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Head Title: COACH BEHAVIOR PROFILE

# A temporal study on coach behavior profiles: Relationships with athletes coping and affects within sport competition.

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**Abstract**

The study aimed to identify coach behavior profiles and explore whether athletes from distinct profiles significantly differed on coping and affects experienced within two hours before the competition and during the competition (measuring them two hours after the competition). A sample of 306 French athletes (M*age* = 22.24; *SD* = 4.91; 194 men and 112 women) participated in the study. The results revealed the emergence of two profiles: (a) a coaching engaged profile that stands out for moderate physical training and planning, technical skills, mental preparation, goal setting, competition strategies, personal rapport and moderate negative personal rapport; (b) a less engaged coaching profile with low physical training and planning, technical skills, mental preparation, goal setting, competition strategies, personal rapport and moderate negative personal rapport. Memberships of coach behavior profiles were not confounded by athletes' practice experience, athlete's gender and coach experience. Results of latent profile analyses with BCH method revealed that coping and affective states significantly differed across the coach behavior profiles. As a whole, the less engaged coaching profile engenders the worst outcomes in competition. In conclusion, the detection of less adaptive coaching profiles would be crucial to prevent negative outcomes in athletes during the competition. This might be using intervention programs adapted to the peculiarities of athletes from particular coach behavior profiles.

Keywords: Affective states; Latent profile analysis; Coaching; Sport competition.

# A temporal study on coach behavior profiles: Relationships with athletes' coping and affects within sport competition

Previous studies showed the salient impact of coaching behaviors on athletes' outcomes such as wellbeing, performance, or dropout (Chia et al., 2015; González-García & Martinent, 2019; Hollembeak & Amorose, 2005; Ignacio et al., 2017). Researchers have noted how coaching practices can lead to positive cognitive, affective, or behavioral outcomes in athletes (Cruz & Kim, 2017; González-García et al., 2019). However, the present study is focused on coach practice in training due to their salient impact on competition. This rationale is based on the Côté et al. (1999) model in which coach behaviors can be conceptualized from a broad perspective in using the most frequent behaviors of coaches related to training. In particular, this framework focuses on seven coach behaviors dimensions likely to influence athletes: Physical training and planning (coach's involvement in athlete's physical training and planning for both training and competition); technical skills (coaches' feedback demonstrations and cues); mental preparation (how the coach helps the athlete to perform under pressure); goal setting (coach's engagement in the identification, development and control of the athlete's goals); competition strategies (interaction of coach-athlete in the competition); personal rapport (coach's closeness, availability and comprehension) and negative personal rapport (coach's usage of negative techniques such as fear and yelling) (Côté et al., 1999). The present study was grounded within the Côté et al. (1999) model based on the rationale that this framework involves a wide range of coaching behaviors likely to impact athletes' psychological outcomes and sports performance (Jowett et al., 2017).

Previous research grounded within the Côté et al. (1999) coaching framework mainly adopted a bivariate approach. In other words, examining each coach behavior dimension allowed researchers to explore how each dimension of coach behavior relates independently to theoretically relevant variables. Such an approach neglected the multivariate nature of the

coaching behavior construct and prevented researchers to explore the proposition that coaches may use simultaneously multiple behaviors.

However, scholars have suggested that coaches use several coaching behaviors (from distinct aforementioned coach behavior dimensions) (Côté et al., 1999; Martinent & Ansnes, 2020). As a result, distinct coach behaviors can coexist within each coach but to a varying degree. Following this line of reasoning, the primary goal of this study was to propose and investigate a framework, derived from the Côté et al. (1999) coaching framework, in which the differential coexistence of multiple coach behaviors is used to generate multivariate profiles of coach behaviors. In this perspective, the use of multiple coaching behaviors by coaches should not be seen as independent or mutually exclusive but they are rather part of a larger interconnected system (Martinent & Nicolas, 2016). The aforementioned multivariate coach behavior profiles could offer a promising platform for examining the complex associations of coach behaviors with key athletes' outcomes such as affective states and coping. We selected these two variables because they seem particularly salient for a sample of competitive athletes in their performance (Cece et al., 2020; Cosma et al., 2020; Doron & Martinent, 2016).

Coaching behaviors can be conceptualized as a stressor that leads to athletes' affective and coping responses (Lazarus, 1991). In this perspective, coaching behaviors refer to a situational context in the sport that can explain temporal changes in people's affective and coping responses. According to the Cognitive-Motivational-Relational Theory (CMRT; Lazarus, 2000), affective states and coping constantly fluctuate over time due to: (a) appraisal understood as the cognitive process; (b) the central role of the individual's strivings, intentions, and goals (the motivational process); and (c) the relevance of external events to these strivings (the relational process that is the interaction between the individual and the situation). Consequently, appraisals, motivation and the relational process may be modified by coaches' behaviors and the competitive situations (González-García & Martinent, 2019). This explains the necessity to

assess affective states and coping in two points of the competition. As such, the study provides a temporal design in which where assessed: coaching behaviors prior to competition; coping and affects two hours before the competition; and coping and affects during the competition measuring retrospectively (two hours after the competition). Thus, of the design will allow to shed light on how coaching profiles impact coping and affects before and during the competition.

