The relationship between observed and perceived assessments of the coach-created motivational environment and links to athlete motivation

Abstract

Objectives

The majority of research examining the relationship between the coach-created motivational and athlete motivation has relied on self-report measures. Grounded in Duda's (2013) theoretically integrated model, the present study examined: (1) athletes', coaches' and observers' reports of the multidimensional motivational coaching environment in four European countries, (2) the interrelationships of these different perspectives of the motivational environment, and (3) links between the multidimensional environment and athletes' autonomous, controlled and amotivation.

Design

We employed a cross-sectional study design and utilized mixed methods to tap the variables of interest. Both descriptive and more sophisticated multi-level statistical analyses were employed to test our hypotheses.

Methods

Seventy-four grassroots soccer coaches and 882 youth athletes from England, France, Greece and Spain were recruited. Coaches were video-recorded during a training session and observers rated the degree to which the coaching climate was autonomy supportive, controlling, task-involving, ego-involving and relatedness supportive. Athletes and coaches completed questionnaires assessing their perceptions of the coach created climate in relation to the aforementioned dimensions of the environment. Athletes also completed measure of their sport-based motivation regulations.

Results

A profile of the motivational environment and athlete motivation was presented actoss four countries. There were weak associations found between different perspectives of the multidimensional coaching environment. However, athletes', coaches' and observers' reports of features of the motivational environment emerged as significant predictors of athletes' autonomous, controlled and amotivation.

Conclusions

Results provide partial support for findings of previous studies examining athlete motivation correlates of the motivational environment relying solely on self-report measures. Findings also point to the value of adopting a mixed-methodological approach and including athletes', coaches' and observers' reports of the environment when time and resources allow.

Keywords: Achievement Goal, Self-determination, Motivational Environment, Observation, Coaching, Mixed-Methods

The coach-created motivational environment has been found to be a key determinant of a variety of cognitive, affective and behavioral outcomes (Adie, Duda & Ntoumanis, 2008; Duda & Balaguer, 2007). These outcomes include the extent to which athletes are motivated for autonomous and controlled reasons (Amorose & Anderson-Butcher, 2007), enjoy their participation (Boixados, Cruz, Torregrosa & Valiente, 2004) and hold intentions to continue taking part in sport (Pelletier, Fortier, Vallerand & Briere, 2001).

Two popular theories of motivation, namely achievement goal theory (AGT; Nicholls, 1989) and self-determination theory (SDT; Deci & Ryan, 2000), place importance on the social psychological environment created by significant others (such as the coach) for the quality of athletes' sport experiences. To date, much of our understanding of the coaching environment drawing from these two theoretical perspectives has been based on research utilizing athletes' self-reported views regarding the characteristics of the environment created. It has been repeatedly suggested that coaches' own perceptions and independent

observers' ratings should also be considered when assessing the coach-created environment (Duda, 2001; Duda & Balaguer, 2007; Healy et al., 2014). In past work, studies have assessed the coach-created motivational environment from different perspectives. This has included ratings made by independent observers (Tessier et al., 2013), coaches' own perceptions (Stebbings, Taylor & Spray, 2011) and, most often, athletes' views regarding the features of the environment manifested on their team (Adie et al.,, 2008; Reinboth, Duda & Ntoumanis, 2004). However, these studies have typically considered only one methodological approach in isolation. Triangulating assessments of the motivational environment and collecting parallel data from coaches' and athletes', as well as independent observers, should provide a more comprehensive assessment of the environment (Duda, 2001; Ntoumanis, 2012). In addition, when determining the concomitants of the coach-created environment, researchers have suggested that using alternative methodologies (such as external observations) enables a more conservative test of relationships between theoretically-based dimensions of that environment and athlete responses, such as motivation, thereby avoiding issues related to common method variance (De Meyer et al., 2013). Ultimately, this multi-method approach can help identify where there is a shared understanding (between athletes and their coaches) and more or less accurate perspectives of the prevailing motivational environment and be used to inform decisions on where to focus any future intervention efforts (i.e., whether to target the coach and/or athlete; Ntoumanis, 2012). To date, the majority of research on the coach-created motivational climate has drawn from AGT and/or SDT.

Coach-Created Motivational Environment

Achievement goal theory. Research grounded in AGT has highlighted two key dimensions of the coach-created motivational climate that are expected to influence how athletes define and construe competence within the sport setting, namely a task- and ego-involving motivational climate (Duda, 2001). When a coach is more task-involving, he/she

emphasizes the importance of effort, self-improvement, cooperation and role importance. In contrast, a strongly ego-involving motivational climate is fostered when a coach emphasizes the importance of superiority, outperforming others, rivalry within the team and punishes mistakes (Newton, Duda & Yin, 2000). A considerable body of research has highlighted the adaptive and maladaptive implications of task- and ego-involving motivational climates, respectively (see Duda & Balaguer, 2007 for a review).

