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Athlete burnout in elite sport: A self-determination perspective

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Abstract

Using self-determination theory (Deci & Ryan, 1985) as the theoretical framework, we examined potential antecedents of athlete burnout in 201 elite Canadian athletes (121 females, 80 males; mean age 22.9 years). Employing a cross-sectional design, our primary aims were to investigate the relationships between behavioural regulations and athlete burnout and to examine whether self-determined motivation mediated relationships between basic needs satisfaction and athlete burnout. Our self-determination theory-derived hypotheses were largely supported. Relationships among athlete burnout and behavioural regulations mostly varied according to their rank on the self-determination continuum, with less self-determined motives showing positive associations and more self-determined motives showing negative correlations with burnout. The basic needs of competence and autonomy, plus self-determined motivation, accounted for significant amounts of variance in athlete burnout symptoms (exhaustion, $R^2 = 0.31$; devaluation, $R^2 = 0.49$; reduced accomplishment, $R^2 = 0.61$; global burnout, $R^2 = 0.74$). Self-determined motivation fully mediated the relationships that competence and autonomy had with exhaustion. Analyses showed indirect relationships between these two needs and devaluation, through their associations with self-determined motivation. Motivation partially mediated the needs-reduced sense of accomplishment relationships, but the direct effects were more prominent than the indirect effects.

Keywords: *Motivation, basic needs, competence, autonomy, behavioural regulations*

Introduction

Athlete burnout is a maladaptive psychological outcome sometimes associated with sport participation (Smith, 1986). Consequently, preventing, or at least minimizing, the occurrence of burnout has been viewed as an important issue in the sport psychology literature (Eklund & Cresswell, 2007; Goodger, Gorely, Harwood, & Lavallee, 2007). Early studies investigating burnout used various conceptual definitions that served to create confusion regarding the nature of athlete burnout (Cresswell & Eklund, 2006a). More recently, researchers have given support to Raedeke's (1997) definition of athlete burnout as a syndrome characterized by: (i) emotional and physical exhaustion; (ii) sport devaluation; and (iii) a reduced sense of accomplishment (e.g. Cresswell & Eklund, 2006b; Raedeke, Lunney, & Venables, 2002). This symptom-based definition provides a means by which the potential causes and consequences of burnout, such as illness, injury, and

dropout (Cresswell & Eklund, 2003), can be examined. As a result of researchers embracing Raedeke's definition, the past decade has seen research turn towards theoretically based investigations of possible athlete burnout antecedents (Goodger et al., 2007).

Self-determination theory (Deci & Ryan, 1985) has been advocated as a promising theoretical lens through which to examine the potential antecedents of athlete burnout (Cresswell & Eklund, 2005a, 2005b, 2005c; Hodge, Lonsdale, & Ng, 2008; Lemyre, Treasure, & Roberts, 2006; Perreault, Gaudreau, Lapointe, & Lacroix, 2007). In their basic needs theory, a sub-theory of self-determination theory, Deci and Ryan (2000) proposed that humans have basic psychological needs for competence, autonomy, and relatedness. Within the sport context, competence refers to a perception that one is able to be effective in one's sport. Autonomy involves feelings of volition, choice, and self-directedness, while relatedness refers to perceptions of connectedness with others. When these needs are satisfied,

humans are expected to experience optimal well-being (e.g. subjective vitality; Ryan & Frederick, 1997). Conversely, the thwarting of needs is thought to lead to expressions of ill-being (e.g. burnout; Perreault et al., 2007).

According to Deci and Ryan (1985), the extent to which these needs are satisfied determines the degree to which an athlete's behaviour is regulated by processes that are congruent with the individual's sense of self, known as self-determined motivation. These behavioural regulations can be represented on a continuum, ranging from low to high self-determination (see Figure 1). Within self-determination theory there are three broad types of motivation: amotivation, extrinsic motivation, and intrinsic motivation. Amotivation is characterized by a lack of motivation, and an amotivated athlete feels as though he or she is "going through the motions". Intrinsic motivation is said to exist when an individual participates because of interest or enjoyment in the activity itself. Extrinsic motivation exists when an individual participates to obtain separable outcomes.

Deci and Ryan (1985) posited four types of extrinsic motivation (see Figure 1). External regulation is the least self-determined form and occurs when an athlete participates to obtain rewards, avoid punishment, or satisfy an external demand. Introjected regulation refers to behaviour that is performed to avoid feelings such as guilt or shame, or to enhance feelings of self-worth. Identified regulation exists when an athlete participates to realize benefits he or she deems personally important. Integrated regulation is the most self-determined form of extrinsic motivation and is present when an athlete views sport as being in congruence with deeply held values and his or her sense of self. External and introjected regulation have been described as non-self-determined or controlled regulatory styles, while identified and integrated regulation are considered self-determined or autonomous regulatory styles (Deci & Ryan, 1987).

