

Associations Among Perceived Autonomy Support, Forms of Self-Regulation, and Persistence: A Prospective Study¹

Luc G. Pelletier,^{2,5} Michelle S. Fortier,² Robert J. Vallerand,³
and Nathalie M. Brière⁴

According to self-determination theory, when the social context is autonomy supportive, people are motivated to internalize the regulation of important activities, and whereas when the context is controlling, self-determined motivation is undermined. A model that incorporates perceptions of coaches' interpersonal behaviors (autonomy support vs. control), 5 forms of regulation (intrinsic motivation, identified, introjected and external regulation, and amotivation), and persistence was tested with competitive swimmers (N = 369) using a prospective 3-wave design. Analyses using structural equation modeling revealed that experiencing relationships as controlling fostered non-self-determined forms of regulation (external regulation and amotivation). Greater levels of self-determined motivation occurred when relationships were experienced as autonomy supportive. Individuals who exhibited self-determined types of regulation at Time 1 showed more persistence at both Time 2 (10 months later) and Time 3 (22 months later). Individuals who were amotivated at Time 1 had the highest rate of attrition at both Time 2 and Time 3. Introjected regulation was a significant predictor of persistence at Time 2 but became nonsignificant at Time 3. External regulation was not a significant predictor of behavior at Time 2, but became negatively associated with persistence at Time 3. The findings are discussed in light of the determinants of the

¹This study was supported by research grants from the Social Sciences and Humanities Research Council of Canada for the first three authors, and a research grant from le Fonds pour la Formation des Chercheurs et l'Aide à la Recherche (FCAR Québec) for the first and third authors.

²University of Ottawa, Ottawa, Ontario, Canada.

³Université du Québec à Montréal, Montréal, Québec, Canada.

⁴RRSSS, Gaspé – Île de la Madeleine, Quebec, Canada.

⁵Address all correspondence to Luc G. Pelletier, PhD, School of Psychology, University of Ottawa, P.O. Box 450, Stn A, Ottawa, Ontario, Canada K1N 6N5; e-mail: social@uottawa.ca.

internalization process and the consequences of different forms of self-regulation for psychological functioning.

KEY WORDS: self-regulation; self-determination theory; persistence; autonomy support.

Every day people are confronted with the challenge of self-regulating a variety of behaviors. We want to pay attention to what we eat, we want to exercise, organize our time more effectively, stop procrastinating, cease smoking or drinking, control our emotions and impulses. Since the beginning of the 1980s, research on issues of self-regulation has considerably expanded. Social scientists have proposed models to explain how people regulate themselves (Bandura, 1977; Carver & Scheier, 1998, 1999; Kanfer & Karoly, 1982) and reasons to explain how and why people fail at self-regulation (Baumeister & Heatherton, 1996; Baumeister, Heatherton, & Tice, 1994; Kirschenbaum, 1987). Within these frameworks, it is usually assumed that people have a capacity for self-regulation. However, questions about how people have acquired or internalized this capacity, the possibility that there could be more than one form of self-regulation, and that different forms of self-regulation may lead to different outcomes, are typically ignored.

Deci and Ryan (1985, 1991) proposed that the regulation of behavior could take many forms. In their self-determination theory (SDT) they propose to differentiate forms of regulation along a continuum of self-determination. This continuum contains identifiable gradations of reasons that go from non-self-determined forms of regulation (i.e., amotivated, external and introjected) to self-determined types of regulation (i.e., identified and intrinsic). According to this theory (Deci & Ryan, 1985, 1991), individuals are inherently motivated to integrate within themselves the regulation of extrinsically motivated activities that are useful for effective functioning in the social world but are not inherently interesting (Deci, Eghrari, Patrick & Leone, 1994). This is what has been termed *internalization*. Internalization concerns all those regulations whose occurrence was originally related to extrinsic incentives. It is a proactive process where external regulations are transformed into regulations by the self (Ryan, 1993). The gradation of reasons on the self-determination continuum is viewed as a reflection of the internalization process where the individual is purported to move from the less self-determined forms of regulation to more self-determined types of regulation.

Amotivated regulation refers to a state where individuals do not perceive a relationship between their actions and the outcomes of these actions. When people are amotivated, they act without intent, or they lack the intent to act. There is a perception of lack of control. Amotivated behaviors are the least self-determined because there is no sense of purpose, no expectation of reward, and no expectation that the present course of events can be changed. *External regulation* occurs when behavior is regulated through external means such as rewards and constraints. For example, an individual may participate in an activity because he/she feels urged to do so by a significant other. The motivation is extrinsic because the reason for participation

lies outside the activity itself. Furthermore, the behavior is not chosen (i.e., self-determined) because the individual experiences an obligation, a pressure to behave in a specific way, and feels controlled by an external source (Deci & Ryan, 1985).

The next form of regulation on the self-determination continuum, *introjected regulation*, represents the first form of internal regulation. Although it is a form a motivation that comes from within, it is not fully accepted as one's own. With introjected regulation the formerly external source of motivation is "taken in" and is now reinforced through internal pressures such as anxiety or emotions related to self-esteem (Ryan & Connell, 1989). Through introjection, reliance on environmental regulation is minimized and replaced by an internal source of control that has a role similar to the role played initially by the external source of control. Thus, when introjected, individuals do the monitoring and sanctioning themselves. For example, an individual who does an activity because she/he would feel guilty if it was not performed is exhibiting this type of regulation. Introjected regulation represents the first attempt at internalization. However, internalization is only partial, as the external regulatory process is taken in but not accepted as one's own (Williams & Deci, 1996). For that reason, there still remains a quality of pressure and conflict, or a lack of integration with the self, which means that the activity is not entirely perceived as freely chosen, and does not necessarily make sense to the individual. It is also for that reason that it is said that people who have introjected reasons for doing an activity are not self-determined, but rather they are "self-controlling" their behavior.

In contrast, with *identified regulation*, the motivation is more autonomous or self-determined (Deci & Ryan, 1991). Thus, the behavior is valued and is perceived as being chosen by oneself. The motivation is extrinsic because the activity is not performed for itself, for pleasure or satisfaction, but instead as a means to an end (e.g., achievement of personal goals). However, the behavior is nevertheless self-determined, in that the individual has decided that the activity is beneficial and important and thus chooses freely to perform it. In this case, the person experiences a sense of direction and purpose, instead of obligation and pressure, in performing the activity. This is what has been labeled successful internalization (Koestner, Losier, Vallerand, & Carducci, 1996).

Intrinsically motivated behaviors are engaged in for their own sake; for the pleasure, fun, and satisfaction derived from participation itself (Deci, 1971). They are performed on a voluntary basis in the absence of external contingencies (Deci & Ryan, 1985). Intrinsic motivation is thought to stem from the needs to feel competent, autonomous, and related (Deci, 1975; Deci & Ryan, 1985). Activities that lead the individual to experience these feelings are intrinsically rewarding and are likely to be performed again.

In sum, there are five different types of regulation with varying degrees of self-determination. Intrinsically motivated behaviors are the most self-determined, whereas amotivated behaviors are the least self-determined. External regulation, introjected regulation, and identified regulation are three different forms of extrinsic

motivation, external regulation being the least self-determined of these types. With introjected regulation, the individual begins to internalize the external regulatory process but does not identify with it and thus does not experience self-determination. Finally, with identified regulation the regulatory process is integrated with one's self and behavior becomes self-determined.

The validity of the self-determination continuum has been supported by several studies where a simplex pattern was obtained between the different forms of motivation on the continuum (Guttman, 1954). Specifically, in that particular structure, it has been observed that each type of motivation displayed positive correlations with adjacent regulatory style on the continuum and that in decreasing order, correlations become more negative with distant types of motivations on the continuum (see Vallerand, 1997, for a review of these studies).

EFFECTS OF THE SOCIAL CONTEXT ON SELF-DETERMINED MOTIVATION AND INTERNALIZATION

Social contexts that support an individual's autonomy are hypothesized to facilitate self-determined motivation, whereas contexts that hinder autonomy (i.e., controlling contexts) are hypothesized to undermine self-determined motivation. Cognitive evaluation theory (CET; Deci & Ryan, 1985, 1991) is a subtheory of SDT that was proposed to account for variations in self-determined motivation and more particularly decreases or increases in intrinsic motivation. According to this subtheory, when individuals perceive their behavior as being induced by an external agent (e.g., a deadline), there is a shift from an internal to an external perceived locus of causality. The construct of locus of causality refers to the personal experience of what initiates and regulates behaviors (deCharms, 1968; Heider, 1958). When people experience an internal locus of causality, they see their actions as self-determined and volitional. On the other hand, a perceived external locus of causality involves the attributions that external factors are responsible for initiating behavior. Thus, when there is a shift from an internal to an external perceived locus of causality, individuals do not participate for the sake of the activity itself anymore but rather for some external entity (i.e., the deadline). This change in locus of causality undermines one's feelings of autonomy for the activity and consequently, decreases self-determined forms of regulation (intrinsic motivation and identified regulation) while increasing non-self-determined types of regulation (introjected regulation, external regulation and amotivation). On the other hand, events that facilitate an internal perceived locus of causality or that promote internal reasons for doing the activity enhance feelings of autonomy and correspondingly, increase self-determined action.