Self-determination theory. Grounded in the SDT framework, research has identified six dimensions of the social environment that are expected to influence the quality of an athletes' motivation, namely the extent to which the environment is autonomy supportive and controlling, relatedness supportive and relatedness thwarting, and marked by structure and chaos. Autonomy support is characterized by a coach encouraging athletes to take control over their participation and behaviors nurturing athletes' interests and preferences. A relatedness supportive environment fosters a sense of belonging and encourages trust and respect while structure relates to the information, organization and guidance given by the coach (Mageau & Vallerand, 2003). Controlling motivational environments coerce athletes and pressure them to behave in ways reflective of the coaches' own interests and values. Relatedness thwarting environments are harsh, cold and critical, while chaotic environments are ambiguous, unclear and lack direction (Bartholomew, Ntoumanis & Thøgersen-Ntoumani 2010; Van den Berghe et al., 2013). A number of studies in sport and PE have highlighted the adaptive implications of autonomy supportive, relatedness support and structured environments (Amorose & Anderson-Butcher, 2007; Curran, Hill & Niemiec, 2013; Reinboth et al., 2004). In contrast, controlling environments have been linked to more maladaptive responses (Bartholomew et al., 2010).

An Integrated Assessment of the Motivational Environment

Past research has pulled from AGT and SDT and considered multiple dimensions of the coach-created motivational environment. For example, Reinboth et al. (2004) found autonomy supportive, task-involving and socially supportive features of the coaching environment to be positively associated with the satisfaction of athletes' autonomy, competence and relatedness need satisfaction, respectively. More recently, Quested and Duda (2010) found that autonomy supportive, task-involving and ego-involving features of the teaching environment accounted for unique variance in dancers' motivational responses in the form of psychological need satisfaction. As a result of these findings, Quested and Duda (2010) highlighted the value of concurrently examining dimensions of the coaching environment from both AGT and SDT perspectives. Although environment dimensions such as autonomy supportive and task-involving coaching are related (Reinboth et al., 2004), these also hold unique information regarding athletes' motivation. For instance, autonomy support, although often associated with all three psychological needs (Adie et al., 2008; 2010; 2012) is a key determinant of athletes' autonomy need satisfaction. Likewise, the task-involving dimension of the environment is expected to hold key information regarding athletes' perceptions of competence, while also being associated with the autonomy and relatedness (Sarrazin et al., 2002). Based on the tenets of AGT and SDT and a plethora of research studies, Duda (2013) conceptualized environments that are autonomy supportive, task-involving and relatedness supportive, and promote higher quality forms of motivation as *empowering*. In contrast, environments marked by controlling, ego-involving and relatedness compromising features, and promote lower quality forms of motivation are considered *disempowering*. Given that researchers have often discussed the links between AGT and SDT (Mageau & Vallerand, 2003; Ntoumanis, 2001), the recent conceptualisation by Duda (2013) is timely and provides a theoretical basis to study further the multidimensional motivational coaching environment in sport settings. Nevertheless, despite this recent development further

research is needed to better understand the relationship between and relative importance of the broad dimensions of the environment emphasised within Duda's conceptualisation of the motivational environment.

Relationship between Athlete, Coach and Observers' Reports of the Environment

In previous studies researchers have examined the associations between coaches', athletes' and observers' reports on discrete coaching behaviors using the Coaching Behavior Assessment System (CBAS; Smith, Smoll & Hunt, 1977). When using the CBAS, Smith, Smoll and colleagues (Curtis, Smith & Smoll, 1979) reported weak and non-significant relationships between coach, athlete and observer ratings of coach behavior. An exception was for punitive dimensions of behavior where athletes, coaches and observers' perspectives were significantly related. To our knowledge, only one study has attempted to examine coach, athlete and observer agreement on dimensions specifically related to the motivational coaching environment, and this was conducted via an AGT theoretical lens (Boyce, Gano-Overway & Campbell, 2009). Contrary to the findings of Smith, Smoll and colleagues, Boyce et al., found moderate correlations between coaches and athletes on task- and ego-involving dimensions of the environment. However, weaker relationships were noted between observers and coaches on the task-involving dimension, and observers and athletes on both the task- and ego-involving dimensions.

Within physical education settings, Haerens et al. (2013) and De Meyer et al. (2013) examined the relationship between observations and students' perceptions of autonomy supportive, relatedness supportive, structured and controlling teaching. Haerens et al. (2013) found modest, but nonetheless significant, relationships between observed dimensions of the teacher-created environment and students' perceptions of the degree of autonomy support and relatedness support provided by their teacher. In a subsequent study, significant and positive associations were also found between observed and student perceived controlling teaching

behaviours (De Meyer et al., 2013). The current study addresses gaps in literature by examining the relationships between athletes', coaches' *and* observers' reports on the multidimensional motivational coaching environment manifested in youth sport, conceptualised within an integrated AGT and SDT perspective (Duda, 2013). Given the findings of previous research in sport and PE settings and the tendency for individuals to monitor and pay more attention to negative feedback and communication (Graziano, Brothen, & Berscheid, 1980), significant associations between the different reports were expected across more disempowering, but not for empowering dimensions of the motivational environment.

