

Coach Autonomy Support, Basic Need Satisfaction, and Intrinsic Motivation of Paralympic Athletes

Hailey R. Banack, Catherine M. Sabiston, and Gordon A. Bloom

The purpose of the present study, grounded in self-determination theory, was to explore the relationship between Paralympic athletes' perceptions of autonomy-supportive coach behavior, basic psychological needs, and intrinsic motivation to know, accomplish, and experience stimulation. One hundred thirteen Canadian Paralympic athletes completed an online survey, consisting of measures of coach autonomy support; of perceptions of autonomy, competence, and relatedness; and of intrinsic motivation. Perceived coach autonomy support was a predictor of athletes' perceptions of autonomy and relatedness. Perceived competence was a significant predictor of all three forms of intrinsic motivation, while perceived autonomy was a significant predictor of intrinsic motivation to accomplish and experience stimulation. The results highlight the important relationship between coach behavior and athlete motivation in disability sport.

Key words: athletes with a disability, coaching, self-determination theory

The Paralympic Games are the largest multisport event in the world for elite athletes with a physical disability (Canadian Paralympic Committee, 2006). Since its inception in 1960, the number of athletes participating in the Paralympics has increased 10-fold, from 400 athletes representing 23 countries at the first Paralympic Games in Rome to approximately 4,000 athletes from 146 countries at the 2008 Summer Paralympic Games in Beijing (International Paralympic Committee, 2009). While the Paralympic Games are growing in size and popularity, there is limited research focused on Paralympic sport, despite calls for more research in this area (Crocker, 1993; DePauw & Gavron, 2005; Hanrahan, 2004; Reid & Prupas, 1998). For example, in 1986, the United States Olympic Committee formed the Committee on Sport for

the Disabled (DePauw & Gavron, 2005; Reid & Prupas, 1998). The committee identified seven research priority areas, including coaching. Despite this, there has been little growth in the field, and there is still a need for empirical theory-driven research about coaches of athletes with a disability.

The field of coaching science has expanded steadily throughout the past three decades, but most of the research has focused on coaching able-bodied athletes. While there are differences between coaching Paralympic athletes and able-bodied athletes, there are also some similarities (DePauw & Gavron, 2005). For example, coaches of athletes with a disability have used the same autonomy supportive strategies (i.e., providing athletes with choice, opportunities for initiative-taking, constructive feedback) as coaches of able-bodied athletes to improve athletes' technical skills as well as their quality of life (Cregan, Bloom, & Reid, 2007; Mageau & Vallerand, 2003). In contrast, coaches of elite athletes with a disability often adapted their training programs to match the athletes' functional capacity and ability levels (Cregan et al., 2007).

On a given Paralympic sport team, a coach may have to simultaneously develop training plans for an athlete who is an upper limb amputee, one with a visual impairment, and an athlete with paraplegia. Furthermore, while Paralympic coaches are required to fulfill the typical role

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Hailey R. Banack, Catherine M. Sabiston, and Gordon A. Bloom are with the Department of Kinesiology and Physical Education at McGill University.

of an elite sport coach, they must also learn about other contextual factors, such as accessibility of facilities, transportation, and communicating with the athletes' support workers and/or caregivers (Cregan et al., 2007). Thus, although there are similarities between coaching elite level athletes with and without disabilities, there are important differences that warrant research specifically examining the influence of coaching on Paralympic athletes. With the current study, we attempt to understand how Paralympic athletes' perceptions of coach behavior influence their motivation to participate in sport. Motivation is critical to sport performance, yet there is little research focused on the factors influencing motivation among elite athletes with a physical disability. We hope that this study will fill this gap in the literature.

Based on theoretical principles (specifically, organismic integration theory [OIT] and self-determination theory [SDT]; Deci & Ryan, 1985, 2000), it is the quality, not quantity, of motivation underpinning self-regulation that is essential to adaptive functioning and performance. Accordingly, motivation lies on a continuum ranging from amotivation (i.e., no desire or intention to participate) to intrinsic motivation (i.e., participation resulting from an inherent enjoyment or interest in the activity; Deci & Ryan, 1985, 2000). In between amotivation and intrinsic motivation are various forms of extrinsic motivation (i.e., participation in order to satisfy external demands or to obtain external benefits that are deemed important). In line with OIT and SDT principles, three distinct forms of intrinsic motivation—to know, to accomplish, and to experience stimulation—have been identified and differentiated (Pelletier et al., 1995; Vallerand & Losier, 1999). Intrinsic motivation to know refers to engaging in an activity for the satisfaction gained while learning a new skill or attempting a new task. Intrinsic motivation to accomplish refers to engaging in an activity for the satisfaction gained while attempting to achieve a new skill or performance level. This type of motivation is driven by the desire to assert one's competence and autonomously achieve a specific goal. Intrinsic motivation to experience stimulation refers to engaging in an activity for sensory enjoyment. It is achieved when an individual attains a certain degree of proficiency, and as a result, the activity provides positive, stimulating experiences, including fun and excitement (Pelletier et al., 1995; Vallerand & Losier, 1999). Intrinsic motivation is the most self-determined type of motivation and leads to a greater persistence, more effort exerted during practices and games, higher enjoyment, less boredom, and less drop-out from sport (Pelletier et al., 1995). Therefore, it is important to understand ways to help athletes develop intrinsic motivation for their sport and to understand better the distinct antecedents to the intrinsic motives to know, to accomplish, and to experience stimulation. While athletes with a physical disability tend to report high levels of intrinsic motivation (Brasile,