Affective states are the valence response (pleasant or unpleasant) associated with a situation occurring in a sporting context (Ekkekakis & Petruzello, 2000; Lazarus, 1999, 2000; Martinent & Nicolas, 2017). Previous research has provided strong evidence that this multidimensional construct is comprised of four core dimensions (Jamieson et al., 2010; Martinent & Ferrand, 2009; Nicolas et al., 2014): Intensity and direction of Positive Affects (PA) and Negative Affects (NA). PA comprise the optimal states of energy and pleasurable engagement, whereas NA engender displeasure and a sense of unpleasant engagement (Ekkekakis & Petruzello, 2000; Lazarus, 1999). The directionality is the perceived impact of affective states on performance (facilitating or debilitating) (Nicolas et al., 2014) and depends on the evaluation of the environment and the characteristics of the athlete (Hanton et al., 2012).

Coping is the ability of the athlete to activate cognitive and behavioral efforts to control the internal and/or external competitive requirements that could exceed the athletes' perceived resources (Lazarus & Folkman, 1984). The bewildering richness of coping responses to manage the demands of sport competition lead several authors to suggest a hierarchical approach of coping for organizing the coping construct (Lazarus & Folkman, 1984; Gaudreau & Blondin, 2002). In the sport context, three main dimensions of coping have been proposed (Gaudreau & Blondin, 2002; Nicolas et al., 2011). Task-oriented coping involves strategies dealing directly with the stressful situation and the resulting thoughts and affects (relaxation; logical analysis; seeking support; imagery; thought control). Disengagement-oriented coping refers to an escape

from the stressful situation (resignation, venting of unpleasant emotions) whereas distraction-oriented coping refers to strategies putting athletes' attention to other stimuli than the ones that cause the stressful situation (distancing, mental distraction). However, a single coping strategy may serve multiple macro-level functions generating difficulties in classifying specific coping strategies by the macro-level function that they are intended to serve (Martinent & Nicolas, 2016). Thus, in the present study, we preferred exploring a wide variety of coping strategies used by athletes to cope with sport competition (e.g., effort expenditure; thought control; seeking support; distancing; mental distraction; or disengagement).

Preliminary results were offered within the literature regarding the links of coach behaviors with coping (Levy et al., 2016; Nicholls et al., 2016a; Nicholls et al., 2016b; Nicolas et al., 2011) and affective states (Cruz & Kim, 2017; Ekstrand et al., 2017; Kristiansen et al., 2008). Previous studies revealed that supportive coaching behaviors (a coach that gives emotional encouragement; positive social climate; work structure and systematically planning training lessons) positively predicted task-oriented coping whereas unsupportive coaching behaviors (a coach that shouts; manipulate; threaten; or upset athletes) positively predicted disengagement-oriented coping (Nicholls et al., 2016b; Nicolas et al., 2011). In contrast, Levy et al. (2016) revealed a negative relationship between supportive coaching behaviors with challenge appraisal (challenge appraisal is positively related to task-oriented coping, Doron & Martinent, 2017, 2021). Of particular importance in the context of the present study, Nicholls et al. (2016a) showed that: (a) physical training, technical skills; mental preparation; goal setting; competitive strategies and personal rapport were positively and significantly related to task-oriented coping; (b) negative rapport was negatively and significantly related to task-oriented coping and significantly positively related to distraction-oriented coping and disengagement-oriented coping; and (c) disengagement-oriented coping was significantly and negatively related to technical skills, competitive strategies and personal rapport.

There is a scarcity of research examining the relationship between coach behaviors and affects (Nicolas et al., 2011). Nevertheless, preliminary results offered by studies focused on theoretical concepts close to coach behaviors such as coach leadership (Cruz & Kim, 2017; Ekstrand et al., 2017; Kristiansen et al., 2008; González-García et al., 2020). This literature showed that authoritarian coaches were related to athletes' NA intensity whereas supportive, democratic, training focused coaches, and coaches social support were linked with the experience of PA intensity (Cruz & Kim, 2017; Ekstrand et al., 2017; Jiménez et al., 2019; Kristiansen et al., 2008; Nicolas et al., 2011). To the best of our knowledge, only one study examined the relationship between directional interpretation of affective states and a coach variable (i.e., coach leadership). In a prospective design study, González-García et al. (2020) showed that social support significantly and positively predicted NA direction during competition controlling for NA direction within two hours before competition. Moreover, in previous research the coach's experience and athletes' experience were related to the use of coping and decision strategies. This means that younger athletes use more disengagement coping strategies than older ones (Dias et al., 2010). In addition, coaches with more years of experience are able to manage a greater number of competitive situations and make more complex decisions (Vergeer & Lyle, 2009). Thus, the coach' and athlete' experience was considered in the present study.

