Journal of Sport and Exercise Psychology, (Ahead of Print)
https://doi.org/10.1123/jsep.2019-0317
© 2020 Human Kinetics, Inc.

Human Kinetics
ORIGINAL RESEARCH

How Do Profiles of Need-Supportive and Controlling Coaching Relate to Team Athletes' Motivational Outcomes? A Person-Centered Approach

Bart Reynders,[1] Stef Van Puyenbroeck,[1] Eva Ceulemans,[1] Maarten Vansteenkiste,[2] and Gert Vande Broek[1]
[1]KU Leuven; [2]Ghent University

Building on recent self-determination theory research differentiating controlling coaching into a demanding and domineering approach, this study examined the role of both approaches in athletes' motivational outcomes when accompanied by autonomy support or structure. Within team-sport athletes ($N = 317$; mean age = 17.67), four sets of k-means cluster analyses systematically pointed toward a four-cluster solution (e.g., high–high, high–low, low–high, and low–low), regardless of the pair of coaching dimensions used. One of the identified coaching profiles involved coaches who are perceived to combine need-supportive and controlling behaviors (i.e., high–high). Whereas combining need-supportive and domineering behaviors (i.e., high–high) yields lower autonomous motivation and engagement compared with a high need-support profile (i.e., high–low), this is less the case for the combination of need-supportive and demanding behaviors (i.e., high–high). This person-centered approach provides deeper insights into how coaches combine different styles and how some forms of controlling coaching yield a greater cost than others.

Keywords: autonomy support, cluster analysis, coach behavior, demanding, domineering, structure

According to self-determination theory (SDT; Ryan & Deci, 2017), athletes' motivation and engagement get promoted when coaches adopt a motivating style, such as through the provision of autonomy support (e.g., being participative) or structure (being clarifying; e.g., Curran, Hill, & Niemiec, 2013). However, this may be undermined when coaches adopt a demotivating style, such as through the use of control (e.g., being coercive and intimidating; Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011). Although the correlates of these separate coaching dimensions are well-documented (e.g., Mageau & Vallerand, 2003), coaches rely on a variety of coaching practices in daily practice. Yet, the question of how coaches combine these different practices into a coaching profile and whether different coaching profiles yield different correlates has received far less attention (Haerens et al., 2018; Matosic & Cox, 2014). In light of the prevalence of controlling behaviors among coaches (e.g., Cushion, Ford, & Williams, 2012) and congruent with the recent differentiation between a demanding and a domineering approach (Delrue et al., 2019), the present study sought to examine how these two forms of controlling coaching get combined with either coach autonomy support or control. By linking these coaching profiles to athlete outcomes, we aimed to gain insight into which coaching profiles yield the most and least optimal pattern of motivation and engagement outcomes.

Reynders, Van Puyenbroeck, and Vande Broek are with the Dept. of Kinesiology, and Ceulemans, the Faculty of Psychology and Educational Sciences, KU Leuven, Leuven, Belgium. Vansteenkiste is with the Dept. of Developmental, Personality and Social Psychology, Ghent University, Ghent, Belgium. Reynders (bart.reynders@kuleuven.be) is corresponding author.

Need-Supportive Coaching: Autonomy Support and Structure

Within SDT (Ryan & Deci, 2017), one of the most researched theories on motivation in sports nowadays, it is maintained that three inherent psychological needs (i.e., need for competence, relatedness, and autonomy) should be fulfilled to catalyze psychological growth, integrity, and well-being (Deci & Ryan, 2000; Vansteenkiste, Ryan, & Soenens, 2020). Given the manifold benefits associated with the satisfaction of these needs, such as improved motivation (e.g., Amorose & Anderson-Butcher, 2007); prosocial behavior (Delrue et al., 2017); and persistence (e.g., Pelletier, Fortier, Vallerand, & Brière, 2001), considerable attention has been devoted to the coaching styles that support these needs.

The notion of coach *autonomy support* has received a lot of attention (e.g., Aelterman, De Muynck, Haerens, Vande Broek, & Vansteenkiste, 2017; Goudas, Biddle, Fox, & Underwood, 1995). When autonomy-supportive, coaches display a general attitude of openness, acceptance, and curiosity toward the athletes such that they experience a sense of psychological freedom and volition in their acting, feeling, and thinking (Aelterman et al., 2017; Delrue et al., 2019). A coach can support players' need for autonomy by providing them choices, giving a meaningful rationale when decisions are made for athletes, validating their concerns and complaints, and supporting a dialogue and a sense of initiative among players such that they willingly take action (Conroy & Coatsworth, 2007; Mageau & Vallerand, 2003). In addition to coach autonomy support, the provision of *structure* has also been increasingly researched. When coaches are highly structured, they support athletes' skill development by creating a predictable, safe, and progress-oriented environment (Delrue et al., 2019). Specifically, structuring coaches set and monitor clear expectations

and goals, they express confidence in the athletes' capacity to effectively handle tasks and to achieve expectations; they offer helpful information, suggestions, and strategies to guide their athletes; and they support athletes' development by providing informational and positive feedback and encouragement (Aelterman et al., 2017; Curran et al., 2013).

Dozens of studies, both correlational and experimental (e.g., De Muynck et al., 2017), have shown that coach autonomy support and structure entail various benefits through actively fostering experiences of need satisfaction. Need satisfaction, in turn, relates to various positive outcomes, including persistence (e.g., Pelletier et al., 2001); motivation (e.g., Amorose & Anderson-Butcher, 2007; Carpentier & Mageau, 2013); engagement (Curran et al., 2013); and well-being (Adie, Duda, & Ntoumanis, 2012; Gagné, Ryan, & Bargmann, 2003). Apart from this "bright" pathway with need-supportive coaching yielding desirable outcomes through need satisfaction (Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015; Vansteenkiste & Ryan, 2013), a "dark" pathway has also been uncovered in which controlling coaching and experiences of need frustration play a central role.

Controlling Coaching: Differentiating Demanding From Domineering Coaching

Coach control has long been dealt with indirectly and treated as the counterpart of autonomy support (e.g., Deci & Ryan, 2000). However, research (Bartholomew et al., 2011) points out that controlling coaching involves more than the absence of autonomy support, as it has been increasingly recognized that autonomy support and control should not be seen as two ends of one single continuum but instead represent separate coaching styles. When controlling, coaches actively engage in a variety of strategies that restrict and intrusively interfere with athletes' acting, thinking, or feeling, thereby eliciting experiences of need frustration (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2009, 2010). Apart from a "bright" pathway, linking coach need support to favorable outcomes via need satisfaction, a complementary dark pathway links control with unfavorable outcomes through need frustration (Bartholomew et al., 2011). In these studies, controlling coaching was found to relate to maladaptive outcomes, such as moral disengagement (Ntoumanis, Barkoukis, Gucciardi, & Chan, 2017); burnout (Balaguer, Atienza, & Duda, 2012); and ill-being in sport (Bartholomew et al., 2011).

Most recently, Delrue et al. (2019) provided a nuanced viewpoint on coach control by separating a demanding from a domineering approach. When demanding, coaches use a variety of strategies to correct athlete misbehavior and push the athlete toward desired behaviors. They do so by insisting firmly on compliance or using controlling commands (e.g., Bartholomew et al., 2010; De Muynck et al., 2017). When domineering, coaches exert power through the use of intimidation, guilt and anxiety induction, and personal attack (Bartholomew et al., 2011). While domineering coaching practices are particularly harsh and intrusive because they target the athletes as people, demanding coaching practices are less pressuring because they target athletes' behavior.