Research in competitive sport suggests that needs satisfaction will foster self-determined motivation (Hollebeak & Amorose, 2005; Sarrazin, Vallerand,

Guillet, Pelletier, & Cury, 2002) and that this will result in positive psychological consequences, such as adaptive coping (Amiot, Gaudreau, & Blanchard, 2004) and flow experiences (Kowal & Fortier, 1999). In contrast, individuals whose needs are frustrated show greater amotivation and controlled motivation and these have been associated with maladaptive outcomes, including dropout from sport (Sarrazin et al., 2002).

In line with self-determination theory propositions and the above evidence relating to various motivational outcomes in the sport context, it has been hypothesized that burnout should be positively correlated with non-self-determined motivation and negatively correlated with self-determined motivational types. Furthermore, correlations between burnout and behavioural regulations should be stronger for regulations at the ends of the self-determination continuum (amotivation and intrinsic motivation) compared with those closer to the centre (introjected and identified regulation).

However, research has found mixed support for these predictions. In support of their hypotheses, Cresswell and Eklund (2005a, 2005b, 2005c) and Raedeke and Smith (2001) found that intrinsic motivation was negatively related to athlete burnout, while amotivation was positively related to the syndrome. In contrast, relationships between athlete burnout and extrinsic motivation have not been as consistent with the predictions of self-determination theory. Researchers have shown non-significant or modest negative relationships between burnout symptoms and external, introjected, and identified regulation (extrinsic motivation) subscale scores (see Eklund & Cresswell, 2007; Goodger et al., 2007).

The reasons for these discrepant results are unclear. It may be that controlled extrinsic motivation is not associated with increased athlete burnout and autonomous extrinsic motivation is not related to low burnout symptoms. It is also possible that using the Sport Motivation Scale (Pelletier, Fortier, Vallerand, Tuson, & Blais, 1995) to assess the behavioural regulations has contributed to these inconsistent results. For example, psychometric

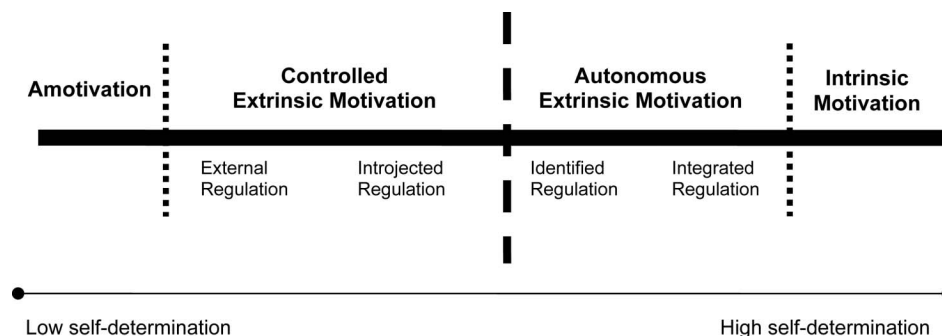


Figure 1. The self-determination continuum.

problems with the Sport Motivation Scale prompted Cresswell and Eklund (2005a) to collapse all extrinsic motivation subscales into a single scale and Raedeke and Smith (2001, Study 2) needed to drop the external and introjected regulation subscales from their analyses. Consequently, the relationships between extrinsic motivation and burnout should be further explored using an alternative measure of behavioural regulations.

In addition to examining relationships between specific behavioural regulations and burnout, researchers have investigated the motivation–burnout relationship by calculating a self-determination index. Using this index, Lemyre and colleagues (2006) reported that swimmers whose overall self-determined motivation increased over the course of a 6-month season reported lower burnout scores at the end of this period. In contrast, swimmers with decreased self-determination scores had higher burnout scores. However, as noted by Lemyre et al. (2006), they did not include assessments of the full range of behavioural regulations outlined in self-determination theory (introjected and integrated regulation were omitted). Therefore, to understand more precisely when an athlete becomes at risk for burnout additional research is needed where the entire range of regulations is measured. Lemyre and his colleagues also recommended that investigations involving larger samples of athletes from a variety of sports are required to confirm associations between motivational regulations and athlete burnout.

Until recently, another important limitation in research investigating self-determination theory and athlete burnout has been the omission of the role of basic needs satisfaction in the burnout process. Cresswell and Eklund (2006a) proposed that basic needs satisfaction would be related to lower athlete burnout; however, only two studies have tested this hypothesis (Hodge et al., 2008; Perreault et al., 2007). Hodge and colleagues (2008) examined this relationship among a sample of elite rugby players and found that while competence and autonomy perceptions accounted for substantial portions of variance in burnout, relatedness was only a low-to-moderate predictor. In contrast, Perreault et al. (2007) found that satisfaction of each of the three needs predicted unique and similar amounts of variance in the total burnout scores ($\beta = -0.22$ to -0.28). Relatedness was also the strongest predictor of exhaustion and the second strongest predictor of reduced sense of accomplishment and devaluation. Thus, satisfaction of the relatedness need appeared to be more important for the adolescent athletes in Perreault and colleagues' study than the young adult rugby players in Hodge and colleagues' investigation.