In sum, the examination of coach behavior profiles could go further in the understanding of how the dimensions of coach behavior may operate. As such, we adopted a person-centered approach designed to identify sub-groups of athletes (profiles) with combinations of coach behaviors (Cece et al., 2019; Ichiro, 2012). Thus, the present study aimed to identify coach behavior profiles based on the perceptions of competitive athletes. We also examined whether participants within distinct coach behavior profiles significantly differed on coping and affects experienced within the pre-competitive (within two hours before competition) and competitive

(measuring two hours after the competition) stages of a sports competition. It is deemed premature to formulate specific hypotheses regarding the number or characteristics of coach behavior profiles because of the lack of studies grounded within a profile approach in the coach behavior literature.

## Method

### *Participants*

A sample of 306 French athletes (M*age* = 22.24; *SD* = 4.91; 194 men and 112 women) participated in the study. The sample of the present study was also used by Martinent, Nicolas, Gaudreau and Campo (2013) and Martinent and Nicolas (2016). The rationales, the aims of each study and the results are fundamentally different. The sports with the greatest number of participants in the sample were: Rugby (25.49%); football (16.33%); handball (12.09%); basketball (10.78%) and gymnastics (5.55%). The level of competition was regional (39.86%); departmental (11.43%); national (40.84%) and international (7.84%). The mean time spent in training per week of athletes was 7.50 hours (*SD* = 4.51). The mean years of experience in the sport of athletes were 10.7 years (*SD* = 5.57). The gender of athletes' coaches was mainly male (84.3%). To ensure the generalizability and external validity of results, the sample was selected from various individual and team sports, male and female athletes as well as elite and nonelite athletes.

### *Measures*

The French version (Jowett et al., 2017) of the Coaching Behavior Scale for Sport (CBS-S; Côté et al., 1999) was used to measure the perceived behaviors of the coach by athletes. This scale is comprised of 47-items with seven dimensions of coaching behaviors: Physical Training and Planning (7 items, e.g., “provides me with a plan for my physical preparation”; α = .84); Technical Skills (8 items, e.g., “gives me reinforcement about correct technique”; α =.93); Goal Setting (6 items, e.g., “helps me set long-term goals”; α =.91); Mental Preparation (5 items,

e.g., “provides advice on how to perform under pressure”; α =.94); Competition Strategies (7 items, e.g., “keeps me focused in competitions”; α =.88); Personal Rapport (6 items, e.g., “is a good listener”; α =.89); and Negative Personal Rapport (8 items, e.g., “intimidates me physically”; α =.63). The scale responses ranged from 1 (never) to 7 (always). Previous works revealed enough reliability and validity of this measure (Côté et al., 1999; Jowet et al., 2017).

The French version of the Coping Inventory for Competitive Sport (CICS; Gaudreau & Blondin, 2002) was used to measure the coping strategies before and during competition. This scale contains 39 items rated on a 5-point Likert scale ranging from 1 (does not correspond at all) to 5 (corresponds very strongly). The questionnaire is made up of 10 subscales: mental imagery (4 items; α pre-competition = .51, α intra-competition = .58); thought control (4 items; α pre-competition = .66, α intra-competition = .71); effort expenditure (3 items; α pre-competition = .72, α intra-competition = .83); seeking support (4 items; α pre-competition = .72, α intra-competition = .73); logical analysis (4 items; α pre-competition = .66, α intra-competition = .67); relaxation (4 items; α pre-competition = .71 , α intra-competition = .78); mental distraction (4 items; α pre-competition = .68 , α intra-competition = .81); distancing (4items; α pre-competition = .70 , α intra-competition = .73); venting of unpleasant emotions (4 items; α pre-competition = .73 , α intra-competition = .83) and disengagement (4 items; α pre-competition = .70, α intra-competition = .84). Cronbach’s α tends to increase with an increase in the number of items leading several researchers to suggest a cut-off value of .60 for 4-item subscales (Hair et al., 2010). Other researchers prefer the use of the average inter item correlation as a statistical marker of internal consistency and recommended that it fall in the range of .15 - .50 (Clark & Watson, 1995). The inter-item correlations were of .19 for pre-competitive mental imagery and .28 for intra-competitive mental imagery. Previous works revealed the reliability and validity of mental imagery scores (Gaudreau & Blondin, 2002).