Many studies over the past decades (see Deci, Koestner, & Ryan, 1999; Deci & Ryan, 1987, 1991, for reviews) have shown that social contexts that are controlling (e.g., giving rewards, using deadlines, surveillance) undermine intrinsic motivation and identified regulation, while increasing non-self-determined forms of

regulation, whereas social contexts that are autonomy supportive (e.g., offering choices) facilitate intrinsic motivation and self-determination. One specific element in the social context that has been examined recently and has been found to influence motivation is interpersonal behavior (see Deci & Ryan, 1987; Ryan & Stiller, 1991). Researchers have mostly been interested in the effects of two specific styles, a *controlling style*, one in which the significant other acts in a coercive, pressuring, authoritarian way and an *autonomy-supportive style*, where the significant other supports freedom, encourages autonomy, and implicates individuals in the decision process. According to CET, a controlling interpersonal style, like other controlling influences (e.g., deadlines, rewards), should bring about an external perceived locus of causality and thus undermine feelings of autonomy and, correspondingly, self-determination. On the other hand, an autonomy-supportive style should facilitate an internal perceived locus of causality and thus enhance feelings of autonomy and, consequently, promote self-determined forms of regulation.

Research in education (Cordova & Lepper, 1996; Gottfried, Fleming, & Gottfried, 1994; Grolnick, Ryan, & Deci, 1991; Lepper & Cordova, 1992; Skinner & Belmont, 1993; Vallerand, Fortier, & Guay, 1997) and in physical activity and health contexts (Black & Weiss, 1992; Goudas, Fox, Biddle, & Underwood, 1995; Williams & Deci, 1996; Williams, Grow, Freedman, Ryan, & Deci, 1996) confirmed these predictions. More specifically, it was found that an autonomy-supportive style, be it from teachers, parents, coaches, school administrators or health care professionals, facilitates self-determined forms of regulation (intrinsic and identified), and decreases non-self-determined types (introjected, external, amotivated), whereas a controlling style undermines self-determination.

According to SDT, the internalization process is a natural motivated tendency. That is, it is a process that is thought to accrue spontaneously, similar to other intrinsically motivated processes. Consequently, the internalization process can also be impeded or facilitated by the social context. More specifically, it is theorized that the context will influence both the amount and quality of internalization (Deci et al., 1994; Isaac, Sansone, & Smith, 1999; Sansone, Weir, Harpster, & Morgan, 1992). The principal implication of the previous statement is that too much control on the part of other people may actually have deleterious effects on internalization. Indeed, for internalization to proceed such that the regulations become self-determined, it is hypothesized that an autonomy supportive context is necessary.

In 1994, Deci et al. (1994) conducted an experimental study to test these predictions. The purpose of their study was to examine the effects of the autonomy support and control on internalization in the context of a laboratory experiment. More particularly, they examined two forms of internalized motivation, introjected regulation and identified regulation. It was found that autonomy-supportive interpersonal behaviors (providing a rationale, acknowledging feelings, and conveying choice) facilitated the occurrence of identified regulation, whereas controlling interpersonal behaviors or a context nonsupportive of individuals' autonomy, favored

the occurrence of introjected regulation, as evidenced by self-regulation of behavior. Thus, the type of internalization, namely identified self-regulation and introjected self-regulation, appears to be dependent on whether the context tended to be supportive or nonsupportive of one's autonomy.

MOTIVATIONAL CONSEQUENCES OF SELF-DETERMINED AND NON-SELF-DETERMINED TYPES OF REGULATION

Numerous studies have revealed that motivation leads to a host of important outcomes (Vallerand, 1997). Because the different types of regulation are hypothesized to be on a continuum from high to low self-determination, and because self-determination is associated with enhanced psychological functioning (Deci, 1980; Deci & Ryan, 1985), self-determination theory predicts a corresponding pattern of consequences. That is, the self-determined forms of regulation (intrinsic motivation and identified regulation) are postulated to bring about positive consequences, whereas the least self-determined types of regulation (external regulation and amotivation) are predicted to lead to negative outcomes. Much field research over the past two decades have shown this to be the case (see Vallerand, 1997, for a review). More specifically, studies in different life domains (e.g., education, work, interpersonal relationships, politics, health, and physical activity) have found that the more self-determined forms of motivation lead to enhanced learning, greater interest, greater effort, better performance, a more positive emotional tone, higher instances of flow, higher self-esteem, better adjustment, greater satisfaction, and enhanced health, whereas the less self-determined types of regulation are negatively related to these outcomes (Blais, Boucher, Sabourin, & Vallerand, 1990; Grolnick & Ryan, 1987; Fortier, Vallerand, & Guay, 1995; Kasser & Ryan, 1996; Pelletier et al., 1995; O'Connor & Vallerand, 1990; Vallerand et al., 1992, 1993; Williams, Grow, Freedman, Ryan, & Deci, 1996). In addition, much laboratory research has revealed that individuals who are induced to participate in an activity for external reasons (i.e., are motivated in a non-self-determined way) persist less during a free-choice period than those who are intrinsically motivated (see Deci et al., 1999, for a review).

In 1992, Vallerand and Bissonnette conducted a prospective study in the academic domain in order to determine if the experimental findings on motivation and behavioral persistence would generalize to real-life settings. More specifically, they conducted a study with 1042 college students to determine the predictive effects of different forms of academic motivation (measured at Time 1, September) on behavioral persistence in the form of persisting versus dropping out of a compulsory course (measured at Time 2, January). They found that students who persisted in the course had previously reported more self-determined forms of regulation (intrinsic, identified regulation) and less non-self-determined types of regulation (external, amotivated) than students who had dropped out.

Although the Vallerand and Bissonnette study showed that past laboratory results regarding motivation and persistence can be generalized to real-world contexts, it is one of the few field studies to examine the effects of different forms of regulation on real-life persistence using a prospective design. In addition, although their study examined some aspects of SDT, namely motivation and motivational consequences, the determinants of motivation were not ascertained. A more complete test of this theoretical framework should include motivational antecedents, motivation, and outcomes. Finally, the Vallerand and Bissonnette study was conducted over a short period of time (i.e., 5 months).

In 1997, Vallerand and colleagues conducted a second study in the educational domain. More specifically, they tested a motivational model of high school dropout using a 1-year prospective design. However, they measured persistence at only one point in time. Also, their study, like many previous studies (Blais et al., 1990; Fortier et al., 1995) used a global self-determination index as their measure of motivation. Although it is convenient to use a summary motivational score, each of the five forms of regulation (intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation) is qualitatively different from the others and lumping them together does not allow us to examine their respective contributions over time. Indeed, following a series of recent studies (Koestner et al., 1996; Ryan, Rigby, & King, 1993) comparing the two types of internalization (introjected regulation and identified regulation) with regards to their cognitive, emotional and behavioral correlates, Koestner et al. (1996) stated, "We encourage other researchers to further distinguish identified regulation and introjected regulation not only from each other but also from their more frequently studied motivational brethren: intrinsic motivation and amotivation" (p. 1035). Therefore, it would appear important to distinguish the different forms of regulation to obtain a more refined understanding of motivation as well, as its relationships with the social context and behavior.

Accordingly, the purpose of this study was to extend the results of Vallerand and Bissonnette (1992) and Vallerand et al. (1997) on the role of different forms of self-regulation on behavioral persistence in a real-life setting by using a 2-year longitudinal design combined with structural equation modeling (SEM). More specifically, the time-lagged relations among perceptions of coach's interpersonal behaviors (autonomy support vs. control), different forms of regulation, and persistence in the practice of a competitive sport (swimming) were investigated using a three-wave design. As suggested by Vallerand and Bissonnette (1992) behavioral persistence represents a real-life analog to the free-choice measure used in laboratory research (Deci & Ryan, 1985). The use of this variable should then inform us regarding the predictive role of the different forms of regulation in a real-life situation and allow comparisons between the results of this study and those obtained by previous laboratory studies.

