions) and only one study examined Pelletier et al.'s (1997) new amotivation (i.e. internal barriers) taxonomy. Furthermore, to date, no one to our knowledge has adapted this new taxonomy to the exercise context. This study therefore attempted to extend the exercise barriers literature by examining internal (i.e. types of amotivation) and external exercise barriers with stages of exercise behavior change.

The Present Study

Therefore, the aim of the present study was to examine the influence of different forms of exercise motivation from SDT (Deci & Ryan, 1985) and exercise barriers on

stages of exercise behavior change. Based on SDT's predictions (Deci & Ryan, 1985) and results from past research (Fortier & Grenier, in press; Frederick et al., 1996; Mullan & Markland, 1997; Pelletier et al., 1998), it was predicted that individuals in the higher stages of exercise behavior change would report higher levels of self-determined forms of exercise motivation (identified regulation and intrinsic motivation) and lower levels of non self-determined motivation (external regulation and introjected regulation) than individuals in the lower stages. They were expected to exhibit higher levels of non self-determined exercise motivation and lower levels of self-determined exercise motivation. With regards to exercise barriers, it was predicted that individuals in the lower stages of exercise behavior change would report significant higher levels of internal and external exercise barriers than individuals in the higher stages (Godin et al., 1994; Myers & Roth, 1997).

Method

Sample

Participants were 74 (68 males, 6 females) employees of an electric power plant company in New Brunswick, Canada. They ranged in age from 28 to 61 years ($M = 39.9$ years) and most participants (75%) had at least 2 years of post-secondary education. In addition, 56% were married, 69% had children, 96% were Canadians and 75% were involved in shift work.

Questionnaire

A questionnaire composed of 4 sections was used to measure the different variables in the present study. The first section served to classify the participants into the different stages of exercise behavior change. The second section measured the different

forms of exercise motivation proposed by Deci and Ryan's (1985) while the third section assessed internal and external exercise barriers. 7-point Likert scales were used to measure exercise motivation and exercise barrier items. Finally, in the fourth section, demographic information such as gender, age, education, nationality and type of occupation was assessed.

Stages of Exercise Behavior Change

According to Godin et al.'s stages in the process of adherence to exercise (1995), participants were classified in the different stages using a measure of behavior/habit (last 3 months) and a measure of intention (next 3 months).

Exercise behavior. In order to assess exercise behavior, an adaptation of Godin & Shephard (1986) and Sallis et al. (1986) was used. Specifically, participants were asked to indicate how many times they had engaged in a series of physical activities during each of the past 3 months (i.e. June, July, August). For each activity, participants had to indicate the frequency (per month), duration (in minutes) and intensity (light, moderate or strenuous). This information determined the total amount of physical activity engaged in the past three months by multiplying the frequency, the duration and the intensity for each activity and then adding all of the activities together. This total score ranged from 0 to 120400 ($M = 13538$). Based on this score, using the percentile command, 3 exercise groups were created: group 1 - sedentary ($M = 2557.6$); group 2 - moderately active ($M = 10466.6$) and group 3 - active ($M = 28175.4$).

Exercise intention. According to Godin et al.'s (1995) procedure, intention towards exercise was measured by asking the following question: "What are your intentions to exercise over the next 3 months?". These future exercise intentions referred

to the months of October, November and December. In line with the work of Myers and Roth's (1997), the choices offered were 1) decrease physical activity, 2) maintain present level of activity or inactivity, or 3) increase physical activity with values ranging from -3 (i.e. strongly decrease) to +3 (i.e. strongly increase). For the purpose of this study, the participants who wanted to decrease their exercise behavior were represented by scores of -3 and -2, those who wanted to maintain their present level of activity or inactivity were represented by scores of -1 and 0 while those who wanted to increase their exercise behavior corresponded scores of +1 to +3. For the purpose of this study, those who had the intention of decreasing their exercise behavior were not included because it was outside the scope of this study.

Based on their exercise behavior during the past three months and their exercise intentions during the next three months, participants were classified in one of the 6 stages of exercise behavior change: *Stage 1* - sedentary individuals who wanted to maintain their sedentary behavior ($n = 11$; 15%); *Stage 2* - sedentary individuals who wanted to increase their exercise behavior ($n = 14$; 19%); *Stage 3* - moderately active individuals who wanted to maintain their exercise behavior ($n = 8$; 11%); *Stage 4* - moderately active individuals who wanted to increase their exercise behavior ($n = 17$; 23%); *Stage 5* - active individuals who wanted to maintain their exercise behavior ($n = 11$; 15%); or *Stage 6* - active individuals who wanted to increase their exercise behavior ($n = 13$; 17%).

Exercise Motivation

To assess the different types of exercise motivation, a slightly adapted version of the Sport Motivation Scale (SMS; Pelletier et al., 1995) was used in the present study. More specifically, six of the subscales of the SMS (representing six different types of

motivation) were used, namely intrinsic motivation (towards knowledge, towards accomplishment and towards stimulation) and extrinsic motivation (identified regulation, introjected regulation and external regulation). Participants were asked to respond to the question: “In general, when you exercise, why do you?”. Each subscale contained 5 items representing the different types of motivation. Examples of items assessing each type of intrinsic motivation were: “For the pleasure I experience while learning new things” (Intrinsic Motivation to Know), “For the pleasure of mastering this activity” (Intrinsic Motivation Towards Accomplishment), and “For the pleasure it gives me to experience positive sensations from this activity” (Intrinsic Motivation Towards Stimulation). Examples of items for the different types of extrinsic motivation were: “Because I think it is good for my personal growth” (Identified Regulation); “Because I must exercise to feel good about myself” (Introjected Regulation); and “To impress others” (External Regulation). Construct validity and internal consistency of the SMS have been demonstrated by Pelletier et al. (1995), and Brière et al. (1995) (for a review see Vallerand & Fortier, 1997). The 6 subscales yielded standardized alpha levels ranging between .73 and .85 ($M = .81$).

