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Observing the coach-created motivational environment across training and competition in youth sport

Nathan Smith[a], Eleanor Quested [b], Paul R. Appleton[c] and Joan L. Duda[c]

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ABSTRACT

Adopting an integrated achievement goal (Nicholls, J. G. (1989). *The competitive ethos and democratic education*. Cambridge, MA: Harvard University Press.) and self-determination theory (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*, 227–268. doi:10.1207/S15327965PLI1104_01) perspective as proffered by Duda, J. L. (2013). (The conceptual and empirical foundations of empowering coaching™: Setting the stage for the PAPA project. *International Journal of Sport and Exercise Psychology*, *11*, 311–318. doi:10.1080/1612197X.2013.839414), the aim of the current study was to observe empowering and disempowering features of the multidimensional motivational coaching environment in training and competition in youth sport. Seventeen grass-roots soccer coaches were observed and rated in training and competitive settings using the multidimensional motivational climate observation system (MMCOS; Smith, N., Tessier, D., Tzioumakis, Y., Quested, E., Appleton, P., Sarrazin, P., … Duda, J. L. (2015). Development and validation of the multidimensional motivational climate observation system (MMCOS). *Journal of Sport and Exercise Psychology*, *37*, 4–22. doi:10.1123/jsep.2014-0059). In line with our hypotheses, coaches created different motivational environments in the two contexts. More specifically, coaches were observed to create a less empowering and more disempowering environment in competition compared to in training. The observed differences were underpinned by distinctive motivational strategies used by coaches in the two contexts. Findings have implications for the assessment of the coach-created motivational environment and the promotion of quality motivation for young athletes taking part in grass-roots-level sport.

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Introduction

Within sport, there are two key settings in which a coach predominantly interacts with his/her athletes, that is, training and competition. To date, few studies have sought to separately examine the coaching environment manifested in both training and competitive contexts (see Chaumeton & Duda, 1988, as an early example). This is important to do, especially when considering the suggestion that coaches may emphasise and rely on more negative coaching strategies when placed under the pressure of competitive situations (Mageau & Vallerand, 2003; Smith, Quested, Appleton, & Duda, in press). Two social-cognitive theories of motivation that identify both adaptive as well as maladaptive facets of the coaching environment are achievement goal theory (AGT; Nicholls, 1989) and self-determination theory (SDT; Deci & Ryan, 2000).

Achievement goal theory

According to AGT (Ames, 1992; Nicholls, 1989), there are two major achievement goals which an individual can differentially adopt. When individuals primarily adopt a task goal focus, they tend to define success according to self-referenced criteria such as exerted effort and task mastery. In previous research a task goal focus has been associated with more adaptive responses such as perceptions of competence and a belief that effort causes success (see Biddle, Wang, Kavussanu, & Spray, 2003 for a review). If an individual has a predominant ego goal focus, he/she tends to define success in terms of other-referenced criteria (such as beating an opponent or demonstrating superior ability compared to relevant others). An ego goal emphasis tends to be associated with more maladaptive outcomes (Duda, 2005), such as unsportspersonlike attitudes and reported engagement in aggressive acts (Biddle et al., 2003; Boardley & Kavussanu, 2010).

The motivational climate (Ames, 1992) created by a significant other, such as a coach, is assumed to impact upon whether an individual adopts a task and/or ego goal focus in a specific activity (Reinboth & Duda, 2006). AGT suggests that, when a coach creates an environment that places emphasis upon effort and improvement, cooperation and ensuring all players have an important role (Newton, Duda, & Yin, 2000), the climate is more task involving. In contrast, a more ego-involving climate is created when the coach punishes mistakes, encourages inter- or intra-team rivalry and focuses on superiority and normative comparisons (Newton et al., 2000). Previous research has demonstrated relationships between perceptions of a task-involving climate and a host of positive cognitive, affective and behavioural outcomes (see Duda

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& Balaguer, 2007). In contrast, a perceived ego-involving climate has been linked to more maladaptive responses (see Duda & Balaguer, 2007).

Self-determination theory

SDT holds that the social environment created by a significant other, such as a coach, would impact upon athlete motivation via the satisfaction and/or thwarting of basic psychological needs for autonomy (i.e. a sense of control and ownership), competence (i.e. a sense of effectiveness) and relatedness (i.e. a sense of connection to others) (Deci & Ryan, 2000). When the social environment created by a coach promotes a sense of autonomy, competence and relatedness, athletes report more intrinsic and higher quality forms of motivation (Amorose & Anderson-Butcher, 2007). However, when the environment undermines need satisfaction and actively thwarts autonomy, competence and relatedness, athletes tend to report more controlled and lower-quality forms of motivation (Pelletier, Fortier, Vallerand, & Briere, 2001).

Within SDT, the social environment created by a significant other (e.g. a coach) is considered according to the extent to which it is autonomy supportive and controlling, interpersonally involved and hostile and marked by structure and chaos (Skinner & Edge, 2002). When a coach is autonomy supportive he/she provides choices and options, encourages intrinsic interest and provides opportunities for athlete input (Adie, Duda, & Ntoumanis, 2008). In contrast, a controlling coaching environment is one that is coercive, power-assertive and intimidating (Bartholomew, Ntoumanis, Ryan, & Thogersen-Ntoumani, 2011). When coaches are interpersonally involved or relatedness supportive,[1] they are respectful, caring and take an interest in their athletes' lives (Mageau & Vallerand, 2003). A hostile or relatedness-thwarting coaching environment is created when a coach belittles athletes, stops the development of relationships and shows a lack of care and concern (Van den Berghe et al., 2013). Finally, a structured coaching environment is marked by clear expectations and guidance, while a chaotic environment is unclear, ambiguous and athletes are unsure of what is expected of them (Reeve, Jang, Carrell, Jeon, & Barch, 2004).