1988; Brasile & Hedrick, 1991; Dickinson & Perkins, 1985; Perreault & Vallerand, 2007), little research has examined the different types of intrinsic motivation reported by elite athletes with a physical disability and the antecedents of such motives.

According to SDT, individuals experience intrinsic motivation when their innate and fundamental needs for autonomy (perceptions of agency and control), competence (perceptions of ability), and relatedness (perceptions of connectedness to others) are satisfied (Deci & Ryan, 2000; Ryan & Deci, 2002). Relationships outlined in SDT suggest that social conditions, such as supportive coaching behaviors, may promote an athlete's basic psychological needs (Adie, Duda, & Ntoumanis, 2008; Alvarez, Balaguer, Castillo, & Duda, 2009; Hollembeak & Amorose, 2005; Mageau & Vallerand, 2003). In particular, autonomy supportive coaching has been shown to positively influence athletes' psychological needs (Amorose & Horn, 2000, 2001). Autonomy-supportive coaching has been defined as (a) providing athletes with choice, (b) giving opportunities for initiative-taking, (c) using a democratic leadership style, (d) giving a rationale for their actions, (e) showing concern for the athlete both on and off the field, (f) giving constructive feedback, and (g) fostering a task-oriented sport environment (Mageau & Vallerand, 2003). Adie and colleagues (2008) found that coach autonomy support was positively associated with all three psychological needs in a sample of adult team sport participants. Other findings confirm the general relationship between coach autonomy support and psychological need satisfaction (Alvarez et al., 2009).

Coach autonomy support may also be associated with athletes' intrinsic (or self-determined) motivation. The model developed by Mageau and Vallerand (2003) proposes that athletes' perceptions of autonomy, competence, and relatedness mediate the relationship between coach behavior and motivational outcomes. Athletes who perceived their coaches' behavior to be autonomy supportive experienced more self-determined forms of motivation (Amorose & Horn, 2000, 2001; Gagné, Ryan, & Bargman, 2003). These relationships have been supported with both male and female adolescent athletes (Gagné et al., 2003), high school and college athletes (Alvarez et al., 2009; Amorose & Andersen-Butcher, 2007; Amorose & Horn 2000, 2001; Hollembeak & Amorose 2005), and Olympic level athletes (Mallett, 2005). Although the relationship between coach autonomy support, basic psychological needs, and self-determined motivation has been supported with able-bodied athletes, it has received limited attention in disability sport. Furthermore, most of the research has focused on creating an index of self-determined motivation rather than exploring the unique antecedents of specific types of intrinsic motivation.

In light of the limited understanding of how coaches can promote intrinsic motivation in Paralympic athletes,

the purpose of the present study was to explore the relationship between Paralympic athletes' perceptions of autonomy-supportive coach behavior, perceived need satisfaction, and intrinsic motivation to know, accomplish, and experience stimulation. Consistent with SDT and previous research, we hypothesized that athletes' perceptions of autonomy, competence, and relatedness would mediate the relationship between perceived coach autonomy support and the three forms of intrinsic motivation.

Method

Participants and Procedures

The participants ($N = 113$, 61.06% men) were Canadian Paralympic athletes participating in individual sports ($n = 12$, 10.6%), team sports ($n = 48$, 42.4%), and coaching sports ($n = 53$, 46.9%). A coaching sport was defined as one in which athletes trained and practiced as a team, but competed individually against their own teammates and others (i.e., swimming, track and field; Widmeyer & Williams, 1991). The sample included athletes from each of the five disability classification groups recognized by the Canadian Paralympic Committee: cerebral palsy ($n = 26$, 23.0%), visual impairment ($n = 9$, 8.0%), amputee ($n = 19$, 16.8%), spinal cord injury ($n = 50$, 44.2%), and *les autres* (i.e., "others," such as spina bifida and multiple sclerosis; $n = 9$, 8.0%). The 113 athletes who participated in the study included both summer ($n = 86$, 76.1%) and winter ($n = 27$, 23.9%) sport athletes.

After gaining institutional behavioral-ethics approval, we contacted the Canadian Paralympic Committee (CPC) and informed them of the study objectives. The CPC sent a recruitment email to approximately 200 active Canadian Paralympic athletes before the 2008 Paralympic Games in Beijing. The recruitment email included a link to a secure, password-protected website containing the questionnaires used in this study. The use of online questionnaires allowed athletes with a disability to use adaptive technology to assist them in completing the study, if needed.