Competitive swimming was selected for several reasons. First, it represents a rigorous competitive sport that has some intrinsically interesting components,

but that also involves a considerable amount of discipline, hours of practice, and work. As such, it make sense to believe that an internalized motivation for the activity and its performance should be associated with adherence and persistence over time. Second, coaches play a very active role in training and in competition. They spend long hours interacting with swimmers to correct their strokes and give work outs. Like many other sports, competitive swimming can be approached in an autonomy-supportive way or a controlling way. For example, autonomy-supportive coaches can explain the purpose of the work outs, let swimmers identify goals for the different sets, help them find ways to correct their strokes, or help them develop their own strategies to conduct their races. Controlling coaches can take charge and make these decisions for their athletes. They may not explain why swimmers are asked to do different sets, they may not offer any options about how to train or behave during work outs, and they may dictate how to conduct a particular race. In sum, coaches should represent a very important source of influence on swimmers' motivation. Finally, competitive swimming, like many other competitive sports, has a high level of attrition (Black & Weiss, 1992; Brown, 1985; Le Bars & Guernichon, 1998; Petlichkoff, 1992; Schmidt & Stein, 1991; Whitehead, 1995). In Canada, close to one out of four swimmers drops out every year. This level of attrition is observed for both male and female athletes, and among athletes of different levels of competence.

THIS STUDY

Thus, the specific purpose of this study was to assess (at Time 1) the influence of athletes' perceptions of coaches' interpersonal behaviors (autonomy support vs. control) on the different forms of regulation for the practice of a competitive sport (intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation), and the combined impact of the perception of coaches' interpersonal behaviors and the distinct types of regulation on persistence in the practice of that sport at the end of two competitive swimming seasons. We will refer to the end of the first competitive season as Time 2 (10 months after Time 1) and the end of the second competitive season as Time 3 (22 months after Time 1).

The model posits that athletes' perceptions of coaches' autonomy support should be positively associated with self-determined forms of regulation (i.e., intrinsic motivation and identified regulation), to a lesser extent with introjected regulation, and negatively associated with external regulation and amotivation. Athletes' perceptions of coaches' control should be positively linked with the less self-determined types of regulation (i.e., external regulation, amotivation, and to a lesser extent introjected regulation), and negatively linked with identified regulation and intrinsic motivation. In turn, the more self-determined forms of regulation (intrinsic motivation and identified regulation) should be positively associated with persistence at both Time 2 and Time 3. Relationships between introjected

regulation and persistence should capture the dynamic aspect of motivation over time. Specifically, we reasoned that because introjected regulation represents a form of internal motivation this construct should be positively associated with persistence over a relatively short period of time (i.e., Time 2, the end of the first competitive season). However, because introjected regulation is also a relatively controlled form of regulation in which behaviors are performed to avoid guilt and is not associated with pleasure (Ryan & Deci, 2000), it should be negatively associated with persistence over a longer period time, and may become negatively related to persistence over a longer period of time (i.e., Time 3, the end of the second competitive season). Finally, the less self-determined forms of regulation (external regulation and especially amotivation) should be the best predictors of dropout behavior over time. More specifically, these constructs should be negatively associated with persistence at Time 2 and their relationship with persistence should become even more negative at Time 3.

METHOD

Participants

Participants were 174 male and 195 female Canadian competitive swimmers from 23 different teams from the Province of Quebec. Participants' age ranged from 13 to 22 years with a mean age of 15.6 years (median = 15.9 years). These athletes were training an average of 13.8 hr/week. Approximately 23% of the swimmers were ranked at the national level, 46% were at the provincial level, and 31% were at the regional level.

Procedures and Measures

Participants were asked to complete a questionnaire at the beginning of the competitive season in October (Time 1). Most of the participants coming from the Montreal region completed the questionnaire before a workout during the week preceding a swim meet in Montreal. Participants coming from regions outside of Montreal completed the questionnaire during a weekend swim meet. The swimming competitive year in the Province of Quebec usually starts at the beginning of September and finishes between the end of July and the second week of August depending on the swimmers' level of competence. A representative (usually the head coach) for most of the Province of Quebec's swim teams was contacted first to get his/her consent to approach his/her athletes either during a workout or the upcoming swim meet. It was explained that the purpose of the study was to know more about why athletes of different level of expertise were swimming.

The questionnaire was administered by two trained researchers. The researchers followed the same standardized procedure for both the training and the

swim meet contexts. The researchers explained the type of questions that athletes would be asked to answer, the purpose of the study, and explained that they were asked to put their name down on the questionnaire so that additional information could be gathered later on. It was clearly stated to participants that confidentiality of their answers would prevail at all times, and more specifically, that their coach would not see their answers. The questionnaire was completed in a room adjacent to the swimming pool and the coach was absent during that period of time. Following the completion of the questionnaire, swimmers were thanked for their participation.

Assessment of Perceived Interpersonal Behaviors

Swimmers' perceptions of their coach's interpersonal behaviors were assessed with a scale adapted from Pelletier, Tuson, and Haddad (1997; see also Pelletier & Vallerand, 1996). More specifically, participants were asked to rate the extent to which their coach behaves in certain ways toward them. The scale included 8 items designed to assess perceptions of autonomy support and perceptions of control. Autonomy support included items that tapped coaches' respect of athletes' desire and choice (e.g., "My coach provides me with opportunity to make personal decisions"; 4 items, $\alpha = .81$). Perceptions of control included items that tapped coaches' coercive behavior (e.g., "My coach pressures me to do what he/she wants," 4 items, $\alpha = .83$). All the items were assessed on a 5-point scale anchored by the end points from 1 = (*Does not correspond at all*) to 5 = (*Corresponds exactly*) with the midpoint 3 = (*Corresponds moderately*). For the purpose of this study, the four items representing autonomy supportive behaviors were used as four indicators of perceived autonomy supportive behaviors and the four items representing controlling behaviors were used as four indicators of perceived controlling behaviors.

Sport Motivation Scale

Swimmers completed the Sport Motivation scale (SMS; Pelletier et al., 1995) that assesses their motivational orientation toward their sport. In the SMS, athletes are asked, "Why do you practice your sport?" They are provided with 28 items, 4 items per subscale, presented in the form of answers to that question. These items assess the constructs of amotivation (e.g., I often ask myself; I can't seem to achieve the goals that I set for myself; $\alpha = .90$), extrinsic motivation by external regulation (e.g., because people around me think it is important to be in shape; $\alpha = .76$), by introjected regulation (e.g., because I must do sports to feel good about myself; $\alpha = .83$), by identified regulation (e.g., because it is a good way to learn lots of things which could be useful to me in other areas of my life; $\alpha = .81$). The items also assess three types of intrinsic motivation, intrinsic motivation, to know (e.g., for

the pleasure of discovering new training techniques; $\alpha = .78$), intrinsic motivation toward accomplishments (e.g., for the pleasure I feel while improving some of my weak points; $\alpha = .89$), and intrinsic motivation to experience stimulation (e.g., for the intense emotion that I feel while I am doing a sport that I like; $\alpha = .85$). Participants indicated the extent to which each item corresponds to the reason why they practice their sport, on a scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). Recent studies (Pelletier et al., 1995) confirmed the factor structure of the scale and revealed that the SMS has satisfactory level of internal consistency, as well as adequate test-retest reliability, over a period of 5 weeks. Correlations among the subscales, and correlations between the subscales and motivational constructs, revealed the presence of a simplex pattern confirming the self-determination continuum and the construct validity of the scale. Because we did not have any specific hypotheses about the different types of intrinsic motivation, the 12 items representing the three types of intrinsic motivation were combined to form three indicators of intrinsic motivation (one for each type of intrinsic motivation) and the four items for the other motivational constructs were used as four indicators for each of the other motivational construct.

Persistence

In August of the following year (Time 2, 10 months later and the subsequent August, Time 3, 22 months later), the Provincial Swimming Federation and all participating swimming teams were contacted in order to establish a list of persistent and dropout swimmers. The period of the year during which dropout swimmers stopped swimming was also identified. Because of limited resources and the period of time necessary to verify if a swimmer had really dropped out or had joined another team, it was possible to keep track of participants only every 2 months. Two measures of persistence were obtained, one for the first season and one for the second season. The behaviors each year were coded on a 1–5 scale. For the 1st year, swimmers who persisted all year were coded as 5; those who dropped out in the period of May–June were coded as 4; those who dropped out in the period of March–April were coded as 3; those who dropped out in the period of January–February were coded as 2; those who dropped out in the period of November–December were coded as 1. During the 2nd year a similar pattern was used. Swimmers who were still involved in swimming and persisted all year were coded as 5; those who dropped out in the period of May–June were coded as 4; those who dropped out in the period of March–April were coded as 3; those who dropped out in the period of January–February were coded as 2. However, because we considered persistence in the 2nd year as a distinct measure from Time 2 and we wanted to consider all participants for Time 3, the swimmers who dropped out in the period of November–December or during the 1st year were coded as 1.