Based on self-determination theory tenets, Vallerand (1997) outlined a motivational model in which self-determined motivation was predicted to mediate the relationship between needs satisfaction and psychological consequences (e.g. positive/negative affect, burnout). McDonough and Crocker (2007) found that motivation partially mediated the relationships between needs satisfaction and affect in adult sport participants. To date, no researchers have investigated this mediation hypothesis with respect to athlete burnout. This type of investigation would allow researchers to understand more fully the motivational processes that may precede athlete burnout and could eventually lead to more effective burnout prevention and treatment interventions. Thus, the main aims of the present study were to examine the relationships between basic psychological needs satisfaction and athlete burnout and to determine whether self-determined motivation mediates these relationships. We examined these issues using data gathered from competitive athletes who had represented their country in international competition or had been identified as having the potential to do so in the near future. To be successful, these elite athletes must dedicate much of their time to training and competition (Baker, Cote, & Abernethy, 2003) and as such may be especially prone to burnout (Hodge et al., 2008).

We hypothesized that the relationships between athlete burnout and behavioural regulations would vary according to their rank on the self-determination continuum. Specifically, amotivation and controlled regulations (external and introjected regulation) would be positively associated with athlete burnout, while autonomous regulations (intrinsic motivation, identified and integrated regulation) would show negative associations. We also predicted that needs satisfaction would be negatively related to athlete burnout, and that overall levels of self-determined motivation (self-determination index) would mediate this relationship.

Methods

Participants

The participants were 201 athletes (121 females, 80 males; mean age 22.9 years, $s = 7.2$, range = 14–61) who were affiliated with the PacificSport Canadian Sport Centres. The athletes were drawn from 51 different sports, comprising a range of team and individual disciplines. On average, these athletes had participated in their sport for 9.5 years ($s = 5.0$, range = 1–27) and just under one-quarter (23.0%) held a “Gold” card, meaning that they received the greatest possible government funding support.

Measures

Basic needs satisfaction. We assessed perceptions of autonomy, competence, and relatedness using three 4-item scales. Ten items were adapted from measures of needs satisfaction at work (Deci et al., 2001), and supplemented with two items used previously to measure competence in sport (McAuley, Duncan, & Tammen, 1989). For the items adapted from Deci and colleagues' (2001) scale, we replaced "work" and "at my work" with "sport" and "in my sport" respectively. Previous research (Lonsdale, 2006) with elite athletes produced supportive reliability and validity evidence. However, Hodge et al. (2008) reported that three negatively worded items from these scales produced scores with low item-total correlations. In an attempt to alleviate this problem, we rephrased these statements so that all items were worded positively. Sample items included "I feel free to express my ideas in my sport" (autonomy), "I think I am good at my sport" (competence), and "I am close to people in my sport" (relatedness). Participants responded using 7-point scales (1 = "not true at all", 4 = "somewhat true", 7 = "very true").

Motivation. We employed the 24-item Behavioural Regulation in Sport Questionnaire (BRSQ; Lonsdale, Hodge, & Rose, 2008), which included six 4-item subscales designed to measure amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic motivation. The item stem was "I participate in my sport ...". Participants responded using the same 7-point rating scale used in the needs measure. Previous research involving competitive athletes has supported the reliability, as well as the factorial and nomological validity, of the BRSQ scores (for details, see Lonsdale et al., 2008).

A self-determination index can be calculated by using weighted scores from subscales intended to represent different types of behavioural regulations. We weighted the BRSQ item scores ($-2 \times$ external regulation; $-2 \times$ introjected regulation; $1 \times$ identified regulation; $1 \times$ integrated regulation; $2 \times$ intrinsic motivation). Using these weighted scores, we took one item from each of the five subscales and summed them to create a self-determination index observed score indicator. This process was repeated a further three times because each subscale contained four items. The result was four self-determination index observed score indicators (see Sarrazin et al., 2002).

Athlete burnout. Athlete burnout was measured using the 15-item Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001). This questionnaire included three subscales: (i) emotional/physical

exhaustion; (ii) devaluation; and (iii) reduced sense of accomplishment. Participants responded using a 5-point rating scale (1 = "almost never" to 5 = "almost always"). In addition to subscale scores, a global burnout index was computed by calculating a mean score from the three subscales (e.g. Raedeke & Smith, 2004). Previous research has supported the reliability (e.g. Lemyre et al., 2006), as well as the factorial (Raedeke & Smith, 2001) and convergent/divergent (Cresswell & Eklund, 2006b) validity, of ABQ scores.

Procedure

Ethical approval was granted by the authors' institution. PacificSport representatives sent a pre-notification email to their athletes, followed up with an invitation email with a link to the online survey and a reminder email 10 days after the initial invitation. Privacy regulations precluded an exact determination of the number of invitations that were delivered. Based on the information provided by PacificSport and the frequency of faulty addresses found in previous online research (Lonsdale, Hodge, & Rose, 2006), we estimated that the response rate was 30%. The athletes were informed that their responses would remain confidential and all participants provided informed consent before completing the questionnaire. Other data gathered from these participants with this questionnaire have been reported elsewhere (Lonsdale, Hodge, & Jackson, 2007).