Measures

Perceived Coach Autonomy Support. The Sport Climate Questionnaire (Deci & Ryan, 2006) was used to measure athletes' perceptions of autonomy-supportive coaching behavior. Athletes were asked to respond to 15 items about their coach, such as "I feel that my coach provides me choices and options" and "I feel that my coach cares about me as a person," which were scored from 1 = strongly disagree to 7 = strongly agree. The responses were summed to create a total score, with higher scores indicating greater perceptions of autonomy support. Previous research with adult athletes has demonstrated the scale is reliable ($\alpha =$

.84; Lavoie & Power, 2006) and possesses construct validity (Amorose & Anderson-Butcher, 2007; Standage, Duda, & Ntoumanis, 2006).

Perceived Competence. Three items developed by Amorose (2003) were used to assess perceived competence. Athletes were asked to respond to the following three items on a 5-point scale ranging from 1 = not skilled at all to 5 = very skilled: (a) "How good do you think you are at your sport," (b) "When it comes to your sport, how much ability do you think you have," and (c) "How skilled do you think you are at your sport." The responses were summed, and higher scores reflected greater perceptions of competence. The scale has demonstrated internal consistency ($\alpha = .74$) as well as construct (content and factorial) validity in a sample of college-age male and female athletes (Amorose, 2003; Hollembeak & Amorose, 2005).

Perceived Autonomy. Athletes' perceptions of autonomy were assessed using a scale developed by Hollembeak and Amorose (2005). Participants were asked to "mark the response that best reflects how you feel about the amount of choice or control you have when it comes to participating in your sport" on six items (e.g., "I have a say in what I do when participating in my sport"). Their responses were scored on a 5-point Likert-type scale, ranging from 1 = not true at all to 5 = completely true for me, and summed to create a total score. Higher scores reflected greater perceived autonomy. The scale was developed and reviewed by two scholars with expertise in the field of motivation research. All of the items have demonstrated internal consistency ($\alpha = .78$) and possess factorial validity (Hollembeak & Amorose, 2005).

Perceived Relatedness. The sport-specific version (Hollembeak & Amorose, 2005) of the Feelings of Relatedness Scale (Richer & Vallerand, 1998) was used to assess feelings of acceptance and closeness with team members. Participants were asked to respond to the stem, "In my relations with the members of my sports team I feel..." using 10 descriptors (e.g., supported, listened to, affiliated), each scored on a 7-point scale ranging from 1 = do not agree at all to 7 = very strongly agree. Higher scores on this measure indicated greater perceptions of relatedness. This scale has demonstrated internal consistency in both the original workplace context ($\alpha = .75$; Deci et al., 2001) and in sport ($\alpha = .96$; Hollembeak & Amorose, 2005). The scale was also tested for content validity (Richer & Vallerand, 1998).

Intrinsic Motivation. The three intrinsic motivation subscales of the Sport Motivation Scale (Pelletier et al., 1995) were used to measure athletes' intrinsic motivation for participating in sport. There are 4 items assessing intrinsic motivation to know (e.g., "For the pleasure of discovering new performance strategies"), 4 items for intrinsic motivation to accomplish (e.g., "For the satisfaction I experience while I am perfecting my abilities"), and 4 items assessing intrinsic motivation to experience

stimulation (e.g., “For the intense emotions I feel doing a sport that I like”), with responses ranging from 1 = does not correspond at all to 7 = corresponds exactly. Higher subscale scores, calculated by summing the respective items, represented higher degrees of intrinsic motivation. The subscales have demonstrated acceptable internal consistency ($\alpha = .79-.89$; Pelletier, Fortier, Vallerand, & Briere, 2001). The simplex structure and construct validity of the scale was supported by Li and Harmer (1996).

Data Analysis

Preliminary analyses were conducted to assess accuracy of data entry, missing values, and assumptions of multivariate analyses (Tabachnick & Fidell, 2007). Linear regression equations were used to test the relationship between perceived coach autonomy support, perceptions of autonomy, competence, relatedness, and intrinsic motivation. SPSS 18.0 Statistical Software (Armonk, NY) was used for all regression analyses. The multiple mediation macro developed by Preacher and Hayes (2008) was used to generate the mediation models. To test the hypothesis of the study, three independent models were tested, each with one of the three forms of intrinsic motivation as a dependent variable. The multivariate extension of the products-of-coefficients approach was used to evaluate the models (Preacher & Hayes, 2008). Additionally, bootstrapping was used as a resampling procedure because it does not assume symmetry or normality (which occurs only in very large samples; Shrout & Bolger, 2002). The bootstrap procedure was used to construct bias-corrected and accelerated 95% confidence intervals (BCa 95% CI)

of the indirect effect. Five thousand bootstrapped samples were requested.