In addition, a self-determination index was computed in order to obtain a global score representing the individual's self-determination profile towards. In line with previous studies using the index, weights were assigned to the motivational items according to their respective placement on the self-determination continuum (Connell & Ryan, 1986; Grolnick & Ryan, 1987, 1989). Intrinsic motivation and identified motivation items, because they are considered self-determined forms of motivation, were assigned the weights of +2, and +1, respectively. Also, amotivation and external

regulation items, because they are less self-determined types of motivation, were assigned weights of -2 and -1, respectively. As there were five items for each of the motivational subscales, five indexes were computed using the following formula: $[(2 \times (\text{IM knowledge} + \text{IM accomplishment} + \text{IM stimulation})/3 + \text{identified regulation}) - (\text{external regulation} + 2 \times \text{amotivation})]$. Introjected regulation items were not included in this formula since the specific weights have to be equally balanced between non self-determined and self-determined types of motivation. The total score, ranging between -18 to +18, indicates the extent to which the individual is self-determined towards exercise (closer to -18) or non self-determined towards exercise (closer to +18). Several studies support the use of this index (Blais, 1995; Grolnick & Ryan, 1987; Vallerand & Bissonnette, 1992).

Exercise Barriers

In line with other exercise barrier studies (Godin et al., 1994; O'Neill & Reid, 1991), the following question was asked to the participants: "In general, when you don't exercise regularly, why don't you?". The choices offered represented possible reasons for not exercising (i.e. exercise barriers). The participants indicated on a 7 point-Likert scale from (1) strongly disagree to (7) strongly agree the extent to which the item corresponded to one of their reasons for not exercising regularly. Based on past literature (Dishman, 1993; Godin et al., 1994; Myers & Roth, 1997; Pelletier et al., 1997), we developed 2 subscales, one that measured internal exercise barriers, another that assesses external exercise barriers.

Internal exercise barriers. An adapted version of Pelletier et al.'s (1997) amotivation towards the environment scale was used to assess internal exercise barriers.

It is to be noted that the scale used in this study stems from concepts that were validated in the exercise domain (Bandura, 1977, 1997; Dzewaltowski, Noble & Shaw, 1990). This instrument was composed of 5 subscales representing 5 different internal barriers (i.e. types of amotivation) containing 3 items each. They were: amotivation because of; 1) capacity beliefs; 2) effort beliefs; 3) strategy beliefs; 4) time beliefs and 5) global helplessness beliefs. An example of each of the subscales are as follows: “I don’t have much talent when it comes to exercise” (capacity beliefs); “I just can’t seem to try hard enough” (effort beliefs); “I don’t think exercising will benefit me” (strategy beliefs); “I can’t seem to manage my time effectively” (time beliefs); and “I feel overwhelmed by the gravity of my situation and I have the feeling there is nothing I can do” (global helplessness beliefs). Pelletier et al. (1997) found these scales to show construct validity and to be internally consistent. In this study, the items yielded standardized alpha levels ranging between .82 and .90 ($M = .86$).

External exercise barriers. As for external exercise barriers, 4 subscales containing 3 items each were developed, namely 1) social, 2) access/cost, 3) responsibilities and 4) climate. The examples of choices of responses offered were as follows: “I don’t like to exercise alone” (social); “I don’t have access to an exercise/sport facility” (access/cost); “I am too busy” (responsibilities); and “I don’t like to exercise in extreme temperatures” (weather). Standardized alpha coefficients for these subscales ranged between .71 and .92 ($M = .80$).

Procedure

Initial permission to conduct this study was granted by the president of the company. Once permission was obtained, a qualified researcher attended an employee

training session during which they completed their questionnaire. On the day of data collection, subjects were informed that their participation in the study was voluntary and that they had the right to withdraw at any time without fear of reprisal. It was also stated that the information provided would remain strictly confidential. These instructions also appeared on the first page of the questionnaire. Any question and/or concerns were addressed at this time. Completion of the questionnaire took approximately 20 minutes. From the total questionnaires, collected immediately after the training session ($n = 81$), 7 were rejected because of missing data or uncompleted questionnaire.

Results

A one-way MANOVA was conducted to assess the stage differences (6 stages) on each dependent variable (types of exercise motivation and internal and external barriers). Table 1 provides the means and standard deviations for each of these variables according to stages of exercise behavior change. Results from this analysis did not reveal a main effect for stages of change [(Wilks' $\Lambda = .229$), approximate $F(5,68) = .922$, $p = 0.67$]. Although the multivariate analysis did not reveal significant differences among stages, follow-up univariate analyses of variance (ANOVA) were made in order to specifically further assess the stage differences for each type of exercise motivation and exercise barriers (see Hopkins, 1998 & Tabachnick & Fidell, 1996 for explanation on the use of ANOVA). These analyses showed that intrinsic motivation towards accomplishment [$F(5,68) = 2.97$, $p < 0.05$] as well as intrinsic motivation towards stimulation [$F(5,68) = 2.25$, $p < 0.05$] differed significantly across the stages. In order to determine where these differences were located, Duncan post-hoc comparisons were conducted. These results

indicated that intrinsic motivation towards accomplishment was significantly higher ($p < .05$) for individuals in stage 5 ($M = 4.89$), than those in stages 1, 2 and 3 ($M = 3.51$, $M = 3.96$, $M = 3.05$ respectively). No significant differences were found between stages 1, 2 and 3. As for intrinsic motivation towards stimulation, individuals in stage 5 ($M = 5.07$) exhibited significant higher levels of this type of motivation ($p < .05$) than those in stage 1, 3 and 4 ($M = 3.72$, $M = 3.15$, $M = 3.96$) and no significant differences were found between these three stages respectively. No other significant differences were found for the other four types of exercise motivation (i.e. intrinsic motivation towards knowledge, identified regulation, introjected regulation and external regulation) [$F(5,68) \geq 0.28$; $p \geq 0.10$]. The results of the self-determination index, however, approached significance ($p = .06$) and showed similar trends to those revealed with the intrinsic motivation subscales where individuals in the higher stages exhibited higher levels of self-determined motivation than individuals in the lower stages. With regards to exercise barriers, no significant differences were found between the stages [$F(5,68) \geq 0.28$; $p \geq 0.13$]. It is important to point out that even though the sample size in each group was different, unweighted and weighted means were identical.

Insert Table 1 about here

Discussion

Of primary interest in the present study was examining the influence of different forms of exercise motivation from self-determination theory (Deci & Ryan, 1985) and

exercise barriers on stages of exercise behavior change. With regards to exercise motivation, it was hypothesized that individuals in the higher stages of exercise would report higher levels of self-determined forms of exercise motivation (identified regulation and intrinsic motivation) and lower levels of non self-determined motivation (external and introjected regulation) than individuals in the lower stages who would exhibit higher levels of non self-determined exercise motivation and lower levels of self-determined exercise motivation.