In previous research, autonomy-supportive coaching environments have been positively linked to athletes' basic psychological need satisfaction (Adie et al., 2008, 2012) as well as positive outcomes such as subjective vitality (Reinboth, Duda, & Ntoumanis, 2004). Coach relatedness support has been shown to predict athletes' relatedness need satisfaction (Reinboth et al., 2004), while structure has been positively associated with athletes' competence and relatedness need satisfaction (Smith et al., 2015) as well as engagement in sport (Curran, Hill, & Niemiec, 2013). Controlling coaching environments have been associated with athletes' psychological need thwarting and more maladaptive responses such as higher levels of negative affect (Bartholomew et al., 2011; Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2010) and behavioural disaffection (Curran et al., 2013). Initial evidence suggests that relatedness-thwarting coaching behaviours associate with lower levels of competence and relatedness need satisfaction (Smith et al., 2015). To date, no studies have directly examined chaotic coaching in relation to athletes' responses to sport.

A theoretically integrated and multidimensional motivational coaching environment

In previous research, dimensions of the environment proffered by AGT and SDT have been primarily studied independently (e.g. Adie et al., 2008, 2012; Newton et al., 2000). Despite researchers discussing the theoretical and empirical links between the two theories (Allen & Hodge, 2006; Ntoumanis, 2001), it is only recently that a more formal integration of the theories, which encapsulates both AGT and SDT features of the motivational "climate" created by coaches, has been proposed and tested (Appleton, Ntoumanis, Quested, Viladrich, & Duda, 2016; Smith et al., 2016).

Within the present study, we draw from Duda's (2013) conceptualisation of the coach-created motivational environment as a hierarchical and multidimensional construct integrating motivationally relevant features of the environment as proffered in both AGT and SDT. According to Duda (2013), the motivational climate can be characterised hierarchically with a number of broad environment dimensions. These dimensions capture key coaching practices that represent motivationally "*empowering*" and "*disempowering*" environments.

In an empowering motivational environment, the coach promotes a feeling of athlete autonomy, relatedness and task-referenced perceptions of competence (Appleton et al., 2016; Duda, 2013). These types of empowering environments are marked by autonomy-supportive, relatedness-supportive and task-involving features (Duda, 2013). In contrast, a disempowering motivational environment is assumed to thwart feelings of autonomy, relatedness and encourage ego-referenced perceptions of competence (Duda, 2013). This is because a disempowering environment is marked by controlling, relatedness-thwarting and ego-involving behaviours. Although not explicitly included in Duda's (2013) conceptualisation, tenets proposed by SDT suggest the dimension of structure should promote individuals' perceptions of competence (Jang, Reeve, & Deci, 2010; Reinboth et al., 2004). Structure has typically received less attention in sporting contexts; however, Curran et al. (2013) have demonstrated a positive relationship between the degree to which the coach offers structure and athletes' behavioural engagement. In education settings, Sierens, Vansteenkiste, Goossens, Soenens, and Dochy (2009) also observed a positive relationship between structure and self-regulated learning, when delivered in an autonomy-supportive manner. Therefore, the inclusion of structure in the present study is warranted and will provide further information on the motivational environment created by coaches in training and match settings.

Previous research on the coach-created motivational environment drawing from AGT and/or SDT almost exclusively relied on self-reported assessments of the environment as completed by the athletes (Duda & Balaguer, 2007; Ntoumanis, 2012). To date, there have been limited attempts to observationally assess the coach-created motivational environment drawing from an AGT or SDT perspective (Boyce, Gano-Overway, & Campbell, 2009; Smith et al., 2016; Webster et al., 2013). Pulling from Duda's theoretically

[1]Different terminology exists in the literature with regards to interpersonal involvement and hostility. Based on Duda's (2013) conceptualisation, interpersonal involvement will be referred to as relatedness support and hostile environments will be considered relatedness thwarting.

integrated approach to examining the motivational climate (2013), Smith et al. (2015) developed the multidimensional motivational climate observation system (MMCOS) to assess dimensions of the coaching environment and also whether this environment is overall more or less *empowering* and *disempowering*.

Motivational environments in training and competition

In general, studies assessing athletes' perceptions of the motivational environment from an AGT or SDT lens have tended to consider features emphasised by the coach at a more contextual level (not discriminating between training and competition; e.g. Adie et al., 2008; Reinboth & Duda, 2006). An exception is work by van de Pol, Kavussanu, and Ring (2011) who found (adult) athletes reported their coaches as creating a more ego-involving climate in more competitive settings when contrasted to the environment created during training.

To our knowledge, there is a dearth of AGT- or SDT-grounded observational work examining potential differences in coaches' behaviours as a function of training versus competition. Using a modified and abbreviated version of the Coaching Behaviour Assessment System (CBAS) which considered whether reinforcements and punishment were based on the demonstration of positive outcomes/superior ability or effort (Smith, Smoll, & Hunt, 1977), Chaumeton and Duda (1988) showed that at higher competitive levels, coaches engaged in more punitive, ego-involving type behaviours compared to the case at lower competitive levels.