Coach-Created Environment and Athlete Motivation

Pulling from SDT (Deci & Ryan, 2000), an individual's motivation varies in the degree to which it is more or less self-determined. More specifically, motivation can be considered on a motivational continuum (Vallerand, 1997) ranging from intrinsic motivation to amotivation. Intrinsic motivation is reflected when one engages in an activity out of interest and enjoyment (Deci & Ryan, 2000). Intrinsic motivation has been found to positively predict a variety of adaptive cognitive, affective and behavioral responses (Haggar & Chatzisarantis, 2007). At the opposite end of the continuum is amotivation. This is considered to be an absence of motivation and relates to more maladaptive patterns of behavior including intentions to drop out of sport (Pelletier et al., 2001). Between intrinsic motivation and amotivation are a variety of extrinsic motivation regulations varying in their degree of internalization. Identified regulation[1] is considered to be a self-determined form of extrinsic motivation and is associated with taking part in an activity as it holds importance to the self and personal value (Vallerand & Ratelle, 2002). Participating in sport for identified reasons has been associated with a number of positive psychological responses (Vallerand &

[1] Integrated regulation is considered to be the most intrinsic form of motivation regulation but was not examined in the present study due to measurement challenges, particularly given the young sample of athletes assessed in the present research.

Ratelle, 2002). Introjected motivation is evident when a person engages in sport to avoid feelings of guilt or negative emotions and has emerged as a predictor of more maladaptive responses (Vallerand & Ratelle, 2002). The most extrinsic form of motivation is labeled external regulation and involves participating to receive a reward, prize and/or to avoid punishment (Haggar & Chatzisarantis, 2007).

A number of studies grounded in AGT or SDT have tested the relationship between athletes' own perceptions of facets of the coaching environment and their sport-based motivation. Typically environments marked by autonomy supportive and task-involving features (i.e., more empowering according to Duda, 2013) predict more self-determined forms of motivation (Amorose & Anderson-Butcher, 2007; Sarrazin, Vallerand, Guillet, Pelletier & Cury, 2002). Although relatedness supportive environments are yet to be explored in relation to athlete motivation, evidence supports the positive relationship between socially supportive and caring motivational coaching environments with relatedness need satisfaction (Reinboth et al., 2004) and indicators of quality motivation (Fry & Gano-Overway, 2010) respectively. In contrast, environments that are marked by controlling and ego-involving features (i.e., more disempowering; Duda, 2013) have been related to more extrinsic and controlled forms of motivation (De Meyer et al., 2013; Pelletier et al., 2001).

To date, sport-based findings linking the coaching environment and athletes' motivation are exclusively based on athletes' own reports of both independent (i.e., dimensions of the coaching environment) and dependent variables (i.e., motivation). This is not surprising given the accepted view that athletes' perceptions of the environment are the key to their ensuing motivational responses (Horn, 2002). However, it is still important to examine whether these relationships hold when adopting a mixed method and multi-perspective approach (Keegan, Spray, Harwood & Lavallee, 2011), particularly given the criticism that results of AGT and SDT-based research could be biased due to reliance on self-

reports and the likelihood of common method variance. In addition, understanding how what coaches are observed to do, and what they perceive themselves to do, relates to athlete motivation is important for intervention efforts aimed at modifying the motivational environment and promoting more positive sport experiences. Based on the findings of previous studies in sport and PE settings (Boyce et al., 2009; Curtis et al., 1979; De Meyer et al., 2013), it is likely that the strength, and possibly the direction, of the relationships between the differing perspectives (e.g., coach perceptions, observer etc.) of the environment and athlete motivation may be different to those resulting from self-reports. At present, there is a limited body of research examining the multidimensional motivational environment from a multi-perspective approach in relation to athlete motivation. However, consistent with previous self-report studies we would expect athletes' perceptions to be a key predictor of their motivation. The link between coach and observer reports of the environment and athlete motivation requires further examination. Previous researchers employing multiple perspectives in PE (De Meyer et al., 2013) has examined a meditational model, situating observations of the teaching environment as an antecedent to students' perceptions of the environment. However, the relationships between observed and perceived reports of different motivational constructs are far from consistent (De Meyer et al., Van den Berghe et al., 2013), particularly across more adaptive dimensions of the environment. Therefore, such a meditational model may not best explain the motivational dynamics at play. This is especially relevant given the suggestion by Haerens et al. (2013) that students and perhaps athletes as well, are likely to base their ratings of the environment on more general perceptions of what their teacher (or coach) does rather than pinpointing specific strategies used within a given lesson (or training session). In contrast, observations capture situational information on the motivational environment created, which is unlikely to be coded and incorporated into ratings made by athletes and coaches but could still hold ramifications and relevance for

motivational functioning. Therefore, rather than examine a meditational model, we aimed to explore the value of triangulating the motivational environment (Tessier et al., 2013) by including the perspectives of the athletes, coach and observer within the same model.

