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Motivational profiles and burnout in elite athletes: A person-centered approach

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ABSTRACT

The aim of this study was to assess the link between elite athletes' motivational profiles and burnout using a person-centered approach. Participants were 391 Spanish elite athletes (201 males and 190 females), aged 16–30 years who completed questionnaires measuring demographic information, self-determined motivation, and athlete burnout. Latent profile analysis resulted in a five profile solution labeled: amotivation (Class 1), low motivation (Class 2), moderately autonomous motivation (Class 3), amotivated and moderately controlled motivation (Class 4), and highly motivated (Class 5). While no significant differences were found in emotional/physical exhaustion, Class 4 (amotivated and moderately controlled motivation) scored higher than classes 2 (low motivation), 3 (moderately autonomous motivation), and 5 (highly motivated) on a Reduced sense of Accomplishment and Sport Devaluation. Findings are discussed in relation to Self-Determination Theory, suggesting that the quality of one's motivation may be equally, if not more important than the quantity of motivation in determining subsequent health, well-being, and performance outcomes.

Athlete burnout has garnered increasing interest over the past 20 years. Given the pressures and demands associated with competitive sport, it is not surprising that interest in burnout has been on the rise (cf. Eklund & DeFreese, 2015; Gustafsson, DeFreese, & Madigan, 2017). Athlete burnout has been commonly defined as a syndrome or a construct comprised of three dimensions: (1) emotional and physical exhaustion, (2) a reduced sense of accomplishment, and (3) sport devaluation (Raedeke & Smith, 2009). The first symptom is characterized by the perceived depletion of emotional and physical resources beyond that associated with routine practice and competition. The second symptom is characterized by an enduring sense of reduced personal accomplishment in terms of sport abilities and achievement. The final symptom reflects the development of a cynical attitude towards sport participation. Although the conceptualization of burnout have been under discussion (cf. Gustafsson, Lundkvist, Podlog, & Lundqvist, 2016), there is consensus among researchers that exhaustion lies at the core of this condition (Gustafsson, Kenttä, & Hassmén, 2011; Maslach, Schaufeli, & Leiter, 2001).

Considering the maladaptive nature of burnout, researchers have examined the factors implicated in its development. Sport psychologists have asserted that athletes are vulnerable to developing burnout to the extent that they experience chronic levels of psychosocial stress (Raedeke, 1997; Smith, 1986) and/or shifts in the quality and level of their sport motivation (Cresswell & Eklund, 2005; Lemyre, Treasure, Roberts, 2006). For instance, interviews with ten burned out athletes revealed that during their career, high initial motivation was a contributor to burnout (Gustafsson, Hassmén, Kenttä, & Johansson, 2008). In addition, longitudinal research indicates that burnout is a likely consequence of maladaptive motivational dispositions (Lemyre, Hall, & Roberts, 2008). Thus, the role of motivation in the burnout syndrome has been of great interest to both researchers and practicing sport psychologists.

The prominent motivational signature of athlete burnout has lead researchers to use self-determination theory (SDT: Li, Wang, & Kee, 2013; Ryan & Deci, 2002) to help explain and predict burnout. Within SDT, five behavioral regulations are proposed to exist along a continuum, ranging from high self-determination (i.e., intrinsic motivation, IM) to low self-determination (i.e., external regulation). IM, occurs when an athlete participates because of interest or enjoyment in the activity itself. A second regulation, integrated regulation is evidenced

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when an athlete views sport as being congruent with deeply held values (i.e., being an athlete) and his or her sense of self. Third, identified regulation underlies participation to realize benefits one deems personally important (e.g., winning). Fourth, introjected regulation refers to behavior that are performed to avoid feelings such as guilt or shame or to enhance feelings of self-worth. Fifth, external regulation occurs when an athlete participates to satisfy an external demand or to avoid punishment. Finally, it is important to note that individuals may demonstrate antipathy towards an activity, what Ryan and Deci term amotivation. Amotivation occurs when athletes lack motivation and feel as though they are "going through the motions."

While external, introjected, identified, and integrated regulation are all considered forms of extrinsic motivation (EM) (i.e., they all represent outcomes separate from the inherent experiential aspects of the activity), some forms of EM are considered more self-determined than others. Specifically, external and introjected regulation have been described as non-self-determined or controlled regulatory styles, whereas identified and integrated regulation are considered self-determined or autonomous regulatory styles (Ryan & Deci, 2000). Intrinsic motivation is seen as the epitome of self-determined motivation, since the only reward associated with participation is engagement in the activity itself.

Researchers investigating motivational regulations and burnout have mostly supported the theoretical assumptions of SDT (e.g. Cresswell & Eklund, 2005; Curran, Appleton, Hill, & Hall, 2011; Raedeke & Smith, 2001). From a SDT perspective, burnout is associated with thwarted psychological needs (i.e., competence, autonomy and relatedness; Deci & Ryan, 2008) and when these needs are chronically unfulfilled this leads to impaired health, non self-determined motivation and amotivation as a consequence. Consistent with SDT assumptions, numerous studies have found that intrinsic motivation is negatively related to athlete burnout, while amotivation has been shown to be positively related to burnout symptoms (Eklund & Cresswell, 2007). In contrast, relationships between athlete burnout and extrinsic motivation have been more equivocal. Specifically, investigators have shown non-significant or modest negative relationships between burnout symptoms and external, introjected, and identified regulation (cf., Eklund & Cresswell, 2007; Li et al., 2013). More research is needed to investigate the partially inconsistent findings.