Mageau and Vallerand (2003) also provide an explanation for the findings of van de Pol and colleagues (2011) and Chaumeton and Duda (1988) by suggesting that under the pressure of competition, coaches will typically resort to a more controlling motivational style in an attempt to influence the outcome of the game or match. Recent research by Stebbings, Taylor, and Spray (2011) supports this proposition and showed that when coaches perceived themselves to be under pressure they reported more controlled motivation regulations and this predicted their creating a less autonomy-supportive and more controlling environment. However, in a later study no differences were found between adult athletes' perceptions of autonomy support across training and match settings (van de Pol, Kavussanu, & Kompier, 2015). Whether there are overt differences in the multidimensional motivation environment emphasised by the coach across the two contexts remains to be tested.

Present study

The overarching aim of the present research was to examine, from an AGT and SDT perspective, differences in the multidimensional coach-created motivational environment across training and competition in youth sport. Although initial research has employed the MMCOS to rate the motivational environment in training settings (Tessier et al., 2013), there are currently no studies that have employed the MMCOS to assess features of the motivational coaching environment manifested during competition. In the current study, we compare the motivational characteristics, in terms of the dimensions of the environment emphasised and motivational strategies used by youth football coaches in training and matches. We hypothesised that coaches would be less autonomy supportive and more controlling, be less task involving and more ego involving, and less relatedness supportive and more relatedness thwarting in competition compared to in training (Mageau & Vallerand, 2003, van de Pol et al., 2011). We provided no a priori hypothesis regarding the dimension of structure. Researchers have discussed how structure may be emphasised alongside other key dimensions of the motivational environment, such as autonomy support and control (Curran et al., 2013; Jang et al., 2010; Sierens et al., 2009). Therefore, it is equally likely that structure could be more or less emphasised in competition compared to training.

Method

Participants

Seventeen (16 males and 1 female) UK-based grass-roots soccer coaches were recruited to take part in the study. On average, the coaches were 44.7 years old (SD = 2.83 years), had been coaching for 5.8 years (SD = 2.68 years) and been with their current team for 3 years.

Procedures

Teams who participated in the local grass-roots soccer league were identified and contacted via e-mail or telephone in the first instance. After demonstrating an interest in the project, coaches were provided an information letter detailing the study commitments. Following coach approval, an information letter was administered to the athletes and their parents. Athletes were required to provide their own informed consent; however, due to their age, parents (or legal guardian) were also given a 2-week period to opt their child out of the filming. No parents chose to withdraw their child from participating. When filming matches, it was inevitable that the opposing coach and players would be captured by the camcorder and voice recording equipment. Potential opposition were contacted in advance of the recording sessions and informed about the purposes of the project. The opposition coaches were given an opportunity to inform their parents and athletes of planned filming and asked to contact the lead researcher in the event of any problems. None of the opposition teams, athletes or parents raised any concerns. All consent procedures were in line with ethical review recommendations offered by the authors' university review process.

As soon as possible after gaining consent, the lead researcher scheduled to visit and film the coach during a training session and a match. During both sessions, the researcher arrived at the location at least 10 min prior to the start of the session. The coach was recorded using a digital camcorder (JVC Everio GZ-EX310), voice recorder (Olympus VN-702) and lapel microphone (Olympus ME15). After the initial set-up, the researcher stood in an unobtrusive position to the side of the training area (or pitch in the instance of a match). The coach was allowed to continue undisturbed until the end of the session and until all players had left the area. To reduce the likelihood of a Hawthorne effect (Adair, Sharpe, & Huynh, 1989) a researcher was in contact and visited the coach prior to filming. This ensured that coaches and athletes were familiar with a researcher's presence.

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Measures

Observed multidimensional coach-created motivational climate

Recordings of the coach in both training sessions (*M*length = 67 min, SD = 17 min) and in matches (*M*length = 78 min, SD = 18 min) were coded using the MMCOS (Smith et al., 2015). Each of the videos was split into four equal time periods and coaches were rated according to the 32 lower-order behavioural strategies, the potency of the seven environmental dimensions (i.e. autonomy supportive, controlling, task involving, ego involving, relatedness supportive, relatedness thwarting and structured) and overall according to two higher-order factors (i.e. empowering and disempowering).

When making ratings, two coders worked independently following a marking scheme and coding sheet (coding materials available from first author upon request). Throughout each quarter time period, coders were asked to mark off the behavioural strategies as they were used by the coach. Within each quarter, if the strategy was present, coders provided a rating of one. If the coach did not use the strategy at all during the time period, then it was given a rating of zero. For each video, the maximum score for each strategy was four (if observed in each of the four quarters). Similar to the checklist used by Boyce et al. (2009), the strategy ratings provided information on the absence/presence of each of the strategies rather than a frequency count (i.e. the strategies were only rated once). Within the MMCOS there are six strategies that inform whether the coach emphasised an autonomy-supportive environment, for example, "provides meaningful choices"; six strategies for the controlling dimension, for example, "uses extrinsic rewards"; four strategies for the task-involving dimension, for example, "emphasises effort and improvement"; three strategies for the ego-involving dimension, for example, "punishes mistakes"; five strategies for the relatedness-supportive dimension, for example, "ensures all players are included in drills, activities and exercises"; five strategies for the relatedness-thwarting dimension, for example, "belittles players" and three strategies for the structure dimension, for example, "provides guidance". Details on how to identify and code the individual behavioural strategies are available from the first author and included within a Coder Training Manual available upon request.