Analyses

Preliminary analyses. The online survey programme automatically prompted participants when they skipped an item, so there were no missing data. We screened the data set for multivariate outliers and examined the degree of univariate and multivariate normality. We also used confirmatory factor analysis to test the measurement models associated with the scores derived from each of the questionnaires and examined the internal consistency of each subscale score. Finally, we examined the correlations among the behavioural regulation factors (as measured by the Behavioural Regulation in Sport Questionnaire). To justify the creation of a self-determination index, the factor correlations would need to approximate a simplex pattern. This pattern occurs when scores representing constructs that are closer together on a proposed continuum are more strongly and positively correlated than scores derived from subscales intended to represent constructs that are expected to be more distal.

Relationships among basic needs, motivation, and burnout. We examined the bivariate correlations

among basic needs, motivation, and athlete burnout scores. We then used structural equation modelling to test the hypothesis that motivation would mediate the negative relationships between basic needs satisfaction and athlete burnout. Four separate model sequences were fit, allowing the hypotheses to be tested in relation to each of the three athlete burnout symptoms and the global athlete burnout variable. According to Holmbeck (1997), for mediation to be possible, two sets of relationships must first be observed. First, basic needs should predict athlete burnout; these relationships are indicated by the letters (a)–(c) in Figure 2 and were termed the “direct effects” model. Second, basic needs should predict motivation and motivation should predict burnout; these relationships are indicated in Figure 2 by the letters (d)–(f) and (g) respectively and were termed the “mediation” model. For full mediation to be shown, the fit of the mediation model should not be worse (i.e. $\Delta\chi^2, P < 0.05$) than a third model in which all paths (a–g) are freely estimated; this latter model was termed the “combined effects” model. Furthermore, when mediation exists, the significant relationships between basic needs satisfaction and burnout from the direct effects model should be reduced (indicating partial mediation) or nullified (indicating complete mediation) in the combined effects model. The magnitude of the mediation effects was also explored by examining the indirect and total effects from the combined effects model (Holmbeck, 1997).

In all structural equation modelling analyses, identification was achieved by fixing one item-factor loading per latent variable to 1.0. Model fit was assessed by examining two absolute [standardized root mean square residual (SRMR) and root mean squared error of approximation (RMSEA)] and two incremental [Tucker-Lewis index (TLI) and comparative fit index (CFI)] fit indexes. Traditional

cut-off criteria (TLI and CFI > 0.90 , SRMR and RMSEA < 0.08) were taken to indicate adequate fit, while Hu and Bentler’s (1999) criteria (TLI and CFI > 0.95 , RMSEA < 0.06 , SRMR < 0.08) were adopted as evidence of good fit.

Results

Preliminary results

As shown in Table I, mean scores for basic needs and all forms of self-determined motivation were all above the mid-point. Controlled behavioural regulations and athlete burnout mean scores were below the mid-point; however, there was a wide range of scores on these subscales, suggesting that there was adequate variance in the data.

No significant outliers ($P < 0.001$) were identified. However, there was evidence of multivariate non-normality in the data (normalized skewness coefficient = 30.33, normalized kurtosis coefficient = 14.17), thus we employed maximum likelihood estimation using a Satorra and Bentler (1994) correction to the χ^2 statistic and standard errors for all structural equation modelling analyses. We tested measurement models for the basic needs, Behavioural Regulation in Sport Questionnaire, and Athlete Burnout Questionnaire scores and found the data fit the hypothesized factor structures well (all RMSEA ≤ 0.06 , SRMR ≤ 0.08 , TLI ≥ 0.95 , CFI ≥ 0.95). Alpha coefficients ranged from 0.70 to 0.93 (see Table I).

As in Lonsdale and colleagues’ (2008) initial development studies, not all correlations between subscales scores derived from the Behavioural Regulation in Sport Questionnaire conformed perfectly to the proposed simplex structure. Scores representing the two forms of controlled extrinsic motivation (external and introjected regulations)