Results

Less than 1.0% of the data were missing; thus, a median substitution was used to replace missing values (Tabachnick & Fidell, 2007). Descriptive statistics (means, standard deviations, skewness, and kurtosis coefficients), Cronbach's alpha, and Pearson correlation coefficients for all study variables are presented in Table 1. High mean scores were reported for all three measures of intrinsic motivation, which were also moderately to highly correlated ($r = .63-.76$). The strength of these relationships suggests that, while there is moderate common variance, there is also unique variance among the intrinsic motivation subscales and therefore the three hypotheses were examined.

Models A to C in Figure 1 display the results of the regression analyses. Across all models, perceived coach autonomy support was a significant predictor of feelings of autonomy and relatedness ($R^2 = .58$ and $.45$, respectively). The direct path between perceptions of coach autonomy support was significant for intrinsic motivation to know ($R^2 = .28$), but not the other two types of intrinsic motivation. Perceptions of competence and autonomy were significant predictors of intrinsic motivation to accomplish ($R^2 = .63$ and $.39$) and experience stimulation ($R^2 = .57$ and $.45$). Competence was the only significant predictor of intrinsic motivation to know ($R^2 = .71$).

Table 2 presents the total and indirect effects of perceived coach autonomy support on the three forms of intrinsic motivation, mediated by perceptions of autonomy,

Table 1. Descriptive statistics for study variables

	1	2	3	4	5	6	7
1. Coach autonomy support	.97						
2. Perceived autonomy	.65*	.89					
3. Perceived competence	.10	.18	.88				
4. Perceived relatedness	.61*	.55*	.08	.92			
5. IM to know	.19*	.31*	.40*	.19*	.86		
6. IM for stimulation	.11	.30*	.37*	.12	.76*	.80	
7. IM to accomplish	.17	.34*	.42*	.18	.71*	.63*	.82
Score range	1-7	1-5	1-5	1-7	1-7	1-7	1-7
Mean	5.71	3.93	4.11	5.33	5.19	5.58	5.67
Standard deviation	1.22	.87	.66	1.16	1.25	1.16	1.12
Skewness ^a	-1.47	-0.86	-0.67	-0.85	-0.85	-1.27	-1.44
Kurtosis ^b	2.37	0.66	0.76	0.32	0.99	2.32	3.37

Note. IM = intrinsic motivation; Cronbach's alpha coefficients are presented along the diagonal; bivariate correlations presented in the lower diagonal are based on subscale scores.

^aStandard error skewness = .23.

^bStandard error kurtosis = .45.

* $p < .05$.