Objectives

The first aim of this research was to examine the profile of empowering and disempowering features of the multidimensional motivational environment, from the perspective of athlete, coach and observers in four different European countries.

Second, we explored the inter-relationships between coaches' and athletes' perceptions and observers' ratings of the coach-created motivational environment. Based on previous research we expected to find weak-to-moderate significant relationships across all configurations (i.e., athlete-coach, athlete-observer, coach-observer) on disempowering dimensions of the environment. No relationships were hypothesised for empowering dimensions of the environment given inconsistency of findings in previous research.

The third and final aim was to examine the relationships between the multidimensional motivational coach-created environment and athletes' self-reported motivation. Aligned with previous research, we expected athletes' perceptions of the coaching environment would be a significant predictor of their own motivation. For athletes' perceptions of the environment, it was hypothesized that the 'empowering' dimensions (i.e., autonomy support, task-involving, social support) would predict more autonomous forms of motivation (i.e., intrinsic and identified) and the 'disempowering' features (i.e., controlling and ego-involving) would predict more controlled forms of motivation (i.e., introjected, external and amotivation). No relationship was hypothesised between coach-perceived and observers' ratings of the environment to athlete motivation. However, in the instance that coach and observer reports were related to athletes' motivation, the triangulated assessment

of the environment was expected to account for more variance in autonomous, controlled and amotivation than when including athletes' perceptions alone.

Method

Participants

Seventy-four grassroots football coaches and 882 athletes from their teams were recruited from the larger PAPA project. There were 17 coaches and 171 athletes from England; 22 coaches and 309 athletes from Greece; 17 coaches and 193 athletes from France; and 18 coaches and 253 athletes from Spain. The coaches had an average age of 36.84 years (*SD* =11.67 years), had been coaching football for 7.33 years (*SD* = 5.75 years), and been with their current team for 1.56 years (*SD* = 1.90 years). Athletes ranged from 9 to 14 years old and had an average age of 11.47 years (*SD* = 1.42 years). The athletes had been with their respective team for 3.17 years (*SD* = 2.13 years) and spent around 4 hours per week with their coach (*M*hours = 4.34, *SD* = 1.70 hours).

Procedure

A subsample of participants from the Promoting Adolescent Physical Activity (PAPA) project (Duda et al., 2013) were recruited to take part in this study. At the onset of the project, coaches and athletes were informed about the nature of the research and provided informed consent to take part. Ethical procedures were in line with the guidelines and requirements of the respective partner Universities in England, Greece, France and Spain. Due to the young age of the athletes, their parents, or legal guardian(s), were given a 2-week period to opt their child out of the study. No parents chose to opt their child out of the study.

After consenting to be involved in the research, coaches were recorded during a training session between September and November during the 2011 - 2012 football season. On the day of recording, a researcher visited the training ground and recorded the session using a camcorder, digital voice recorder and microphone. After the initial setup, the

researcher positioned himself/herself in a non-intrusive location away from the side of the training area. Once recording had begun, the coach was allowed to continue undisturbed until the close of the session. These steps were taken to reduce the likelihood of a Hawthorne effect taking place (Adair, Sharpe & Huynh, 2007). As soon as possible after the recording session (1-3 weeks), coaches and their athletes were asked to complete a multi-section questionnaire tapping their typical perceptions of the coaching environment over the past 3-4 weeks, and motivation to take part in football.

Measures

Prior to the study, measures were translated and back-translated into Greek, French and Spanish following the procedure reported by Duda et al. (op. cit. p 323). The following measures were used in all four participating countries.

Observed Motivational Environment

Recordings of the coach in England, France, Greece and Spain were coded using the MMCOS (Smith et al., 2015). Coach behaviors were rated according to the potency of 5 environmental dimensions, namely the extent to which they were autonomy supportive, controlling, task-involving, ego-involving and relatedness supportive. Each video was split into 4 equal quarters and when making the ratings, independent coders were instructed to follow a marking scheme and given a list of behavioral strategies that are indicative of each of the 5 environmental dimensions (coding materials available from first author on request). Within the MMCOS, there are 6 strategies that inform whether the coach emphasized an autonomy supportive environment (e.g., 'provides meaningful choices'); 6 strategies for the controlling dimension (e.g., 'uses extrinsic rewards'); 4 strategies for the task-involving dimension (e.g., 'emphasizes effort and improvement'); 3 strategies for the ego-involving dimension (e.g., 'punishes mistakes'); and 5 strategies for the relatedness supportive dimension (e.g., 'ensures all athletes are included in drills, activities and exercises'). Based

on the frequency, intensity and pervasiveness (i.e., potency) of the behavioral strategies, coders rated the 5 dimensions on a 4-point potency scale ranging from 0 to 3 (0 – not at all; 1 – weak potency; 2 – moderate potency; 3 – strong potency).