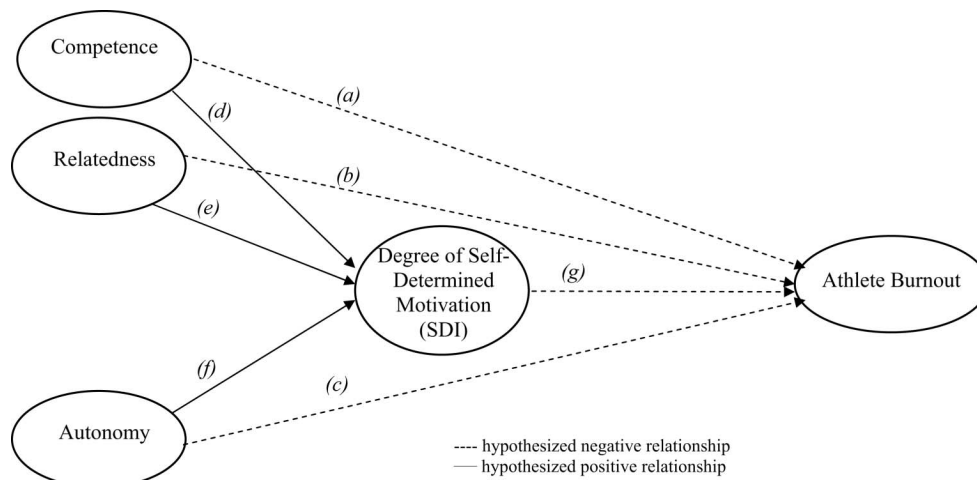


Figure 2. Hypothesized structural model of basic needs, motivation, and athlete burnout. Paths correspond with those in Table II.

Table I. Descriptive statistics and Pearson correlation matrix for basic needs, motivation, and athlete burnout.

	Range	Mean (<i>s</i>)	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Autonomy	1.00 to 7.00	5.38 (1.24)	0.85													
2. Competence	2.67 to 7.00	5.90 (0.89)	0.45	0.84												
3. Relatedness	1.00 to 7.00	6.28 (0.88)	0.34	0.29	0.91											
4. Amotivation	1.00 to 7.00	2.23 (1.54)	-0.40	-0.35	-0.22	0.93										
5. External regulation	1.00 to 7.00	2.01 (1.31)	-0.27	-0.27	-0.12*	0.66	0.93									
6. Introjected regulation	1.00 to 7.00	2.82 (1.65)	-0.30	-0.38	-0.12*	0.60	0.70	0.88								
7. Identified regulation	2.25 to 7.00	5.70 (0.95)	0.26	0.31	0.12	-0.42	-0.37	-0.24	0.70							
8. Integrated regulation	1.00 to 7.00	5.64 (1.07)	0.20	0.25	0.15*	-0.36	-0.31	-0.16	0.61	0.78						
9. Intrinsic motivation	1.00 to 7.00	6.22 (1.02)	0.29	0.47	0.34	-0.68	-0.55	-0.43	0.55	0.51	0.92					
10. Self-determination index	-13.50 to 18.00	11.27 (5.82)	0.34	0.44	0.23	-0.77	-0.90	-0.78	0.56	0.50	0.81	0.96				
11. Exhaustion	1.00 to 4.80	2.47 (0.84)	-0.27	-0.34	-0.27	0.51	0.34	0.44	-0.27	-0.12	-0.44	-0.47	0.89			
12. Reduced sense of accomplishment	1.00 to 4.60	2.30 (0.73)	-0.48	-0.68	-0.17	0.54	0.33	0.41	-0.37	-0.25	-0.44	-0.47	0.42	0.80		
13. Devaluation	1.20 to 4.80	2.37 (0.68)	-0.28	-0.24	-0.24	0.65	0.44	0.32	-0.40	-0.34	-0.52	-0.53	0.40	0.41	0.84	
14. Global burnout	1.27 to 4.67	2.38 (0.59)	-0.43	-0.54	-0.29	0.72	0.47	0.51	-0.43	-0.30	-0.59	-0.63	0.81	0.78	0.75	0.90

Note: Subscale alpha coefficients are listed in italics on the diagonal. Underlined correlations were not significant at $P=0.05$. *Correlations are significant at $P < 0.05$ (one-tailed). All other correlations were significant at $P < 0.01$ (one-tailed). The amotivation subscale was not used in any of the analyses but is included for descriptive purposes. Global burnout is the mean of the three Athlete Burnout Questionnaire subscale scores.

showed similar relationships with other factor scores. Scores representing autonomous extrinsic motivation (identified and integrated regulation) also had similar correlations with the other factors. These results represent a limitation associated with the Behavioural Regulation in Sport Questionnaire that requires further investigation (Lonsdale et al., 2008). Given the pattern of correlations observed, the proposed weighting system, in which the external and introjected regulation scores were weighted equally (scores multiplied by -2) and the identified and integrated regulation scores were also given equal weighting (-1), was appropriate.

Relationships among basic needs, motivation, and burnout

Basic needs satisfaction scores showed negative correlations with all Athlete Burnout Questionnaire scores. Amotivation and controlled forms of motivation were positively correlated with all aspects of burnout, while autonomous forms of motivation showed negative relationships with all burnout scores (see Table I). The structural models fit the data well according to most of the fit statistics (one exception was the direct effects model for global burnout; RMSEA=0.09). Standardized root mean square residuals were at or above the specified cut-off in all versions of direct effects and two of the mediation models, but were at or below the specified cut-off in all versions of the combined effects model (see Table II).