Most of the previous burnout research has adopted a variable-oriented approach, in which specific behavioral regulations or a self-determination index (i.e. a composite of regulations) are used to examine relations with athlete burnout (e.g., Cresswell & Eklund, 2005; Lemyre, Roberts, & Stray-Gundersen, 2007). Using a person-centered approach, offers complementary insights into the concomitant motivations within individuals that may influence burnout susceptibility (Gillet, Vallerand, & Rosnet, 2009; Gustafsson, Hill, Stenling, & Wagnsson, 2016). Such an approach places emphasis on the individual rather than variables.

Using a person-centered approach seems well-suited to an examination of motivation as a multidimensional construct – as is the case with motivation on the SDT continuum. A person-centered analysis models the theoretical possibility that individuals endorse combinations of motivation regulations, rather than specific regulations (Bergman & Andersson, 2010; Gustafsson, Hill, et al., 2016). Further adopting a person-oriented approach provides the opportunity to investigate the *number* of athletes characterized by distinct motivational profiles in a manner that cannot be done using a variable-centered approach. Finally, a person-oriented approach gives the opportunity to determine actual motivational profiles that exist in an elite sport context, rather than examine theoretically proposed possibilities based on SDT assumptions (e.g., high autonomy/low control combinations) (Gillet et al., 2009). Thus using a person-centered approach can provide an alternative picture to a variable/correlational approach when investigating burnout and motivation (Gustafsson, Sagar, & Stenling, 2016).

Despite its advantages, limited research using a person-centered approach has been conducted in the area of athlete burnout and motivation (e.g., Lemyre et al., 2008) and only one study has used a SDT as their theoretical framework (Gillet, Berjot, Vallerand, Amoura, & Rosnet, 2012). In their investigation of ultra-distance marathon runners, Gillet et al. (2012) found three motivational profiles including: low (low autonomous motivation, high amotivation), moderate (moderate autonomous motivation, moderately controlled motivation, and low amotivation) and high motivation (high controlled and high autonomous motivation). Interestingly, a high motivation profile was associated with both higher performance and increased levels of emotional and physical exhaustion. The latter finding suggests that high motivation might be a double-edged sword in so far as greater performance levels may come at a price, namely increased burnout susceptibility. These findings demonstrate the potential of a person-oriented approach in providing more nuanced insights into the relationship between motivation and burnout. However, despite the benefits of using a person-centered approach, the studies above used cluster analysis which have methodological limitations (c.f., Gustafsson, Hill, et al., 2016).

In the present study, we employed latent profile analysis (LPA; e.g., Marsh, Lüdtke, Trautwein, & Morin, 2009; McLachlan & Peel, 2000; Morin & Marsh, 2015; Muthén, 2001; Pastor, Barron, Miller, & Davis, 2007) to uncover underlying subgroups of athletes with different motivational profiles. As with more traditional cluster analysis techniques, LPA is used to divide persons into homogenous subgroups. There are, however, some noticeable advantages of LPA compared to cluster analysis techniques (Marsh et al., 2009; Vermunt, 2011; but see also; Steinley & Brusco, 2011). The main difference between LPA, hierarchical and most non-hierarchical cluster analysis techniques is that LPA is a model-based approach, whereas cluster analysis is an exploratory technique (Marsh et al., 2009; Pastor et al., 2007). A model-based approach allows for less arbitrary decisions regarding how many classes to retain because several fit indexes can be used to compare models and aid the decision regarding the number of underlying classes (Marsh et al., 2009; Vermunt & Magidson, 2002). With cluster analysis, researchers most often examine different solutions, and use theory and subjective judgment to decide on the number of clusters to retain because rigorous guidelines (e.g., statistical tests) are lacking in making such decisions (Pastor et al., 2007). LPA allows for more flexible model specification that can include different distributional forms, variables of different scale types, and ease of including various predictors and/or outcomes in the analysis (e.g., Asparouhov & Muthén, 2014; Morin & Wang, 2016; Vermunt & Magidson, 2002). LPA is also a probabilistic approach, meaning that although each person is assumed to belong to one class, the analysis takes into account that there is uncertainty in the classification (Vermunt & Magidson, 2002). For the abovementioned reasons, LPA seems to be gaining popularity in sport and exercise psychology research as it provides a less subjective and more robust approach for person-centered analyses (Morin & Wang, 2016).

It is worth noting that recent inquiry outside the sport context (e.g., work settings; Howard, Gagné, Morin, & Van den Broeck, 2016) has examined SDT motivational profiles and burnout using LPA. For instance, Howard et al. (2016) found four different profiles showing varying amounts of self-determined motivation as well as qualitative differences between the motivational profiles (i.e., profiles exhibiting different shapes). The profiles included: an amotivated group, a "moderately" motivated group (mid-range levels on all motivational regulations), a moderately autonomous group, and finally, a group high on all regulations except for amotivation. In this study, burnout was highest in the moderately motivated group followed by the amotivated group. These findings are different from Gillet et al. (2012) who found a different set of profiles and the highest burnout scores were found in a "high" motivation group with high levels of all motivational regulations except for amotivation. This is especially interesting as amotivation are generally associated with burnout in earlier studied using a variable approach (c.f., Li et al., 2013). The different findings might be due to

contextual difference (i.e., sport versus job context) or the use of method (i.e., cluster analysis versus LPA). These contradictory findings warrant studies investigating the existence of different SDT motivational profiles and their relationships with outcomes such as burnout in a sport context using LPA.