Initial research has supported the validity and reliability of the MMCOS in a team sport environment across 3 European countries (Smith et al., op. cit.). Two-way random intra-class correlation coefficients were used to determine the reliability of each environment dimension. Based on the cut points proposed by Portney and Watkins (2009), all 5 dimensions of the environment were coded to a moderate to good degree of reliability (autonomy support = 0.85; controlling = 0.90; task-involving = 0.75; ego-involving = 0.73; relatedness supportive = 0.80). For a within-country breakdown of reliability see Table 1.

Coder Training. Coder training was conducted by the lead researchers in each of the four participating countries. The lead researchers met at the onset of the project to establish a baseline level of reliability and coded footage in a common language prior to delivering the training. The coder-training package that was ultimately delivered was consistent across countries and all materials were translated following the back-translation procedures mentioned above. To ensure a high degree of reliability, coders completed six hours of training including informative presentations and interactive seminars addressing the theoretical tenets underpinning the MMCOS, as well as collaborative and independent coding (coder training materials available from first author on request). At the end of training, coders were asked to independently rate two recordings using the MMCOS. To establish inter-rater reliability, the coders' ratings were compared to a 'gold standard' rating made by the lead researchers in each of the four countries. Before rating the footage, coders were required to surpass the reliability value of ICC = 0.70. Further detail on the reliability of coded footage can be seen in Table 1 and 2.

Athlete Perceptions of the Motivational Environment

To capture English, French, Greek and Spanish athletes' perceptions of the multidimensional coaching environment, the Empowering and Disempowering Motivational Climate Questionnaire-Coach was employed (EDMCQ-C; Appleton, Ntoumanis, Quested, Viladrich & Duda, 2016). Based on Duda's (2013) conceptualization of the multi-dimensional coach-created climate that considers key facets of the environment from an AGT and SDT perspective, this 30 item scale captures the extent to which athletes perceive their coach to be autonomy supportive, controlling, task-involving, ego-involving and socially supportive (i.e., relatedness supportive).

When completing the EDMCQ-C, participants were asked to respond to the stem, "During the past 3 – 4 weeks on this team…" which included the time period of observations, and rate their answer on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). To capture athletes' perceptions of autonomy support, 5 items were included (e.g., "my coach gives players choice and options"). Seven items were used to tap into the extent to which athletes perceived their coach to be controlling (e.g., " my coach only rewards players with prizes or treats if they have played well"). Nine items tapped into the task-involving dimension of the coaching environment and 6 items considered ego-involving features of the environment. Example task-involving items include "my coach makes sure everyone has an important role on the team" and ego-involving items "my coach has his or her favorite players". Finally, 3 items were utilized to capture the athletes' perceptions of social support (e.g., "my coach really appreciates players as people, not just as footballers). Previous research has provided initial evidence for the reliability and validity of the EDMCQ-C (Appleton et al., op. cit.). In the present study, when averaged across countries internal reliability values for the autonomy support, controlling, task-involving, ego-involving and social support subscales were 0.57, 0.66, 0.80, 0.71 and 0.41 respectively. For a full breakdown of scale reliabilities see Table 1.

Coaches' Perceptions of the Motivational Environment

English, French, Greek and Spanish coaches' perceptions of their own coaching environment were also assessed using the 30-item EDMCQ-C (Appleton et al., op. cit.). The questionnaire stem was modified for the coach questionnaire following the same approach as taken by Stebbings et al., (2011). Coaches were asked to respond to the stem "During the last 3 – 4 weeks, on the team I named above…". Similar to the athlete questionnaire, the subscales for task- and ego-involving were close to acceptable levels (i.e., 0.69 and 0.67). Subscales tapping autonomy support, controlling and relatedness support were lower (i.e., 0.50, 0.60 and 0.50 respectively).

Athletes' Motivational Regulations

To examine English, French, Greek and Spanish athletes' motivation to participate in sport, the Behavioral Regulation in Sport Questionnaire (BRSQ; Lonsdale, Hodge & Rose, 2008) recently modified for youth sport (Viladrich et al., 2013) was administered. In total, 23 items from the BRSQ were included that tapped into 5 types of motivation regulation; intrinsic motivation, identified regulation, introjected regulation, external regulation and amotivation.

Athletes responded to the stem "I play football for this team…" using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). There were 4 items included to assess intrinsic motivation (e.g., because I enjoy it), 4 items to assess identified regulation (e.g., because I value the benefits), 4 items to examine introjected regulation (e.g., because I would feel guilty if I quit), 7 items concerned with external regulation (e.g., because people push me to play), and 4 items related to amotivation (e.g., but I really don't know why anymore). In the past, the BRSQ has been demonstrated as a valid and reliable measure of motivation regulations in sport (Lonsdale et al., op. cit.). In the present study and across the 4 countries, the subscales demonstrated a moderate-to-good level of reliability, which can be

considered acceptable given the small number of items within each of the subscales (Whitley & Kite, 2012; intrinsic = 0.67; identified = 0.64; introjected = 0.67; external = 0.79; amotivation = 0.82).