Path coefficients from all structural analyses can be viewed in Table II. The direct effects model analyses indicated that all three needs predicted exhaustion scores, autonomy predicted devaluation, and both competence and autonomy predicted reduced sense of accomplishment and global burnout. When testing the mediation models, paths from competence and autonomy to motivation were significantly different from zero and motivation scores predicted burnout scores. Combined effects models provided better fit ($\Delta\chi^2, P < 0.05$) than the mediation models, regardless of whether the global burnout latent score or the separate burnout symptoms' latent scores were specified as the outcome variable. These final models, which included direct paths from needs and motivation to athlete burnout, accounted for substantial portions of variance in exhaustion ($R^2 = 0.31$), devaluation ($R^2 = 0.49$), reduced accomplishment ($R^2 = 0.61$), and global burnout ($R^2 = 0.74$).

These findings suggested that not all the relationships between needs satisfaction and burnout were fully mediated by motivation. However, as shown in Table II, many of the path estimates associated with autonomy-burnout relationships as well competence-burnout relationships showed decreases from the direct effects model to the combined effects

Table II. Fit statistics and standardized path coefficients for structural models.

Burnout dimension	Scaled χ^2	d.f.	TLI	CFI	SRMR	RMSEA (90% CI)	Needs \rightarrow Burnout			Needs \rightarrow SDI			SDI \rightarrow Burnout	Burnout variance explained (R^2)
							Comp (a)	Relate (b)	Aut (c)	Comp (d)	Relate (e)	Aut (f)	(g)	
Exhaustion														
Direct effects	350.46	183	.97	.97	.18	0.07 (0.06–0.08)	–0.17*	–0.17*	–0.19*	–	–	–	–	0.17
Mediation	295.50	182	.96	.97	.08	0.06 (0.04–0.07)	–	–	–	0.26*	0.04	0.29*	–0.52*	0.28
Combined effects	286.18	179	.98	.98	.07	0.06 (0.04–0.07)	–0.06	–0.15*	–0.06	0.26*	0.03	0.28*	–0.44*	0.31
Devaluation														
Direct effects	408.22	183	.96	.96	.20	0.07 (0.07–0.09)	–0.14	–0.12	–0.30*	–	–	–	–	0.20
Mediation	341.98	182	.96	.96	.08	0.07 (0.06–0.08)	–	–	–	0.26*	0.04	0.29*	–0.68*	0.46
Combined effects	332.36	179	.97	.97	.08	0.07 (0.05–0.08)	0.02	0.03	–0.15	0.26*	0.03	0.28*	–0.60*	0.49
Reduced sense of accomplishment														
Direct effects	345.91	183	.97	.97	.17	0.07 (0.05–0.08)	–0.55*	0.11	–0.37*	–	–	–	–	0.56
Mediation	330.34	182	.95	.96	.12	0.06 (0.05–0.07)	–	–	–	0.27*	0.03	0.29*	–0.55*	0.30
Combined effects	290.70	179	.98	.98	.07	0.06 (0.04–0.07)	–0.48*	0.12	–0.30*	0.26*	0.03	0.28*	–0.25*	0.61
Global burnout														
Direct effects	357.20	146	.95	.96	.20	0.09 (0.07–0.10)	–0.48*	0.09	–0.41*	–	–	–	–	0.52
Mediation	301.21	145	.94	.95	.10	0.07 (0.06–0.09)	–	–	–	0.27*	0.04	0.29*	–0.79*	0.62
Combined effects	285.37	142	.97	.97	.08	0.07 (0.06–0.08)	–0.28*	–0.01	–0.30*	0.26*	0.03	0.28*	–0.51*	0.74

Note: TLI = Tucker-Lewis index, CFI = comparative fit index, SRMR = standardized root mean square residual, RMSEA = root mean squared error of approximation. Comp = competence, Relate = relatedness, Aut = autonomy, SDI = self-determination index. (a) to (g) coincide with the paths indicated in Figure 2. *Standardized path coefficient was significantly different from zero ($P < 0.05$).

model. Decreases in path estimates were larger in the models associated with exhaustion and devaluation scores than the models where reduced sense of accomplishment was the endogenous variable.

The mediation hypothesis was also supported by the numerous significant indirect relationships found in the combined effects models (see Table III). Indirect relationships (i.e. through motivation) between needs satisfaction (autonomy and competence) and the exhaustion and devaluation aspects of burnout were dominant, accounting for over 50% of the total effects. Indirect effects associated with needs satisfaction and a reduced sense of accomplishment were less marked, accounting for less than 20% of the total effects.

These results indicated the following: (a) The competence → exhaustion and autonomy → exhaustion relationships were fully mediated by motivation, but motivation did not mediate the relatedness → exhaustion relationship. (b) The autonomy → devaluation relationship was fully mediated by motivation. Despite the decrease in the competence → devaluation parameter estimate from direct to combined models, mediation was not, strictly speaking, demonstrated because this path was not statistically significant ($P=0.06$) in the direct effects model. However, the analyses did show a significant indirect effect of competence on devaluation (see Table III), suggesting that these variables were related through their relationships with self-determined motivation. (c) The competence → reduced sense of accomplishment and autonomy → reduced sense of accomplishment relationships were partially mediated by motivation. And (d) motivation partially

mediated the competence → global burnout and autonomy → global burnout relationships.