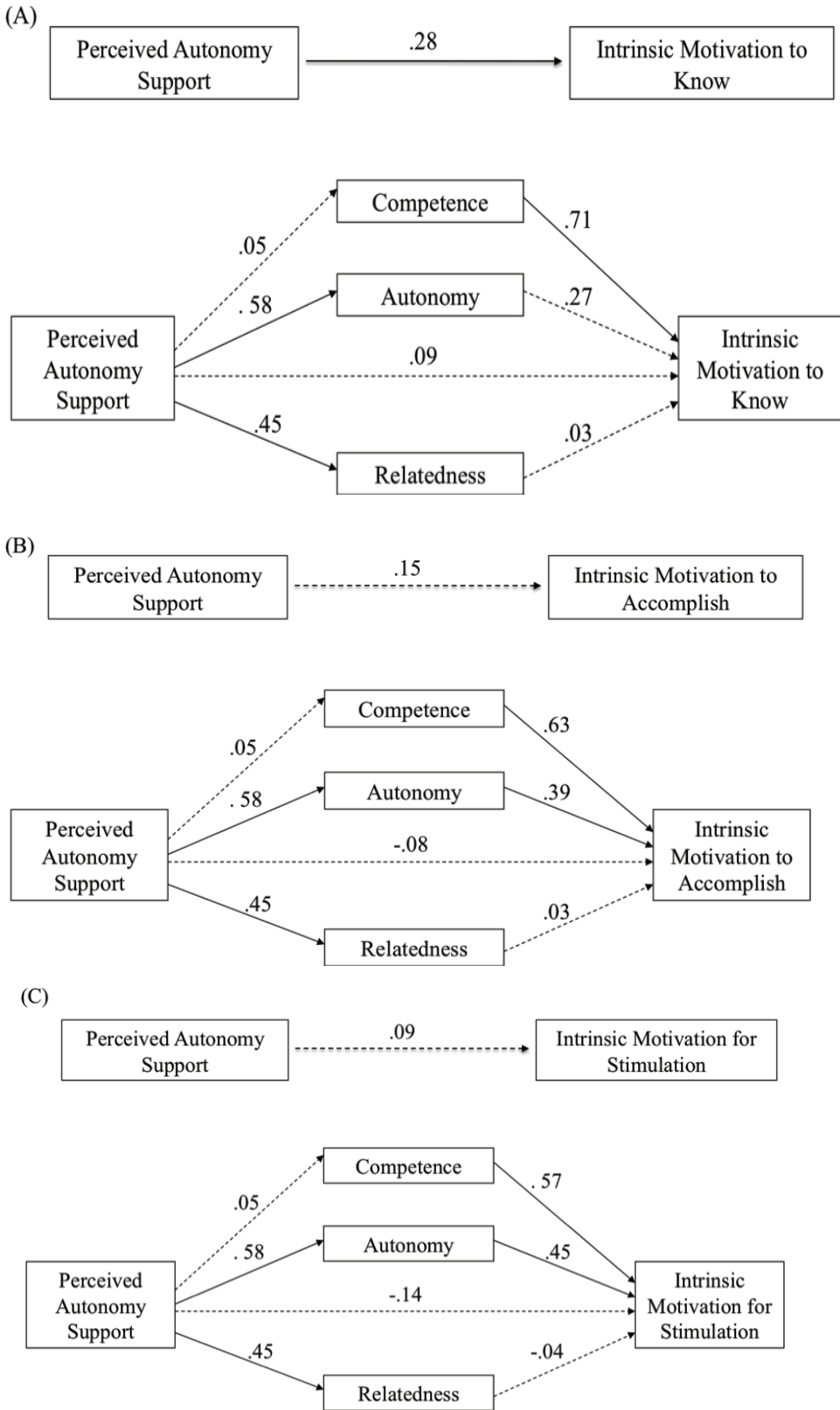


Figure 1. Multiple mediation models showing the effects of perceived coach autonomy support on autonomy, competence, and relatedness and (A) intrinsic motivation to know, (B) intrinsic motivation to accomplish, and (C) intrinsic motivation to experience stimulation. Standardized coefficients are presented. Solid arrows represent significant paths ($p < .05$); dashed arrows represent nonsignificant relationships.

competence, and relatedness. For intrinsic motivation to know, the specific indirect effects are .04, .12, and .02 (through competence, autonomy, and relatedness, respectively). For intrinsic motivation to accomplish, the specific indirect effects are .03, .17, and .02 (respectively through competence, autonomy, and relatedness). Finally, for intrinsic motivation to experience stimulation the specific indirect effects are .03, .20, and -.002 (respectively through competence, autonomy, and relatedness). The need for autonomy was a significant mediator of the relationship between perceived coach autonomy support and intrinsic motivation to accomplish (BCa 95% CI = .06–.36) and experience stimulation (BCa 95% CI = .08–.41). The total indirect effects were not significant for intrinsic motivation to know (standardized path coefficient = .18) but were significant for intrinsic motivation to accomplish (standardized path coefficient = .23) and to experience stimulation (standardized path coefficient = .23).

Table 2. Mediation of the effect of perceived coach autonomy support on intrinsic motivation to know, accomplish, and experience stimulation through competence, autonomy, and relatedness

	Pt E	SE	BCa 95% CI
Model A:			
IM to know			
Competence	.04	.04	-.03–.17
Autonomy	.12	.08	-.03–.32
Relatedness	.02	.07	-.11–.16
Total	.18	.10	.00–.39
Contrast 1	.02	.08	-.15–.19
Contrast 2	-.08	.09	-.28–.11
Contrast 3	-.10	.12	-.37–.14
Model B: IM to accomplish			
Competence	.03	.03	-.02–.16
Autonomy	.17	.07	.06–.36
Relatedness	.02	.06	-.12–.18
Total	.23	.09	.06–.46
Contrast 1	.02	.07	-.18–.19
Contrast 2	-.14	.08	-.33–.00
Contrast 3	-.16	.10	-.42–.06
Model C: IM to experience stimulation			
Competence	.03	.03	-.02–.15
Autonomy	.20	.07	.08–.41
Relatedness	-.002	.06	-.13–.14
Total	.23	.09	.06–.47
Contrast 1	.03	.07	-.13–.19
Contrast 2	-.18	.08	-.37–.03
Contrast 3	-.21	.11	-.47–.001

Note. Pt E = point estimate; SE = standard error; BCa = bias-corrected and accelerated CI = confidence interval; IM = intrinsic motivation; Contrast 1 = competence versus relatedness; Contrast 2 = competence versus autonomy; Contrast 3 = relatedness versus autonomy.

Discussion

The purpose of this study was to examine the relationship between Paralympic athletes' perceptions of autonomy-supportive coach behavior, perceived needs satisfaction, and intrinsic motivation to know, accomplish, and experience stimulation. The results partially supported the hypothesis of the study. Perceptions of autonomy supportive coaching were linked to athletes' perceived autonomy and relatedness. Contrary to the hypothesis, autonomy support was not significantly associated with perceptions of competence. Perceived coach autonomy was a predictor of intrinsic motivation to accomplish and experience stimulation. Perceived competence was a predictor of all three forms of intrinsic motivation. Perceptions of relatedness were not associated with the intrinsic motives. Taken together, the results highlight important relationships between coach behavior and athlete motivation in disability sport as suggested by SDT (Deci & Ryan, 1985) and by Mageau and Vallerand (2003).