Results showed that the best discriminators among stages were intrinsic forms of motivation (i.e. intrinsic motivation towards accomplishment and intrinsic motivation towards stimulation). More specifically, it was found that individuals in stage 5 (active individuals who want to maintain their exercise behavior) were more intrinsically motivated towards the accomplishment of exercise than those in stage 3 (moderately active individuals who want to maintain their exercise behavior), those in stage 2 (sedentary individuals who want to increase their exercise behavior); and those in stage 1 (sedentary individuals who want to maintain their sedentary behavior). Findings also revealed that individuals in stage 5 (active individuals who want to maintain their exercise behavior) were more intrinsically motivated towards the stimulation of exercise than those in stage 4 (moderately active individuals who want to increase their exercise behavior), those in stage 3 (moderately active individuals who want to maintain their exercise behavior), and those in stage 1 (sedentary individuals who want to maintain their sedentary behavior). These findings are in line with self-determination theory's predictions (Deci & Ryan, 1985) in that self-determined forms of motivation such as intrinsic motivation lead to positive outcomes, in this case, higher exercise frequency.

These results are also in accordance with various studies (Oman & McAuley, 1993; Rutherford, Corbin & Chase, 1992; Ryan et al., 1997) that indicated that self-determined forms of exercise motivation, such as intrinsic motivation, are critical factors in physical activity persistence/participation. In a study examining sport persistence, Pelletier et al. (1998) found that athletes who were intrinsically motivated and self-determined towards their sport showed more persistence over a two year period than those who were non self-determined. Similarly, results from Fortier & Grenier (in press) revealed that self-determined exercise motivation was an important predictor of exercise adherence. Specifically relevant to this study, are the results from Mullan & Markland's (1997) research on exercise motivation and stages of exercise behavior change which indicated that intrinsic motivation distinguished those in the later stages of change (action and maintenance) from those in the preliminary stages (prepreparation and preparation). The above mentioned findings demonstrate that intrinsic motivation is indeed an important factor in determining one's persistence and regular involvement in an activity.

Interestingly enough, individuals in stage 6 (active individuals who want to increase their exercise behavior) did show the same motivational trends as those in stage 5. We would have expected that individual's in stage 6 would have shown to be significantly different in terms of their intrinsic motivation from those in the lower stages. It might be possible that individuals in stage 6 were athletes who wanted to increase their athletic performance, in which case the focus of some might have been on external rewards or outcome goals (i.e. extrinsic types of motivation). Other individuals in stage 6, on the other hand, may have wanted to increase their exercise behavior to enhance their pleasure or sensation received while participating in the activity. This pooling of

regularly active individuals who wanted to increase their exercise behavior for different reasons might explain why those in stage 6 did not have similar motivational trends to those in stage 5, and also did not differ from those in the lower stages of change.

With regards to the other types of self-determined exercise motivation, intrinsic motivation towards knowledge and identified regulation, no significant differences were found between the stages of exercise behavior change. It should be noted, however, that although no significant differences were found with these forms of self-determined motivation, results with the self-determination index approached significance. These findings were in line with the results obtained with the intrinsic motivation subscales and showed that the individuals in the higher stages were generally more self-determined towards exercise than those in the lower stages. This trend is congruent with both the theoretical postulates of SDT (Deci & Ryan, 1985) and the results of Mullan and Markland's (1997) study which demonstrated that the individuals with a more self-determined motivational profile exercised more frequently (i.e. higher stages) than those with a less self-determined profile.

With respect to the non self-determined types of exercise motivation (introjected regulation and external regulation), no significant differences between the stages were revealed in the present study. These results ran contrary to our hypotheses and are surprising based on SDT's predictions and past findings (Frederick & Ryan, 1993; Mullan & Markland, 1997; Pelletier et al., 1998) that have shown that non self-determined motivation may lead to a decrease in physical activity involvement. Indeed, we would have expected that individuals in the lower stages of change would have

exhibited significantly higher levels of non self-determined forms of exercise motivation compared to those in the higher stages.

One reason that might possibly explain the non-significant differences found in the present study would be the small sample size (i.e. 74 participants). Indeed, the low overall number of participants in relation with the large number of variables examined might have affected the amount of significance obtained. Furthermore, the fact that there were a small number in some of the stages (e.g. only eight participants in stage 3) might have also affected the overall significance level. Even though the low and unequal representation of participants in each stages might have been a limitation, it should be remembered that the focus of this study was comparing individuals in different stages according to their forms of exercise motivation and barriers towards exercise rather than providing an accurate estimate of the population prevalence in each stage. However, to effectively assess the role of less self-determined types of motivation in the different stages, a greater number of participants involved in the study would be recommended for future studies.

With respect to the internalization process, some inconsistencies have been observed. On one hand, intrinsic types of motivation could differentiate individuals in the higher stages from those in the lower stages of change, whereas the extrinsic types of motivation did not discriminate individuals in the different stages. On the other hand, the self-determination profile showed trends revealing that there was an increase in the level of self-determination throughout the stages. Therefore, it can be stipulated that there might be, to some extent, an internalization process occurring across the stages of change. It is also possible that individuals that have a less self-determined profile are more likely

to be in the lower stages of change, and those with more self-determined profiles tend to be in the higher stages, hence maintain their exercise behavior on a more regular basis. Further research must explore the relationship between exercise motivation and stages of change and also use prospective studies in order to examine the process in which sedentary individuals attempt to become more active.

Since findings from the present study partially support our hypotheses, results bring about questions concerning the relative importance of both extrinsic and intrinsic motivation in examining and understanding the characteristics of individuals in the different stages of readiness to change. Perhaps intrinsic forms of exercise motivation are the most influential factors in differentiating between regularly active and less active individuals. Although contrary to past research on exercise behavior (Pelletier et al., 1998), extrinsic types of exercise motivation may not be as crucial in distinguishing people in the different stages. Since this is only one of two studies to date that has examined relationships between SDT and stages of exercise behavior change, more studies should be conducted to firmly establish these relationships.