These two controlling approaches were identified in a circumplex model, which captures coaches' variation in need-supportive and need-thwarting coaching. In such a circular structure, the strength of the correlation between coaching approaches provides information about the conceptual relation between them. Adjacent approaches are highly correlated because of their shared conceptual features. In contrast, approaches that are situated at a greater distance or even in opposition to one another are, respectively, weakly or even negatively correlated because they share fewer conceptual features or may even stand in a conceptually conflicting relation to each other. Within this circular structure, these two controlling approaches were adjacent to one another, yet they occupied a somewhat different position in relation to other identified coaching styles. Delrue et al. (2019) reported that the demanding approach was situated next to coach structure, implying that coaches who are demanding are also often structuring and vice versa. In contrast, the domineering approach fell next to chaotic coaching, suggesting that coaches who are domineering may also give up on their athletes and abandon them. In accordance with their different position in the circumplex, they yielded a partially similar and partially dissimilar pattern of correlates with external outcomes. Specifically, both controlling approaches correlated positively with athlete need frustration, controlled motivation, and amotivation, with the pattern of correlates being more pronounced in the case of a domineering approach. In contrast, while a domineering approach was negatively correlated with beneficial motivational outcomes such as athletes' autonomous motivation and need satisfaction, such associations were not found for the demanding approach.

Coaching Profiles: A Refreshing Approach to Study Coaching Behavior

In spite of the well-documented benefits associated with coach autonomy support and structure, coaches still rely upon a controlling coaching style for a number of reasons. For example, in youth sports more than half of all coaches in Flanders (i.e., 62.42% [e.g. Vlaamse Trainersschool, 2018]) lack a formal education in coaching, presumably because ex-players or parents serve as volunteering coaches (e.g., Conroy & Coatsworth, 2006). As a result, they may be inspired by tradition, personal experiences, or the observation that successful elite sport coaches within their sport often make use of a controlling style, which strengthens their belief that such a style is effective (e.g., Cushion et al., 2012; Ntoumanis & Mallet, 2014). For example, sports such as judo (e.g., d'Arripe-Longueville, Fournier, & Dubois, 1998) or soccer (e.g., Cushion et al., 2012) have been traditionally characterized by an underlying authoritarian and highly directive approach. Also, coaches of team athletes are more likely to adopt a controlling style (Delrue et al., 2019). Whereas the one-on-one relationship of individual sports allows for a more athlete-attuned and participative approach (e.g., Hollembeak & Amorose, 2005), team-sport coaches may act in a more controlling way to maintain discipline (e.g., when a player is troubling the rest of the team; e.g., Chelladurai, 1993; van de Pol, Kavussanu, & Kompier, 2015).

Yet, even when they are controlling, some coaches may, in addition, make use of need-supportive practices (Bartholomew et al., 2011). For example, coaches who push athletes to comply with their requests (i.e., demanding) may also provide a clear rationale for them (i.e., autonomy support). In practice, it may therefore be incorrect to categorize coaches as being either controlling or need-supportive. Instead, some coaches may make use of a coaching profile characterized by the combined presence of need support and control. Unfortunately, most prior SDT-grounded coaching research relied on a more traditional, variable-centered approach (e.g., correlation or regression), thereby examining the unique or separate contribution of different coaching styles on athlete outcomes (e.g., Carpentier & Mageau, 2013; Howard &

Hoffman, 2018; Mageau & Valllerand, 2003). Although it is a valuable method that is not inferior or in competition with other methods, a variable-centered approach limits the understanding of how need-supportive and controlling behaviors may group within individuals. Within a person-centered approach, typical configurations of variables within a person are identified, which allows for the determination of subgroups of coaches, each characterized by specific coaching profiles or a combination of different parameters (i.e., coaching styles; e.g., Howard & Hoffman, 2018).

From such a person-centered perspective, several critical questions can be addressed. First, the question of how many coaching profiles can be retained to parsimoniously capture the heterogeneity in coaches' combined use of different coaching styles arises. Second, the type of retained coaching profiles provides information about the extent to which coaching styles go hand in hand or, instead, stand in opposition. To illustrate, if profiles are identified in which coaches score simultaneously either high or low on two coaching styles (e.g., autonomy support and control), this provides evidence for the relative distinct nature of these coaching styles. Third, in terms of its external validity, identification of coaching profiles helps to shed light on the question of whether the simultaneous presence of a need-supportive and controlling coaching style necessarily comes with a cost or may even yield supplementary benefits compared with when a need-supportive style is solely present.

Prior research within SDT has primarily focused on the interplay between autonomy support and structure (e.g., Jang, Reeve, & Deci, 2010). The question of whether coaches do well to adopt a controlling approach in addition has received limited attention. A notable exception is the study by Haerens et al. (2018), which identified four coaching profiles based on the combination of perceived coach autonomy support and psychological control. In line with previous research within the sport context (Matosic & Cox, 2014), four clusters were identified, characterized by varying levels of both autonomy support and control, with two groups displaying discrepant scores (i.e., high–low and low–high) and two groups displaying similar scores (i.e., high–high and low–low) on both dimensions. In terms of the association with external outcomes, profiles characterized by higher levels of coach control yielded poorer motivational outcomes compared with profiles characterized by lower levels of coach control. Given a more differentiated view on controlling behaviors (Delrue et al., 2019), the question of how different forms of coach control combine with either autonomy support or structure deserves further attention. Possibly, a demanding approach in combination with a need-supportive style may yield a differential pattern of outcomes compared with when coaches are perceived to combine a domineering and need-supportive style.

Present Study

The question of whether different configurations (i.e., profiles), consisting of both need-supportive and controlling styles, can be retained has received limited attention. Because a controlling coaching style is more normative within team, relative to individual, sports (e.g., Cushion et al., 2012; Delrue et al., 2019), the present study focused on the correlates of controlling approaches (i.e., demanding and domineering) in team sports when occurring in combination with a need-supportive style (i.e., autonomy support and structure). Using a person-centered approach (i.e., cluster analyses), the first aim of the present study was to examine the heterogeneity in coaching profiles by pairing each need-supportive style (i.e., autonomy support and structure) with each subdimension of coach control (i.e., demanding and domineering), resulting in four sets of analyses. Based on previous research (Haerens et al., 2018) and the assumption that need-supportive and controlling coaching do not necessarily represent the two ends of a single continuum (Bartholomew et al., 2011; Delrue et al., 2019; Vansteenkiste & Ryan, 2013), we hypothesized to find evidence for four different coaching profiles (i.e., high–high, high–low, low–high, or low–low) within each set of performed cluster analysis.

The second aim of the present research was to examine associations between coaching profiles and athletes' motivational outcomes (i.e., autonomous motivation, controlled motivation, engagement). Based on the identification of a "bright" and "dark" pathway (e.g., Haerens et al., 2015), we expected that those profiles characterized by relatively high autonomy-supportive or structuring and low-demanding or domineering coaching (i.e., high–low) would score the highest on autonomous motivation and engagement and the lowest on controlled motivation. In contrast, the opposite coaching profile (i.e., low–high), characterized by low autonomy support or structure and relatively high demanding or domineering coaching, was expected to yield lower scores on autonomous motivation and engagement and higher scores on controlled motivation. Yet, we considered the possibility that coaches who are perceived to be high on one of the need-supportive styles (i.e., autonomy support or structure) and to be demanding might not by definition differ from those perceived to be high on need-supportive coaching only. In contrast, the additional presence of a domineering approach next to a high need-supportive style would be detrimental, as domineering coaches are too invasive into athletes' functioning for the athletes to perceive such an approach as legitimate and necessary.

Methods

Participants and Procedure

Participants were 317 youth athletes (74% boys), who were practicing team sports (i.e., volleyball, basketball, soccer, American football, rugby, hockey, and korfball), from sport clubs throughout Flanders (Belgium). Athletes' ages ranged from 16 to 23 years with an average age of 17.67 years old ($SD = 1.31$), and they had been practicing their sport for 8.51 years on average ($SD = 3.55$; range = 1–17). Athletes were active at different levels of competition, ranging from the regional (e.g., regional level of korfball) to the national level (e.g., highest division in hockey).