At the end of each quarter, the coder was asked to rate the potency of each of the seven environment dimensions. While the individual strategy ratings are made using a checklist approach (0 = not present; 1 = present), the potency rating for the higher-order environment dimensions are based on the observed frequency, intensity and pervasiveness of the behavioural strategies used by the coach and is rated using a four-point potency scale ranging from 0 to 3 (0 – *not at all*; 1 – *weak potency*; 2 – *moderate potency*; 3 – *strong potency*). At the end of each video, coders were asked to make a separate rating and consider the degree to which the coach was empowering by supporting autonomy, relatedness and task-referenced competence (i.e. autonomy supportive, relatedness supportive, task involving and emphasising structure), or disempowering by thwarting autonomy, relatedness and encouraging ego-referenced perceptions of competence (i.e. controlling, relatedness thwarting and ego involving).

Initial research has supported the validity and reliability of the MMCOS in a team sport environment (Smith et al., 2015). To determine the inter-observer reliability, percentage agreement was calculated for the individual behavioural strategies, and two-way random intra-class correlation coefficients (ICC) were calculated for the environment dimensions and higher-order factors. Percentage agreement is considered acceptable when surpassing the level of 85% as recommended by Siedentop (1976). To interpret the ICC, the average measures are reported and interpreted based on the cut points proposed by Portney and Watkins (2009). When the ICC is smaller than 0.50, reliability is considered as poor; between 0.50 and 0.75 is moderate; and greater than 0.75 is good.

Coder training

Three coders were recruited to rate the collected training and match recordings. Prior to being involved in the present study, the three coders had taken undergraduate courses centred on motivation and had covered both AGT and SDT in their studies. Furthermore, the coders had a good knowledge of soccer and experience of coaching in sport. To ensure a baseline level of understanding, a coder-training package was delivered to the three coders by the lead author following the same procedure reported by Smith et al. (2015). Before coding main footage, coders were required to surpass an ICC of 0.75 for both inter- and intra-coder agreement.

Data analysis

Overall ratings for each of the environment dimensions in both training and competition were computed by averaging the two coders' scores from each of the four quarters. Three multiple analyses of variance (MANOVA) were then conducted. In the first test, empowering dimensions of the observed coaching environment (i.e. autonomy support, task involving, relatedness support and structure) were included as dependent variables and context (i.e. training or match) was included as a fixed factor to explore the differences in the ratings across the two contexts. A second MANOVA was conducted using the same procedure replacing the dependent variables with the disempowering environment dimensions of controlling, ego involving and relatedness thwarting. A final MANOVA was computed, including the higher-order ratings of empowering and disempowering as dependent variables.

Further MANOVA analyses were conducted to examine the behavioural strategies used during competition and training (see Table 1 for breakdown). To begin, a sum was created for each of the behavioural strategies based on whether the strategy was or was not used by the coach (a maximum possible score of four was available, which indicates the coach was observed to use the strategy in each of the four quarters). Unlike ratings for the environment dimensions, only the rating made by the lead researcher was used

Table 1. Descriptive statistics, reliability values and results of MANOVA analyses for all study variables.

	Training			Match			
	Mean (SD)	ICC	%	Mean (SD)	ICC	%	Difference
Autonomy support	1.45 (0.56)	0.81		0.82 (0.53)	0.90		0.63**
Acknowledges feelings and perspective	0.97 (1.32)		96	0.29 (0.85)		100	0.68+
Provides meaningful choice	2.29 (1.32)		82	1.50 (1.30)		83	0.79+
Encourages intrinsic interest	0.85 (1.06)		89	0.50 (0.61)		87	0.35
Provides rationale for tasks/requests/constraints	1.82 (1.33)		74	0.68 (0.97)		89	1.14**
Provides opportunity for player input	1.82 (1.15)		82	0.97 (0.76)		79	0.85*
Encourages initiative taking	1.97 (1.44)		87	0.85 (0.90)		83	1.12*
Controlling	1.03 (0.61)	0.71		1.74 (0.54)	0.87		0.71**
Uses extrinsic rewards	0.15 (0.29)		96	0.27 (0.53)		93	0.12
Uses controlling language	3.21 (1.00)		80	3.71 (0.61)		88	0.50+
Relies on intimidation	0.21 (0.40)		99	0.29 (0.56)		88	0.08
Demonstrates negative conditional regard	0.91 (1.14)		87	0.85 (1.03)		78	0.06
Uses overt personal/physical control	1.15 (1.04)		78	2.29 (0.94)		62	1.14**
Devalues athletes' perspective	0.56 (0.73)		89	1.21 (1.02)		75	0.65*
Task involving	2.00 (0.45)	0.67		1.52 (0.63)	0.89		0.48*
Emphasises task-focused competence feedback	3.71 (0.47)		88	2.97 (1.15)		83	0.74*
Explains player role importance	1.97 (1.18)		72	1.11 (1.07)		85	0.87*
Emphasises/recognises effort and/or improvement	2.85 (1.25)		83	2.59 (1.09)		71	0.26
Uses cooperative learning	0.47 (0.67)		91	0.38 (0.55)		89	0.09
Ego involving	0.74 (0.45)	0.75		1.04 (0.55)	0.93		0.30+
Punishes mistakes	0.06 (0.17)		97	0.32 (0.98)		96	0.26
Emphasises/recognises inferior/superior performance and ability	1.88 (1.21)		79	2.41 (1.30)		85	0.53
Encourages inter-/intra-team rivalry	1.03 (1.24)		89	1.35 (0.86)		79	0.32
Relatedness supportive	1.86 (0.54)	0.89		1.41 (0.44)	0.85		0.45*
Ensures athletes are included in drills/activities/exercises	1.44 (1.10)		78	0.32 (0.50)		93	1.12**
Engages in non-instructional conversation with athletes	2.18 (1.52)		88	1.03 (1.02)		83	1.15*
Adopts a warm communication style	2.79 (1.16)		69	2.56 (1.45)		81	0.23
Shows care and concern for athletes	2.24 (1.20)		71	2.06 (1.21)		71	0.18
Shows unconditional regard	2.41 (1.31)		77	1.44 (1.50)		75	0.97+
Relatedness thwarting	0.31 (0.28)	0.87		1.16 (0.69)	0.95		0.85**
Excludes athletes from certain drills/activities/exercises	0.18 (0.39)		100	0.12 (0.33)		100	0.06
Restricts opportunities for interactions and conversation	0.59 (0.83)		94	0.24 (0.53)		91	0.35
Shows a lack of care and concern for athletes	0.24 (0.40)		88	0.32 (0.56)		87	0.08
Belittles (makes an attempt to embarrass) athletes	0.47 (0.70)		94	1.26 (0.97)		83	0.79*
Adopts a cold communication style	0.91 (1.24)		87	2.50 (1.44)		87	1.59**
Structure	2.26 (0.51)	0.87		1.65 (0.50)	0.89		0.61**
Provides instructions and organisation	3.79 (0.36)		89	2.59 (1.15)		88	1.20***
Offers expectations for learning	1.15 (1.51)		87	0.47 (1.04)		94	0.68
Provides guidance throughout drills/activities/exercises	3.82 (0.39)		94	3.88 (0.33)		100	0.06
Empowering	1.97 (0.65)	0.87		1.41 (0.59)	0.87		0.56*
Disempowering	0.94 (0.67)	0.66		1.62 (0.63)	0.93		0.68**