A total of 175 dropout cases (83 in the 1st year, 92 in the 2nd year) was identified using these procedures. The number of drop-out cases amounted to 47.4% (22.5% in the 1st year and 24.9% in the 2nd year). The dropout rates were equally distributed among the swimmers of different competence levels. In the 1st year 23.9% ($n = 23$) of the national level swimmers, 22.3% ($n = 33$) of the provincial level swimmers, and 23.6% ($n = 27$) of the regional level swimmers dropped out of competitive swimming. In the 2nd year 26.0% ($n = 25$) of the national level swimmers, 25.6% ($n = 38$) of the provincial level swimmers, and 25.4% ($n = 29$) of the regional level swimmers dropped out of competitive swimming. These numbers are very much in line with recent statistics in swimming across Canada (Swim Canada, 1995), which reveal that 27% of competitive swimmers drop out every year, and close to 80% of participants swimming at the age of 13 drop out before the age of 18. Finally, the number of male ($n = 82$) and female ($n = 92$) dropouts over 2 years represented 47% of their respective samples.

Analyses

Two sets of analyses were carried out. The first set focused on the differences between the dropout and persistent athletes on the scores of the five motivational subscales and the perceptions of coaches' interpersonal behaviors. The second set of analyses tested how perceptions of coaches' interpersonal behaviors might affect athletes' motivational orientation and how athletes' motivation, in turn, might affect persistence in competitive swimming. Our primary method of analysis was SEM (LISREL VIII; Jöreskog & Sörbom, 1996). The specified model was tested with standardized coefficients obtained from the maximum-likelihood method of estimation. This method, particularly useful in longitudinal research (Bentler, 1980), allows examination of the covariances among all the constructs involved in a model using a latent representation of constructs that is not influenced by errors of measurement. In view of the current state of controversy regarding measures of overall model fit, it is generally recommended to report multiple indices (Bollen, 1989; Hoyle & Panter, 1995). When model fit is adequate, the χ^2 is nonsignificant. However, because the χ^2 is notoriously oversensitive to sample size (Byrne, 1989), alternative fit indices are generally assessed. Several fit indices and other estimates from the LISREL solution were used to evaluate the adequacy of the proposed model (Bentler, 1990; McDonald & Marsh, 1990; Mulaik et al., 1989). The goodness-of-fit chi-square value from the LISREL solution, the goodness-of-fit index (GFI; Jöreskog & Sörbom, 1996), the normed fit index (NFI; Bentler & Bonett, 1980), and the comparative fit index (CFI; Bentler, 1990) were reported as overall assessment of model fit. The adjusted goodness-of-fit index (AGFI; Jöreskog & Sörbom, 1996) provided an indication of fit that is adjusted for model complexity. Finally, the root mean square error of approximation

(RMSEA) is provided as a measure of absolute model fit given that we were interested in the fit of our hypothesized model rather than in contrasting alternative models.

RESULTS

Preliminary Analyses

Maximum likelihood estimation is valid provided that the data conform to a certain number of basic assumptions. The main goal of the preliminary analyses was to assess whether these assumptions held for the sample under study. First, mean and standard deviation values revealed that the variables displayed acceptable dispersion. Kurtosis values ranged from -1.42 to 0.34 , whereas skewness values ranged from -0.71 to 0.13 . Despite a few high values, univariate values of kurtosis and skewness were considered adequate since mean kurtosis ($|M| = 0.77$) and mean skewness ($|M| = 0.25$) were within an acceptable range of $0-1.00$ (Muthén & Kaplan, 1985). Moreover, from a multivariate perspective, the distribution of standardized residuals appeared normal. Second, bivariate scatterplots were inspected to detect potential departures from linearity. The bivariate distributions generally displayed linear configurations. The bivariate scatterplots were also screened to identify uneven distributions of the variance between the pairs of variables. No evidence of heteroscedasticity was found. Third, the correlations between all possible pairs of variables included in the analyses were scanned for multicollinearity. There were no correlations in excess of $.89$ (Tabachnick & Fidell, 1996). Finally, the distribution of the standardized scores for all the variables included in the model was examined to detect potential univariate outliers. No cases with standardized scores greater than $|3|$ were identified. Multivariate standardized residuals, leverage, and Mahalanobis' and Cook's distances were computed to screen for multivariate outliers. Multivariate standardized residuals displayed acceptable values, ranging from -1.99 to 1.79 . There were no leverage scores above 0.20 within the cases under study (Huber, 1981). No Cook's distances above 1.00 were identified within the present sample (Hamilton, 1992), and no cases presented significant Mahalanobis' distances.

Comparison of means between female and male swimmers for the different types of motivation revealed that female swimmers ($M = 16.25$) scored higher than male swimmers did ($M = 15.19$) on the identified regulation subscale, $t(267) = 2.95$, $p < .01$, and female swimmers ($M = 11.14$) scored lower than male swimmers did ($M = 11.95$) on the external regulation subscale, $t(267) = 1.76$, $p < .05$. These differences were relatively marginal. Because males and females did not differ on the other subscales or in the relation of different kinds of regulation and perception of coaches' behavior to persistence, gender was not considered in the following analyses.

Table I. Mean Comparisons for the Persistent and Dropout Athletes on the Motivational Subscales and Dimensions of Coaches' Interpersonal Behaviors

Variables	Persistent athletes (<i>n</i> = 194)	Dropout athletes (<i>n</i> = 175)	<i>t</i>
Athletes' motivation			
Intrinsic motivation	17.01 (1.14)	14.62 (0.72)	3.83**
Identified	16.92 (1.05)	14.53 (0.91)	3.71**
Introjected	13.13 (1.02)	13.32 (0.88)	1.12
Externally regulated	11.03 (0.98)	12.57 (1.03)	2.37*
Amotivation	5.52 (1.05)	8.59 (0.87)	4.21**
Coaches' behaviors			
Autonomy support	15.86 (1.26)	14.26 (1.08)	2.68*
Control	12.52 (2.06)	13.85 (1.95)	2.59*

Note. All scores could range from 1 to 20. Numbers in parentheses are standard deviations. The three Intrinsic Motivation subscales were collapsed to form one overall intrinsic motivation score.

* $p < .01$. ** $p < .001$.

Mean Comparisons Between Persistent and Dropout Athletes

We begin by examining differences between persistent and drop-out athletes regarding their motivational profiles and their perceptions of coaches' interpersonal behaviors. The means and standard deviations for the five motivational subscales and the two dimensions of coaches' interpersonal behaviors as a function of persistent and drop-out athletes are shown in Table I. In agreement with Vallerand and Bissonnette (1992), and Vallerand, Fortier, and Guay (1997), it was hypothesized that athletes who persisted in the practice of the activity would report higher levels of self-determined motivation (i.e., be more intrinsically motivated and identified, and less externally regulated and amotivated), and would perceive their coach to be more autonomy supportive and less controlling than dropout athletes. As expected, persistent athletes were more intrinsically motivated and identified, and less externally regulated and amotivated toward their sport than dropout athletes. Means for both groups on the introjected regulation subscale were not significantly different. Persistent athletes also reported that their coach was more autonomy supportive and less controlling than dropout athletes.

Test of the Proposed Model

We tested the proposed model using structural equation modeling and the variance-covariance matrix of the observed variables. The model included seven latent constructs representing perceptions of coaches' autonomy support and control as predictors of the five types of regulation (intrinsic motivation, identified, introjected and external regulation, and amotivation), and two observed variables representing actual dropout behaviors at Time 2 and Time 3. Measurement specifications included the estimation of all 31 target loadings and residuals variances.

All cross-loadings and item error covariances were fixed to 0. The variances of the latent variables were scaled by fixing the first constituent loadings at 1, thus scaling the variance of the latent variables in the metric of that particular measured variable. Then, we requested the standardized solution as part of the LISREL output to evaluate all constituent loadings. The structural model was specified to estimate the regression coefficients of coaches' autonomy support and coaches' control on the five constructs representing the five types of motivation, and the regression coefficients of the five types of motivation on dropout behavior at Time 2 and dropout behavior at Time 3. The correlation (ϕ value) between perceptions of coaches' autonomy support and control, and residual variances for the endogeneous constructs were also estimated.