Analyses

Aggregated scores in the form of means and standard deviations were computed for coaches' and athletes' reports of the 5 assessed environmental dimensions for each country and overall. For observations, the ratings made by the 2 coders were averaged and an overall mean score was computed for each dimension also within each country, as well as an overall aggregated score. With respect to athletes' motivation, a mean score was calculated for the individual regulations before computing composite scores for autonomous (intrinsic & identified) and controlled motivation (introjected & external) following the procedure used by Sheldon and Elliot (1998). Descriptive statistics and psychometric information broken down by country can be seen in Table 1 and Figure 1. Bivariate correlations between variables can be seen in Table 2.

To begin, the profile of the multidimensional motivational environment from the perspective of athletes, coaches and observers, as well as athletes' motivation were plotted on a four graphs, which can be seen in figure 1.

After examining the profile of the study variables split down according to country, we sought to address the second objective of the research. Due to the nature of the data, with athletes nested within teams (i.e., coaches), multilevel analyses were necessary to examine the convergence between the observed, coach perceived, and athlete perceived reports of the environment. All analyses were conducted using Predictive Analytics SoftWare (PASW; previously SPSS) Version 18.0.02. The specified model included 74 coaches at Level 2 and 882 athletes at Level 1. Following Hox's (2010) recommendations, the first step involved running baseline component models to determine the amount of variance attributed to the

grouping of athletes within teams for each of the five dependent variables (i.e., athletes' perceptions of coach-provided autonomy support, controlling, task-involving, ego-involving and social support). Intra-class correlation values (ICC) of 8.43% for autonomy support, 10.70% for controlling, 16.92% for task-involving, 21.36% for ego-involving and 10.19% for relatedness support suggesting that a significant amount of variance in the athletes' reports of the 5 environment dimensions could be attributed to the grouping of athletes within teams (i.e., within coach). In the second step, observed dimensions of the coaching environment were included as covariates and specified as fixed effects in the analysis. To examine the relationship between coach and athletes' reports of the environment, the steps above were repeated replacing observational predictor variables with coaches' perceptions of the environment. For all multi-level analyses relationships are reported according to standardized beta values. Bivariate correlations were used to examine the relationships between observed and coach-perceived environment dimensions as they were situated at the same level and are reported as Pearson's correlation coefficient (*r*).

Following the procedure outlined previously, baseline variance component models (i.e., empty models) were run to examine the variance attributed to the team level for autonomous motivation (29.04%), controlled motivation (5.26%) and amotivation (8.35%). We then ran a series of models which included athletes' age, years playing for their team and hours per week with team as predictors of autonomous motivation, controlled motivation and amotivation. Athletes' age was significantly and negatively related to both controlled and amotivation. Therefore 'age' was included alongside other predictors in the following models.

After the initial exploratory steps mentioned above, model 1 involved adding athletes' perceptions of the motivational environment as predictors of autonomous motivation, controlled motivation and amotivation. In model 2, coach perceived dimensions of the

environment were included as predictors of athletes' motivation and in model 3 observers' ratings were used to predict the three types of athlete motivation. A final step (i.e., model 4) involved adding the three different perspectives of the motivational coaching environment in parallel, to examine whether the triangulated assessment of the environment resulted in a significantly improved model fit as assessed via change in -2Log.

All predictor variables were mean centered prior to being included in the different analyses within the present study. To determine the significance of all multi-level analyses conducted within this study, the -2Log reference model was compared to the predictor model(s) and examined in relation to chi-squared value at *k* degrees of freedom. This provides an indication of model fit at the specified level of significance.

Results

A profile of the athlete, coach and observer reports of the multidimensional environment and athlete motivation is presented in Figure 1 (1a – 1d). In general, athlete and coach reports of the environment share a similar pattern in each of the four countries. Athletes, and more so coaches, agree that an empowering environment is created with less emphasis on disempowering features. Observed reports are less potent and the profile of the environment was variable across the four countries. Observers rated lower emphasis on autonomy supportive coaching and more controlling practices were evident. In terms of motivation, athletes agreed that they were autonomously motivated and reports are of controlled and amotivation were lower.

Due to the nested structure of the data, a multi-level analysis approach was used to examine associations between observed and athlete-perceived dimensions of the environment. In general, regression coefficients (as indicated by beta values) were weak and non-significant, which was partially consistent with our hypothesis (see Table 3). Adopting the same multi-level approach, a number of significant findings were revealed between

coaches' perceptions of the environment and athletes' perceptions of that same climate (see Table 4). Coaches' perceptions of their controlling behavior positively predicted athletes' perceptions of controlling ($\beta = 0.30$, $p < 0.01$) and ego-involving coaching ($\beta = 0.36$, $p < 0.01$), and negatively predicted autonomy supportive ($\beta = -0.19$, $p < 0.01$), task-involving ($\beta = -0.17$, $p < 0.05$) and relatedness supportive ($\beta = -0.19$, $p < 0.05$) dimensions of the environment. Coach-perceived task-involving behaviors also positively predicted athletes' reports of relatedness support ($\beta = 0.29$, $p < 0.05$) provided by their coach. Finally, coach perceptions of autonomy support negatively predicted athletes' reports of autonomy supportive coaching ($\beta = -0.17$, $p < 0.05$).