*$P < 0.05$; **$P < 0.01$; ***$P < 0.001$.

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to create strategy score. Given this was a nominal rating, averaging scores of the two coders was not appropriate. After summing the strategy scores, groups of behavioural strategies (i.e. six autonomy-supportive, six controlling strategies, etc.) were inputted as dependent variables (a total of seven MANOVAs were conducted based on the seven environmental dimensions) and context identified as the fixed factor in the analysis.

Results

Results presented in Table 1 suggest that a moderate to good degree of reliability was evident across all of the rated environmental dimensions and higher-order factors in both training (ICC range = 0.66–0.87) and matches (ICC range 0.85–0.95). While a number of the individual behavioural strategies were rated to an acceptable level of reliability (i.e. >85% agreement), 12 strategies in training and 14 strategies in matches fell below the 85% agreement level (training range 69–100%/match range 62–100%) (see Table 1 for value breakdown).

The bivariate correlations between dimensions of the MMCOS can be seen in Table 2. In general, the size of the effects and direction of correlations are equivalent in both training (correlations in bottom left) and match settings (correlations in top right). Items considered empowering (i.e. autonomy support, task involving, relatedness supportive and structure) were moderately and positively related to each other when rated in both training and matches. Furthermore, the empowering environment dimensions were also positively correlated with the higher-order rating of an empowering environment in both contexts. A similar pattern was observed for the disempowering environment dimensions. Specifically, controlling, ego-involving and relatedness-thwarting dimensions were positively correlated with each other in both training and matches, as well as being positively correlated with the higher-order rating of a disempowering environment.

Results included within Table 1 highlight significant differences between the potency of ratings in training and matches for both higher-order factors (empowering and disempowering) and six out of seven environmental dimensions.

Table 2. Bivariate correlation between dimensions of MMCOS rated in training and matches.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. AS	1	−0.51*	0.32	−0.21	0.33	−0.57*	0.76**	0.45	−0.41
2. CO	−0.48*	1	−0.56*	0.60*	−0.42	0.55*	−0.62**	−0.55*	0.65**
3. TI	0.67**	−0.27	1	−0.07	0.37	−0.26	0.61**	0.77**	−0.02
4. EI	0.04	0.47	0.27	1	−0.36	0.28	−0.20	−0.34	0.47
5. RS	0.59*	−0.41	0.47	0.17	1	−0.48	0.36	0.71**	−0.46
6. RT	−0.28	0.48*	−0.45	0.04	−0.51*	1	−0.52*	−0.50*	0.59*
7. ST	0.68**	−0.34	0.90**	0.26	0.47	−0.34	1	0.54*	−0.33
8. EMP	0.78**	−0.56*	0.71**	0.14	0.83**	−0.47	0.69**	1	−0.31
9. DISEMP	−0.20	0.37	0.15	0.54*	−0.10	0.48	0.11	−0.37*	1

Correlations to the bottom left indicative of ratings made during training, top right relates to ratings made in matches; *$P < 0.05$; **$P < 0.01$.

At the higher-order factor level analyses indicated a significant effect for context, Wilks' Lambda = 0.67, $F = 7.82$, $df = (2, 31)$, $P = 0.002$. Coaches were observed to be significantly more empowering $F = 7.48$, $df = (1, 32)$, $P = 0.01$ in training compared to the case in matches and significantly less disempowering $F = 11.63$, $df = (1, 32)$, $P = 0.002$ in training compared to match situations.