Structural measurement coefficients, and residual variances for each constructs from the completely standardized solution under the maximum likelihood method of estimation are displayed in Table II. Intercorrelations among the seven latent constructs and the two measures of persistence included in the model are shown in Table III. Model estimation yielded a satisfactory fit, $\chi^2(351, N = 369) = 647.67, p < .001$; RMSEA = 0.048; GFI = 0.92; AGFI = 0.90; CFI = 0.95; NFI = 0.91. All estimated parameters were significant except for the direct effect of perception of coaches' autonomy support on external regulation, perception of coaches' control on identified regulation and intrinsic motivation, external regulation on dropout behavior at Time 2, and the effect of introjected regulation on dropout behavior at Time 3. An illustration of the model is presented in Fig. 1. Because introduction of these five associations between latent constructs did not contribute in any way to the model, a new model was estimated in which those associations were omitted. Model estimation yielded a satisfactory fit very similar to the first model estimated, $\chi^2(356, N = 369) = 601.46, p < .001$; RMSEA = 0.048; GFI = 0.92; AGFI = 0.90; CFI = 0.95; NFI = 0.92. The GFI indicated that the model explained 92% of the sample covariance. Finally, the RSMEA was just below 0.05, which indicates a very good fit to the data (Steiger, 1990).

As illustrated in Fig. 1, perception of autonomy support and control were negatively and moderately related, suggesting that the two constructs were perceived as being relatively independent. Perception of coaches' control was positively associated with introjected regulation, external regulation, and amotivation. Perception of autonomy support was associated positively with intrinsic motivation, identified regulation and introjected regulation, and negatively with amotivation. Moreover, intrinsic motivation and identified regulation were significant positive predictors of persistence at both Time 2 (10 months later) and Time 3 (22 months later). Amotivation was a strong negative predictor of persistence at both Time 2 and Time 3. Introjected regulation was a significant predictor of persistence at Time 2, but became nonsignificant at Time 3. Finally, external regulation was not a significant predictor of behavior at Time 2; however, it became negatively associated with persistence a year later. It is important to note that the same relations were observed when Time 2 and Time 3 persistence were considered in separate models.

Table II. Standardized Maximum Likelihood Estimates for the Six Latent Factors

Items	Latent factors						
	Amotivation	External regulation	Introjected regulation	Identified regulation	Intrinsic motivation	Coaches' autonomy support	Coaches' control
Amotivation 1	0.96 (0.28)						
Amotivation 2	0.94 (0.33)						
Amotivation 3	0.91 (0.40)						
Amotivation 4	0.90 (0.41)						
External Regulation 1		0.92 (0.36)					
External Regulation 2		0.90 (0.39)					
External Regulation 3		0.88 (0.44)					
External Regulation 4		0.81 (0.56)					
Introjected Regulation 1			0.89 (0.33)				
Introjected Regulation 2			0.82 (0.37)				
Introjected Regulation 3			0.75 (0.38)				
Introjected Regulation 4			0.72 (0.40)				
Identified Regulation 1				0.93 (0.21)			
Identified Regulation 2				0.85 (0.28)			
Identified Regulation 3				0.82 (0.39)			
Identified Regulation 4				0.81 (0.40)			
Intrinsic Motivation 1					0.94 (0.28)		
Intrinsic Motivation 2					0.92 (0.38)		
Intrinsic Motivation 3					0.90 (0.39)		
Intrinsic Motivation 4					0.82 (0.51)		
Coaches' Autonomy Support 1						0.83 (0.35)	
Coaches' Autonomy Support 2						0.82 (0.47)	
Coaches' Autonomy Support 3						0.78 (0.55)	
Coaches' Autonomy Support 4						0.70 (0.59)	
Coaches' Control 1							0.84 (0.32)
Coaches' Control 2							0.75 (0.42)
Coaches' Control 3							0.72 (0.48)
Coaches' Control 4							0.69 (0.61)

Note. All standardized factor loadings are significant at $p < .001$. Numbers in parentheses are standardized residuals.

Table III. Intercorrelations Among the Constructs Included in the Model

	Autonomy support	Control	Intrinsic motivation	Identified regulation	Introjected regulation	External regulation	Amotivation	Persistence Time 2
Coaches' behaviors								
Autonomy support	-.41							
Control								
Athletes' motivation								
Intrinsic motivation	.46	-.10						
Identified regulation	.59	-.11	.46					
Introjected regulation	.30	.36	.33	.28				
External regulation	.09	.78	.05	.10	.29			
Amotivation	-.45	.38	-.36	-.30	.02	.15		
Persistence Time 2	.18	-.02	.41	.40	.28	.08	-.66	
Persistence Time 3	.10	-.09	.47	.31	-.01	-.33	-.89	.67

Note. Correlations higher than $\pm.11$ are significant at $p < .01$, two-tailed tests.

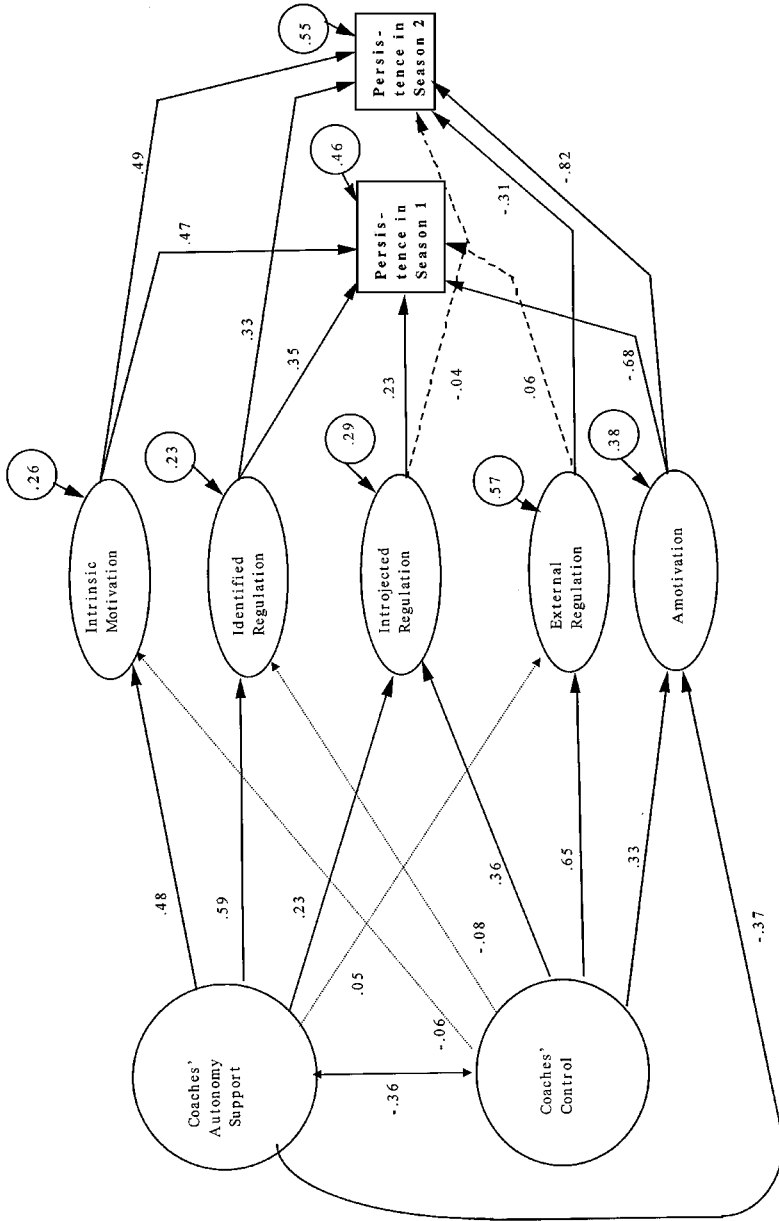


Fig. 1. Structural equation model for the influence of coaches' interpersonal behaviors on athletes' forms of regulation and persistence over a 10-month period (Time 2) and a 22-month period (Time 3). All parameters are standardized and significant at $p < .01$. Nonsignificant paths are represented by dashed lines.