With respect to exercise barriers, it was predicted that individuals in the lower stages of exercise behavior change would report significantly higher levels of exercise barriers than individuals in the higher stages. However, no significant differences were found with either internal or external exercise barriers. These findings are not consistent with the literature on exercise barriers (CFLRI, 1996; Godin et al, 1994; Pelletier et al., 1997) that found that less active people reported more exercise barriers than regularly active people. For instance, Ishee & Sagan's (1996) study on exercise barriers among sedentary, moderate and active women found that sedentary and moderately active

individuals perceived more exercise barriers than the active individuals. Similar results were found in Myers & Roth's (1997) study examining exercise barriers and stages of change in that individuals who were regularly active (i.e. higher stages) reported fewer exercise barriers than those who did not exercise regularly (i.e. lower stages) reported the most exercise barriers. The results from the present study are also not in line with the findings of a preliminary study examining the new amotivation taxonomy (Pelletier et al., 1997) which revealed that individuals who did not engage in a specific behavior reported different types of amotivation towards the behavior. That is, the reasons for not performing a behavior were related to at least one of the amotivation beliefs (i.e. capacity beliefs, strategy beliefs, effort beliefs and helplessness beliefs). Since the present study was the first to attempt to use the amotivation in the exercise context, more studies should further explore the relationships between amotivation and exercise behavior change.

Again, maybe due to small sample size or the fact that barriers are similar throughout the stages of change, findings from this study may shed a different light in explaining the role of barriers in this context. Although contradictory to other studies examining exercise barriers which found that less active people reported more exercise barriers than those who are regularly active, perhaps there is more to explaining exercise barriers than merely looking at differences between stages. Other important factors, within the different stages, may be useful in explaining why participants report certain exercise barriers. For instance, Yoshida et al. (1988) found that the same exercise barriers were reported by both inactive individuals who wanted to become active and active individuals who wanted to increase their exercise behavior. While further investigating the factors influencing the reported barriers within each group, it was found

that age, education and the type of occupation contributed to the variance explained in the type and amount of exercise barriers reported between the two groups. To this effect, identifying exercise barriers between different groups (i.e. stages) of individuals who have various exercise behavior and intentions may not be sufficient in explaining barrier differences among these groups. More detailed demographics of the individuals within each group may bring about a better explanation concerning the barriers. For instance, those who are in the lower stages and have low levels of education might not realize the importance of regular physical activity involvement or maybe those who have a higher level of education may not have the time to exercise on a regular basis. Therefore, demographic information may help to identify barriers that are specific to a particular population.

Different strategies to overcome the barriers may be another reason that could explain these contradictory findings. If, in fact, individuals in the different stages report no differences in their perceived barriers to exercise, perhaps those in the higher stages of change overcome their exercise barriers easier compared to those in the lower stages. More effective strategies might have been developed for those who have acquired a regular pattern of exercise. Therefore, the process by which individuals in the different stages cope with their exercise barriers may be an avenue of interest for future research.

Concerning intention as an important factor in determining exercise stages of change, in the present study, both exercise behavior (sedentary, moderately active, active) and exercise intentions (decrease, maintain, increase) seemed to discriminate individuals in the different stages of change. Indeed, significant differences were found between individuals in stages 5 (active individuals who want to maintain their exercise behavior)

and those in stage 1 (sedentary individuals who want to maintain their sedentary behavior), stage 2 (sedentary individuals who want to increase their exercise behavior) and stage 3 (moderately active individuals who want to maintain their exercise behavior) for intrinsic motivation towards accomplishment. As for intrinsic motivation towards stimulation, individuals in stage 5 were found to be significantly different from those in stage 1, 3 and 4 (moderately active individuals who want to increase their exercise behavior). As can be seen, both exercise behavior and exercise intention were effective in differentiating individuals in the various stages. Therefore, the addition of “increase intention” in all stages enabled us to further breakdown exercise behavior. These findings are in agreement with results from other studies (Courneya, Estabrooks & Nigg, 1997; Godin et al., 1994) that have demonstrated that intention can differentiate the stages. For example, results from Myers & Roth (1997) found that including both exercise intentions and exercise behavior in order to classify participants in stages was effective for better accounting for the processes involved in adopting a positive behavior (i.e. exercise behavior). In order to better ascertain the importance of exercise intention in explaining exercise stages of change, more studies are needed to further clarify the role of intention in the classification of stages of change.

In addition to the limitations mentioned in the above section, other considerations should be kept in mind when interpreting the results from this study. First, since the present study used a cross-sectional design, it is not possible to determine if the differences in motivational profile across the stages are due to change or predisposition. In other words, it was either due to the fact that the individuals who were in the higher stages became more self-determined as they progressed through the stages or the fact that

they advanced through the stages because they were more self-determined from the beginning. Thus, more prospective/longitudinal designs should be used in future research in order to better understand the interaction between self-determination and stages of change as well as the complex process involved in adopting and/or maintaining a regular pattern of exercise. Secondly, the homogeneous sample (i.e. majority male representation) might also have skewed the results since studies have shown that there are motivational differences between men and women (Mullan & Markland, 1997).

Although the aim of the present study was not to examine the differences in self-determination between men and women, this avenue of research would certainly be an interesting one.

Despite these limitations, this study has shown that people who are regularly active are more intrinsically motivated than those who are less active. These findings support the use of self-determination theory with stages of exercise behavior change. More studies should integrate well developed theoretical models such as SDT with stages of change in order to better assess the differences in people who have adopted various levels of exercise behavior (Courneya et al., 1997). For practitioners who seek to promote physical activity, it would be recommended that intrinsic motivation be instilled in the participants. Increasing their autonomy, competence and relatedness towards exercise can foster such intrinsic motivation. Therefore, it is important to encourage participants to choose activities that they enjoy, to continually give positive feedback and to provide opportunities for social interaction.