Team-sport clubs were invited by email to participate in this study. Interested clubs were asked to invite their youth coaches to engage in the study. Interested coaches were informed by email or telephone and asked to pick out a time to meet. Teams were visited once before or after practice to fill out the questionnaires, which took approximately 20 min. Participation in the study was voluntary and athletes were asked to sign an active informed consent. This study was approved by the social and societal ethics committee of KU Leuven.

Measures

Coaches' Need-Supportive/Thwarting Behavior. Athletes rated their coaches' autonomy-supportive, structuring, demanding, and domineering coach behavior using the Situation in Sport Questionnaire (Delrue et al., 2019). Within this questionnaire, 15 autonomy support items (Cronbach's $\alpha = .82$), 15 structure

items (Cronbach's α = .85), 10 demanding items (Cronbach's α = .72), and five domineering items (Cronbach's α = .69) were answered regarding sport-specific vignette-like situations. Athletes had to answer to which degree the items corresponded to the behavior of their coach in a specific situation on a 7-point Likert scale from 1 (*does not describe my coach at all*) to 7 (*describes my coach extremely well*). Examples are: (a) *In the first part of the competition/game you did not play at the level that the coach expected. During the break . . . – he/she gives you a stern talking-to: "It is up to you now to set this right and show what you are worth"* (i.e., demanding); (b) *An athlete is suffering from performance anxiety in the run-up to a competition. How does your coach respond? – He/she says: "You have to learn to cope with the stress. If you don't, the competition will be a disaster"* [i.e., domineering]; (c) *The training session begins . . . – Your coach is interested to hear which specific skill you would like to practice and provides the necessary space for you to do so* [i.e., autonomy]; and (d) *During a difficult moment in the training session an athlete begins to complain. Your coach . . .—gives him/her a helpful strategy to solve the problem step by step* [i.e., structure].

Athletes' Motivation. To measure athletes' motivation, we used 32 items based on the slightly modified version of the Behavioral Regulations in Sport Questionnaire (Lonsdale, Hodge, & Rose, 2008) as used by Assor, Vansteenkiste, and Kaplan (2009). Athletes were asked to rate each of these items on a 7-point Likert scale from 1 (*totally disagree*) to 7 (*totally agree*). To become scores on autonomous motivation (e.g., "I participate in my sport because it is part of who I am") scores of intrinsic, integrated, and identified regulation were aggregated, whereas controlled motivation (e.g., "I participate in my sport to satisfy people who want me to") was measured by composing items regarding introjected and external regulation (Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). Internal consistencies of autonomous and controlled motivation were .87 and .89, respectively.

Athletes' Engagement. A set of 17 items, based on work of Skinner, Kindermann, and Furrer (2009), Reeve (2013), Reeve and Tseng (2011), and Wolters (2004), was used to measure athletes' engagement (e.g., "I try hard to do well during training & competition" and "I express my preferences and opinions during training & competition"). All items were answered on a 7-point Likert scale ranging from 1 (*totally disagree*) to 7 (*totally agree*). Congruent with previous research studying engagement in the sport context (e.g., Reynders et al., 2019), scores on the four subcomponents of engagement (i.e., emotional, behavioral, cognitive, and agentic) were aggregated and resulted in a total score of athletes' engagement (Cronbach's α = .90).

Data Analysis

To identify the presence of clusters within our data, we used R (R Foundation for Statistical Computing, Vienna, Austria; i.e., package "clusterSim" and "flexclust") to conduct k-means cluster analysis, using the Hartigan and Wong (1979) algorithm with 1,000 random starts, on the combinations of autonomy support and demanding, structure and demanding, autonomy support and domineering, and structure and domineering. To remove differences in scale use across the different variables and focus on the within-scale differences, scores on autonomy support, structure, demanding, and domineering were standardized using z scores prior to running cluster analyses. When further discussing relative scores within clusters and labeling the different clusters (i.e., high or low, or moderate low or moderate high), these z scores were used as criteria for interpretation of higher or lower levels of perceived coaching behavior relative to the sample mean of that specific variable/scale. While z scores above 0.30 were labeled as "High" and z score under –0.30 as "Low", z scores ranging from –0.30 to 0 and from 0 to 0.30 were considered to be "Moderately low" and "Moderately high," respectively. It is critical to emphasize that these labels need to be considered in comparative terms as they reflect relative differences between identified groups. Although these labels do not speak to the absolute presence of different coaching behaviors in each group, these absolute values are nevertheless added to the tables for informative purposes.

To obtain correct and clearly interpretable cluster solutions, we included a limited number of variables (Timmerman, Ceulemans, De Roover, & Van Leeuwen, 2013). That is, to get insight in the unique relations between distinct controlling (i.e., demanding and domineering) and need-supportive (i.e., autonomy support and structure) styles, we performed separate cluster analyses on the variables of either autonomy support or structure in combination with either demanding or domineering. Correlations between the study variables can be found in Table 1. To determine the optimal number of clusters, we looked for a theoretically meaningful, parsimonious, and interpretable solution (i.e., using the Pseudo F-statistic). The Pseudo F-statistic expresses the ratio of between-cluster variance to within-cluster variance (Calinski & Harabasz, 1974). As a result, the highest values of Pseudo F indicate the greatest cluster separation, and thus the most optimal solution (Wilkinson, Engelman, Corter, & Coward, 1998). However, the solution with the highest Pseudo F-statistic may sometimes show high complexity or explain only a limited amount of variance in cluster variables. Therefore, we subjected the best solution to a check for (theoretical) interpretability and explained variance in cluster variables, thereby aiming toward a minimum of approximately 50% (Milligan & Cooper, 1985).

Table 1 Means, *SD*s, and Correlations Between All Variables (*N* = 314)

	M	*SD*	1	2	3	4	5	6	7
1. Autonomy	4.35	0.86	—						
2. Structure	5.03	0.85	.77**	—					
3. Demanding	4.15	0.87	.12*	.28**	—				
4. Domineering	3.15	1.08	–.22**	–.16**	.58**	—			
5. Autonomous motivation	5.63	0.86	.17**	.25**	.08	-.03	—		
6. Controlled motivation	3.39	1.08	.01	–.08	.15**	.19**	.15**	—	
7. Engagement	5.18	0.80	.50**	.54**	.08	–.09	.43**	.01	—

*$p < .05$. **$p < .01$.

Next, multivariate analyses of variance (MANOVAs) were performed separately for the different combinations (e.g., autonomy-supportive and demanding coaching), with clusters as independent and athletes' outcomes as dependent variables, to check for cluster differences. Given the high correlations between autonomy support and structure (i.e., $r = .77$), we controlled for scores of structure within the autonomy clusters and scores of autonomy within the structure clusters when looking at multivariate tests. Next, to identify differences in study outcomes between the obtained profiles (i.e., clusters) within each combination, univariate analysis of variance was checked for the separate outcomes. Finally, we checked for mean differences in these outcomes between the obtained clusters by using pairwise comparisons with Bonferroni test.

Results

Aim 1: Identification of Coaching Profiles

Configurations With Demanding Coaching Behavior. In determining the number of clusters, analysis suggested a three- or four-cluster solution regarding the autonomy support–demanding combination, with Pseudo F values (Calinski & Harabasz, 1974) of 188.2 (i.e., three clusters) and 187.2 (i.e., four clusters). As the three-cluster solution only explained 27% of the variance in autonomy support, and given the small difference in the Pseudo F values of the two solutions, we opted for the richer four-cluster solution, which explained, respectively, 49% and 59% of the variance in the dimensions of autonomy-supportive and demanding coaching. The z scores of the four-cluster profiles can be found in the top half of Table 2 and Figure 1. Cluster 1 represents coaches who are perceived to be relatively low on autonomy support and demanding coach behavior ($n = 61$, 19.43%; low–low), while Cluster 4 ($n = 58$, 18.47%; high–high) scores relatively high on both dimensions. Cluster 2 and 3 yielded an opposite pattern, with Cluster 2 representing coaches who are perceived to be moderately low on autonomy support but high on being demanding ($n = 94$, 29.93%; moderate low–high) and Cluster 3 involving coaches who are perceived to be high on autonomy support and low on being demanding ($n = 101$, 32.17%; high–low).