In addition to the analytic limitations of previous burnout research, much of the past work has focused on adolescent and/or sub-elite populations (for exceptions see Cresswell & Eklund, 2005; Gustafsson et al., 2008; Lemyre et al., 2008). Given the intense pressures, intensive training schedules, and multiple demands placed on elite athletes, it seems logical that athletes at the highest performance level may be prone to burnout, since as alluded to above, the very same qualities that enable athletes to achieve high performance levels may be the same attributes that lead to burnout (Gustafsson et al., 2011). For instance, perfectionist tendencies, a high level of concern about one's performance, and patterns of over exertion during periods of fatigue, can in the face of frustrating setbacks, become detrimental attributes that ultimately increase the risk of burnout (Hill & Curran, 2016). Given the dearth of burnout research on elite samples, we focused on this population in the present investigation.

Taking into account the relative absence of studies adopting a person-oriented approach investigating the role of motivational regulations and burnout in elite samples, we sought to extend past research by analyzing the link between motivational profiles and burnout in elite athletes using latent profile analysis. Several hypotheses were forwarded in the current study. First, given that SDT predicts a simplex motivational structure in which behavioral regulations close in proximity are highly related, we anticipated the existence of several motivational groups, including athletes characterized by amotivation, autonomous motivation (intrinsic motivation and identified regulation), and controlled motivation (introjected and external regulations). Second, based on recent research on high performance athletes (Gillet et al., 2009; 2012) and in work settings (Howard et al., 2016), we also anticipated the existence of groups with profiles including *both* high levels of autonomous and controlled forms of motivation. Third, consistent with SDT and past burnout research, we hypothesized that athletes characterized by profiles with controlled regulations and amotivation would experience higher levels of all three burnout dimensions. Finally, considering hypothesis two, although the research have been contradictory in sport (Gillet et al., 2012) and work settings (Howard et al., 2016), based on the only study in athletes (Gillet et al., 2012) we predicted that athletes high in autonomous and controlled motivation would experience high levels of burnout, given that controlled motivation might offset some of the benefits of autonomous motivation.

1. Method

1.1. Participants

Three hundred ninety-one elite athletes (201 males and 190 females) ages 16 and 30 years (M = 20.6, SD = 3.86), from different regions of Spain, participated in the study. They had extensive experience competing in their sport (M: 10.21; SD: 4.31). Many of the athletes had reached the national level (n = 337, 86.2%) or international level (n = 54, 13.8%). Those at the national level had all met regional standards needed to qualify for national level competitions. Participants competed in a total of 22 different sports, the most common ones including: volleyball (n = 73, 18.7%), handball (n = 52, 13.3%), track and field (n = 45, 11.5%), and basketball (n = 41, 10.5%). The remaining athletes competed in a variety of other sports (n = 180, 46.0%). Sixty-five percent of athletes (n = 254) competed in team sports, while 35.0% (n = 137) competed in individual sports.

1.2. Procedures

After receiving institutional ethical approval, the second author visited various sport clubs to request permission for athlete involvement in the study. When permission was granted, meetings were established with the athletes to inform them of the study aims, to obtain informed written consent, and to conduct data collection procedures. Participants were informed that their involvement was completely voluntary and that they could withdraw from the study at any time. They were also given the opportunity to ask any questions and were told to take as long as they needed in completing the battery of questionnaires. As questionnaires were administered in group meeting sessions and the second author checked for any incomplete responses before athletes left the meeting room, we managed to achieve a 100% response rate. No athlete declined study participation. Although coaches were present during the data collection, the second author observed that none of the coaches intruded on the athletes' privacy while completing the questionnaire. That is, coaches maintained a certain physical distance from the athletes during questionnaire completion. As data was obtained by the 2nd author immediately upon questionnaire completion, coaches had no opportunity to access the questionnaire data. Data collection occurred within the last month of athletes' respective competitive seasons.

1.3. Measures

1.3.1. Self-determination

A Spanish version (Balaguer, Castillo, & Duda, 2007) of the Sport Motivation Scale (SMS; Pelletier et al., 1995) was used to assess athletes' behavioral regulations. The SMS is a 28-item scale with the statement stem, "Why do you practice your sport?" prefacing items assessing intrinsic motivation (e.g., "For the pleasure it gives me to know more about the sport that I practice"); identified regulation (e.g., "Because it is one of the best ways I have chosen to develop other aspects of myself"); introjected regulation (e.g., "Because I must do sports to feel good about myself"); external regulation (e.g., "For the prestige of being an athlete"), and amotivation (e.g., "I don't know anymore; I have the impression that I am incapable of succeeding in this sport"). Participants provided responses on a seven-point Likert scale ranging from 1 (*Does not correspond at all*) to 7 (*Corresponds exactly*). The scale has demonstrated acceptable reliability and construct validity (Balaguer et al., 2007; Pelletier et al., 1995). Cronbach's alpha scores of the subscales ranged from 0.70 to 0.88 in the present study.