Discussion

Until now, athlete burnout investigations based on self-determination theory tenets have focused on the associations between basic needs satisfaction and burnout (Hodge et al., 2008; Perreault et al., 2007) or the relationships between behavioural regulations and burnout (e.g. Cresswell & Eklund, 2005a, 2005b, 2005c; Lemyre et al., 2006). In this study, we examined athlete burnout taking into account a more comprehensive self-determination theory framework of basic needs and behavioural regulations and sought to provide further insight into the motivational processes that may influence athlete burnout. Our hypotheses regarding the differential relationships that the various forms of extrinsic motivation would have with athlete burnout (at both the global and burnout symptom level) were supported. Controlled extrinsic motivation scores were positively correlated with athlete burnout, while autonomous forms of extrinsic motivation were negatively related to burnout.

In addition, our results support previous studies (Hodge et al., 2008; Perreault et al., 2007) in which autonomy and competence were significant predictors of athlete burnout. We also found that the relationships between these needs and exhaustion and devaluation were largely mediated by athletes' levels of self-determined motivation, while their relationships with reduced sense of accomplishment and global burnout were only partially mediated.

Are behavioural regulations differentially related to athlete burnout?

Amotivation and intrinsic motivation have been consistently and strongly related to athlete burnout (e.g. Cresswell & Eklund, 2005b) and our results provide further evidence of these relationships. However, a clear understanding of the relationships between the various forms of extrinsic motivation and burnout has proved elusive (Eklund & Cresswell, 2007), possibly as a result of using the Sport Motivation Scale (Pelletier et al., 1995) to measure behavioural regulations. Our findings provided support for our hypotheses and self-determination theory proposals that external regulation and introjected regulation (controlled extrinsic motivation) would be positively related to athlete burnout and that identified regulation and integrated regulation (autonomous extrinsic motivation) would be negatively correlated with athlete burnout. Similar results between behavioural regulations (measured using the Behavioural Regulation in Sport

Table III. Standardized effects of needs satisfaction scores on athlete burnout scores.

Indirect relationship	Indirect effect	t-value	Total effects	t-value
Competence → Exhaustion	-0.11	2.58*	-0.17	-2.06*
Relatedness → Exhaustion	-0.01	-0.40	-0.13	-2.25*
Autonomy → Exhaustion	-0.12	2.69*	-0.11	-2.13*
Competence → Devaluation	-0.16	-2.46*	-0.14	-1.66
Relatedness → Devaluation	-0.02	-0.40	-0.11	-1.31
Autonomy → Devaluation	-0.17	-2.58*	-0.33	-3.31*
Competence → Reduced sense of accomplishment	-0.07	-2.70*	-0.55	-5.33*
Relatedness → Reduced sense of accomplishment	-0.01	-0.41	0.11	1.34
Autonomy → Reduced sense of accomplishment	-0.07	-2.19*	-0.37	-4.20*
Competence → Global burnout	-0.13	-2.76*	-0.41	-4.50*
Relatedness → Global burnout	-0.02	-0.41	-0.02	-0.28
Autonomy → Global burnout	-0.14	-2.50*	-0.44	-3.73*

* $P < 0.05$.

Questionnaire) and global athlete burnout have been reported in non-elite athletes (Lonsdale et al., 2008).

Findings regarding extrinsic motivation and athlete burnout are important as they suggest that participation “for the love of the game” (intrinsic motivation) is not the only behavioural regulation linked to lower levels of athlete burnout. Athletes who were motivated to achieve valued outcomes or to express their sense of self (autonomous extrinsic motivation) were less likely to report high burnout symptoms than athletes who were motivated to comply with an external demand or to avoid guilt and shame (controlled extrinsic motivation). Thus, it would appear that participation to gain extrinsic benefits may not lead to burnout if the athlete perceives these outcomes to be personally important and worthwhile. These results should be confirmed in future studies using the Behavioural Regulation in Sport Questionnaire.

Does motivation mediate the relationship between needs satisfaction and athlete burnout?

We found that motivation mediated the relationships between both competence and autonomy and the athlete burnout symptom of exhaustion. There was also evidence that autonomy and competence were indirectly related to devaluation via their associations with self-determined motivation. However, the evidence supporting the mediation hypothesis was stronger for the autonomy → devaluation relationship than the competence → devaluation relationship. These results generally supported the hypotheses based on Vallerand’s (1997) meditational model. In contrast, the relationships between needs satisfaction (competence and autonomy only) and reduced sense of accomplishment were only partially mediated by self-determined motivation, with direct effects accounting for a large portion of the relationship between needs (competence and autonomy) and reduced sense of accomplishment. Thus, it is possible that the psychological processes responsible for reduced sense of accomplishment may be different from those underlying exhaustion and devaluation. Organizational psychologists have suggested that exhaustion and cynicism are considered the core burnout symptoms (e.g. Gonzalez-Roma, Schaufeli, Bakker, & Lloret, 2006) and that reduced efficacy in employees often develops separately (Maslach, Schaufeli, & Leiter, 2001) via processes that differ from those responsible for these more central burnout indicators (e.g. Bakker, Demerouti, & Euwema, 2005). Consequently, athlete burnout researchers should consider the possibility that the three burnout symptoms may have different antecedents (Lemyre et al., 2006) and conduct prospective studies in which the developmental trajectory of

all three athlete burnout symptoms and potential antecedents are examined.