Cluster analysis regarding the structure-demanding combination again suggested two possible cluster solutions, that is a two-cluster (Pseudo $F = 193.43$) and four-cluster solution (Pseudo $F = 209.53$). Because the four-cluster solution yielded a higher Pseudo F value (Wilkinson et al., 1998) and explained more variance in both structuring (i.e., 50%) and demanding (i.e., 59%) coaching, it was preferred over the two-cluster solution. The bottom half of both Table 2 and Figure 1 depicts the obtained cluster solution, which was very much in line with the profiles identified when combining autonomy-supportive and demanding coaching: coaches were perceived to be either low ($n = 39$, 12.42%; low–low, Cluster 1) or high ($n = 75$, 23.89%; high–high, Cluster 4) on both dimensions. The second and third cluster yielded more opposing scores, that is, low structuring and high demanding coaching ($n = 108$, 34.39%; low–high) and high structuring and low demanding coaching ($n = 92$, 29.30%; high–low).

Table 2 Differences in Study Variables and Motivational Outcomes for Autonomy- and Structure-Demanding Clusters

Autonomy support/demanding	Clusters					
(C = 4)	Low–low	Moderate low–high	High–low	High–high	$F(3, 309)$	η^2
Cluster centers						
Autonomy (z score)	-1.36^{a}	-0.27^{b}	0.38^{c}	1.21^{d}	92.51**	.49
Demanding (z score)	-0.52^{a}	0.77^{b}	-0.86^{c}	0.81^{b}	133.69**	.59
Autonomy (raw score)	3.19^{a}	4.12^{b}	4.68^{c}	5.39^{d}	92.51**	.49
Demanding (raw score)	3.70^{a}	4.82^{b}	3.41^{c}	4.85^{b}	133.69**	.59
Outcomes						
Autonomous motivation	5.43^{a}	5.63^{a}	5.58^{a}	6.03^{b}	6.10**	.05
Engagement	4.65^{a}	5.01^{b}	5.33^{c}	5.78^{d}	4.55*	.05
Controlled motivation	3.26	3.48	3.24	3.65	2.41	.02
Structure/Demanding	**Clusters**					
(C = 4)	Low–Low	Low–High	High–Low	High–High	$F(3, 309)$	η^2
Cluster centers						
Structure (z score)	-1.69^{a}	-0.42^{b}	0.43^{c}	0.96^{d}	95.63**	.50
Demanding (z score)	-0.93^{a}	0.36^{b}	-0.88^{a}	1.05^{c}	148.10**	.59
Structure (raw score)	3.59^{a}	4.67^{b}	5.39^{c}	5.85^{d}	95.63**	.50
Demanding (raw score)	3.35^{a}	4.46^{b}	3.99^{a}	5.07^{c}	148.10**	.59
Outcomes						
Autonomous motivation	5.26^{a}	$5.50^{a,b}$	$5.72^{b,c}$	5.99^{c}	5.66*	.05
Engagement	4.52^{a}	4.93^{b}	5.41^{c}	5.62^{c}	5.07*	.05
Controlled motivation	3.62^{a}	3.50^{a}	3.08^{b}	$3.49^{a,b}$	4.88*	.05

Note. C = Number of obtained clusters. Different superscript letters indicate a significant difference in means at the $p < .05$ level.
*$p < .05$. **$p < .001$.

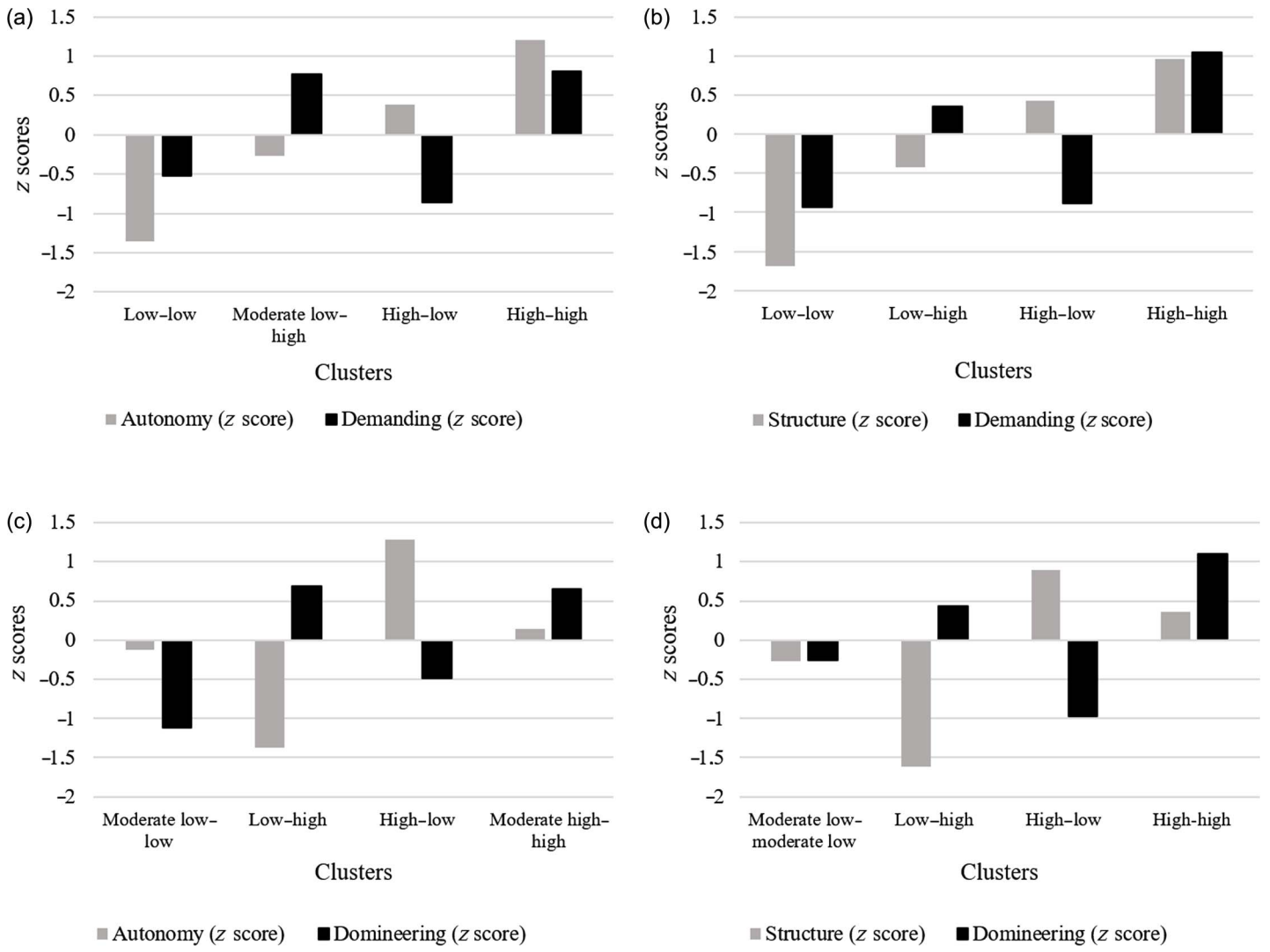

Figure 1 — *z* scores in each four-cluster solution for (a) perceived autonomy support and perceived demanding behavior, (b) perceived structure and perceived demanding behavior, (c) perceived autonomy support and domineering behavior, and (d) perceived structure and perceived domineering behavior.