1.3.2. Athlete burnout

To identify symptoms of athlete burnout, we used a Spanish version of the Athlete Burnout Questionnaire (ABQ; Arce, De Francisco, Andrade, Arce, & Raedeke, 2010; Raedeke & Smith, 2001). The ABQ is a 15-item inventory that contains three subscales including emotional and physical exhaustion (EXH; e.g., "I feel overly tired from my sport participation"); a reduced sense of accomplishment (RA; e.g., "I am not achieving much in sport"), and sport devaluation (DEV; e.g., "I have negative feelings toward sport"). Participants responded on a five-point Likert scale with anchors ranging from 1 (*Almost never*) to 5 (*Almost always*). Results from previous validation work showed good reliability and convergent and discriminant validity (Arce et al., 2010; Raedeke & Smith, 2001). Cronbach's alpha scores in the present investigation were 0.83 for emotional and physical exhaustion, 0.77 for reduced sense of accomplishment, and 0.81 for sport devaluation.

1.3.3. Analyses

Mplus software (version 7.4; Muthén & Muthén, 1998–2012) was used to perform confirmatory factor analysis (CFA) and latent profile analysis (LPA). Model parameters were calculated using robust maximum likelihood (MLR) estimation. Latent profile analysis was performed with the five SMS subscales (amotivation, external regulation,

Table 1
Descriptive statistics, internal reliability coefficients for dimensions of self-determination and burnout, and bivariate correlations.

Variable	M	SD	α	1	2	3	4	5	6	7
1. Intrinsic motivation	3.99	0.55	0.88							
2. Identified regulation	3.75	0.69	0.77	0.55**						
3. Introjected regulation	3.29	0.76	0.74	0.43**	0.45**					
4. External regulation	2.84	0.80	0.70	0.23**	0.36**	0.49**				
5. Amotivation	1.91	0.82	0.75	-0.31**	-0.15**	0.05	0.12*			
6. Emotional/physical exhaustion	2.15	0.69	0.83	-0.04	0.09	0.08	0.16**	0.25**		
7. Reduced sense of accomplishment	2.48	0.66	0.77	-0.15**	-0.09	0.03	-0.10*	0.42**	0.27**	
8. Sport devaluation	1.79	0.77	0.81	-0.25**	-0.07	-0.01	0.02	0.55**	0.32**	0.44**

**$p < 0.01$; *$p < 0.05$.

introjected regulation, identified regulation, and intrinsic motivation) as input variables. In order to make sure the five input variables represented true combinations of motivational regulations, and not shared error variance, latent factor scores (rather than manifest total scores) from CFA were saved and used as the input variables in the LPA. A sequence of nested models, with an increasing number of profiles, starting with one, were compared to determine if more complex models (with more profiles) fit the data better than more parsimonious models with less profiles. In the present study, models with one to seven profiles were tested to identify the optimal number of profiles. Profiles were added iteratively to identify the best model fit. Based on the recommendations in the literature (e.g., Marsh et al., 2009; Morin & Marsh, 2015; Nylund, Asparouhov, & Muthén, 2007), several criteria were used to determine the optimal number of profiles. Results from recent simulation studies suggest that four of these tests and indices are particularly effective for model selection in LPA (see Henson, Reise, & Kim, 2007; Nylund et al., 2007; Peugh & Fan, 2013; Yang, 2006): the consistent Akaike's Information Criterion (CAIC), Bayesian Information Criterion (BIC), the sample-size adjusted BIC (SSA-BIC), and the Bootstrapped Likelihood Ratio Test (BLRT). Lower values of CAIC, BIC, and SSABIC indicates a better model fit. A statistically significant BLRT tests ($p < 0.05$) indicate that the target profile solution fits better with the data than a profile solution with one less profile. The entropy criterion was also examined; this criteria varies from 0 to 1 and indicates how accurately people are categorized into their respective profiles, with higher values indicating a better fit for a given solution (Aldridge & Roesch, 2008). The entropy should not be used to determine the optimal number of profiles (Lubke & Muthén, 2007; Tein, Coxe, & Cham, 2013), but is considered a useful tool to assess classification accuracy (Morin & Marsh, 2015). In addition to the fit criteria, it is important to assess interpretability, theoretical meaningfulness, and parsimony of the latent profiles when determining the optimal solution (Marsh et al., 2009; Muthén, 2003). To support the interpretation of the best-fitting solution, *z*-scores with a mean of 0 and standard deviation of 1 were used in the analysis. Overall tests of associations and pairwise class comparisons were performed using Wald tests (the BCH method; Asparouhov & Muthén, 2014) to examine differences in burnout between the latent profiles. The three burnout subscales were entered in the analysis as auxiliary outcome variables.

2. Results

2.1. Preliminary analysis

Initially data was screened for univariate and multivariate outliers. Following the guidelines of Tabachnick and Fidell (2007), standardized z-scores with 3.29 as critical value ($p < 0.001$) were used for univariate outliers. Mahalanobis distances and the critical value of $\chi^2_{(2)} = 26{,}13$ ($p < 0.001$) were used for multivariate outliers. Four multivariate outliers were found with values above 26.13. However, in accordance with established guidelines (Tabachnick & Fidell, 2007), no values higher than 1.0 (highest value 0.033) for Cook's distance were found and we therefore decided to include the four outliers.[1]

2.2. Descriptive statistics

Table 1 shows the means, standard deviations, and reliability estimates for all study measures. The sample reported relatively high levels of intrinsic motivation, identified regulation, and introjected regulation. Conversely, relatively low levels of external regulation and amotivation (7-point Likert) were evident. Athletes in the sample also reported moderate levels of a reduced sense of accomplishment, moderate to low levels of emotional/physical exhaustion, and low levels of sport devaluation (5-point Likert). The mean scores on the three ABQ subscales suggested a low prevalence of burnout in the current sample.