The French version of the Positive and Negative Affect Scale including a direction scale (PANAS-D; Nicolas et al., 2014) was used to evaluate affects before and during competition. The scale is made up of four sub-scales to measure intensity of PA (10 items; α pre-competition = .86, α intra-competition = .86) and NA (10 items; α pre-competition = .75, α intra-competition = .82) and direction of PA (10 items; α pre-competition = .76, α intra-competition = .77) and NA (10 items; α pre-competition = .84, α intra-competition = .87). The questionnaire asked to respond: (a) the intensity of each symptom on a 5-point Likert scale ranging from 1 (not at all or very slightly) to 5 (extremely); and (b) the degree with which the intensity of the symptoms are either facilitative or debilitative to subsequent performance (directional interpretation) on a 7-point Likert scale ranging from - 3 (very debilitative) to 3 (very facilitative). Previous works revealed the reliability and validity of this measure (Gaudreau et al., 2006; Nicolas et al., 2014).

***Procedure***

The study followed international ethical guidelines and anonymity was preserved. Informed consent was signed by participants before beginning the study. Also, the questionnaires were fulfilled in person and were hard copy questionnaires. Participants were recruited from sports clubs in the Burgundy region and the University of Burgundy. A temporal design was carried out to reach the goals of the study in which two measures were taken. First, in previous days before the competition, the athletes completed the CBS. Second, two hours before the competition the athletes completed the PANAS-D and the CICS (Martinent, Nicolas, Gaudreau, & Campo, 2013). They were instructed to indicate to which extent the items represented their actual actions, thoughts, or affective states. Third, two hours after the competition the participants fulfilled the PANAS-D and the CICS to assess their affects and coping skills during the competition (Martinent et al., 2013; Nicolas et al., 2014). Participants were respectively instructed to indicate the extent to which each item represented (a) how they had felt during the competition, (b) the things that they had done or thought during the competition. According to

previous research (Gaudreau & Blondin, 2002; Gaudreau et al., 2006; Nicolas et al., 2011), the timeframe used for data collection was chosen to do not interfere in athletes warm and recovery routines. As such, the measurement points were included two hours before and after the competition. Finally, those participants with missing data were removed from the study.

***Data analyzes***

The M plus 7.3 version was the software used to conduct the main statistical analysis (Muthén & Muthén, 2012). A Latent Profile Analysis (LPA) was used to test the hypotheses previously established. LPA is a multivariate statistical model which posits that an underlying grouping variable (e.g., coaching behaviors) is not observed but can be inferred from a set of indicators (Martinent & Nicolas, 2017). Firstly, to identify the model that best fits the selection of the different coach behavior profiles, a series of measurement models was performed to determine which model fit the best (Martinent & Nicolas, 2016). Particularly, LPA models are grounded in a series of modeling steps, starting with the specification of a one-class model.

The number of classes is increased until there is no further improvement of the model, since adding another class would result in meaningless classes (Martinent & Nicolas, 2016). In LPA models, several statistical indicators are used to evaluate the model adequacy to the data. Therefore, a combination of statistical indicators was used to decide which model suits the best: log-likelihood value, Akaike information criterion (AIC; Akaike, 1987), Bayesian information criterion (BIC; Schwartz, 1978); Sample Size Adjusted BIC (SSABIC; Sclove, 1987), entropy, Lo, Mendell, and Rubin likelihood ratio test (LRT; Lo et al., 2001) and boostrapped likelihood ratio test (BLRT). The model that contains the smallest values on the AIC, BIC, and SSABIC, as well as the highest values on the log-likelihood value and the entropy, indicates the best-fitting model (Martinent & Nicolas, 2017). In addition, the LRT and BLRT were used for model comparison (chi-square difference test). Regarding the required sample, there are no firm rules of thumb in LPA, but Collins and Wugalter (1992) and Park and Yu (2017) suggested a

minimum *N* of almost 250. On the other hand, profiles with few participants (e.g., less than 5% of the total sample) may be difficult to interpret or validate, as such it is generally advisable to select profiles comprising more than 5% of the total sample (Collins & Lanza, 2010). Another issue in LPA is the number of indicators because the increasing number of indicators could modify the number of possible response patterns, some of which may be observed infrequently, leading to data sparseness (Collins & Lanza, 2010). Hence, researchers generally prefer using fewer indicators (from 4 to 10 indicators) with LPA even if there are no firm rules of thumb concerning this point (Collins & Lanza, 2010). Finally, it is noteworthy that 1500 random start values have been used in the LPAs in order to check that the results hold true and avoid local maxima. We also checked that the log-likelihood values were systematically replicated.

Thirdly, because the use of classify-analyze approaches (e.g., ANOVA) to compare distal outcomes across coach behavior profiles are related to several weaknesses (Nylund-Gibson et al., 2019), we used the Bolck et al. (2004) method (BCH method) to examine coach behavior group differences on athlete affects and coping. For instance, the two-step approach (i.e., using LPA and ANOVA) does not account for the imperfect profile assignment and has been shown to be biased (Nylund-Gibson, Grimm, Quirk, & Furlong, 2014).