Configurations With Domineering Coaching Behavior. In line with previous combinations, cluster analysis again proposed two possible solutions regarding the autonomy-domineering combination, that is a two-cluster solution (Pseudo $F = 205.31$) and four-cluster solution (Pseudo $F = 194.75$). Taking into account the explained variance in autonomy-supportive and domineering coaching in both cluster solutions, we opted for a four-cluster solution. More specifically, whereas in the two-cluster solution 13% and 46% of variance in autonomy-supportive and domineering coaching was explained, the four-cluster solution accounted for 49% and 55% of variance in both dimensions, respectively. *Z* scores of these four clusters can be found in Figure 1 and the top half of Table 3. Cluster 1 encompassed athletes who scored their coaches moderately low on autonomy support and low on domineering coaching ($n = 78$, 24.8%; moderate low–low) and Cluster 4 involved coaches scoring moderately high and high on both dimensions, respectively ($n = 114$, 36.3%; moderate high–high). Next, Cluster 2 displayed coaches who were perceived to be low on autonomy support and high on domineering coaching ($n = 62$, 19.7%; low–high), while Cluster 3 represents high scores on autonomy-supportive and low scores on domineering coaching ($n = 60$, 19.1%; high–low).

Regarding the configurations involving structure and domineering coaching, cluster analysis pointed towards a three- (Pseudo $F = 207.01$) or four-cluster solution (Pseudo $F = 192.50$). Although it clearly showed the highest Pseudo *F* value, the three-cluster solution only explained 32% of variance in structure. Because the four-cluster solution significantly improved the amount of explained variance in structure (i.e., 47%), we again opted for the four-cluster solution. As can be seen from Figure 1 and the bottom half of Table 3, athletes perceived their coaches to be either moderately low ($n = 101$, 32.2%; moderate low–moderate low, Cluster 1) or high ($n = 80$, 25.5%; high–high, Cluster 4) on both dimensions. Cluster 2 and 3 again showed an opposite pattern. More specifically, Cluster 2 involved low structuring and high domineering coaching ($n = 48$, 15.3%; low–high), while Cluster 3 included high scores on structure and low scores on domineering coaching ($n = 85$, 27.1%; high–low).

Table 3 Differences in Study Variables and Motivational Outcomes for Autonomy- and Structure-Domineering Clusters

Autonomy support domineering	Clusters					
(C = 4)	Moderate low–low	Low–high	High–low	Moderate high–high	*F*(3, 309)	η^2
Cluster centers						
Autonomy (*z* score)	–0.12[a]	–1.37[b]	1.28[c]	0.15[d]	100.49**	.49
Domineering (*z* score)	–1.12[a]	0.69[b]	–0.49[c]	0.65[b]	128.18**	.55
Autonomy (raw score)	4.25[a]	3.18[b]	5.45[c]	4.48[d]	100.49**	.49
Domineering (raw score)	1.94[a]	3.90[b]	2.62[c]	3.85 [b]	128.18**	.55
Outcomes						
Autonomous motivation	5.62	5.56	6.00	5.52	2.26	.03
Engagement	5.19	4.64	5.75	5.18	1.80	.02
Controlled motivation	3.15	3.47	3.38	3.52	2.10	.02
Structure domineering	**Clusters**					
(C = 4)	Moderate low–moderate low	Low–high	High–low	High–high	*F*(3, 309)	η^2
Cluster centers						
Structure (*z* score)	–0.27	–1.62	0.90	0.36	88.24**	.47
Domineering (*z* score)	–0.26	0.43	–0.97	1.10	138.33**	.57
Structure (raw-score)	4.80[a]	3.65[b]	5.80[c]	5.34[d]	88.24**	.47
Domineering (raw score)	2.86[a]	3.62[b]	2.09[c]	4.34[d]	138.33**	.57
Outcomes						
Autonomous motivation	5.40[a]	5.39[a]	5.94[b]	5.80[b]	6.09**	.05
Engagement	5.00[a]	4.54[b]	5.61[c]	5.34[c]	4.95*	.05
Controlled motivation	3.40[a,b]	3.61[a]	3.10[b]	3.54[a]	5.38*	.05

Note. C = Number of obtained clusters. Different superscript letters indicate a significant difference in means at the $p < .05$ level.
*$p < .05$. **$p < .001$.

Aim 2: Relation between Obtained Clusters and Motivational Outcomes

Configurations With Demanding Coaching Behavior. A MANOVA test with the profiles of the autonomy support and demanding coaching clustering as the independent variable, and outcome variables as the dependent variables, revealed a significant effect: $F(9, 915) = 9.46$, $p < .001$, Pillai's Trace = 0.25, partial $\eta^2 = .08$. Also, all univariate effects were significant, except for controlled motivation (see Table 2). Pairwise comparisons indicated that athletes who perceived their coaches to be high on both autonomy-supportive and demanding coaching reported the highest levels of desirable motivational outcomes (i.e., engagement and autonomous motivation) compared with the three other groups (all $ps < .05$, all $ds > 0.56$). Regarding engagement, all other clusters also differed from each other with the high autonomy–low demanding cluster showing the second highest score (all $ps < .05$, all $ds > 0.47$), followed respectively by the low autonomy–high demanding cluster (all $ps < .05$, all $ds > 0.47$), and the low autonomy–low demanding cluster (all $ps < .05$, all $ds > 0.47$).

Following a significant multivariate effect of the structure-demanding clusters on outcome variables, as revealed by MANOVA, $F(9, 915) = 4.30$, $p < .001$, Pillai's Trace = 0.13, partial $\eta^2 = .04$, univariate effects for all separate outcomes were significant (see Table 2). Pairwise comparisons indicated an almost identical pattern for both desirable outcomes (i.e., autonomous motivation and engagement). That is, compared with the two clusters low on structure, scores on these outcomes were found to be the highest in the high structure–low demanding (all $ps < .05$, all $ds > 0.50$) and high structure–high demanding clusters (all $ps < .001$, all $ds > 0.66$). It should, however, be noted that the difference in autonomous motivation failed to reach significance between the low structure–high demanding and the high structure–low demanding groups ($p = .35$). Regarding controlled motivation, the clusters involving low structure revealed higher scores compared with the cluster high structure–low demanding (all $ps < .05$, all $ds > 0.42$).

Configurations With Domineering Coaching Behavior. The MANOVA test showed a significant effect regarding the outcome variables among the clusters differing in terms of autonomy-supportive and domineering coaching, $F(9, 915) = 2.30$, $p < .05$, Pillai's Trace = 0.07, partial $\eta^2 = .02$. Yet, the follow-up univariate analyses were not significant for autonomous motivation, engagement, and controlled motivation (see Table 3).

Finally, a MANOVA test with the clusters differing in terms of structure and domineering coaching differed from each other at the multivariate level, $F(9, 915) = 4.68$, $p < .001$, Pillai's Trace = 0.13, partial $\eta^2 = .05$. Univariate effects for all separate outcomes were significant (see Table 3). Compared with the two clusters low on structure, scores on desirable outcomes (i.e., autonomous motivation and engagement) were found to be higher in the high structure–low domineering (all $ps < .01$, all $ds > 0.62$) and high structure–high domineering cluster (all $ps < .05$, all $ds > 0.50$), with the low structure–high domineering cluster clearly showing the lowest level of engagement (all $ps < .01$, all $ds > 0.63$). Regarding controlled motivation, clusters involving high levels of domineering

behavior showed significantly higher levels compared with the high structure–low domineering cluster (all $ps < .05$, all $ds > 0.43$).