Due to being situated at the same level, bivariate correlations (as indicated by Pearson's *r*) were used to examine associations between coach and observer reports of the motivational environment and these can be seen in Table 1. Observed autonomy support was significantly positively correlated with coach perceived autonomy support ($r = 0.20$**) and relatedness support ($r = 0.12$**), and significantly negatively related to coach perceived controlling ($r = -0.23$**) and ego-involving ($r = -0.08$**) behaviors. Observed disempowering features were significantly positively correlated with coach perceived disempowering dimensions and negatively correlated with coaches' perceptions of an empowering environment. There were several inconsistent findings. Observed task-involving coaching behaviors were significantly negatively correlated with coach perceived autonomy support ($r = -0.09$**) and task-involving ($r = -0.22$**) behaviors. Further, observed relatedness support was significantly negatively associated with coaches' perceptions of an autonomy supportive ($r = -0.15$**), task-involving ($r = -0.13$**) and relatedness supportive ($r = -0.13$**) environment.

The relationships between the different perspectives of the motivational environment and athlete motivation can be found in Table 5. Three models were tested to compare the

473 predictive effects of athletes', coaches' and observers' reports of the motivational environment on athletes' autonomous, controlled and amotivation.

For autonomous motivation, athletes' reports of a task-involving ($\beta = 0.29$, $p < 0.001$) climate emerged as a significant positive predictor. There was also a trend for athletes' perceptions of autonomy support ($\beta = 0.08$, $p < 0.10$) to predict more autonomous motivation. In comparison, coaches' perceptions of creating an autonomy supportive ($\beta = -0.30$, $p < 0.05$) and task-involving ($\beta = -0.38$, $p < 0.05$) climate were negatively related to athletes' autonomous motivation. However, coach perceived relatedness support ($\beta = 0.25$, $p < 0.05$) was positively linked to athletes' autonomous motivation. In the third model, an observed task-involving ($\beta = 0.47$, $p < 0.001$) climate emerged as a significant positive predictor of autonomous motivation. All models demonstrated a significant improvement in fit calculate by the reduction in -2Log.

With respect to athletes' controlled motivation, age was a significant negative predictor ($\beta = -0.08$, $p < 0.001$). Indicating that as the athletes got older their controlled motivation decreased. In the first model, athletes' perceptions of a controlling ($\beta = 0.23$, $p < 0.001$) and ego-involving ($\beta = 0.25$, $p < 0.001$) environment both positively predicted their controlled motivation. In model 2, coaches' perceptions of controlling ($\beta = 0.20$, $p < 0.05$) coaching positively predicted athletes' controlled motivation. There was a trend for a negative relationship between coach-perceived ego-involving ($\beta = -0.15$, $p < 0.10$) behaviors and athletes' controlled motivation. In model 3, observed controlling coaching ($\beta = 0.18$, $p < 0.05$) positively predicted athletes' controlled motivation.

Athletes' age was negatively related to amotivation ($\beta = -0.12$, $p < 0.001$). Therefore, as athletes got older their levels of amotivation decreased. In the first model, athletes' perceptions of controlling ($\beta = 0.29$, $p < 0.001$) and ego-involving ($\beta = 0.22$, $p < 0.001$) coaching positively predicted amotivation. In model 2, where coaches' perceptions of the

environment were included as predictors, no significant relationships emerged. There was a trend for coaches' perceptions of an ego-involving (β = -0.18, $p < 0.10$) climate to be negatively related to athletes' amotivation. In model 3, observed dimensions of the environment were included as predictors and observed controlling (β = 0.23, $p < 0.05$) coaching positively predicted athletes' amotivation. For models 1 and 3, the addition of athletes' perceptions and observations significantly reduced the -2Log and indicated an improved model fit. After including athletes' age in the model, the addition of coaches' perceptions did not significantly improve the fit.

In a final set of models (i.e., model 4), we included the three different perspectives of the environment as predictors of athlete motivation. This was to test whether the triangulated assessment of the environment resulted in a significantly improved model fit compared to when including athletes' perceptions alone (difference between model 1 and 4). There was no significant improvement in model fit for athletes' controlled and amotivation. However, for autonomous motivation, the triangulated model (i.e., model 4) demonstrated a better model fit than when including only athletes' perceptions (i.e., model 1) χ^2 *(df)* 165.27 – 117.04 = 48.23 (*10*) $p < 0.05$. Furthermore, the observed task-involving (β = 0.45, $p < 0.001$) dimension remained a significant predictor of athletes' autonomous when considered alongside athletes' own reports of a task-involving climate.