Because coaches' interpersonal behaviors and swimmers' motivation were assessed simultaneously, there was a possibility that swimmers' motivation may have influenced coaches' interpersonal behaviors or that coaches' interpersonal behaviors may have directly influenced persistence at Time 2 and Time 3. To examine these possibilities, an alternative model was tested. This model was specified to estimate the regression coefficients of the five constructs representing the five types of motivation on coaches' autonomy support and coaches' control, and the regression coefficients of the two coaches' behaviors on dropout behavior at Time 2 and dropout behavior at Time 3. The indicators revealed that the model did not adequately reflect the data, $\chi^2(351, N = 369) = 1012.43, p < .001$; RMSEA = 0.08; GFI = 0.86; AGFI = 0.84; CFI = 0.89; NFI = 0.86. Second, we examined the modification indices obtained for the first model to verify if the relationships between coaches' behaviors and persistence at Time 2 and Time 3 would indicate that perceptions of coaches' interpersonal behaviors had a direct impact on dropout behaviors or that the five types of motivation were predicting the perception of coaches' behaviors. No additional modifications were suggested or that could lead to significant improvement in the fit indices.

We also examined possible ways to consider the Time 2 and Time 3 persistence variables and their role in the model. Although Time 2 and Time 3 represented the end of distinct competitive seasons, it is also possible to treat the persistence measure as a single continuous measure. This way, a swimmer who dropped out during the season of the 2nd year would get a score that represents the length of time that she or he swam competitively following the Time 1 assessment. Model estimation yielded a satisfactory fit very similar to that of the first model estimated, $\chi^2(350, N = 369) = 491.23, p < .001$; RMSEA = 0.047; GFI = 0.93; AGFI = 0.91; CFI = 0.95; NFI = 0.92. Overall, the associations among perceptions of coaches' autonomy support, coaches' control, and the five types of motivation were the same as the associations observed in Model 1. However, when the persistence data were treated as a single variable, the β s between the five types of motivation and persistence were all significant (Intrinsic Motivation = 0.45; Identified Regulation = 0.38; Introjected Regulation = 0.11; External Regulation = -0.22; Amotivation = -0.77). In sum, the results obtained with both models were highly consistent, but suggest also that breaking down persistence as a function of two distinct competitive seasons may allow a more refined analysis of the dynamic relationships between the different types of motivation and persistence by showing that some predictors were significant at one assessment, but not at another.

DISCUSSION

In this study, a model describing a causal sequence between swimmers' perceptions of coaches, forms of regulation differentiated along a continuum of

self-determination, and persistence over a two competitive seasons was examined in the context of a competitive physical activity. Overall, it was predicted that athletes' perceptions of coaches' autonomy support should be positively associated with intrinsic motivation and identified regulation, and to a lesser extent with introjected regulation. Athletes' perceptions of coaches' control should be positively linked with external regulation, amotivation, and to a lesser extent introjected regulation. In turn, intrinsic motivation and identified regulation should be positively associated with persistence at both the end of the first competitive season (i.e., Time 2) and the end of the second competitive season (i.e., Time 3). Introjected regulation should be positively associated with persistence over a relatively short period of time (i.e., Time 2) but should be negatively associated with persistence over a longer period time. Finally, external regulation, and especially amotivation should be the best predictors of dropout behavior over time. More specifically, these constructs should be negatively associated with persistence at Time 2 and their relationship with persistence should become even more negative at Time 3. Globally, the analyses supported the hypotheses. Athletes who were intrinsically motivated and self-determined (identified regulation) showed more persistence for both Time 2 and Time 3. Athletes who indicated that they were amotivated had the highest rate of attrition at both assessments. Introjected regulation was a significant predictor of persistence at Time 2, and became nonsignificant at Time 3. Finally, external regulation was not a significant predictor of dropout at Time 2; however, this specific type of motivation showed a different pattern a year later. As revealed in Fig. 1, external regulation became a significant predictor of dropout at Time 3. Overall, our results support the proposition that the regulation of behavior can vary greatly in its relative autonomy, and unlike some perspectives that view the regulation of behavior as unidimensional, the distinctions between the different types of regulation can lead to significant predictions about the persistence of behavior over time.

In the case of introjected regulation, two scenarios could become possible. As suggested by analyses of the facilitation of the integrative process (Deci & Ryan, 1985, 1991), athletes who train for introjected reasons could follow a pattern similar to the pattern observed with the non-self-determined athletes and simply take more time before they drop out. Introjected reasons could also represent temporary reasons for training. As athletes become more self-determined (i.e., the environment is autonomy supportive and favors the internalization process), they may try to understand more clearly why they behave or train as they do. Their behaviors may become more chosen, and less pressured. In these conditions, it is probable that they will persist. The direction that the individuals will take may depend largely on the type of support they receive from their social environment (e.g., coach and parents). Although, an autonomy supportive environment may appear as a better choice, for some reasons individuals in a position of authority may behave otherwise because they have lay theories regarding ways of optimizing motivation (Boggiano, Barrett, Weiher, McClelland, & Lusk, 1987) or because

they have beliefs about a subordinates' motivation that could induce them to support autonomy (or to be controlling) with subordinates, which may in turn, cause the behavior of the subordinate to confirm the supervisor's beliefs (Pelletier & Vallerand, 1996). It is also possible that contextual factors, such as impressing upon supervisors that they were responsible for a subordinate performing up to high standards (Deci, Speigel, Ryan, Koestner, & Kauffman, 1982), whether or not supervisors are expected to use rewards to motivate subordinates or that supervisors are themselves rewarded (Harackiewicz & Larson, 1986), may determine whether supervisors create a climate that is primarily controlling or primarily oriented toward supporting autonomy.

Implications for Self-Determination Theory and Research

Given the significance of self-determined motivation for personal experience and behavioral outcomes, autonomy support may become especially relevant for teenage athletes. Competitive swimming, like many other contexts, can yield self-determined motivation when it is autonomy supportive (Ryan & Deci, 2000). To integrate the regulation of the activity and become self-determined, teenage athletes must understand the meaning of the activity and relate that meaning to other goals and valued activities in their life. According to Deci et al. (1994), this process is facilitated by a sense of choice, the provision a meaningful rationale for training, and freedom from external pressure which should allow athletes progressively to transform the activity into something that they will value. Interestingly, there is almost no research on the effect of autonomy-supportive versus controlling styles on individuals of different age groups and more specifically on teenage athletes' motivation (Vallerand & Losier, 1999). Future research is needed in order to better understand what is the role of coaches' interpersonal behaviors on the motivation of athletes of different ages and how these behaviors facilitate the development of self-determined motivation.

The findings from this study are in line with findings from recent research on the influence of interpersonal behaviors on self-determined motivation and the internalization process (see Deci et al., 1994; Deci & Ryan, 1991; Ryan & Stiller, 1991). More specifically, an autonomy-supportive context as compared to a controlling context, represents an important determinant that could affect the quality of motivation. Autonomy support occurs when a significant other (i.e., a parent, a coach, or a teacher) takes the target's perspective, provides choice, reflects the target's feelings, and encourages the target's initiative. Control occurs when a significant other pressures to perform up to external standards or uses rewards and constraints to manipulate the target's behavior. When significant others are autonomy-supportive and less controlling, individuals are more likely to be intrinsically motivated, and the internalization of self-determined extrinsically motivated behaviors is more likely to be facilitated. Although our results support

these propositions, they must be interpreted with caution. It is important to point out that it was swimmers' perceptions of their coaches' behaviors that were being assessed in this study and that those perceptions were measured at the same time swimmers' motivation was assessed. There is still a possibility that swimmers' perception of their coach was influenced by their own motivational orientation, that coaches' interpersonal behaviors may be influenced by swimmers' motivation, or that some unmeasured third variable influenced both.

A closer examination of the relationships between perception of coaches' interpersonal behaviors and the different types of motivation is quite interesting. More specifically, the association between our swimmers' perceptions of coaches' autonomy support and control, is significant but moderately negative. This suggests that perceptions of autonomy support and control may not be the exact opposite of each other. Perception of autonomy support and the absence of control are associated positively with the self-determined types of motivation, whereas the perception of control and the absence of autonomy support are associated with external regulation. These observations support Ryan and Deci's proposition that the experience of autonomy facilitates internalization and the experience of control yields less overall internalization (Ryan & Deci, 2000). However, it is also interesting to note that perceptions of autonomy support and control are both positively associated with introjected regulation, which suggest that coaches sometimes could use components of both types of interpersonal behaviors. The perception of both types of interpersonal behaviors seems to capture the essence of introjected regulation, which is "taking in a regulation but not fully accepting it as one's own" (Deci & Ryan, 2000, p. 72). Finally, amotivation, which is defined as a state where people do not act, act without intent, or lack the intention to act, is positively associated with the perception of control and negatively associated with the perception of autonomy support. In sum, the support of autonomy and the control of behavior may represent something different than two sides of the same coin. Further research is needed to understand how both types of interpersonal behaviors are associated with different types of motivation. These research could examine more closely if the present results about the influence of autonomy-supportive and controlling behaviors are sport-specific and if they can be generalized to other sports or other domains like education.