2.3. Bivariate correlations

The relationship between motivational regulations and the three dimensions of athlete burnout was first assessed via correlational analyses (Table 1). Bivariate correlations indicated that amotivation was positively associated with all three burnout dimensions. Based on Cohen's criteria of 0.10, 0.30, 0.50 representing a small, medium, and large effect size, respectively (1992), the strength of associations ranged from small/medium (emotional/physical exhaustion) to large (sport devaluation). External regulation was positively associated with emotional/physical exhaustion and negatively associated with a reduced sense of accomplishment (small effect sizes). Finally, intrinsic motivation was negatively associated with a reduced sense of sport accomplishment and sport devaluation, with small effect sizes. Identified and introjected regulation showed no statistically significant relations with burnout.

2.4. Latent profile analyses

Model fit for the five-factor CFA of the SMS was, χ^2 (340) = 821.24, $p < 0.001$, CFI = 0.84, RMSEA = 0.06, 90 CI [0.06, 0.07], SRMR = 0.06. The factor score determinacy coefficients ranged from 0.878 to 0.951 indicating a strong association between the estimated factor scores and the true factor scores (Grice, 2001; Skrondal & Laake, 2001).

The model fit of the five estimated latent profile solutions are displayed in Table 2. It is noticeable that the CAIC, BIC, SSABIC, and the

[1] We performed a sensitivity analysis and re-analyzed the data without these four multivariate outliers to examine their potential impact on the results. The results were almost identical and we only observed one minor difference. A statistically significant difference (according to the significance level of 0.005 after Bonferroni corrections) in Sport Devaluation between the amotivated profile and the highly motivated profile was observed when the outliers were excluded. When examining this more closely the difference in magnitude when including and excluding the outliers is 0.119 (i.e., 0.496 with outliers; 0.615 without outliers). We do not consider this to be of substantial importance for the interpretation of the results and have chosen to retain the four multivariate outliers in analyses.

Table 2
Fit indices, entropy, and model comparisons for estimated latent profile analyses models (N = 391).

Model	LL	#fp	CAIC	BIC	SSA-BIC	Entr	BLRT	nC < 10/5%
1 class	−2774.025	10	5617.737	5607.737	5576.007	NA	NA	NA
2 class	−2513.322	16	5138.144	5122.144	5071.377	0.789	0.000	0
3 class	−2346.362	22	4846.035	4824.035	4754.230	0.865	0.000	0
4 class	−2261.497	28	4718.118	4690.118	4601.275	0.871	0.000	1/0
5 class	**−2191.070**	**34**	**4619.076**	**4585.076**	**4477.196**	**0.844**	**0.000**	**1/0**
6 class	−2139.646	40	4558.040	4518.040	4391.122	0.862	0.000	1/1
7 class	−2091.686	46	4503.933	4457.933	4311.977	0.852	0.000	2/1

Note: LL = Log-likelihood; #fp = number of free parameters; CAIC = Consistent Akaike Information Criterion; BIC = Bayesian Information Criterion; SSA-BIC = Sample Size Adjusted Bayesian Information Criterion; BLRT = *p*-value for bootstrap likelihood ratio test; nC < 10/5% = number of classes with less than 10 and 5% of the cases respectively.

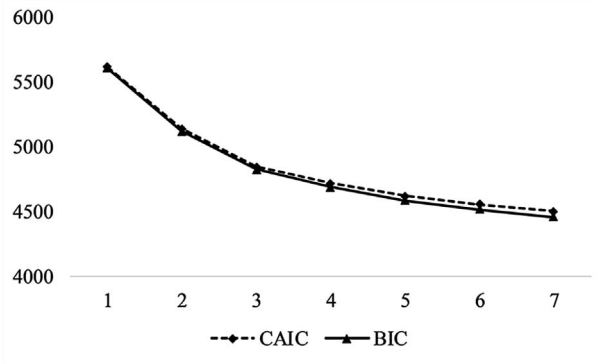

Fig. 1. Elbow plot for the information criteria.

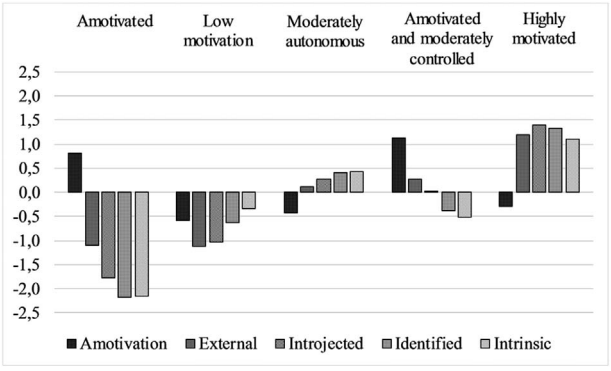

Fig. 2. Motivational profiles.