The inclusion of some outcomes (athlete affects and coping) in mixture models introduces some complexity because the LPA measurement model (coach behavior profiles) can substantially shift when moving from the unconditional latent profile measurement model to a structural equation mixture model including the coach behavior profiles (Nylund-Gibson et al., 2019). The BCH method allowed to compute athlete's affects and coping dimensions as consequences rather than indicators of coaching behaviors. The statistical program SPSS 21 was used to further explore the relationship between coaching behavior profiles and athletes' outcomes. In particular, we examined if the coach behavior profiles predicted the intra-competitive variables (intra-competitive coping and affective states) controlling for pre-

competitive measures (pre-competitive affective states and coping) using a series of multiple regression analyses.

Subsequently, to explore potential socio-demographic profile confounds, a series of chi-square tests were conducted with qualitative variables (Athlete's gender and coach's gender) in order to inspect significant differences in coaches' and athletes' gender across the two coach behavior profiles. Finally, according to previous research (Dias et al., 2010; Vergeer & Lyle, 2009), we performed a MANOVA with quantitative demographic variables (athletes' playing experience and coaches' experience) entered as the dependent variables to explore the difference between profile groups. Partial eta squared ($\eta^2$) provided an index of effect size.

## Results

### *Coaching Behavior Latent Profiles Analyzes*

The LPA models were run by first testing a one-class model and then exploring models with more classes. Table 1 includes fit information (log-likelihood ratio, AIC, BIC, SSABIC, entropy, LRT and BLRT) for LPA models with one through five classes. For the AIC, BIC, and SSABIC, there were big drops between one and two classes and between two and three classes. The Lo, Mendel and Rubin LRTs also found that two classes showed better fit than one whereas three classes did not show better fit than two classes. In contrast, the bootstrapped LRTs suggested that two classes showed better fit than one, three classes showed better fit than two, four classes showed better fit than three, and five classes showed better fit than four. To achieve the balance between theoretical and statistical considerations, we used the model parameters to make sense of the classes and decide which model fits best. As a result, based on the interpretability of the coach behavior (i.e., the two-class solution made more theoretical sense and added substantive meaning to the understanding of coaching behavior profile than the three-class solution whereas a fourth or fifth class did not add anything substantive to the understanding of coaching behaviors) and the LPA statistical indicators, a two-class solution

was selected. In particular, whereas the two profiles emerging from the two-class solution were clearly different from each other, the three-class, four-class and five-class solutions provided some profiles which were not clearly different from other coach behavior profiles. Moreover, the 5-profile membership distribution was poor with not enough participants represented in one of the five profiles (i.e., one coach behaviour profile was comprised of only 4 participants). Finally, it is also noteworthy that average profile probabilities provided evidence for the two-class solution as average profile probabilities were of .95 and .96 for class 1 and class 2 respectively.

The descriptive labels for profiles are: (a) a coaching engaged profile ($n$ = 167) that stands out for high physical training and planning; technical skills; mental preparation; goal setting; competition strategies; personal rapport and moderate negative personal rapport; (b) a less engaged coaching profile ($n$ = 139) with low physical training and planning; technical skills; mental preparation; goal setting; competition strategies; personal rapport and positive-negative personal rapport ($n$ = 140).

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***Profiles Group Differences on Affects and Coping Variables***

Results of LPA using the BCH method are presented in Table 3 and provided evidence of the statistically significant differences in athlete affects and coping between the profiles. In particular, results showed that: athletes from the coaching engaged profile reported significantly higher scores of pre-competitive PA intensity ($\chi^2$ = 9.46) and direction ($\chi^2$ = 5.18); mental imagery ($\chi^2$ =9.28); effort expenditure ($\chi^2$ = 33.97); thought control ($\chi^2$ = 18.37) seeking support ($\chi^2$ = 30.58); relaxation ($\chi^2$ = 10.69); logical analysis ($\chi^2$ = 38.41); distancing ($\chi^2$ = 17.55); and venting of unpleasant emotions ($\chi^2$ = 16.87) as well as significantly higher scores of intra-competitive mental imagery ($\chi^2$ = 9.41); effort expenditure ($\chi^2$ = 17.96); thought control ($\chi^2$ = 15.73); seeking support ($\chi^2$ = 18.05); relaxation ($\chi^2$ = 11.43); logical analysis ($\chi^2$ = 17.85) and

venting of unpleasant emotions ($\chi^2 = 9.87$) than athletes from the less engaged coaching profile (Table 3).

In order to rule out the possibility that athletes from distinct coach behavior profiles simply continued to have similar levels of coping and affective states during the competition than those already experienced just before the competition, we performed a series of multiple regression analyses in which each of the distal outcomes (i.e., intra competitive coping strategies and affective states) was regressed on the dummy variable representing coach behavior profiles and on the pre-competitive level of each of outcomes (i.e., intra competitive coping strategies and affective states). Among the seven significant relationships between coach behaviors profiles and intracompetitive coping, two relationships remained marginally significant in using multiple regression analyses (thought control and relaxation). The results also provided new significant link between coach behaviors profiles and direction of intracompetitive positive affects. These results are available on request to the correspondence author.