As discussed, our results indicate that exhaustion and devaluation were both negatively related to competence and autonomy. However, there were also differences in the results associated with these two burnout symptoms. First, self-determination theory-based variables explained a greater proportion of the explained variance in devaluation than exhaustion. Burnout has been hypothesized to be caused by both physical (e.g. overtraining and under-recovery) and psychological factors (Gould, 1996; Kentta & Hassmen, 2002). Our analyses indicated that self-determined motivation, in particular, was more strongly related to devaluation than exhaustion. Lemyre et al. (2006) reported similar findings in their study of college-age swimmers. Studies with adolescent swimmers (Raedeke & Smith, 2001) and adult rugby players (Cresswell & Eklund, 2005a, 2005b, 2005c) also produced similar results. Lemyre et al. (2006) suggested that devaluation is “perhaps the most cognitive of the burnout dimensions” (p. 45) and thus links with motivation are understandable. Exhaustion, on the other hand, may be more strongly influenced by physiological factors (for reviews of the related issue of “overtraining” syndrome, see Kentta & Hassmen, 2002; Kreider, Fry, & O’Toole, 1998). Future research should examine both physiological and psychological factors to test the hypothesis that burnout dimensions may have differential antecedents.

The second difference associated with the exhaustion and devaluation symptoms was the significant direct relationship between relatedness and exhaustion, but the lack of a direct relationship between relatedness and devaluation (or the reduced sense of accomplishment symptom). The contention that relatedness may be a factor that prevents or lessens exhaustion symptoms more than other burnout symptoms is supported by previous research with age-group swimmers (Raedeke & Smith, 2004) that showed a significant relationship between social support and exhaustion, but no significant relationship between social support and the other two athlete burnout symptoms. On the other hand, Perreault et al. (2007) have previously shown athlete-coach relatedness to be a significant predictor of all three burnout symptoms.

In general, our results suggest that, compared with relatedness, autonomy and competence were more strongly related to burnout symptoms. Relatedness was only a significant predictor of exhaustion, whereas competence and autonomy showed direct and/or indirect relationships with all three athlete burnout symptoms and global burnout. These results are similar to those found by Hodge et al. (2008) with young adult rugby players who showed a

modest relationship between relatedness and athlete burnout, but more substantial relationships between burnout and satisfaction of the other two needs. Ryan and Deci (2002) have suggested that, compared with competence and autonomy, relatedness may play a more distal role in the promotion of well-being and the avoidance of ill-being. Our results supported this contention.

Limitations and future research

We employed a cross-sectional design and thus no causal inferences can be drawn from our findings. Clearly, longitudinal, prospective research should be the next step in self-determination theory burnout research and there are some key issues that should be investigated: (1) the impact of potential antecedent variables on changes in athlete burnout (at both the global and burnout symptom level) and the relative importance of satisfying each of the three needs with respect to the burnout dimensions; (2) alternative theoretical models, such as those in which burnout leads to less self-determined motivation or where the variables have reciprocal relationships (Cresswell & Eklund, 2005b); (3) the impact of burnout on key outcome variables, such as injury, illness, and performance (Cresswell & Eklund, 2003); and (4) the temporal development of athlete burnout symptoms.

There is also a need to test the efficacy of intervention programmes designed to prevent burnout. Researchers have indicated that coaching behaviours that promote athlete decision making (e.g. Hollebeak & Amorose, 2005), autonomy-supportive coaching behaviours (Gagné et al., 2003), and a task/mastery motivational climate (e.g. Reinboth & Duda, 2006) are related to greater perceptions of needs satisfaction and self-determined motivation. Therefore, based on the results of the current study and others (Hodge et al., 2008; Perreault et al., 2007), it is plausible that interventions designed to promote these coaching behaviours may result in decreased likelihood of athlete burnout. These types of interventions, and those aimed at other important socializing influences (e.g. parents, peers), are worthy of investigation.

Conclusions and implications

Preventing athlete burnout is an important goal for researchers and practitioners and an understanding of the potential antecedents of this syndrome is therefore important. This cross-sectional study simultaneously examined relationships among basic needs satisfaction, motivation, and athlete burnout. Competence, autonomy, and athletes' overall levels of self-determined motivation accounted for significant amounts of variance in all three athlete burnout

symptoms, with self-determined motivation fully mediating the effect of competence and autonomy on exhaustion and devaluation symptoms and partially mediating the needs satisfaction–reduced sense of accomplishment association. As a result, sport environments that promote needs satisfaction, appear likely to promote more self-determined motivation and prevent athlete burnout.

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