BLRT suggested improvements in model fit for each successive class that was added. The entropy values were also quite high (≤0.789) for all estimated models. Given the high entropy values, we followed the recommendations of Diallo, Morin, & Lu (2017) to rely primarily on the CAIC and BIC when determining how many profiles to retain. As neither the CAIC ort the BIC provided clear guidance in the model selection process, we followed previous recommendations to use graphical representation (i.e., elbow plot) of these information criteria when determining the final solution (Howard et al., 2016; Morin & Marsh, 2015; Petras & Masyn, 2010). The elbow plots of the CAIC and BIC are displayed in Fig. 1 and show decreases in the information criteria that level off around five profiles. When comparing the five-class solution to a four-class solution, adding a fifth class provided a theoretically interpretable and meaningful additional class. Adding a sixth class, however, resulted in an arbitrary division of an existing profile into smaller profiles that only differed quantitatively from each other. Furthermore, the sixth class was small (≈2% of the sample) and did not add anything theoretically meaningful as it had the same meaning as already present profiles in the five-class solution. Hence, based on the combination of statistical criteria showing a high level of classification accuracy (i.e., entropy = 0.84, average latent class probabilities ranging from 0.88 to 0.99) and interpretability, we retained the five-class solution as our final model (n = 27, n = 74, n = 142, n = 86, n = 62).

Using the five-class solution, distinct profiles based on athletes' motivation regulation scores were generated (Table 3 and Fig. 2).

What follows is a description of the five latent profiles. Note that the descriptions are based on standardized *z*-scores and thus represent standard deviation (SD) units above (i.e., positive values) or below (i.e., negative values) the sample mean (which is 0). We are not aware of any agreed upon criteria of what constitutes low or high values, but we define larger than ± 1 SD as very low/high, ± 0.5 to 1.0 SD as low/high, and values from −0.5 to 0.5 SD as slightly below/above average. A brief description of the mean subscale scores are also provided for each profile (see also Table 5 in the supplemental material).

Athletes in class 1 reported very low levels of intrinsic motivation, identified, introjected, and external regulations, and high levels of amotivation. Class 1 was labeled "amotivated". The mean subscale scores in class 1 were below 3 on the 7-point scale for all types of motivation (see Table 5 in the supplemental material).

Athletes in class 2 reported slightly below average levels of intrinsic motivation, low levels of identified regulation, very low levels of introjected and external regulations, and low levels of amotivation. Class 2 was thus labeled "low motivation". Based on the mean subscale scores (see Table 5 in the supplemental material) athletes in class 2 reported just above the mid-point of the scale on intrinsic motivation (3.81) and below the mid-point on the other types of motivation.

Table 3
Description of the five latent classes based on standardized (z-scores) motivation regulation scores (N = 391).

	"Amotivated"	"Low motivation"	"Moderately autonomous"	"Amotivated and moderately controlled"	"Highly motivated"
SMS-variables	Class 1	Class 2	Class 3	Class 4	Class 5
Amotivation	0.818*	−0.589*	−0.424*	1.118*	−0.281*
External regulation	−1.092*	−1.112*	0.104	0.274*	1.183*
Introjected regulation	−1.768*	−1.023*	0.263	0.001	1.404*
Identified regulation	−2.167*	−0.625*	0.402*	−0.379*	1.327*
Intrinsic motivation	−2.16*	−0.327*	0.435*	−0.524*	1.101*

Note. 5-class solution: Class 1 (n = 27, 6.9%); Class 2 (n = 74, 18.9%); Class 3 (n = 142, 36.3%); Class 4 (n = 86, 22.0%); Class 5 (n = 62, 15.9%).
*p < 0.05.

Table 4
Standardized profile mean scores on the three burnout factors across the five latent classes.

	"Amotivated"	"Low motivation"	"Moderately autonomous"	" Amotivated and moderately controlled"	"Highly motivated"	Summary class comparisons
	Class 1	Class 2	Class 3	Class 4	Class 5	
Emotional and Physical Exhaustion	−0.141[a]	−0.151[a]	−0.085[a]	0.255[a]	0.073[a]	No statistically significant differences
Reduced Sense of Accomplishment	0.169[a,b]	−0.097[a]	−0.277[a]	0.551[b]	−0.115[a]	4 > 2, 3, 5
Sport Devaluation	0.231[a,b]	−0.256[a]	−0.307[a]	0.824[b]	−0.265[a]	4 > 2, 3, 5

Note: The significance level was Bonferonni corrected within each variable (0.05/10) and set to 0.005. Values in the same row that do not share common subscripts (e.g., [a,b]), are significantly different at $p < 0.005$ level in pairwise tests.

Athletes in class 3 reported slightly above average levels of intrinsic motivation, identified, introjected, external regulations, and slightly below average levels of amotivation. Class 3 was thus labeled "moderately autonomous motivation". The mean subscale scores (see Table 5 in the supplemental material) decreased from intrinsic motivation (4.23) to amotivation (1.57) in class 3.

Athletes in class 4 displayed low levels of intrinsic motivation, slightly below average levels of identified regulation, average and slightly above average levels of introjected and external regulations, respectively, and very high levels of amotivation. Class 4 was labeled "amotivated and moderately controlled motivation". The mean subscale scores decreased from intrinsic motivation (3.70) to amotivation (2.83) and athletes in class 4 reported the highest level of amotivation among the five classes (see Table 5 in the supplemental material).