### *Profiles Group Differences on Demographic Variables*

Results of chi-square tests showed significant differences in coach gender across the two profiles ($\chi^2$ (2) = 6.07; $p < .05$) but there were no significant differences between athletes' gender ($\chi^2$ (2) = .55; $p > .05$). Particularly, most coaches were men (84.3%) and 43.36% of them pertained to the profile "coaching engaged profile", while only 11.11% of the women coaches pertained to profile "coaching engaged profile". Regarding the quantitative sociodemographic variables (athletes' practice experience and coach experience) a MANOVA was performed (Wilk's Lambda = .99, $F$ (2) = .26, $p > .05$; $\eta^2 = .001$) and showed no significant differences in practice experience and coach experience between the two profiles.

## Discussion

The study aimed to identify coach behavior profiles and examine whether athletes from distinct behavior profiles significantly differed on coping and affects experienced within two

hours before competition and during the competition (measuring two hours after the competition). Results of profile analysis provided evidence for the emergence of two profiles: (a) a coaching-engaged profile and (b) a less engaged coaching profile. In contrast to previous studies that followed a bivariate approach (Jowett et al., 2017; Levy et al., 2016; Nicholls et al., 2016a; Nicholls et al., 2016b; Nicolas et al., 2011), this study examined the multivariate experience of coaching behaviors in identifying subgroups of athletes with particular combinations of the seven dimensions of coaching behaviors of the Côté et al. (1999) framework. Indeed, the coaching-engaged profile highlighted the coaches' training skills and their closeness with their athletes whereas the less engaged coaching profile revealed coaches with low training skills perceived from the athletes and worst perceived relationships with their athletes. These results are in line with sports studies highlighting that supportive coaching (using coaches' instructions) is preferred from the athletes' points of view and is related to adaptive outcomes in sports (Cruz & Kim, 2017; Ignacio et al., 2017). Besides, according to Côté et al. (1999) the less engaged profile reported a fewer frequency of the most common behaviors of coaches in relationship with training. Subsequently, and following other studies (Cruz & Kim, 2017; Ignacio et al., 2017) this can turn into less athletes' satisfaction regarding the coaching process. Coach behavior profiles would act as a stimulus that could make a difference in athletes' coping strategies to face competition. Thus, based on the Côté et al. (1999) and Lazarus (1999, 2000) frameworks, the perception of the most frequent coach behaviors could be conceptualized as situational stressor that may play a salient role in athletes' affective states and coping before and during the competition (Lazarus, 1999).

Identification of prototypical subgroups of athletes with particular configurations of coach behaviors offered a robust heuristic to examine coach behavior within a more holistic approach to unpack their complex associations with key athletic outcomes such as pre-competitive and intra-competitive affective states and coping. Indeed, athletes from the engaged

coaching profile reported higher scores of pre-and intra-competitive coping (effort expenditure; thought control; seeking support; relaxation; logical analysis; distancing and venting of unpleasant emotions) as well as higher scores in pre-competitive PA and NA intensities and PA direction. As such, following the previous study of Nicholls et al. (2016), high physical training, technical skills, mental preparation, goal setting, competitive strategies and personal rapport were related to the use of task-oriented coping by athletes (effort expenditure, thought control, seeking support, relaxation and logical analysis). Surprisingly, contradicting the Nicholls et al. (2016) study, pre-competitive distancing, as well as pre-and intra-competitive venting of unpleasant emotions, were significantly more use by the coaching engaged profile in comparison with the less engaged coaching profile. It implies that a coach engaged in training behaviors and closeness can also engender the use of a coping strategy of distancing into their athletes to face threats triggered by sports competition (Doron & Martinent, 2017; González-García et al., 2020). Considering that the distancing coping strategy is significantly more use within two hours before the competition but not during the competition, this experience of distancing might be categorized as adaptive based on the rationale that it could be a tool to not expend extra energy unnecessarily (Gaudreau & Blondin, 2002; Lazarus, 2000). The significantly more use of venting of unpleasant emotions reported by the coaching engaged profile in comparison to the less engaged coaching profile could also be interpreted as a positive strategy allowing athletes to not somatize the negative effects of threats just before and during the competition (Weerdmeester et al., 2020). It is important to keep in mind that the manner in which coping strategy has been defined within the CMRT involves a fundamental distinction between the use of coping strategies and the effectiveness of coping strategies (Lazarus, 1999, 2000). Indeed, any coping strategy could be adaptive or maladaptive in a particular context depending on the competitive situation, the athlete and the interaction between the athlete and the situation (Lazarus, 2000). The contradiction with the study of Nicholls et al. (2016) might

be regarding the differences between cultures in terms of coaching preferences (Cruz & Kim, 2017). Mostly because the sample of the aforementioned study involved athletes from different continents (Cruz & Kim, 2017), the preference in the coaching style is something that varies depending on the cultural components. Likewise, this study is an opportunity to understand the implication and combination of profiles in French athletes. Finally, it is noteworthy that the results of multiple regression analyses dampened the relationships between coach behavior profiles and intracompetitive variables. Hence, it is likely that coach behavior profiles mainly impacted intracompetitive use of coping strategies through the precompetitive measures.