Discussion

Congruent with the recent decomposition of controlling coaching into a demanding and domineering approach (Delrue et al., 2019), the present study aimed to examine the heterogeneity in coaching profiles by pairing these two controlling approaches with each need-supportive style (i.e., autonomy support or structuring coaching). As hypothesized, evidence was found for four different coaching profiles regardless of the pair of coaching behaviors used. Next, the person-centered approach allowed us to examine associations between those coaching profiles and athletes' motivational outcomes. As hypothesized, profiles characterized by relatively low need-support and high isolated controlling behavior yielded the least optimal pattern of motivational outcomes. While the presence of need-supportive coaching yields a desirable pattern of motivational outcomes, the additional presence of a demanding approach showed similar associations. In contrast, the additional presence of a domineering approach next to a high need-supportive style does come with a cost in terms of athletes' outcomes.

Theoretical Implications

In line with previous research (Delrue et al., 2019), the person-centered approach (cluster analyses) revealed that at least some athletes indicate that their coaches are not necessarily either need-supportive or demanding. In contrast, some coaches are perceived to combine these behaviors in a more (or less) balanced way, thereby scoring high or fairly low on both, with the latter suggesting a lack of involvement with their players (Delrue et al., 2019). Analogously, the retained coaching profiles involving the combination of need-support and domineering behavior implied that domineering coaching could either differentiate from or somehow go along with coaches' need-support. Altogether, the pattern of results is congruent with the dual-pathway model, which suggests that there exists a "bright" and "dark" pathway from need-supportive and need-thwarting coaching to, respectively, need satisfaction and need frustration. If need-supportive (i.e., autonomy support and structure) and controlling behaviors (i.e., demanding and domineering) would fall along a single continuum and thus be mutually exclusive, no coaching profiles should be found in which both styles are equally present (e.g., a high–high group).

Together with the identification of different profiles combining need-supportive and controlling coach behaviors, the current study examined associations between these profiles and athletes' motivational outcomes (i.e., autonomous motivation, controlled motivation, and engagement). First, the detrimental role of a domineering approach, even when being complemented with high structure, seems not limited to its associations with maladaptive outcomes (e.g., controlled motivation) through a "dark" pathway (Haerens et al., 2015). That is, based on a more detailed inspection of the cluster scores, the presence of a domineering approach seemed to deflate the level of athletes' autonomous motivation and engagement, even when combined with high need support. These results are in line with the study of Haerens et al. (2018) which made use of a more harsh operationalization controlling style. That is, athletes in the high autonomy support and low control group reported the highest levels of athletes' autonomous and lowest levels of controlled motivation. In contrast, the diametrically opposed group (i.e., low autonomy support and high control) reported the lowest level of autonomous and highest level of controlled motivation.

In contrast to profiles involving the presence of a domineering approach, coaches combining high need-supportive and demanding behavior showed a more optimal pattern with respect to athletes' autonomous motivation and engagement. It should be noted that within profiles combining high need support and high demanding behavior, both relative (i.e., compared with the other profiles) and absolute (i.e., compared with the midpoint of the scale) scores on autonomy and structure were the highest, which may account for the fact that these profiles yield the absolute highest scores on desirable outcomes. Indeed, the degree of need-supportive behaviors may regulate positive motivational outcomes such as autonomous motivation through a "bright" pathway (e.g., Haerens et al., 2015). Accordingly, high autonomy support and structure may stimulate a positive pathway toward more positive outcomes. Nevertheless, it is important to notice that the presence of highly demanding behavior, when accompanied with high need support, does not seem to harm athletes' autonomous motivation and engagement. Such findings are in line with the study of Matosic and Cox (2014), in which no significant differences were found between a high autonomy support group and a high autonomy–high control (i.e., controlling the use of rewards) group regarding athletes' autonomous forms of motivation. Yet, demanding behaviors should not be considered innocuous, as they can provoke higher scores on controlled motivation when relied on in isolation. These results also bear similarities with those reported by Matosic and Cox (2014), who found high control coach profiles (i.e., only controlling) to be associated with higher levels of athletes' controlled forms of motivation compared with high autonomy coach profiles (i.e., only autonomy-supportive).

Practical Implications

The use of the person-centered approach within this study may increase the ecological validity of the existing body of research in coaching, as in practice coaches will probably rely on a mixture of coaching behaviors instead of relying on one single coaching style. Therefore, findings of this study may extend existing literature by highlighting some practical relevance for coaches as well. For example, results of the present study show that demanding and need-supportive behaviors may co-occur within team-sport coaches' daily practice. Regarding a demanding approach in particular, results from the study of Delrue et al. (2019) showed coaches in team sports to be more demanding when compared with coaches from individual sports, as reported by both athletes and coaches themselves. While implementing need-supportive strategies may be more straightforward within individual sport settings, coaches may be skeptical toward a need-supportive, and in particular an autonomy-supportive, coaching style, which they may associate with deregulation (e.g., Cushion et al., 2012; Mageau & Vallerand, 2003; Reynders et al., 2019). Besides, it may be not self-evident for coaches to unconditionally rely on a need-supportive coaching style within the context of team sports (Cushion et al., 2012; Rhind, Jowett, & Yang, 2012; Vroom & Jago, 2007). As team sports are characterized by high interdependency, there may be circumstances (e.g., when a player is disturbing the rest of the team) in which coaches act in a more demanding manner as they may suppose this to be beneficial for the functioning of the team as a whole (e.g., Chelladurai, 1993; van de Pol et al., 2015). It would therefore be naïve to ignore the fact that demanding coaching behaviors are part of daily coaching in team sports. Results of the current study point out that the use of demanding strategies does not have to affect athletes' autonomous motivation and engagement in a negative way if they are combined

with need-supportive behavior. For example, when coaches consult their athletes (i.e., participative) in making clear agreements about rules and guidelines within the team (i.e., structure), the motivational impact of pushing athletes for compliance (i.e., demanding) may be somehow mitigated. As a result, a demanding approach may be considered a milder form of coach control when compared with domineering behavior. Yet given the gradual perspective following the circumplex structure (Delrue et al., 2019), it is important for coaches to be aware that an isolated demanding approach may account for higher levels of controlled motivation and eventually may open the door for slipping further into a domineering approach, which should be considered a no-go zone. It is unlikely that athletes benefit from guilt and anxiety induction, intimidation, or personal attack (Bartholomew et al., 2011).

Limitations and Future Research

The present study also has some limitations. First, this study was conducted within a team-sport setting, thereby limiting our findings to the context of team sports. Previous research indicated that coaches' behavior is perceived differently within samples of team and individual sport athletes (Hollembeak & Amorose, 2005). In line with this, empirical evidence suggested that team-sport settings are characterized by higher levels of demanding and domineering coaching behavior when compared with individual sports (Delrue et al., 2019). As team and individual sports may diverge in terms of complexity and prevailing coaching culture, coaches from team and individual sports may act in a different way, resulting in a varied set of (de)motivating coaching profiles (Rhind et al., 2012; van de Pol et al., 2015). Therefore, it would be interesting to see if the same results would be obtained among individual sport athletes. In line with this, our study comprised only a limited amount of female coaches. Therefore when performing cluster analyses, future work might include a sufficient number and equal distribution of male and female athletes to test for possible gender differences as well.

Second, current research involved rather young athletes from different levels of competition. Therefore, it could be asked whether the same coaching profiles would be obtained when performing cluster analysis within samples of elite athletes. In a high-stakes, elite sport context coaches experience high levels of accountability and responsibility, which may incite them to rely more on behaviors that provide them with perceived feelings of control (i.e., demanding; Cushion et al., 2012; Din, Paskevich, Gabriele, & Werthner, 2015; Ntoumanis & Mallet, 2014). Moreover, within this elite sport context, a demanding approach has been identified as common coach behavior among high-performing coaches (Din et al., 2015). Accordingly, the present study examined the role of different coaching profiles on proximal and positive outcomes such as athletes' motivation and engagement. Therefore, when the obtained profiles could be replicated, future research should also consider focusing on performance-related and/or more negative outcomes (e.g., ill-being) as these may benefit more or differently from certain combinations of coaching styles.