At the environmental dimension, analyses highlighted significant effects for dimensions grouped as empowering, Wilks' Lambda = 0.68, $F = 3.40$, $df = (4, 29)$, $P = 0.021$, and disempowering, Wilks' Lambda = 0.56, $F = 7.75$, $df = (3, 30)$, $P = 0.001$. Figure 1 demonstrates the differences in the potency rating across contexts. Specifically, coaches more potently emphasised autonomy supportive $F = 11.40$, $df = (1, 32)$, $P = 0.002$, task-involving $F = 6.64$, $df = (1, 32)$, $P = 0.015$, relatedness-supportive $F = 7.10$, $df = (1, 32)$, $P = 0.012$ and structured $F = 12.58$, $df = (1, 32)$, $P = 0.001$ motivational environments during training compared to in matches. Coaches also created a significantly less potent controlling $F = 13.02$, $df = (1, 32)$, $P = 0.001$ and relatedness thwarting $F = 22.46$, $df = (1, 32)$, $P < 0.001$ environment in training compared to the case in matches. Although not significant, there was a trend for coaches to less potently emphasise ego-involving $F = 3.09$, $df = (1, 32)$, $P = 0.088$ criteria in training compared to matches.

Differences in the lower-order strategy use are presented in Table 2. Significant effects were found for strategies across six out of the seven environmental dimensions. In match scenarios, coaches offered less rationale $F = 8.24$, $df = (1, 32)$, $P = 0.007$, provided fewer opportunities for input $F = 6.55$, $df = (1, 32)$, $P = 0.015$ and encouraged initiative taking $F = 7.37$, $df = (1, 32)$, $P = 0.011$ significantly less than in training. Coaches were observed to use significantly more overt control $F = 11.39$, $df = (1, 32)$, $P = 0.002$ and devalue athletes' perspective $F = 4.56$, $df = (1, 32)$, $P = 0.04$ in matches compared to training. In training, coaches provided more task-focused competence feedback $F = 5.94$, $df = (1, 32)$, $P = 0.021$ and explained player role importance $F = 4.89$, $df = (1, 32)$, $P = 0.034$. Coaches also ensured all players were included in drills and activities $F = 14.51$, $df = (1, 32)$, $P = 0.001$, and engaged in non-instructional conversation more in training compared to competition $F = 6.66$, $df = (1, 32)$, $P = 0.015$. Furthermore, coaches were observed to belittle $F = 7.53$, $df = (1, 32)$, $P = 0.01$ and adopt a cold communication style $F = 11.91$, $df = (1, 32)$, $P = 0.002$ more often in matches than in training. Finally, coaches provided more instruction and organisation $F = 17.09$, $df = (1, 32)$, $P < 0.001$ in training compared to matches.

Discussion

The purpose of the present study was to use the newly developed MMCOS (Smith et al., 2015), which pulls from a theoretically integrated and multidimensional conceptualisation of the

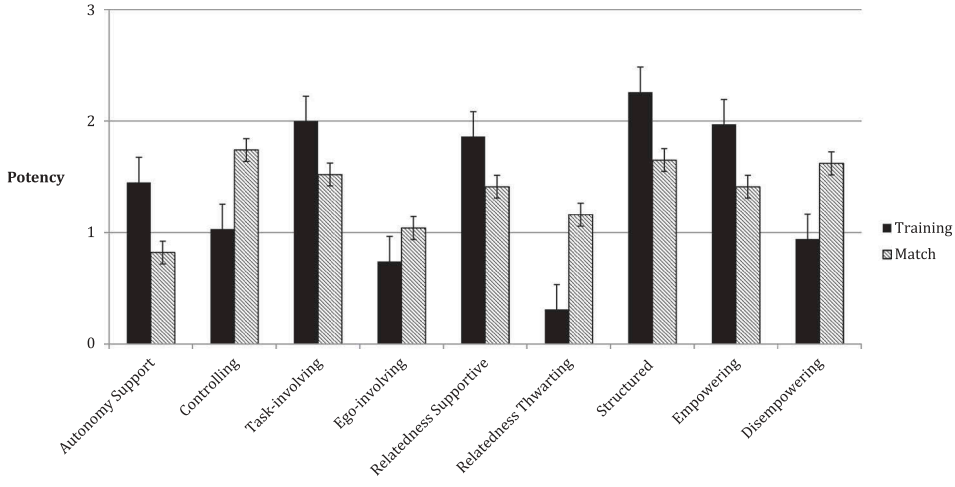

Figure 1. Graph to show differences in environment dimensions and higher-order factors rated in training and matches. Potency rating – 0 = not at all; 1 = weak; 2 = moderate; 3 = strong.

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motivational environment (Duda, 2013), to rate and compare the observed coach-created motivational environment in training and match scenarios. Prior to this study no attempts have been made to compare the observed coaching environment in training and competition, specifically using an observational measure grounded in AGT and/or SDT. Furthermore, this is the first study to employ the MMCOS to rate the motivational coaching environment in a competitive team sport setting.

Results highlighted a moderate to good degree of reliability when using the MMCOS in both training and matches. Focusing on competitive situations, observers achieved a high degree of consistency between their ratings of the environmental dimensions (range = 0.85–0.95). This finding supports previous research examining the reliability of the MMCOS in practice settings (Smith et al., 2015; Tessier et al., 2013) and provides further evidence for the inter-rater reliability of the measure.