Despite previous studies did not examine the relationships between affective states and coaching behaviors using the Côté et al. (1999) framework, related works (Cruz & Kim, 2017; Ekstrand et al., 2017; Jiménez et al., 2019; Kristiansen et al., 2008; Nicolas et al., 2011) showed that coaches characterized by high scores of physical training; technical skills; mental preparation; goal setting; competitive strategies and personal rapport (i.e., coaching engaged profile) could be related to PA intensity and PA and NA direction. Consistent with this previous research, the results reported significant differences in pre-competitive intensity and direction of PA in the expected direction (coaching-engaged profile reported the highest scores of PA intensity and direction). In contrast, athletes from the coach-engaged profile also experienced higher levels of pre-competitive NA intensity.

From an applied perspective, the results of the present study might help sport psychologists or coaches to counteract detrimental psychological outcomes related to coach behaviors and to foster adaptive psychological outcomes related to coach behaviors. For instance, it is noteworthy that a less engaged coaching profile could be conceptualized as a less adaptive coaching style that may hinder performance in competition due to the maladaptive affective and behavioral outcomes reported by athletes of this coach behavior profile within the pre-competitive and competitive period of a sports competition. As such, coaching courses may

be useful to create strategic interventions to promote coaches' behaviors such as physical training and planning, technical skills, mental preparation, goal setting, competition strategies and personal rapport. Besides, the less adaptive coaching behaviors should be considered among the technical staff of teams to handle this profile of coaches in order to optimize their skills and relationships with their athletes. Finally, the study provided a promising starting point to compare future research grounded in coaching behaviors profiles with other European countries and all around the world. Particularly, the profile approach might serve to raise awareness of the coexistence of various coaching behaviors at the same time, rather than appearing in isolation. As such, this study claims the need of coaches to be educated in the several parcels of coaching that may co-occur and that may impact performance.

Some limitations of the present study should be addressed. The measurement of affective states using only self-report questionnaires may lead to some bias (e.g., social desirability, acquiescence, memory). However, measuring affects using psychobiological tools can hinder the number of participants and reduce the ecological validity of the study given the difficulties associated with these types of mechanisms in sports competition (Podsakoff et al., 2003). It should be highlighted that the use of a temporal design with two measure points for affects and coping provided a more reliable way to understand the complex relationships of these concepts with coach behaviors profiles. Another limitation of the temporal design refers to the intrinsic characteristics of the competition that may modify the outcomes of the assessed variables. Besides, the evaluation of coaching behavior through the perceptions of athletes may also create some bias that can hinder the validity of the construct of coach behaviors. Indeed, perceived behaviors may differ from actual behaviors. Thus, it would be particularly useful to validate the assessed actual coach behaviors (in addition to perceived coaches' behaviors) using behavioral measures suggested within the sports literature (Smith et al., 2015).

Notwithstanding these limitations, the use of a profile approach for examining a wide range of coach behaviors provided new insights to further increase the knowledge on the multivariate nature of this construct. Indeed, it is noteworthy that the engaged coaching profile reported the best affective and behavioral outcomes in competition whereas the opposite pattern of results emerged for the less engaged coaching profile. In conclusion, the present study proposed an alternative person-centered approach that may provide researchers and practitioners with a useful way to examine combinations of the several coaching behaviors. Finally, the results of the present study must be considered to develop empirically proven interventions designed to help coaches modify their less adaptive coach behavior profile in order to maximize their athletes' psychological adjustment to the inherent demands of sport competition.

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632

# Tables

*Table 1. Fit Indices for Latent Profile Analysis Models.*

| No. of classes | 1 | **2** | 3 | 4 | 5 |
|---|---|---|---|---|---|
| No. of free parameters | 14 | **22** | 30 | 38 | 46 |
| log-likelihood | - 7516.82 | **- 7217.30** | - 7143.81 | -7095.61 | 7069.39 |
| AIC | 15061.64 | **14478.61** | 14347.62 | 14267.22 | 14230.79 |
| BIC | 15113.77 | **14560.53** | 14459.33 | 14408.72 | 14402.07 |
| SSABIC | 15069.37 | **14490.75** | 14364.18 | 14288.20 | 14256.18 |
| LRT | — | **599.03*** | 146.99 | 96.40 | 52.44 |
| BLRT | — | **599.03*** | 146.99* | 96.40* | 52.44* |
| Entropy | — | **.86** | .80 | .83 | .86 |