Third, the explorative nature of this study, with the circumplex model being only recently developed, led us to opt for k-means clustering (Stanley, Kellermanns, & Zellweger, 2017). However, latent profile analysis (LPA) would have been a valuable person-centered alternative to k-means clustering. Simulation studies have shown that neither of these two techniques consistently outperforms the other, yet some strengths and limitations of LPA and k-means could be highlighted (Steinley & Brusco, 2011a, 2011b). As opposed to k-means clustering, LPA is often considered a more suitable method as it is model based, and yields fit statistics and probability measures (e.g., the probability that a coach belongs to one profile vs. another), while k-means focuses on minimizing within-cluster differences and maximizing between-cluster differences in determining cluster solutions (Stanley et al., 2017). Future work could therefore consider LPA a suitable alternative approach when aiming to replicate or expand upon the current findings.

Finally, although the number of coaching variables that was included in the person-centered analysis was limited to two, coaches are perceived to differ on multiple dimensions. Future research may include three or more coaching dimensions to examine whether this allows for the identification of a more diverse and greater number of clusters, possibly yielding more refined insights. Moreover, due to the correlational design of this study, the obtained coaching profiles may reflect coach behavior only at one moment in time. Yet as more situational or contextual factors such as serial winning or losing (e.g., Fry, Kerr, & Lee, 1986) may affect coaches' behavior, longitudinal studies may extend the current research and obtain more dynamic coaching profiles.

Conclusion

While need support is widely recognized to foster desired motivational outcomes, coaches may still be hesitant toward a need-supportive coaching style and may display controlling behavior from time to time (Cushion et al., 2012; Ntoumanis & Mallet, 2014). The current study within team sports emphasized the interplay between need-supportive and controlling behaviors, thereby distinguishing between a domineering and demanding approach among the latter. By identifying a set of different coaching profiles, it was found that some coaches are perceived to combine need-supportive and controlling behaviors. This more person-centered and nuanced perspective on coaching may not only provide new theoretical insights in research involving need-supportive and controlling (i.e., demanding and domineering) coach behaviors, but may also play a key role in fostering a conceptual change in coaches' beliefs regarding need-supportive and controlling coach behavior.

Acknowledgments

The research was funded by the Government of Flanders, Department of Sport (B/14197/02-IV2).

References

Adie, J.W., Duda, J.L., & Ntoumanis, N. (2012). Perceived coach-autonomy support, basic need satisfaction and the well- and ill-being of elite youth soccer players: A longitudinal investigation. *Psychology of Sport and Exercise, 13*(1), 51–59. doi:10.1016/j.psychsport.2011.07.008

Aelterman, N., De Muynck, G.-J., Haerens, L., Vande Broek, G., & Vansteenkiste, M. (2017). *Motiverend coachen in de sport*. Leuven, Belgium: Acco.

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*(5), 654–670. doi:10.1016/j.psychsport.2006.11.003

Assor, A., Vansteenkiste, M., & Kaplan, A. (2009). Identified versus introjected approach and introjected avoidance motivations in school and in sports: The limited benefits of self-worth strivings. *Journal of Educational Psychology, 101*(2), 482–497. doi:10.1037/a0014236

Balaguer, I., Atienza, F.L., & Duda, J.L. (2012). Self-perceptions, self-worth and sport participation in adolescents. *The Spanish Journal of Psychology, 15*(2), 624–630. PubMed ID: 22774436 doi:10.5209/rev_SJOP.2012.v15.n2.38873

Bartholomew, K.J., Ntoumanis, N., Ryan, R.M., Bosch, J.A., & Thøgersen-Ntoumani, C. (2011). Self-determination theory and diminished functioning: The role of interpersonal control and psychological need thwarting. *Personality and Social Psychology Bulletin, 37*(11), 1459–1473. PubMed ID: 21700794 doi:10.1177/0146167211413125

Bartholomew, K.J., Ntoumanis, N., & Thøgersen-Ntoumani, C. (2009). A review of controlling motivational strategies from a self-determination theory perspective: Implications for sports coaches. *International Review of Sport and Exercise Psychology, 2*(2), 215–233. doi:10.1080/17509840903235330

Bartholomew, K.J., Ntoumanis, N., & Thøgersen-Ntoumani, C. (2010). The controlling interpersonal style in a coaching context: Development and initial validation of a psychometric scale. *Journal of Sport and Exercise Psychology, 32*(2), 193–216. PubMed ID: 20479478 doi:10.1123/jsep.32.2.193

Calinski, T., & Harabasz, J. (1974). A dendrite method for cluster analysis. *Communications in Statistics, 3*(1), 1–27.

Carpentier, J., & Mageau, G.A. (2013). When change-oriented feedback enhances motivation, well-being and performance: A look at autonomy-supportive feedback in sport. *Psychology of Sport and Exercise, 14*(3), 423–435. doi:10.1016/j.psychsport.2013.01.003

Chelladurai, P. (1993). Leadership. In R.N. Singer, M. Murphey, & L.K. Tennant (Eds.), *Handbook of research on sport psychology* (pp. 647–671). New York, NY: Macmillan.

Conroy, D.E., & Coatsworth, J.D. (2006). Coach training as a strategy for promoting youth social development. *The Sport Psychologist, 20*(2), 128–144. doi:10.1123/tsp.20.2.128

Conroy, D.E., & Coatsworth, J.D. (2007). Assessing autonomy-supportive coaching strategies in youth sport. *Psychology of Sport and Exercise, 8*(5), 671–684. PubMed ID: 18769531 doi:10.1016/j.psychsport.2006.12.001

Curran, T., Hill, A.P., & Niemiec, C.P. (2013). A conditional process model of children's behavioral engagement and behavioral disaffection in sport based on self-determination theory. *Journal of Sport and Exercise Psychology, 35*(1), 30–43. PubMed ID: 23404877 doi:10.1123/jsep.35.1.30

Cushion, C., Ford, P.R., & Williams, A.M. (2012). Coach behaviours and practice structures in youth soccer: Implications for talent development. *Journal of Sports Sciences, 30*(15), 1631–1641. PubMed ID: 23016800 doi:10.1080/02640414.2012.721930

d'Arripe-Longueville, F., Fournier, J.F., & Dubois, A. (1998). The perceived effectiveness of interactions between expert French judo coaches and elite female athletes. *The Sport Psychologist, 12*(3), 317–332. doi:10.1123/tsp.12.3.317

Deci, E.L., & Ryan, R.M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268. doi:10.1207/S15327965PLI1104_01

Delrue, J., Reynders, B., Aelterman, N., De Backer, M., Decroos, S., De Muynck, G.-J., … Vansteenkiste, M. (2019). Adopting a helicopter-perspective towards motivating and demotivating coaching: A circumplex approach. *Psychology of Sport and Exercise, 40,* 110–126. doi:10.1016/j.psychsport.2018.08.008

Delrue, J., Vansteenkiste, M., Mouratidis, A., Gevaert, K., Broek, G.V., & Haerens, L. (2017). A game-to-game investigation of the relation between need-supportive and need-thwarting coaching and moral behavior in soccer. *Psychology of Sport and Exercise, 31,* 1–10. doi:10.1016/j.psychsport.2017.03.010

De Muynck, G-J., Vansteenkiste, M., Delrue, J., Aelterman, N., Haerens, L., & Soenens, B. (2017). The effects of feedback valence and style on need satisfaction, self-talk, and perseverance among tennis players: An experimental study. *Journal of Sport and Exercise Psychology, 39*(1), 67–80. PubMed ID: 28253062 doi:10.1123/jsep.2015-0326

Din, C., Paskevich, D., Gabriele, T., & Werthner, P. (2015). Olympic medal-winning leadership. *International Journal of Sports Science and Coaching, 10*(4), 589–604. doi:10.1260/1747-9541.10.4.589

Fry, L., Kerr, S., & Lee, C. (1986). Effects of different leader behaviors under different levels of task interdependence. *Human Relations, 39*(12), 1067–1082. doi:10.1177/001872678603901201

Gagné, M., Ryan, R.M., & Bargmann, K. (2003). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. *Journal of Applied Sport Psychology, 15*(4), 372–390.