In partial support of our hypothesis, athletes' perceptions of autonomy support from the coach were significantly related to perceived autonomy and relatedness, yet the relationships between perceived coach autonomy support and perceptions of competence did not reach statistical significance. It may be that the strength of the relationship between perceived coach autonomy support and need satisfaction varies as a function of contextual factors (Adie et al., 2008; Standage et al., 2006). In an elite sport context, athletes primarily obtain competence information from recent performance outcomes, such as beating opponents or winning competitions (Duda & Hall, 2001; Reinboth & Duda, 2006). This could explain the weak link between Paralympic athletes' perceptions of autonomy support and competence. Also, Adie and colleagues (2008) reported a weak relationship between autonomy support and perceptions of competence for males and a nonsignificant relationship for female athletes. While not explored in the current study, the relationship between coach autonomy support and the psychological needs may vary both by context and by gender. Further research is needed for better understanding of this possibility.

Consistent with our hypothesis, athletes' perceptions of autonomy and competence were associated with intrinsic motivation to accomplish and experience stimulation. Intrinsic motivation to accomplish is defined by participating in an activity such as sport to achieve new goals (Pelletier et al., 1995). Thus, elite athletes with a physical disability may need to feel in control of their sport experience, as well as competent in their sport, to be motivated to achieve new goals. The same is true of intrinsic motivation to experience stimulation, which is defined as doing the activity for the positive physical and emotional experiences that occur while doing the activity (Pelletier et al.,

1995). Goodwin and colleagues (2009) recently explored the experiences of 11 Canadian national wheelchair rugby players. The interviewed athletes discussed the increased feelings of self-confidence and empowerment they felt as a result of belonging to a sport community where they were no longer isolated because of their disability. Moreover, their sport experience helped them grow as individuals on and off the court. Consistent with the responses of the athletes interviewed by Goodwin and colleagues, findings from the present study indicated the benefits of satisfying athletes' perceptions of competence and autonomy for developing intrinsic motivation to accomplish and to experience stimulation.

Contrary to our hypothesis, and despite significant correlations between all three needs and intrinsic motivation to know, perceived competence was the only significant predictor of intrinsic motivation to know. Therefore, the current findings suggest that the elite athletes in our sample who reported higher perceptions of competence were more likely to be engaged in their sport to acquire new skills and knowledge. Research on sport participation for individuals with a physical disability has highlighted similar goals and objectives of the participants (Giacobbi, Stancil, Hardin, & Bryant, 2008). Despite this, it is necessary to point out that the cross-sectional nature of the data precludes inferences of directionality, suggesting it may be those athletes who engage in their sport to learn, experience stimulation, and accomplish their goals who develop higher perceptions of competence.

Research has consistently documented the influence of autonomy and competence on intrinsic motivation, but support for the link between relatedness and self-determined motivation has been less compelling (Hollebeak & Amorose, 2005; McDonough & Crocker, 2007; Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002). Wilson, Rodgers, and Fraser (2002) suggested that feeling connected to others was an important catalyst for the internalization of extrinsically motivated behaviors, but that feelings of relatedness were weak predictors of behaviors that had already been internalized. Athletes in the current study reported high levels of all three types of intrinsic motivation, which could explain why relatedness was not a significant correlate of motivation. Vallerand (1997) suggested that the relative importance of the need for relatedness depended on three factors: (a) the nature of the task or behavior (e.g., team sport versus individual sport), (b) the conditions under which the activity was performed (e.g., recreational level or elite level), and (c) the individual's personal characteristics (e.g., age). In line with this suggestion, the current results indicated that Paralympic athletes did not need to feel connected to others in their social environment to feel intrinsically motivated toward elite sport. Perhaps the athletes in the current study developed intrinsic motivation from coaches that supported their psychological needs at an earlier

point in their athletic career, and they no longer depend on being connected to others in their sport. Moreover, considering the significant correlation between perceived autonomy and perceived relatedness, it is possible that the lack of relationship between relatedness and intrinsic motivation was due, in part, to the strong relationship between relatedness and autonomy. The significant correlation between relatedness and autonomy was expected, in line with the theoretical principles of SDT. Future research needs to focus specifically on the importance of the need for relatedness in developing intrinsic motivation in different sport contexts, including Paralympic sport.