*Note: AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SSABIC = Sample Size Adjusted BIC; LRT = Lo, Mendell, and Rubin Likelihood Ratio Test; BLRT =Bootstrapped Likelihood Ratio Test*
** $p < .05$; Bold entries reflect selected model.*

633

634 *Table 2. Estimates of Latent Coach Behavior Scores and Prevalence of Coach Behavior*
635 *Profiles for the LPA Model.*

| *Estimates of latent coach behavior scores and prevalence of profiles* | Coach behavior profiles | |
|---|---|---|
| | Less engaged coaching profile ($N$ = 139) $M$ ($SE$) | Engaged coaching profile ($N$ = 167) $M$ ($SE$) |
| Physical Training and Planning | 23.19 (.89) | 35.23 (.63) |
| Technical Skills | 30.01 (.99) | 41.58 (.77) |
| Mental Preparation | 11.84 (.59) | 23.37 (.79) |
| Goal Setting | 13.81 (.63) | 26.62 (.77) |
| Competition Strategies | 25.71 (.84) | 36.28 (.61) |
| Personal Rapport | 24.17 (.88) | 31.17 (.54) |
| Negative Personal Rapport | 19.15 (.53) | 19.30 (.41) |

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637

638 *Table 3. Profile Differences in Coping and Affects using the Bolck, Croon, and Hagenaars*
639 *Method.*

| | Less engaged coaching profile ($N$ = 139) *M (SE)* | Coaching engaged profile ($N$ = 167) *M (SE)* | Chi-square tests *overal test* | α |
|---|---|---|---|---|
| **Precompetitive Measures** | | | | |
| ***Affects*** | | | | |
| Intensity of Positive Affects | 32.49 (.60) | 35.02 (.51) | 9.46** | .86 |
| Direction of Positive Affects | 13.91 (.53) | 15.58 (.47) | 5.18* | .76 |
| Intensity of Negative Affects | 17.22 (.46) | 18.27 (.41) | 2.65 | .75 |
| Direction of Negative Affects | .46 (.74) | .68 (.65) | .05 | .84 |
| ***Coping*** | | | | |
| Mental imagery | 10.48 (.26) | 11.62 (.25) | 9.28** | .51 |
| Effort expenditure | 8.70 (.23) | 10.69 (.23) | 33.97*** | .72 |
| Thought control | 11.03 (.27) | 12.66 (.24) | 18.37*** | .66 |
| Seeking support | 6.73 (.25) | 8.77 (.25) | 30.58*** | .72 |
| Relaxation | 8.72 (.28) | 10.09 (.29) | 10.69** | .71 |
| Logical analysis | 9.63 (.28) | 11.98 (.24) | 38.41*** | .66 |
| Distancing | 6.85 (.24) | 8.37 (.25) | 17.55*** | .70 |
| Mental distraction | 8.80 (.28) | 9.11 (.27) | .61 | .68 |
| Venting of unpleasant emotions | 6.07 (.21) | 7.46 (.24) | 16.87*** | .73 |
| Disengagement | 5.99 (.23) | 5.94 (.19) | .02 | .70 |
| **Intracompetitive Measures** | | | | |
| ***Affects*** | | | | |
| Intensity of Positive Affects | 28.69 (.69) | 29.37 (.58) | .52 | .86 |
| Direction of Positive Affects | 10.37 (.56) | 9.40 (.56) | 1.39 | .77 |
| Intensity of Negative Affects | 17.99 (.54) | 18.14 (.52) | .03 | .82 |
| Direction of Negative Affects | .49 (.71) | .10 (.67) | .34 | .87 |
| ***Coping*** | | | | |
| Mental imagery | 9.32 (.27) | 10.54 (.26) | 9.41** | .58 |
| Effort expenditure | 10.10 (.25) | 11.67 (.26) | 17.96*** | .83 |
| Thought control | 10.54 (.30) | 12.23 (.28) | 15.73*** | .71 |
| Seeking support | 6.40 (.26) | 7.97 (.25) | 18.05*** | .73 |
| Relaxation | 7.78 (.29) | 9.19 (.28) | 11.43** | .78 |
| Logical analysis | 10.20 (.27) | 11.88 (.26) | 17.85*** | .67 |
| Distancing | 6.65 (.24) | 7.12 (.22) | 1.87 | .73 |
| Mental distraction | 7.12 (.30) | 7.51 (.25) | .92 | .81 |
| Venting of unpleasant emotions | 7.77 (.32) | 9.19 (.29) | 9.87** | .83 |
| Disengagement | 6.70 (.31) | 6.44 (.22) | .43 | .84 |

Note. * $p < .05$ ** $p < .01$ *** $p < .001$.

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