The present findings are also in line with recent research on the prediction of persistence in the domain of education (Vallerand et al., 1997; Vallerand & Bissonnette, 1992), the prediction of attendance at weight-loss program meetings (Williams et al., 1996), and persistence in physical activity (Frederick, Manning, & Morrison, 1996). It is interesting to note that Vallerand et al. (1997) observed a negative relationship between introjected regulation and high school drop out over a period of one year. In this study, introjected regulation was positively associated with persistence over a period of 1 year and became nonsignificant over a period of 22 months. It is difficult to tell if these findings may be specific to our

sample, the activity that was the focus of our study, or the age of the participants. In the Vallerand et al. (1997) study, students had a mean age of 15 years, a year younger than the legal age where they can decide to drop out of school. In this study, participants were also teenagers with an average of 15.6 years. However, unlike school, there is no legal age an athlete must attain before dropping out of swimming. Future research could examine more closely if the association between introjected regulation and persistence is related to the participants' age or is a function of an obligation to remain involved in an activity until one reach a specific age. It should also be noted that our measure of persistence assessed quitting competitive swimming, which is not necessarily the same as dropping out of swimming altogether. It is still possible that some drop-out swimmers may have decided to continue swimming for fun or exercise without being involved in competitive swimming.

These findings have an important implication with respect to the assessment of the different forms of motivation. Sometimes researchers combine the different subscales into a self-determination index (e.g., Blais et al., 1990; Fortier, Vallerand, & Guay, 1995; Grolnick & Ryan, 1987; Vallerand et al., 1997). This is done by weighting the subscales according to their respective placement on the self-determination continuum. The scores for each subscales are then added to derive a single score. A single score may be useful to select individuals who display a self-determined or non-self-determined motivational profile and to assign them to experimental conditions. The self-determination index may also be useful to test a theoretical model. The index provides a reliable indication of the participants' relative autonomy without having to deal with multiple indicators for each types of motivation. However, the use of a single score may not be appropriate for a more refined analysis of changes that may occur over time with respect to the influence of the different forms of motivation. In other words, a multidimensional approach to motivation may yield valuable information that an index cannot provide. For example, Sheldon and Elliot (1998) observed that autonomous reasons for goals, when compared with controlled reasons, led to attainment because they promoted early and later effort investment. In this study, the multidimensional assessment of motivation allowed us to make important distinctions among the quality of different forms of regulations. Intrinsic motivation and identified regulation were positively associated, and amotivation negatively associated, with persistence over 22-month period. Introjected regulation was positively associated with persistence over a 10-month period and became nonsignificant over a 22-month period. External regulation was not significantly associated with persistence over a 10-month period but became a significant predictor of dropout behavior over a 22-month period. These patterns suggest dynamic relationships consistent with predictions from self-determination theory. When these distinctions are considered, significant aspects of behavior such as persistence over a long period of time, can be predicted and observed.

Implications for Understanding Different Forms of Self-Regulation and Their Effects

Together these results provide strong support for the idea that the regulation of behavior can take many forms and that these forms can be distinguished along a continuum of self-determination, as suggested by self-determination theory (Deci & Ryan, 1985, 1991). More specifically, although our analyses revealed that self-regulation can predict persistence, our findings also suggest that how one self-regulates (intrinsic motivation, identified or introjected regulation) also matters. Intrinsic motivation represents a form of self-regulation in which there is a sense of autonomy and behaviors are performed out of interest or the inherent satisfaction that these behaviors provide. Identified regulation represents a form of self-regulation in which there is a sense of volition for behaviors that are valued and perceived as personally important. Introjected regulation refers to a form of self-regulation in which there is a sense of pressure, guilt, and self-esteem contingencies (Ryan et al., 1993). As a result, introjected regulation is theorized to be associated with conflict and internal pressure. Although the three forms of self-regulation could lead to maintenance of a specific behavior over a relatively short period of time, with introjected regulation it becomes more difficult to maintain the behavior for a longer period of time.

An important implication of the present findings for theories and research self-regulation is that by making distinctions among different forms regulation (intrinsic motivation and identified regulation, introjected and external regulation, and amotivation), it becomes possible to further understand successful as well as unsuccessful self-regulation. For instance, Baumeister, Heatherton, and Tice (1994) proposed that the failure to exert the necessary control over oneself could occur because people do not have the strength or the will power to maintain self-regulation (i.e., underregulation), or when they try to exert control in a way that fails to bring about the desired result (i.e., misregulation). We suggest that distinctions between forms of regulation along a continuum of self-determination may account for the lack of strength to maintain self-regulation and the reasons why people fail to exert or maintain control over themselves. Furthermore, in accordance with the proposition that higher levels of self-determined motivation are associated with better psychological functioning, we suggest that some reasons for misregulation may be associated with forms of regulation not well integrated into the self. This proposition supports the arguments of Ryan (1995), who suggested that people acting through introjected regulation could be just as energized in their effort to regulate themselves as those whose motivation is based on identification. However, the functional effects of these two forms of motivation should affect considerably how the behavior is regulated. Introjected regulation should typically result in behavior that is less stable, persistent, well-performed, and less coordinated with other aspects of the self, than identified regulation. As a result, over time successful self-regulation should be positively associated with identified regulation and less

associated with introjected regulation. This is exactly what was found in this study.

In conclusion, we believe that the present findings provide additional support for self-determination theory and the importance of considering different forms of regulation in the prediction of behavior. Because SDT specifies characteristics of different forms of self-regulation, findings that support its application have also important implications for our understanding of the factors responsible for successful or unsuccessful self-regulation.

REFERENCES

- Bandura, A. (1977). Self-efficacy theory: Toward a unifying theory of behavioral change. *Psychological Review*, *84*, 191–215.
- Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry*, *7*, 1–15.
- Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing control: How and why people fail at self-regulation*. New York: Academic Press.
- Bentler, P. M. (1980). Multivariate analysis with latent variables: Causal modeling. *Annual Review of Psychology*, *31*, 419–456.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238–246.
- Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structure. *Psychological Bulletin*, *88*, 588–606.
- Black, S. J., & Weiss, M. R. (1992). The relationship among perceived coaching behaviors, perceptions of ability, and motivation in competitive age-group swimmers. *Journal of Sport and Exercise Psychology*, *14*, 309–325.
- Blais, M. R., Sabourin, S., Boucher, C., & Vallerand, R. J. (1990). Toward a motivational model of couple happiness. *Journal of Personality and Social Psychology*, *59*, 1021–1031.
- Boggiano, K. M., Barrett, M., Weiher, A. W., McClelland, G. H., & Lusk, C. M. (1987). Use of maximal-operant principle to motivate children's intrinsic interest. *Journal of Personality and Social Psychology*, *53*, 866–879.
- Bollen, K. A. (1989). *Structural equations with latent variables*. New York: Wiley.
- Brown, B. A. (1985). Factors influencing the process of withdrawal by female adolescents from the role of competitive age group swimmer. *Sociology of Sport*, *2*, 111–129.
- Byrne, B. M. (1989). *A primer of LISREL*. New York: Springer.
- Carver, C. S., & Scheier, M. F. (1998). *On the self-regulation of behavior*. New York: Cambridge University Press.
- Carver, C. S., & Scheier, M. F. (1999). Themes and issues in the self-regulation of behavior. In R. S. Wyer, Jr. (Ed.), *Advances in social cognition: Vol. XII. Perspectives on behavioral self-regulation*. Mahwah, NJ: LEA.
- Cordova, D. I., & Lepper, M. R. (1996). Intrinsic motivation and the process of learning: Beneficial effects of contextualization, personalization, and choice. *Journal of Educational Psychology*, *88*, 715–730.
- deCharms, R. (1968). *Personal causation: The internal affective determinants of behavior*. New York: Academic Press.
- Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, *18*, 105–115.
- Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum.
- Deci, E. L. (1980). *The psychology of self-determination*. Lexington, MA: D.C. Heath.
- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination perspective. *Journal of Personality*, *62*, 119–142.
- Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, *125*, 627–668.

- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E. L., & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of Personality and Social Psychology*, *53*, 1024–1037.
- Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Nebraska symposium on motivation: Vol. 38. Perspectives on motivation* (pp. 237–288). Lincoln, NE: University of Nebraska Press.
- Deci, E. L., Spiegel, N. H., Ryan, R. M., Koestner, R., & Kauffman, M. (1982). The effects of performance standards on teaching styles: The behavior of controlling teachers. *Journal of Educational Psychology*, *74*, 852–859.
- Fortier, M. S., Vallerand, R. J., & Guay, F. (1995). Academic motivation and school performance: Toward a structural model. *Contemporary Educational Psychology*, *20*, 257–274.
- Frederick, C. M., Manning, T., & Morrison, C. (1996). Motivation to participate, exercise affect, and outcome behaviors toward physical activity. *Perceptual and Motor Skills*, *82*, 691–701.
- Gottfried, A. E., Fleming, J. S., & Gottfried, A. W. (1994). Role of parental motivational practices in children's academic intrinsic motivation and achievement. *Journal of Personality and Social Psychology*, *86*, 104–113.
- Goudas, M., Fox, K., Biddle, S., & Underwood, M. (1995). It Ain't What You Do, It's the Way That You Do It! Teaching Style Affects Children's Motivation in Track and Field Lessons. *The Sport Psychologist*, *9*, 254–264.
- Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology*, *52*, 890–898.
- Grolnick, W. S., Ryan, R. M., & Deci, E. L. (1991). Inner resources for school achievement: Motivational mediators of children's perceptions of their parents. *Journal of Educational Psychology*, *83*, 508–517.
- Guttman, L. (1954). A new approach to factor analysis: The padex. In L. Lazerfel (Ed.), *Mathematical thinking in the social sciences* (pp. 258–348). New York: Free Press of Glencoe.
- Hamilton, L. C. (1992). *Regression with graphics—A second course in applied statistics*. Pacific Grove, CA: Brooks/Cole.
- Harackiewicz, J. M., & Larson J. R. (1986). Managing motivation: The impact of supervisor feedback on subordinate task interest. *Journal of Personality and Social Psychology*, *47*, 287–300.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.
- Hoyle, R. H., & Panter, A. T. (1995). Writing about structural equation modeling. In R. H. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications* (pp. 158–176). Thousand Oaks, CA: Sage.
- Huber, P. J. (1981). *Robust statistics*. New York: Wiley.
- Isaac, J. D., Sansone, C., & Smith, J. L. (1999). Other people as a source of interest in an activity. *Journal of Experimental Social Psychology*, *35*, 239–265.
- Jöreskog, K. G., & Sörbom, D. (1996). *LISREL 8: User's reference guide*. Chicago, IL: Scientific Software International.
- Kanfer, F. H., & Karoly, P. (1982). The psychology of self-management: Abiding issues and tentative directions. In P. Karoly & F. H. Kanfer (Eds.), *Self-management and behavior change: From theory to practice* (pp. 571–599). New York: Pergamon.
- Kasser, T., & Ryan, R. M. (1996). Further examining the American dream: Differential correlates of intrinsic and extrinsic goals. *Personality and Social Psychology Bulletin*, *22*, 280–287.
- Kirschenbaum, D. S. (1987). Self-regulation failure: A review with clinical implications. *Clinical Psychology Review*, *7*, 77–104.
- Koestner, R., Losier, G., Vallerand, R. J., & Carducci, D. (1996). Identified and introjected forms of political internalization: Extending self-determination theory. *Journal of Personality and Social Psychology*, *70*, 1025–1036.
- Le Bars, H., & Gernichon, C. (1998). Perceived motivational climate, dispositional goals, and participation/withdrawal in judo. *Journal of Sport and Exercise Psychology*, *558*.
- Lepper, M. R., & Cordova, D. I. (1992). A desire to be taught: Instructional consequences of intrinsic motivation. *Motivation and Emotion*, *16*, 187–208.
- McDonald, R. P., & Marsh, H. W. (1990). Choosing a multivariate model: Noncentrality and goodness of fit. *Psychological Bulletin*, *107*, 247–255.

- Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of goodness-of-fit indices for structural equation models. *Psychological Bulletin*, *105*, 430–445.
- Muthén, B., & Kaplan, D. (1985). A comparison of methodologies for the factor analysis of non-normal Likert variables. *British Journal of Mathematical and Statistical Psychology*, *38*, 171–189.
- Pelletier, L. G., Fortier, M. S., Vallerand, R. J., Tuson, K. M., Brière, N. M., & Blais, M. R. (1995). Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sports: The sport motivation scale (SMS). *Journal of Sport and Exercise Psychology*, *17*, 35–53.
- Pelletier, L. G., Tuson, K. M., & Haddad, N. K. (1997). The Client Motivation for Therapy Scale (CMOTS): A measure of intrinsic motivation, forms of extrinsic motivation, and amotivation for therapy. *Journal of Personality Assessment*, *68*, 414–435.
- Pelletier, L. G., & Vallerand, R. J. (1996). Supervisors' beliefs and subordinates' intrinsic motivation: A behavioral confirmation analysis. *Journal of Personality and Social Psychology*, *71*, 331–341.
- O'Connor, B. P., & Vallerand, R. J. (1990). Religious motivation in the elderly: A French–Canadian replication and an extension. *Journal of Social Psychology*, *130*, 53–59.
- Petlichkoff, L. M. (1992). Youth sport participation and withdrawal: Is it simply a matter of fun? *Pediatric Exercise Science*, *4*, 105–110.
- Ryan, R. (1993). Agency and organization: Intrinsic motivation, autonomy and the self in psychological development. In J. Jacobs (Ed.), *Nebraska symposium on motivation* (Vol. 40, pp. 1–56). Lincoln, NE: University of Nebraska Press.
- Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, *57*, 749–761.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68–78.
- Ryan, R. M., Rigby, S., & King, K. (1993). Two types of religious internalization and their relations to religious orientations and mental health. *Journal of Personality and Social Psychology*, *65*, 586–596.
- Ryan, R. M., & Stiller, J. (1991). The social context of internalization: Parent and teacher influences on autonomy, motivation and learning. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in Motivation and Achievement* (Vol. 7, pp. 115–149). Greenwich: JAI.
- Sansone, C., Weir, C., Harpster, L., & Morgan, C. (1992). Once a boring task always a boring task? Interest as a self-regulatory mechanism. *Journal of Personality and Social Psychology*, *63*, 379–390.
- Schmidt, G. W., & Stein, G. L. (1991). Sport commitment: A model integrating enjoyment, dropout, and burnout. *Journal of Sport and Exercise Psychology*, *8*, 254–265.
- Sheldon, K. M., & Elliot, A. J. (1998). Comparing autonomous and controlled reasons for goals as predictors of effort and attainment. *Personality and Social Psychology Bulletin*, *24*, 546–557.
- Skinner, E. A., & Belmont, M. J. (1993). Motivation in the Classroom: Reciprocal Effects of Teacher Behavior and Student Engagement Across the School Year. *Journal of Educational Psychology*, *85*, 571–581.
- Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, *21*, 309–331.
- Swim Canada. (1995). *Rate of attrition in Canadian swimming*. Unpublished data. Ottawa, ON: Author.
- Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics*. New York: Harper Collins College Publishers.
- Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 271–360). New York: Academic Press.
- Vallerand, R. J., & Bissonnette, R. (1992). On the predictive effects of intrinsic, extrinsic and amotivational styles on behavior: A prospective study. *Journal of Personality*, *60*, 599–620.
- Vallerand, R. J., Fortier, M. S., & Guay, F. (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology*, *72*, 1161–1176.
- Vallerand, R. J., & Losier, G. F. (1999). An integrative analysis of intrinsic and extrinsic motivation in sport. *Journal of Applied Sport Psychology*, *11*, 142, 169.

- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C., & Vallières, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic and amotivation in education. *Educational and Psychological Measurement, 52*, 1003–1019.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C., & Vallières, E. F. (1993). On the assessment of intrinsic, extrinsic and amotivation in education: Evidence on the concurrent and construct validity of the Academic Motivation Scale. *Educational and Psychological Measurement, 53*, 159–172.
- Whitehead, J. (1995). Multiple achievement orientations and participation in youth sport: A cultural and developmental perspective. *International Journal of Sport Psychology, 26*, 431–452.
- Williams, G. C., & Deci, E. L. (1996). Internalization and biopsychological values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology, 70*, 767–779.
- Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M., & Deci, E. L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology, 70*, 115–126.