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Table 1

Means and Standard Deviations of Exercise Motivation and Exercise Barriers for each of the Stages of Change

Variables	Stages											
	1		2		3		4		5		6	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Exercise Motivation												
Intrinsic motivation												
Accomplishment*	3.51	0.96	3.96	1.25	3.05	0.98	4.06	1.03	4.89	1.30	4.22	1.21
Knowledge	2.60	1.10	2.85	1.12	2.38	0.86	3.38	0.95	3.53	1.07	2.92	1.18
Stimulation*	3.72	1.57	4.04	1.38	3.15	1.37	3.96	1.03	5.07	1.22	4.00	1.36
Extrinsic motivation												
Identified regulation	2.71	1.28	3.31	0.89	2.92	0.77	3.45	0.98	3.31	0.89	3.25	1.22
Introjected regulation	3.51	1.54	3.91	1.10	2.63	1.02	3.91	1.02	3.84	1.38	3.79	1.31
External regulation	2.54	1.23	2.69	1.04	2.28	0.82	2.47	0.97	2.32	1.35	2.68	1.05
Self-determination index	2.31	2.36	2.72	2.67	1.14	3.59	3.20	2.54	5.54	2.73	3.26	4.34
Exercise Barriers												
Internal (amotivation)												
Capacity	2.16	0.87	2.17	0.84	2.50	1.36	1.98	0.92	1.76	1.27	1.97	1.10
Strategy	1.95	0.81	1.79	0.82	2.17	0.76	1.51	0.62	1.60	0.77	1.38	0.51
Effort	3.05	1.18	3.51	1.19	3.46	1.82	3.43	1.40	2.39	1.78	3.08	1.45
Time	2.97	1.29	3.89	1.37	3.17	1.62	3.55	1.32	2.70	1.89	3.23	1.46
Helplessness	2.38	0.84	2.67	1.05	2.79	1.49	2.73	1.24	1.97	1.57	2.36	1.13
External												
Social	2.95	1.11	2.70	1.03	3.38	1.16	2.94	1.31	2.24	1.48	2.67	1.27
Access/cost	1.85	0.69	2.70	1.69	2.63	1.08	2.35	0.78	1.94	1.26	2.36	1.21
Responsibilities	3.18	1.54	4.02	1.65	3.50	1.88	4.06	1.57	2.94	1.98	3.74	1.26
Climate	3.00	1.37	3.14	1.09	3.63	1.09	2.90	1.47	2.85	2.05	2.46	1.00

Note. All motivation and barrier items are based on 7 whereas the self-determination index scores range from -18 to +18.* $p < .05$.

CHAPTER IV

General Discussion

In this chapter, a general discussion is presented, theoretical implications are discussed, practical issues are addressed and future research directions are proposed.

The general purpose of this thesis was to examine the influence of different forms of exercise motivation and internal and external barriers on exercise behavior change.

The findings of this research are presented in the previous article, however, a number of important issues pertaining to the theoretical and practical implications of these results with regards to motivation, barriers and exercise behavior change will be highlighted in the following sections.

Theoretical Implications

With respect to exercise motivation, findings from the present study partially supported our hypotheses showing that intrinsic types of exercise motivation (i.e. intrinsic motivation towards accomplishment and intrinsic motivation towards stimulation) distinguished individuals in the higher stages from those in the lower stages. These findings are in line with SDT's predictions and past research (Fortier & Grenier, in press; Frederick et al., 1996; Mullan et al., 1997; Oman & McAuley, 1993) indicating that self-determined forms of exercise motivation are associated with a more regular and frequent involvement in physical activity.

With regards to extrinsic forms of exercise motivation (identified regulation, introjected regulation and external regulation), the findings of the present study ran contrary to SDT's predictions and most studies on this issue (Frederick & Ryan, 1993; Mullan & Markland, 1997; Pelletier et al., 1998) as extrinsic motivation did not

significantly differentiate individuals in the different stages of exercise behavior change. These findings cast some doubt on the relative importance of extrinsic motivation in characterizing those who are less active. Perhaps when studying exercisers vs. non exercisers, differences in extrinsic types of motivation between the two groups might arise but that there are not as many nuances in extrinsic types of motivation among the different stages. In which case, extrinsic types of motivation are not crucial in distinguishing stages of change. Therefore, more research needs to focus on determining the important factors that characterize individuals in the different stages.

This then leads us to the following question: “Is there an internalization process occurring across the stages of change?”. Although contrary to recent studied on this issue (Mullan & Markland, 1997; Mullan et al., 1997), findings from the present study demonstrate that individuals may not be undergoing an internalization process when acquiring a regular and more frequent exercise behavior pattern. Perhaps individuals in the higher stages have acquired this frequent exercise behavior because they were intrinsically motivated towards exercise from the onset. It is difficult to assess this internalization of behavior since this study was cross-sectional in nature. Future studies should attempt to use a prospective approach in order to assess each individual’s motivational profile as they are progressing through the stages of change over time.

After reviewing the role of both extrinsic and intrinsic types of motivation, intrinsic forms of exercise motivation seem to be the most important type of motivation within the SDT framework that best explains exercise behavior through the stages of change, although more studies should be made to confirm these relationships.

Regarding exercise barriers, findings from the present study also contradict most studies in the exercise barriers literature (Godin et al, 1994; Yoshida et al., 1989) in individuals in the lower stages did not perceive to have more exercise barriers than those in the lower stages of change. Most studies (CFLRI,1996; Ishee & Sagan, 1996) have found that individuals who are less active are more likely to have more exercise barriers than those who adhere and maintain a regular exercise regimen. In an attempt to understand why people in the different stages perceive similar exercise barriers, it might be possible that those in the higher stages learned or acquired skills that enabled them to overcome their exercise barriers.

The results from the present study also do not support a current study assessing the new amotivation taxonomy (Pelletier et al., 1997). Pelletier's findings revealed that the different types of amotivation reflected reasons why people did not perform a certain behavior, in this case, exercise behavior. Since the present study was the first attempt to use the amotivation taxonomy to the exercise behavior context, perhaps the amotivation items identified did not reflect the current exercise barriers that hinder participation in physical activity. This would seem surprising considering that these types of amotivation are a reflection of the most commonly identified internal exercise barriers in the literature such as lack of time and effort (Steindhardt & Dishman, 1989; Vanden et al., 1997) and low self-efficacy (Bandura, 1997b). More research that specifically examines exercise barriers (i.e. amotivation) within stages of change would be recommended in order to clarify these contradictions.

In general, these findings suggest that intrinsic forms of motivation may be the most influential factor in differentiating between regularly active and less active

individuals. Perhaps different forms of extrinsic motivation and amotivation are not as predominant in characterizing people in the different stages. Based on these results (i.e. the role of intrinsic motivation), and the fact that past research has predominantly focused on examining exercise behavior through the eyes of the self-efficacy theory (Bandura, 1977) and the theory of planned behavior (Fishbein & Ajzen, 1975), motivation is an avenue that needs to be pursued in order to better understand exercise behavior change. Therefore, it would be important to incorporate motivation as a determinant of exercise behavior change. In addition, SDT is a useful theoretical framework for better understanding the process involved in acquiring and maintaining a regular pattern of exercise. Since this is only one of two studies to date that examined the relationship between SDT and stages of change, more research combining these two frameworks should be conducted in order to assess properly and understand exercise behavior change.