Although the current findings offer new insights into athletes' experiences of Paralympic sport, some limitations exist. First, given the self-selected sample and cross-sectional nature of the study design, it was not possible to establish whether the observed pattern of relationships was characteristic of all Paralympic athletes, nor was it possible to infer causality or directionality of the observed relationships. Longitudinal research is required to accurately track the relationship between perceptions of coach behavior and athlete motivation over time. Second, the participants in the study were all elite athletes with a physical disability. As such, the results of the study are not generalizable to athletes with a disability participating in sport at other levels of competition. Third, these elite athletes might also have higher levels of perceived competence and achievement compared to many of their contemporaries. This in turn might affect their perceptions of their coaches. Fourth, the participants in this study were limited to those who had Internet access, which may have resulted in Paralympic athletes without Internet access being excluded from the study population. Finally, data were collected while some athletes were preparing to compete at the Summer Paralympic Games, thus some athletes may have chosen not to participate in the study because they were focused exclusively on preparing for the Games. The athletes who were training for the Paralympics also may have been spending more time with coaches and working on a different training schedule.

In spite of these limitations, this study makes several theoretical and practical contributions. Theoretically, it extends the developing body of SDT literature to a unique population and confirms the presence of three distinct forms of intrinsic motivation in this population. Practically, it highlights the importance of creating an autonomy-supportive sport environment when coaching elite athletes with a disability. There are few programs available for coaches of elite athletes with a disability, and the present study provides information that could be used to train coaches to work with Paralympic athletes. For example, coach training should educate coaches on specific autonomy-supportive strategies, such as how to provide athletes with choices (e.g., which drills to use during practice), how to give athletes opportunities to take

initiative (e.g., designing a practice on their own), and how to give constructive, task-oriented feedback in order to foster intrinsic motivation. In conclusion, the present study extends the sport literature to a growing population that has been largely understudied and lays the foundation for future theory-driven research on motivation in Paralympic athletes.