Finally, athletes in class 5 reported very high levels of intrinsic motivation, identified, introjected, and external regulations, and slightly below average levels of amotivation. Class 5 was thus labeled "highly motivated". The mean subscale scores in class 5 were above the mid-point of the scale (> 3.5) on all types of motivation except amotivation (see Table 5 in the supplemental material).

Subsequent auxiliary variable analyses, using Wald tests, revealed significant differences in two of the three burnout subscales across the latent classes. The overall test of equality of means was significant for RA χ^2 (4) = 29.207, $p < 0.001$ and DEV χ^2 (4) = 52.552, $p < 0.001$, but not significant for EXH χ^2 (4) = 6.960, $p = 0.138$. Bonferroni corrected pair-wise comparisons indicated that class 4 ("amotivated and moderately controlled motivation") scored higher than classes 2 ("low motivation"), 3 ("moderately autonomous motivation"), and 5 ("highly motivated") on both RA and DEV (see Table 4 and Fig. 3).

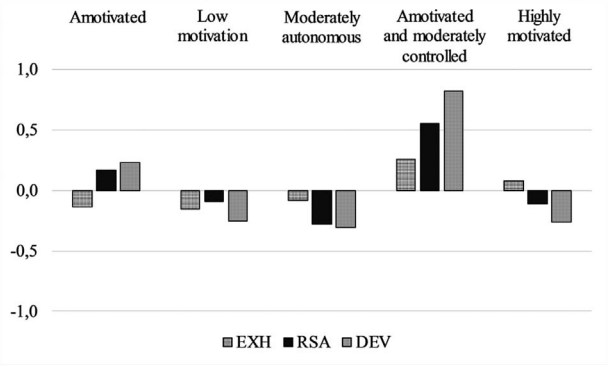

Fig. 3. Burnout scores of the five motivational profiles. EXH = Emotional and Physical Exhaustion, RSA = Reduced Sense of Accomplishment, DEV = Sport Devaluation.

3. Discussion

The aim of this study was to analyze the link between motivational profiles and burnout in elite athletes using a person-centered approach. Based on earlier research (e.g., Cresswell & Eklund, 2005; Lemyre et al., 2006; Lonsdale & Hodge, 2011) it was hypothesized that groups with low levels intrinsic motivation and identified regulation, and high levels of external regulation, introjected regulation, and amotivation would report higher levels on the three athlete burnout dimensions. Consistent with our first hypothesis, we found numerous motivational profiles which we labeled: "amotivation" (Class 1), "low motivation" (Class 2), "moderately autonomous motivation" (Class 3), "amotivated and moderately controlled motivation" (Class 4), and "highly motivated" (Class 5). The emergence of such profiles also supported our second hypotheses and previous sport research (Gillet et al., 2009; 2012) revealing the existence of profiles with more autonomous motivation, groups with more controlled motivation and groups including *both* high levels of autonomous and controlled forms of motivation. Findings from the current study therefore suggest that athletes endorse combinations of motivation regulations.

We also found fairly strong support for our third hypothesis that athletes characterized by profiles with controlled regulations and amotivation would experience higher levels of all three burnout dimensions. Although no differences among the classes were found in emotional/physical exhaustion, class 4 ("amotivated and moderately controlled motivation") scored higher than classes 2 ("low motivation"), 3 ("moderately autonomous"), and 5 ("highly motivated") on a reduced sense of accomplishment and sport devaluation. Such findings support the contention that different motivational profiles are differentially related to athlete burnout and highlight the value of LPA analyses in uncovering multiple motives within individuals that distinguish different burnout levels (amounts). These findings also bolster earlier research (e.g., Cresswell & Eklund, 2005; Gillet et al., 2009; 2012; Lemyre et al., 2006) and are in line with SDT tenets suggesting the deleterious implications of high amotivation and controlled motivation (cf. Ryan & Deci, 2000). Thus these findings support the suggestion that amotivation is the motivational signature of burnout (Eklund & Cresswell, 2007).

However, further research is warranted of motivational profiles and associations with emotional/physical exhaustion, as this is the core dimension of burnout (Gustafsson et al., 2017). A potential explanation for the lack of differences in emotional/physical exhaustion might be that exhaustion is a more stress related than the reduced sense of accomplishment and sport devaluation and thereby less related to motivation. The relationship between the dimensions of burnout have recently been questioned (Lundkvist et al., 2017) and the association between motivational profiles and dimensions of burnout needs further examination.

With regard to our final hypothesis that athletes high in autonomous and controlled motivation would experience high levels of burnout (Gillet et al., 2012), analysis did reveal the existence of a group with relatively high levels of autonomous and controlled motivation (i.e. Class 5). In contrast with expectations, however, this group did not demonstrate significantly higher levels of burnout on any ABQ dimensions. Rather, at least descriptively, class 5 demonstrated lower

mean scores on a reduced sense of accomplishment and sport devaluation than the "amotivated/moderately controlled group (Class 4) and the amotivated group (Class 1). Although caution is certainly warranted in interpreting descriptive findings, results from the present study might imply that autonomous regulations serve as a buffer or protection against negative outcomes, particularly when controlled forms of motivation are also evident (Howard et al., 2016). Alternatively, the fact that the high motivation group reported lower levels of a reduced sense of accomplishment and sport devaluation, could be seen as indication that the amount of motivation is more important in determining the likelihood of maladaptive states such as burnout, than the quality of motivation. That is, even though two motivational types comprised class 5, the fact that both types (autonomous and controlled) were *high* in quantity, suggests that it could be the amount of motivation that played a greater role in mitigating burnout symptoms than the quality of it. This line of reasoning however, runs contrary to SDT theorizing suggesting that motivational quality is of equal or greater importance than its quantity (Ryan & Deci, 2000). Further intervention research is needed to examine issues of motivational quantity versus quality in the development of athlete burnout. Furthermore, researchers are encouraged to examine whether changes in motivational quantity or quality over time are associated with positive outcomes such as athlete engagement and sustained sport involvement.