Concerning stage models, our classification of stages of change was indeed effective in demonstrating that individuals differ in their exercise patterns. Findings showed that both past exercise behavior and future exercise intentions could be used throughout the 6 stages of change. In previous years, stage models (Prochaska & Diclemente, 1983) used exercise behavior (i.e. past three months) for all stages and future intention to exercise for a few stages (stage 1- precontemplation, stage 2- contemplation and stage 3- preparation) to create the various stages. Since then, attempts have been made to modify these stages (Godin et al, 1995; Myers & Roth, 1997; Weinstein et al., 1998a); for example, by incorporating other components to the stages such as intention to maintain or increase current exercise behavior. The present study was successful in demonstrating that future intentions to exercise can be useful in discriminating among the

stages of change. More research should focus on clarifying the variables (current/past exercise behavior vs. future exercise intentions) in order to properly create the stages that reflect the most realistic steps through which individuals progress in order to become more regularly active. By doing so, a more effective assessment of the exercise behavior change process can be made.

An issue worth addressing when interpreting the results of the present study is the fact that the employees participating in this study were undergoing significant personal stresses during the period of time surrounding this study. I believe that the fact that the employees' job security was threatened had an influence on their responses to the questionnaire. At the time, the company was undergoing some major internal changes (i.e. privatization) making the employees susceptible to losing their jobs. This might have affected their psychological state of mind and emotional stability during the data collection. If one were going to lose one's job, how focused would one be when filling out an exercise behavior questionnaire? Based on Maslow's pyramid of self-actualization (1967), a hierarchy of personal needs was developed in order to create an echelon of fundamental to more complex needs. It is postulated that once basic essential needs such as food, water and security are provided, more complex psychological needs (i.e. self-actualization) may be acquired. If basic needs are not met, then all of the following needs (i.e. esteem, social acceptance and self-actualization) become of secondary importance, in which case exercise becomes less important than security. Therefore, the fact that their job security and financial stability were in jeopardy, the need to exercise or to reflect on such a topic might have been deemed unimportant and irrelevant at the time. I believe

this needs to be kept in mind when considering the big picture in which this study was conducted.

Practical Implications

From a practical perspective, as important as it is to discuss the theoretical implications of the results of the present study, it is of equal importance to look into practical applications. These results may be useful to fitness instructors, health practitioners and/or physical activity promoters in order to improve their effectiveness in increasing the population involvement in regular physical activity. First, these findings suggest that intrinsic exercise motivation is a characteristic predominantly found in individuals who are regularly active compared to those who have difficulty adopting and/or maintaining a regular pattern of exercise. Thus, the issue of how to foster intrinsic motivation is of great importance.

Three main factors have been shown to influence intrinsic types of exercise motivation, namely autonomy, competence and relatedness (Vallerand, 1997). First, encouraging individuals to choose their own physical activities in which they receive a sense of enjoyment and satisfaction can increase autonomy towards exercise. This freedom to choose their own exercise will instill a sense of autonomy towards getting involved in the activity and hence increase their chances of maintaining their involvement in physical activity for a longer period of time (Pelletier, Tuson & Haddad, 1997). Secondly, increased feelings of competence can be fostered by providing positive feedback. Performance-enhancing information is important, since it provides useful information that enables individuals to improve their skills. As a result, they find the activity more interesting and enjoyable, put more effort into it, feel better about

themselves and thus improve their sense of self-worth and confidence (Rutherford et al., 1992). Thirdly, the extent to which one relates with others does play a significant part in improving intrinsic motivation. Individuals feel better about themselves when they can interact, socialize and meet people with whom they share similar experiences. Their increased sense of belonging and interpersonal involvement can therefore enhance the intrinsic motivation of an individual. Thus, by supporting autonomy, increasing feelings of competence and facilitating interpersonal relationships, intrinsic motivation may be fostered and more regular patterns of exercise may be adopted. The role of fitness professionals or personal trainers should become aware of such important factors and use their expertise to positively influence adherence to and maintenance of exercise.

In addition to promoting intrinsic types of motivation, it is important that fitness practitioners use stages of change. Classifying individuals in their appropriate stages of readiness to change will enable practitioners to target the psychosocial characteristics of individuals in their respective stages. By considering these differences and particular characteristics, more effective programs and interventions can be developed to help people adopt or maintain an active lifestyle. Thus, fitness and health practitioners are better equipped to effectively facilitate and encourage exercise adoption and maintenance.

Future Research

In light of these findings, future research is proposed in order to further existing knowledge and to bring forth new ideas that might shed some light on the complexities of understanding exercise behavior change. First, since findings of the present study provide evidence that the determinants of exercise adoption are not necessarily the same as those that predict exercise maintenance, it is recommended that a multidimensional

approach (i.e. different variables/concepts) be studied in conjunction with stages. The complexity of human behavior in adopting or maintaining exercise habits may thus be better accounted for. As Courneya (1997) identified the need to incorporate well-developed theoretical frameworks, future studies also need to include a multiple range of variables from different theories that might bring a broader perspective and deepen current understanding of exercise behavior change. Instead of examining stages of change through the eyes of only one theoretical framework, a shift in focus should be made to incorporate various important variables that have to date been able to explain, to some extent, exercise behavior change, for example, self-efficacy theory, theory of planned behavior and self-determination theory (Brawley, 1993; Weinstein et al, 1998a). In addition to studying motivation and stage models, it would be interesting to combine the concepts of self-determination theory to the process of change proposed by Prochaska et DiClemente (1994). By having a better understanding of their motivational profile or behavioral regulation, perhaps strategies can be developed accordingly and thus more effective intervention can be implemented. Finally, future research could also focus on examining gender differences in motivational profile across the stages. Since studies have shown that there are motivational differences between men and women (Mullan & Markland, 1997), it would be interesting to see if their self-determination profiles differ when progressing in the stages.

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APPENDIX A

CONTRIBUTIONS OF THE AUTHORS

The relative contributions of each author are provided in this appendix. This final thesis has been conceptualized, developed, planned and put together mainly by the work of two authors, namely Lynne LeBlanc and Dr. Michelle Fortier.