References

- Adie, J. W., Duda, J. L., & Ntoumanis, N. (2008). Autonomy support, basic need satisfaction and the optimal functioning of adult male and female sport participants: A test of basic needs theory. *Motivation and Emotion, 32*, 189–199.
- Alvarez, M. S., Balaguer, I., Castillo, I., & Duda, J. L. (2009). Coach autonomy support and quality of sport engagement in young soccer players. *The Spanish Journal of Psychology, 12*, 138–148.
- Amorose, A. (2003). Reflected appraisals and perceived importance of significant others' appraisals as predictors of college athletes' self-perceptions of competence. *Research Quarterly for Exercise and Sport, 74*, 60–70.
- Amorose, A. J., & Anderson-Butcher, D. (2007). Autonomy-supportive coaching and self-determined motivation in high school and college athletes: A test of self-determination theory. *Psychology of Sport and Exercise, 8*, 654–670.
- Amorose, A., & Horn, T. (2000). Intrinsic motivation: Relationships with collegiate athletes' gender, scholarship status, and perceptions of their coaches' behavior. *Journal of Sport and Exercise Psychology, 22*, 63–84.
- Amorose, A., & Horn, T. (2001). Pre- to post-season changes in the intrinsic motivation of first year college athletes: Relationships with coaching behavior and scholarship status. *Journal of Applied Sport Psychology, 13*, 355–373.
- Brasile, F. N. (1988). Psychological factors that influence participation in wheelchair basketball. *Palaestra, 3*, 16–27.
- Brasile, F. N., & Hedrick, B. N. (1991). A comparison of adult and youth wheelchair basketball players. *Palaestra, 4*, 40–46.
- Canadian Paralympic Committee. (2006). *Changing minds, changing lives: Rehabilitation through sport*. Retrieved May 9, 2008, from Canadian Paralympic Committee: <http://www.paralympic.ca/page?s=88&lang=en-CA>
- Cregan, K., Bloom, G. A., & Reid, G. (2007). Career evolution and knowledge of elite coaches of swimmers with a physical disability. *Research Quarterly for Exercise and Sport, 78*, 339–350.
- Crocker, P. R. (1993). Sport and exercise psychology research with individuals with physical disabilities: Using theory to advance knowledge. *Adapted Physical Activity Quarterly, 10*, 324–335.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, R. L., & Ryan, R. M. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68–78.
- Deci, E. L., & Ryan, R. M. (2006). *Self-determination theory*. Retrieved May 9, 2008, from <http://www.psych.rochester.edu/SDT/measures/auton.html>
- Deci, E. L., Ryan, R. M., Gagné, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need satisfaction, motivation, and well-being in the work organization of a former Eastern Bloc country: A cross-cultural study of self-determination. *Personality and Social Psychology Bulletin, 27*, 930–942.
- DePauw, K., & Gavron, S. (2005). *Disability sport*. Champaign, IL: Human Kinetics.
- Dickinson, J., & Perkins, J. (1985). Socialization into physical activity for disabled populations. *Canadian Association for Health, Physical Education, and Recreation, 51*, 4–12.
- Duda, J. L., & Hall, H. (2001). Achievement goal theory in sport: Recent extensions and future directions. In R. N. Singer, H. A. Hausenblas, & C. M. Janelle (Eds.), *Handbook of sport psychology* (2nd ed., pp. 417–443). New York: John Wiley.
- Gagné, M., Ryan, R., & Bargman, K. (2003). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. *Journal of Applied Sport Psychology, 15*, 372–390.
- Giacobbi, P. R., Stancil, M., Hardin, B., & Bryant, L., (2008). Physical activity and quality of life experienced by highly active individuals with physical disabilities. *Adapted Physical Activity Quarterly, 25*, 189–207.
- Goodwin, D. L., Johnston, K., Gustafson, P., Elliott, M., Thurmeier, R., & Kuttai, H. (2009). It's okay to be a quad: Wheelchair rugby players' sense of community. *Adapted Physical Activity Quarterly, 26*, 102–117.
- Hanrahan, S. J. (2004). Sport psychology and athletes with disabilities. In J. Summer & T. Morris (Eds.), *Sport psychology: Theory, applications and issues* (pp. 572–583). Milton, Australia: John Wiley.
- Hollembek, J., & Amorose, A. J. (2005). Perceived coaching behaviors and college athletes' intrinsic motivation: A test of self-determination theory. *Journal of Applied Sport Psychology, 17*, 20–36.
- International Paralympic Committee. (2009). *Past games*. Retrieved August 14, 2009, from http://www.paralympic.org/Paralympic_Games/Past_Games/Beijing_2008/index.html
- Lavoi, N. M., & Power, F. C. (2006). Pathways to fostering civic engagement in collegiate female athletes: An exploratory study. *Journal of College and Character, 7*, 1–12.
- Li, F., & Harmer, P. (1996). Testing the simplex assumption underlying the sport motivation scale: A structural equation modeling analysis. *Research Quarterly for Exercise and Sport, 67*, 396–405.
- Mageau, G., & Vallerand, R. (2003). The coach-athlete relationship: A motivational model. *Journal of Sports Sciences, 21*, 883–904.
- Mallet, C. J. (2005). Self-determination theory: A case study of evidence-based coaching. *The Sport Psychologist, 19*, 417–429.
- McDonough, M. H., & Crocker, P. R. (2007). Testing self-determined motivation as a mediator of the relationship between psychological needs and affective and behavioral outcomes. *Journal of Sport and Exercise Psychology, 29*, 645–663.
- Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Briere, N. M. (2001). Associations among perceived autonomy support, forms of self-regulation, and persistence: A prospective study. *Motivation and Emotion, 25*, 279–302.
- Pelletier, L. G., Fortier, M. S., Vallerand, R. J., Tuson, K., Briere, N. M., & Blais, N. (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, 18–34.
- Perreault, S., & Vallerand, R. (2007). A test of self-determination theory with wheelchair basketball players with and without disability. *Adapted Physical Activity Quarterly*, 24, 305–316.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40, 879–891.
- Reid, G., & Prupas, A. (1998). A documentary analysis of research priorities in disability sport. *Adapted Physical Activity Quarterly*, 15, 168–178.
- Reinboth, M., & Duda, J. L. (2006). Perceived motivational climate, need satisfaction and indices of well-being in team sports: A longitudinal perspective. *Journal of Sport and Exercise Psychology*, 7, 269–286.
- Richer, S. F., & Vallerand, R. J. (1998). Construction et validation de l' Echelle du sentiment d'appartenance sociale [Construction and validation of the relatedness feeling scale]. *Revue Européenne de Psychologie Appliquée*, 48, 129–137.
- Ryan, R. M., & Deci, E. L. (2002). An overview of self-determination theory. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3–33). Rochester, NY: University of Rochester Press.
- Sarrazin, P., Vallerand, R., Guillet, E., Pelletier, L., & Cury, F. (2002). Motivation and dropout in female handballers: A 21-month prospective study. *European Journal of Social Psychology*, 32, 395–418.
- Shrout, P. E., & Bolger, N. (2002). Mediation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, 7, 422–445.
- Standage, M., Duda, J. L., & Ntoumanis, N. (2006). Students' motivational processes and their relationship to teacher ratings in school physical education: A self-determination theory approach. *Research Quarterly for Exercise and Sport*, 77, 100–110.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). Boston: Allyn and Bacon.
- 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). San Diego, CA: Academic Press.
- Vallerand, R. J., & Losier, G. F. (1999). An integrated analysis of intrinsic and extrinsic motivation in sport. *Journal of Applied Sport Psychology*, 11, 142–169.
- Widmeyer, J. M., & Williams, W. N. (1991). The cohesion-performance outcome relationship in a coaching sport. *Journal of Sport and Exercise Psychology*, 13, 364–371.
- Wilson, P. M., Rodgers, W. M., & Fraser, S. N. (2002). Examining the psychometric properties of the behavioral regulation in exercise questionnaire. *Measurement in Physical Education and Exercise Science*, 6, 1–21.

Authors' Note

Please address correspondence concerning this article to Catherine Sabiston, Department of Kinesiology and Physical Education, McGill University, 475 Pine Avenue West, Montreal, Quebec, Canada H2W 1S4.

E-mail: catherine.sabiston@mcgill.ca