Several limitations are evident in the current study. First, the study is cross-sectional and therefore no causal explanation is possible. Although LPA and a person-centered approach offer new insights regarding the burnout phenomenon, there is a need to use longitudinal designs to investigate how motivational processes play a role in the onset of athlete burnout. In addition, further research is needed to examine the replicability of the classes across different samples and sport contexts. It is important to note that the LPA, as used in the present study, is largely conducted in an exploratory fashion (mixture models [e.g., LPA] are by some referred to as constrained exploratory techniques; Ram & Grimm, 2009). With this approach the researcher fits several models and compares the fit indexes to determine the optimal number of classes given the observed data. This approach is reasonable when there is not a well-developed theory of the nature of the latent groups to be found in the population (Laudy, Boom, & Hoijtink, 2005). As the evidence accumulates from studies using person-centered approaches (e.g., LPA) regarding the nature of athletes' motivational profiles, researchers should also use confirmatory LPA and test specific hypotheses by placing constraints on the parameters that reflects these hypotheses (Finch & Bronk, 2011). Another potential limitation is the use of the original SMS measure (Mallett, Kawabata, Newcombe, Otero-Forero, & Jackson, 2007). Although this measure has been criticized for low internal consistency (Mallett et al., 2007), the Spanish version has shown acceptable reliability (Balaguer et al., 2007), as was the case in this study. Another criticism is that the original SMS does not measure integrated regulation (Mallett et al., 2007). As this form of extrinsic motivation may be present in elite athletes', researchers may wish to employ the Behavioral Regulation in Sport Questionnaire (BRSQ; Lonsdale, Hodge, & Rose, 2008) or the new revised SMS-II (Pelletier, Rocchi, Vallerand, Deci, & Ryan, 2013) in future research. Finally, the sample in the current study could be considered "healthy", given the low levels of reported burnout. This is a common finding in the literature (c.f., Raedeke & Smith, 2009) and might be due to the "healthy athlete effect". This effect suggests that during the progression towards elite levels of competition, many athletes drop out, thus leaving only the healthy athletes still participating in sport (Gustafsson, Kenttä, Hassmén, & Lundqvist, 2007). Given the small percentage of athletes reporting burnout in the current study, it seems possible that the healthy athlete effect was present.

4. Conclusion

The current study strengthens the assumption that it may be unlikely that elite athletes are purely autonomous in their motivation to participate in sport. Taking into account the benefit of LPA analysis, the present study also highlights combinations of motivational regulations which appear to make athletes more (or less) susceptible to sport burnout. In support of the tenets of SDT, we found that athletes characterized by relatively high levels of amotivation and moderately controlled motivation (class 4), showed higher levels of a reduced sense of accomplishment and sport devaluation (Ryan & Deci, 2000). Descriptive findings from the present study also revealed that athletes displaying relatively high autonomous and controlled motivation (class 5) showed lower levels of sport devaluation and reduced sense of accomplishment than the amotivated/moderately controlled group (class 4) and the amotivated group (class 1). This finding lends support for the suggestion that autonomous regulations might help protect athletes from the negative outcomes associated with controlled forms of motivation. An alternative suggestion based on these findings, is that the quantity of motivation, specifically a high amount of motivation may be important in mitigating burnout symptoms, irrespective of its quality.

Findings from the current study suggest the need for effective strategies for dealing with highly amotivated athletes in order to reduce the likelihood of burnout symptoms. Towards this end, empirical examination of the efficacy of preventive burnout interventions in sport is needed. Limited research indicates that when coaches and parents foster autonomy supportive climates, such climates are related to greater satisfaction of athletes' basic psychological needs, which in turn, are linked to more adaptive forms of motivation and lower burnout (Amorose, Anderson-Butcher, & Cooper, 2009; Isoard-Gautheur, Guillet-Descas, & Lemyre, 2012). Such findings suggest the value of burnout interventions that target not only the individual athlete, but those focused on coaches, parents, or organizational structures, including the fit between athletes and organizations. Certainly, findings from the current study suggest the value in investigating the potential of SDT-based interventions in reducing the likelihood of negative health and performance outcomes such as burnout. Finally, the descriptive finding that athletes with relatively high levels of controlled and autonomous motivation (class 5) reported lower levels of burnout in the current study suggests that athletes may simultaneously value the intrinsic aspects of their sport participation as well as the external reward structures. Further work is needed to untangle the importance of high motivation, irrespective of its quality. Results from the study highlight the value of person-centered approaches in better understanding the nuanced connections between motivation regulations and athlete burnout.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.psychsport.2017.11.009.

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