The birth of this research project came about through discussions between Dr. Michelle Fortier and myself. Based on Dr. Fortier's expertise (exercise motivation and exercise behavior) and my interest in this area (stages of change). Together, we conceptualized the preliminary ideas for this research. Step by step, through regular weekly meetings, we worked on developing and organizing the many details of this thesis in order to ensure its success.

This project would thereafter see daylight through the collaborative efforts of the head researchers (Dr. Fortier and myself) of the University of Ottawa, Tim Snow from New Brunswick Power and "l'Institut de leadership de l'Université de Moncton". NB Power gave us permission to conduct the study with their employees, Tim Snow ensured the administrative assistance in data collection, and l'Université de Moncton contributed financial support for the production of the questionnaires. Through these cooperative efforts, the data collection of the project was successful.

In terms of writing the thesis document as well as the journal article, it was my primary responsibility to write the drafts and Dr. Fortier would then meticulously revise these drafts on a regular basis. Afterwards, she would hand it over to me so that I could make the necessary corrections and adjustments. This cycle was conducted on a regular basis until both Dr. Fortier and myself were satisfied with the final product.

APPENDIX B

¹EXERCISE BEHAVIOR CHANGE QUESTIONNAIRE

¹ In the questionnaire, bolded items are the ones used in the analysis of the present study. Here are the corresponding items of the different types of motivations and barriers as they appear in the questionnaire. The motivation items are: IMS - 1, 11, 28, 35, 48; IMA - 4, 16, 23, 36, 42; IMK - 7, 17, 32, 41, 52; ID - 13, 21, 33, 44, 46; IN - 6, 20, 29, 38, 51; ER - 3, 10, 25, 40, 45; and the barrier items are: BIC - 12, 23, 33; BIE - 25, 27, 36; BIH - 19, 32, 45; BIS - 20, 29, 30; BIT - 11, 34, 43; BER - 16, 28, 44; BEW - 17, 35, 47; BEA - 9, 21, 48; BES - 22, 38, 41.

ATTITUDES, PERCEPTIONS AND BEHAVIORS TOWARDS EXERCISE

We are presently conducting a study which aims to better understand attitudes, perceptions and behaviors towards exercise. Please read each question carefully and indicate (by circling the appropriate number) the extent to which the questions correspond to YOUR personal experience. It is important to answer, i.e., circle a number for each question.

This is neither a test nor an evaluation. ~~Therefore, there are no correct or incorrect answers.~~ We are simply interested in your honest and truthful responses to the questions and ask that you respond as seriously as possible. It is important to carefully read all of the instructions.

It is not necessary to write your name on the questionnaire, therefore no one can identify you, however for the study to be conducted successfully, we require your date of birth and the last 4 digits of your telephone number. The information that you provide us with is strictly confidential and will be used for research purposes only.

DATE OF BIRTH (DAY/MONTH/YEAR) : ____/____/____

TELEPHONE NUMBER (LAST 4 DIGITS) : _____

We sincerely thank you for your participation.

Lynne LeBlanc and Michelle Fortier, Ph.D.
School of Human Kinetics
University of Ottawa

Regular exercise is an important thing to do for your physical health.
If you don't do it, you're missing out on a lot of benefits.
(There's nothing like a good workout to get you going.)
It's not just about the physical benefits, it's about the mental ones too.

Decrease behavior **Maintain behavior** **Increase behavior**

-3 -2 -1 0 +1 +2 +3

3. EXERCISE MOTIVATION

Using the scale below, please indicate to what extent you are in agreement with the following items concerning your REASONS FOR EXERCISING.

In general, when you exercise, WHY DO you?		Strongly Disagree		Moderately Agree		Strongly Agree		
		1	2	3	4	5	6	7
1.	For the pleasure it gives me to experience positive sensations from this activity.	1	2	3	4	5	6	7
2.	To be attractive to others.	1	2	3	4	5	6	7
3.	Because people around me think it is important to exercise.	1	2	3	4	5	6	7
4.	For the satisfaction I feel while trying to achieve my exercise goals.	1	2	3	4	5	6	7
5.	To improve my health.	1	2	3	4	5	6	7
6.	Because I would feel guilty if I wasn't doing it.	1	2	3	4	5	6	7
7.	For the pleasure I experience while learning new things.	1	2	3	4	5	6	7
8.	To help me cope with stress/anxiety.	1	2	3	4	5	6	7
9.	I used to have good reasons for exercising, but now I am asking myself if I should continue.	1	2	3	4	5	6	7
10.	Because it allows me to be well regarded by people that I know.	1	2	3	4	5	6	7
11.	For the intense emotions I feel while I am doing something that I enjoy.	1	2	3	4	5	6	7
12.	To be slim.	1	2	3	4	5	6	7
13.	Because, in my opinion, it is one of the best ways to meet people.	1	2	3	4	5	6	7
14.	Because I would feel ugly/fat if I didn't exercise.	1	2	3	4	5	6	7
15.	To lift my spirits.	1	2	3	4	5	6	7
16.	Because I feel a lot of personal satisfaction while trying to master certain skills.	1	2	3	4	5	6	7
17.	For the pleasure it gives me to know more about exercise.	1	2	3	4	5	6	7
18.	I don't know, lately I feel unmotivated.	1	2	3	4	5	6	7
19.	To improve my fitness.	1	2	3	4	5	6	7
20.	Because it is absolutely necessary to exercise if one wants to be in shape.	1	2	3	4	5	6	7
21.	Because it is one of the best ways I have chosen to develop other aspects of myself.	1	2	3	4	5	6	7
22.	To improve my mood.	1	2	3	4	5	6	7
23.	Because I enjoy the feeling of improving through practising this activity.	1	2	3	4	5	6	7
24.	To maintain a healthy body weight.	1	2	3	4	5	6	7
25.	Because I feel urged to do so by others.	1	2	3	4	5	6	7
26.	I can't understand why I do it.	1	2	3	4	5	6	7
27.	To help prevent negative feelings.	1	2	3	4	5	6	7
28.	For the excitement I feel when I am really involved in the activity.	1	2	3	4	5	6	7
29.	Because I must exercise to feel good about myself.	1	2	3	4	5	6	7