Goudas, M., Biddle, S.J.H., Fox, K.R., & Underwood, A.M. (1995). It ain't what you do, it's the way that you do it! Teaching style affects children's motivation in track and field lessons. *The Sport Psychologist, 9*(3), 254–264. doi:10.1123/tsp.9.3.254

Haerens, L., Aelterman, N., Vansteenkiste, M., Soenens, B., & Van Petegem, S. (2015). Do perceived autonomy-supportive and controlling teaching relate to physical education students' motivational experiences through unique pathways? Distinguishing between the bright and dark side of motivation. *Psychology of Sport and Exercise, 16*(3), 26–36. doi:10.1016/j.psychsport.2014.08.013

Haerens, L., Vansteenkiste, M., De Meester, A., Delrue, J., Tallir, I., Vande Broek, G., … Aelterman, N. (2018). Different combinations of perceived autonomy support and control: Identifying the most optimal motivating style. *Physical Education and Sport Pedagogy, 23*(1), 16–36. doi:10.1080/17408989.2017.1346070

Hartigan, J., & Wong, M. (1979). Algorithm AS 136: A k-means clustering algorithm. *Journal of the Royal Statistical Society. Series C (Applied Statistics), 28*(1), 100–108.

Hollembeak, J., & Amorose, A. (2005). Perceived coaching behaviors and college athletes' intrinsic motivation: A test of self-determination theory. *Journal of Applied Sport Psychology, 17*(1), 20–36. doi:10.1080/10413200590907540

Howard, M.C., & Hoffman, M.E. (2018). Variable-centered, person-centered, and person-specific approaches: Where theory meets the method. *Organizational Research Methods, 21*(4), 846–876. doi:10.1177/1094428117744021

Jang, H., Reeve, J., & Deci, E.L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology, 102*(3), 588–600. doi:10.1037/a0019682

Lonsdale, C., Hodge, K., & Rose, E.A. (2008). The behavioral regulation in sport questionnaire (BRSQ): Instrument development and initial validity evidence. *Journal of Sport & Exercise Psychology, 30*(3), 323–355. PubMed ID: 18648109 doi:10.1123/jsep.30.3.323

Mageau, G.A., & Vallerand, R.J. (2003). The coach-athlete relationship: A motivational model. *Journal of Sports Sciences, 21*(11), 883–904. PubMed ID: 14626368 doi:10.1080/0264041031000140374

Matosic, D., & Cox, A.E. (2014). Athletes' motivation regulations and need satisfaction across combinations of perceived coaching behaviors. *Journal of Applied Sport Psychology, 26*(3), 302–317. doi:10.1080/10413200.2013.879963

Milligan, G.W., & Cooper, M.C. (1985). An examination of procedures for determining the number of clusters in a data set. *Psychometrika, 50*(2), 159–179. doi:10.1007/BF02294245

Ntoumanis, N., Barkoukis, V., Gucciardi, D.F., & Chan, D.K.C. (2017). Linking coach interpersonal style with athlete doping intentions and doping use: A prospective study. *Journal of Sport and Exercise*

Psychology, 39(3), 188–198. PubMed ID: 28891379 doi:10.1123/jsep.2016-0243

Ntoumanis, N., & Mallet, C. (2014). Motivation in sport: A self-determination theory perspective. In A. Papaioannou & D. Hackfort (Eds.), *Routledge companion to sport and exercise psychology: Global perspectives and fundamental concepts* (pp. 67–82). Hove, UK: Routledge.

Pelletier, L.G., Fortier, M.S., Vallerand, R.J., & Brière, N.M. (2001). Associations among perceived autonomy support, forms of self-regulation, and persistence: A prospective study. *Motivation and Emotion, 25*(4), 279–306. doi:10.1023/A:1014805132406

Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of Educational Psychology, 105*(3), 579–595. doi:10.1037/a0032690

Reeve, J., & Tseng, C.-M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology, 36*(4), 257–267. doi:10.1016/j.cedpsych.2011.05.002

Reynders, B., Van Puyenbroeck, S., Decroos, S., De Backer, M., Delrue, J., De Muynck, G.-J., … Vande Broek, G. (2019). Coaching the coach: Intervention effects on need-supportive coaching behavior and athlete motivation and engagement. *Psychology of Sport and Exercise, 43,* 288–300. doi:10.1016/j.psychsport.2019.04.002

Rhind, D., Jowett, S., & Yang, S. (2012). A comparison of athletes' perceptions of the coach-athlete relationship in team and individual sports. *Journal of Sport Behavior, 35*(4), 433–452.

Ryan, R.M., & Deci, E.L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York, NY: Guilford Publishing.

Skinner, E., Kindermann, T., & Furrer, C. (2009). A motivational perspective on engagement and disaffection: Conceptualization and assessment of children's behavioral and emotional participation in academic activities in the classroom. *Educational and Psychological Measurement, 69*(3), 493–525. doi:10.1177/0013164408323233

Stanley, L., Kellermanns, F.W., & Zellweger, T.M. (2017). Latent profile analysis: Understanding family firm profiles. *Family Business Review, 30*(1), 84–102. doi:10.1177/0894486516677426

Steinley, D., & Brusco, M.J. (2011a). Evaluating mixture modeling for clustering: Recommendations and cautions. *Psychological Methods, 16*(1), 63–79. doi:10.1037/a0022673

Steinley, D., & Brusco, M.J. (2011b). k-means clustering and mixture model clustering: Reply to McLachlan (2011) and Vermunt (2011). *Psychological Methods, 16*(1), 89–92. doi:10.1037/a0022679

Timmerman, M., Ceulemans, E., De Roover, K., & Van Leeuwen, K. (2013). Subspace k-means clustering. *Behavioral Research Methods, 45*(4), 1011–1023. doi:10.3758/s13428-013-0329-y

van de Pol, P.K., Kavussanu, M., & Kompier, M. (2015). Autonomy support and motivational responses across training and competition in individual and team sports. *Journal of Applied Social Psychology, 45*(12), 697–710. doi:10.1111/jasp.12331

Vansteenkiste, M., & Ryan, R.M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration, 23*(3), 263–280. doi:10.1037/a0032359

Vansteenkiste, M., Ryan, R.M., & Soenens, B. (2020). Basic psychological need theory: Trends, critical themes, and future directions. *Motivation and Emotion, 44*(1), 1–31. doi:10.1007/s11031-019-09818-1

Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology, 101*(3), 671–688. doi:10.1037/a0015083

Vlaamse Trainersschool. (2018). *Visienota 2025 Vlaamse Trainersschool*. Brussel, Belgium: Author.

Vroom, V.H., & Jago, A.G. (2007). The role of the situation in leadership. *American Psychologist, 62*(1), 17–24. PubMed ID: 17209676 doi:10.1037/0003-066X.62.1.17

Wilkinson, L., Engelman, L., Corter, J., & Coward, M. (1998). Cluster analysis. In L. Wilkinson (Ed.), *SYSTAT 8.0 statistics* (pp. 53–86). Chicago, IL: SPSS Inc.

Wolters, C.A. (2004). Advancing achievement goal theory: Using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational Psychology, 96*(2), 236–250. doi:10.1037/0022-0663.96.2.236