The correlations between different dimensions of the MMCOS in both training and match settings offer additional evidence for the construct validity of the measure. The present results suggest that when a coach creates an empowering motivational climate by emphasising criteria such as autonomy support, they are likely to also be task involving, relatedness supportive and provide structure. Similarly, when coaches emphasise disempowering criteria such as when they are controlling, they are also likely to exchange with athletes in a more ego-involving and relatedness-thwarting manner. The size of the effects and direction of correlations are similar to those reported in previous self-report and observational research that examined dimensions of the coaching environment relevant to both AGT and SDT (Quested & Duda, 2010; Reinboth et al., 2004; Tessier et al., 2013). To confirm the factor structure of the MMCOS in match settings, a larger sample size is needed to run the appropriate confirmatory factor analysis.

Interestingly, there was no correlation found between the ego-involving and relatedness-thwarting dimension in training (r = 0.04), while a small albeit non-significant effect was noted in matches (r = 0.28). In matches, coaches placed a greater focus on emphasising ability and encouraging rivalry, which is more likely to cause tensions between team members and may well explain the small correlation noted between the ego-involving and relatedness-thwarting dimension. Examining the link between the ego-involving and relatedness-thwarting dimension, in training and matches, over time should further elucidate the relationship between the two environmental dimensions. In the short term, an ego-involving climate may not necessarily be disempowering (Smith et al., 2015). However, over time, we would expect that such an emphasis on uncontrollable factors such as ability and superiority are more likely to be maladaptive for motivation and accompanied by controlling and relatedness-thwarting messages (Duda & Balaguer, 2007).

Coaches were observed to be more empowering and less disempowering in training compared to matches. According to the rating criteria used, coaches were observed and rated as creating an environment likely to support athletes' basic psychological needs for autonomy, relatedness and promoting task-referenced perceptions of competence in training sessions more potently than in match settings. During matches, coaches created an environment that would be expected to thwart athletes' basic needs for autonomy, relatedness, and promote ego-referenced perceptions of competence (Duda, 2013). Previous research examining relationships between observational ratings made with the MMCOS and athletes' psychological needs (Smith et al., 2015, 2016) suggest that the present findings may have consequences for athlete motivation. Based on both conceptual (Duda, 2013) and empirical work (Quested & Duda, 2010; Reinboth et al., 2004; Smith et al., 2015), empowering rather than disempowering motivational environments are expected to promote more autonomous forms of motivation (Duda, 2013), which have been linked to adaptive responses to sport, including greater levels of enjoyment (Gagne & Blanchard, 2007) and persistence (Pelletier et al., 2001). Dimensions of a disempowering motivational environment have been show to predict more maladaptive responses such as higher levels of negative affect (Bartholomew et al., 2011) and intentions to dropout of sport (Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002). To better judge the cognitive, emotional and behavioural implications of observed empowering and disempowering coaching environments, research should consider the extent to which observed reports in training and competition predict athletes' motivational responses and ensuing outcomes. This would provide a valuable extension to the present work.

Findings from analyses at the environmental dimension level indicated that coaches created a more potent autonomy-supportive, task-involving, relatedness-supportive and structured environment in training compared to matches. These findings are consistent with our hypothesis and suggest that coaches are likely to create a more empowering environment in practice settings. Interestingly, alongside the dimensions conceptualised as empowering by Duda (2013), structure was also coded as being lower in matches compared to in training. In sport and education settings, researchers have suggested that structure is supportive of need satisfaction and engagement when delivered in an autonomy-supportive style (Curran et al., 2013; Sierens et al., 2009). Although previous findings indicate structure to be an empowering dimension of the motivational environment, Sierens et al. (2009) demonstrated that structure only had a positive impact upon self-regulated learning when delivered in an autonomy-supportive way. It is possible that structure might hold different implications when delivered in a controlling, and/or ego-involving way. In future studies, research could examine the interactive effects of structure with other key dimensions of the environment (e.g. autonomy support, controlling) in both training and competitive settings and examine the implications for athletes' motivation and overall functioning. This would provide further information on the categorisation of structure as a more or less empowering or disempowering dimension of the motivational environment.

Coaches also emphasised more controlling and relatedness-thwarting criteria in matches compared to what was observed in training sessions. For this group of coaches, it appears that they were creating rather distinctive motivational coaching environments across practice and competitive situations. Overall, the findings correspond to suggestions by Mageau and Vallerand (2003), as well as previous research by

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Stebbings et al. (2011) and van de Pol et al. (2011) that coaches will tend to rely on more controlling and disempowering criteria, when under the pressure of competition. At the lower-order strategy level, the increased use of overt control, devaluing athletes' perspective, belittlement and "cold" communication observed suggest that coaches were trying to regulate and impact what was happening in the match.

In contrast to previous observational research examining differences in coach behaviours based on age and competitive level (e.g. Chaumeton & Duda, 1988), no significant differences were found for the potency of the ego-involving (or more performance-focused) dimension across training versus match contexts. Perhaps because of the young age of the athletes, and the competitive level they were performing at (i.e. grass roots), emphasis on ego-involving criteria may have been less emphasised by the coaches in the present sample (Smith et al., 2015). Although the observed mean potency rating of the ego-involving dimension could be considered as weak, it is important to note that coaches did employ strategies that emphasised distinctions between players as a function of possessing superior/inferior ability. Future research should examine how overt strategies, such as highlighting individual athletes' ability levels, are interpreted by athletes and the impact that has on their motivation as well as important psychological characteristics such as self-esteem and fear of failure.

Within previous studies tapping perceptions of the motivational environment from a SDT or AGT perspective, researchers have typically asked athletes to consider the motivational climate manifested at a more contextual level (Newton et al., 2000; Quested et al., 2013). That is, the motivational environments operating in training and competitions are not differentiated. Current findings based on observational assessments of the motivational climate suggest that coaches may be creating a different environment in the two contexts. Ascertaining whether athletes also identify these distinctions and to the same degree, as well as the implications of such differences for athletes' functioning in the two settings, would be interesting directions for future research.