30. To be sexually desirable.	1	2	3	4	5	6	7
31. To increase my resistance to illness and disease.	1	2	3	4	5	6	7
32. Because I enjoy trying movements that I have never done before.	1	2	3	4	5	6	7
33. Because it is a good way to learn things which could be useful to me in other areas of my life.	1	2	3	4	5	6	7
34. It is not clear to me anymore; I don't really think exercise is for me.	1	2	3	4	5	6	7
35. For the positive emotions that I feel when I am exercising.	1	2	3	4	5	6	7
36. For the satisfaction I experience while I am improving my abilities.	1	2	3	4	5	6	7
37. To improve my body shape.	1	2	3	4	5	6	7
38. Because I would feel bad if I was not taking time to exercise.	1	2	3	4	5	6	7
39. To maintain my physical well-being.	1	2	3	4	5	6	7
40. To impress others.	1	2	3	4	5	6	7
41. For the pleasure of discovering new activities.	1	2	3	4	5	6	7
42. For the pleasure of mastering this activity.	1	2	3	4	5	6	7
43. Because I think exercise contributes to my health.	1	2	3	4	5	6	7
44. Because it is one of the best ways to maintain good relationships with my friends/family.	1	2	3	4	5	6	7
45. To show others how physically fit I am.	1	2	3	4	5	6	7
46. Because I think it is good for my personal growth.	1	2	3	4	5	6	7
47. To increase my energy.	1	2	3	4	5	6	7
48. Because I like the feeling of being totally immersed in the activity.	1	2	3	4	5	6	7
49. To improve my appearance.	1	2	3	4	5	6	7
50. I often question myself; I can't seem to achieve the exercise goals I set for myself.	1	2	3	4	5	6	7
51. Because I feel I must exercise regularly.	1	2	3	4	5	6	7
52. For the pleasure of learning new skills.	1	2	3	4	5	6	7
53. To lose weight in order to look good.	1	2	3	4	5	6	7

4. EXERCISE BARRIERS

Using the scale below, please indicate to what extent you are in agreement with the following items concerning your **REASONS FOR NOT EXERCISING**.

In general, when you don't exercise, WHY DON'T you?	Strongly Disagree		Moderately Agree			Strongly Agree			
	1	2	3	4	5	6	7		
1. I don't like to exercise alone.			1	2	3	4	5	6	7
2. I don't have much talent when it comes to exercise.			1	2	3	4	5	6	7
3. I just can't seem to try hard enough.			1	2	3	4	5	6	7
4. Because of disability.			1	2	3	4	5	6	7
5. I don't feel that I have much control over my exercisebehavior.			1	2	3	4	5	6	7

6. I am not interested in exercise.	1	2	3	4	5	6	7
7. I find exercising uncomfortable.	1	2	3	4	5	6	7
8. I don't think exercising will benefit me.	1	2	3	4	5	6	7
9. I don't have access to an exercise/sport facility.	1	2	3	4	5	6	7
10. My friends don't exercise.	1	2	3	4	5	6	7
11. I can't seem to use my time effectively.	1	2	3	4	5	6	7
12. I don't have what it takes to exercise.	1	2	3	4	5	6	7
13. I can't seem to find it in me to make the necessary sacrifices.	1	2	3	4	5	6	7
14. I think exercising is boring.	1	2	3	4	5	6	7
15. Because of injury.	1	2	3	4	5	6	7
16. My daily responsibilities take up most of my time.	1	2	3	4	5	6	7
17. Because the weather is not suitable to exercise.	1	2	3	4	5	6	7
18. I don't like to have sore muscles.	1	2	3	4	5	6	7
19. I feel helpless when it comes to exercising.	1	2	3	4	5	6	7
20. I don't think that exercising is worthwhile.	1	2	3	4	5	6	7
21. I don't have enough money to exercise.	1	2	3	4	5	6	7
22. My family does not encourage me to exercise.	1	2	3	4	5	6	7
23. I lack confidence when it comes to exercise.	1	2	3	4	5	6	7
24. Because of illness.	1	2	3	4	5	6	7
25. I don't have the energy to exercise.	1	2	3	4	5	6	7
26. I don't enjoy exercising.	1	2	3	4	5	6	7
27. I lack the motivation to exercise.	1	2	3	4	5	6	7
28. My workload is so considerable that it does not enable me to exercise.	1	2	3	4	5	6	7
29. I don't think that exercising will improve my health.	1	2	3	4	5	6	7
30. I don't think that exercising is important.	1	2	3	4	5	6	7
31. I don't have an exercise partner.	1	2	3	4	5	6	7
32. I have the feeling there is nothing I can do, I just can't seem to bring myself to exercise.	1	2	3	4	5	6	7
33. I don't feel I have the competence/ability to exercise.	1	2	3	4	5	6	7
34. I can't organize my time properly.	1	2	3	4	5	6	7
35. I don't like to exercise in extreme temperatures.	1	2	3	4	5	6	7
36. I just can't seem to make the effort to change my habits.	1	2	3	4	5	6	7
37. I don't think that exercising will help me.	1	2	3	4	5	6	7
38. My family does not exercise.	1	2	3	4	5	6	7
39. I am too lazy.	1	2	3	4	5	6	7
40. I have difficulty succeeding when I exercise.	1	2	3	4	5	6	7
41. My friends do not encourage me to exercise.	1	2	3	4	5	6	7
42. Because of health problems.	1	2	3	4	5	6	7

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| 43. I find it too inconvenient to exercise. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 44. I am too busy. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 45. I am unable to make myself exercise. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 46. Exercise interferes with my other responsibilities. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 47. I don't like to exercise in bad weather. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 48. It is too expensive. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 49. I don't take pleasure from exercising. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 50. Because of fear of being injured. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 51. I don't like to get hot and sweaty. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 52. Because I lack self-discipline. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

5. BACKGROUND

Age : _____

Gender : Female _____ Male _____

Nationality: Canadian _____ Other _____

Marital status: i) Single _____ Married _____ Common law _____ Divorced _____ Separated _____
 ii) With children _____ Without children _____

High school diploma: Yes _____ - years of education after high school _____ No _____

Type of Occupation: Shift Work _____ Physical Labor _____ Desk Work _____ Other _____

Height (in feet and inches): _____ Weight (in pounds): _____

How many times a week did you exercise in the last 3 months (June, July, August): _____

Do you have the intention to exercise at least 3 times a week in the next 3 months Yes _____ No _____

We thank you very much for your participation!