Although differences were noted in the strategies used by coaches in the two settings, a number of behaviours were rarely employed by coaches (e.g. shows lack of care and concern). Given this is the first study to report using the MMCOS to rate behavioural strategies at the lower-order level, there are still a number of questions to be addressed in relation to which strategies should/should not be included in the measure. To this end, re-examining the factor structure and predictive utility of the MMCOS using ratings made at the lower-order strategy level will be informative. If strategies are predictive of athlete responses then inclusion in the MMCOS would certainly be warranted and could inform the focus of intervention efforts.

Overall, the observed difference in the motivational environment found in the present study are relevant to training programmes (such as the *Empowering Coaching*™ programme, Duda, 2013) which aim to assist coaches in creating a more empowering and less disempowering environment in training and match settings. For example, our findings point to the importance of having coaches engage in reflective practice that has them identify the environment they create in training, as well as in matches (Knowles, Gilbourne, Borrie, & Neville, 2001). Present results also provide credence to having coaches generate more empowering strategies they might use in addition to identifying disempowering behaviours they might reduce or eliminate in both practice and competitive contexts.

There are several limitations that should be noted within the present work. The first revolves around the sample used and generalisability of the results. Within the current study, coaches were mostly males (with exception of 1 female coach), based in the UK and coaching at a grass-roots level. Future studies should examine training-competition differences in coach behaviours in more elite samples, including female athletes (and coaches) as well as various age-groups. Previous studies have found differences in the environment created due to the age and competitive level of athletes; therefore, this would provide an important progression to the current findings (Chaumeton & Duda, 1988).

A second limitation is related to a number of the lower reliability values noted for the environmental dimensions assessed via the MCCOS. In general and across both settings, the environmental dimensions were rated to a moderate-to-good level of reliability, as indicated by the ICC. However, the rating of the task-involving dimension in training sessions fell below the threshold of 0.75 (ICC = 0.67) that is indicative of a "good" agreement. Therefore, the results regarding the task-involving dimension in practice sessions should be interpreted with appropriate caution.

At the lower-order strategy level, there were a number of individual strategies that fell, albeit not too far, below the percentage agreement indicated as reliable by Siedentop (1976) (see Table 1). While lower than 85% agreement proposed by Siedentop (1976), researchers have argued about the arbitrary nature of such values indicating that percentage values between 70–80% agreement can be considered acceptable, particularly in exploratory research where new methods and approaches are being tested (Yoder & Symons, 2010). Nevertheless, future studies might consider examining the specific processes coders employ to generate their ratings of the individual behavioural strategies. Understanding how individuals code such behaviours could be informative when trying to foster more adaptive motivational environments and should improve the reliability of observational reports. In terms of the lower-order strategies, it is possible that the suppressed reliability values in both training and competition are a bi-product of the nominal checklist approach used. If there was only one disagreement between coders across the four quarters, the level agreement would automatically fall to 75%. As can be seen in Table 1, few values were below 75% suggesting that coding was generally done reliably. Nevertheless, in future research, coders may benefit from regular refresher sessions to maintain a consistently high level of reliability when coding training and competitive sessions at the behavioural strategy level.

Based on the present findings, it is not known whether the checklist rating approach used to identify the individual behavioural strategies was marked by good predictive validity. A checklist system has been used previously to observe and rate

AGT-based coaching strategies and examine their relationships to self-reports of the motivational environment from the perspective of athletes and coaches (Boyce et al., 2009). Therefore, subsequent work could use the MMCOS to rate individual behavioural strategies and determine the extent to which specific behaviours explain athletes' motivational responses. This may be particularly beneficial when examining behavioural outcomes in athletes, such as their levels of engagement and disaffection (Curran et al., 2013).

It is important to highlight that a checklist rating system does not provide information on the frequency of behaviours exhibited. In the present work, however, a checklist approach to rating individual behavioural strategies was deemed conceptually aligned with the motivational theories underpinning the work, where the quality and not necessarily the quantity of behaviour is fundamental to a prevailing motivational environment. Adopting a checklist rating procedure provides a rudimentary assessment of the consistency and type of strategies being adopted (i.e. the coach uses the strategy in one quarter, two quarters or all quarters), but does not provide an assessment of when, how much and where strategies are employed. From a practical perspective, and when coding so many strategies, this should enable coders to achieve higher levels of reliability when making their ratings. Often, observational research is overlooked due to the time and resources needed to code (Smith et al., in press), therefore, adopting a procedure that minimises such demands whilst providing useful information is crucial.

Conclusions

In summary, this is the first study to directly observe features of the coach-created motivational environment relevant to AGT and SDT in both training and match settings. Drawing from Duda's (2013) theoretically integrated conceptualisation of the environment as a multi-dimensional and hierarchical construct and employing the newly developed MMCOS (Smith et al., 2015), we found that coaches emphasised a less empowering and more disempowering motivational environment in competition compared to in training. Furthermore, there were differences in the specific strategies that coaches employed to "motivate" their athletes in the two contexts. Overall, results provide further evidence for the construct validity, discriminant validity, and inter-coder reliability of the MMCOS. In addition, findings highlight the assessment-related implications and practical importance of considering the motivational coaching environment created in both training and matches.

Disclosure statement

No potential conflict of interest was reported by the authors.

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