Discussion

The present study extends previous AGT (Nicholls, 1989) and SDT-based (Deci & Ryan, 2000) research by examining the multidimensional motivational coaching environment, according to Duda's (2013) integration of AGT and SDT-based characteristics, and links to athletes' motivation via a multi-method approach. We had three main aims. First, we sought to establish a profile of the multi-dimensional motivational environment and athlete motivation across the four participating countries. Second, we examined the

significance of the interrelationships between the key selected facets of the motivational coaching environment when assessed using the different methodological approaches (i.e., observations, coach perceptions and athlete perceptions). Thirdly, we sought to test the predictive effects of the different perspectives of the environment on athlete motivation and examine whether the inclusion of coach and observed variables, alongside athletes' perceptions, explains more of the variance in athletes' motivational responses.

Cross-country Profile of the Motivational Environment and Athlete Motivation

Athletes and coaches in all 4 countries appeared to report a similar profile of the multidimensional motivational environment. Both responders indicated a more empowering and less disempowering environment was created. As expected coaches reported more favourably than athletes, both in terms of creating an empowering environment and utilising less disempowering strategies. An exception was for French coaches who reported being less relatedness supportive. In general, these findings are consistent with previous research in sport and PE settings (Curtis et al., 1979; Ntoumanis, 2012; Taylor & Ntoumanis, 2007). The variability in observed ratings of the environment are more indicative of a situational rating and represent the view of a single training session. Observer reports suggest that coaches engage in both empowering and disempowering motivational practices but that there is room to improve the environment being created. Across the four countries there was more consistency in the observed environment on disempowering rather than empowering practices. Exclusively, athletes in the four countries reported high levels of autonomous motivation and lower levels of controlled and amotivation.

Relationship between Athlete, Coach and Observed Motivational Environment

In general, the relationships between observed and athlete perceived dimensions of the environment were weak and non-significant. Contrary to our predictions and past work (De Meyer et al., 2013), there were no significant relationships between the observed and

athlete perceived disempowering (i.e., controlling and ego-involving) dimensions of the environment. A number of significant relationships were found between coaches' and athletes' perceptions of the same environment. As hypothesized, there were moderate positive associations between coaches' and athletes' reports on maladaptive environment dimensions. Specifically, as coaches reported creating a controlling environment, athletes also identified a more controlling and ego-involving motivational climate, and a less autonomy supportive, task-involving and relatedness supportive environment. These findings are aligned with results of previous research that showed significant associations between coaches' and athletes' reports on more punitive and disempowering dimensions of the coaching environment (Curtis et al., 1979). Graziano et al. (1980) suggested that individuals monitor, pay attention to and are more aware of negative feedback and evaluations, which may explain the agreement found between athlete and coach reports on these more maladaptive dimensions.

Despite the significant relationships found for coaches' perceptions of a controlling environment and athletes' reports of more controlling coaching, there were a number of non-significant findings between coaches' and athletes' reports across the more empowering dimensions as predicted. These findings are consistent with results from previous PE-based studies linking teacher and students' reports of autonomy support, interpersonal involvement and structure (Taylor & Ntoumanis, 2007). It has been suggested that coaches (or teachers) may be overly positive when rating their own behavior (Ntoumanis, 2012), which may explain the weak and non-significant findings between coach and athlete reports on empowering dimensions of the environment. This seems to be a plausible explanation considering that coaches in all four countries almost exclusively reported creating a more adaptive environment when compared to reports provided by athletes (Figure 1). The unexpected negative relationship noted between coach and athletes' reports of autonomy

supportive coaching is likely to be the result of a suppression effect, particularly as the bivariate correlation between the two variables was zero as seen in Table 2.

Similar to the associations between coach and athlete reports of the environment, coach and observer views were significantly and positively correlated on the more disempowering dimensions. Relationships between coach and observers on the more empowering dimensions tended to be weak and non-significant. In line with the suggestion by Curtis et al. (1979) and De Meyer et al. (2013), coaches seem to be more aware of when they create a controlling and ego-involving motivational environment perhaps due to the more overt and punitive nature of the type of behavioral strategies that create this climate. It is also likely that coaches understand and appreciate the importance of creating an empowering environment, however when they actually engage with their athletes they may be unaware of the degree to which they utilise such behaviors (Partington & Cushion, 2011).

Coach-Created Motivational Environment and Athlete Motivation

In line with previous findings (Amorose & Anderson-Butcher, 2007; Duda & Balaguer, 2007), when athletes perceived the environment to be more empowering (i.e., autonomy supportive and task-involving) they reported more autonomous forms of motivation. In contrast, when the environment was perceived as disempowering, athletes reported more controlled motivation and amotivation. This pattern of results is aligned with suggestions that empowering and disempowering dimensions of the environment predict adaptive and maladaptive processes and outcomes, respectively (Bartholomew et al., 2010; Balaguer et al., 2012). In essence, current findings provide support for both a ‘brighter’ and ‘darker’ motivational pathway between dimensions of the coaching (or teaching) environment and athletes’ motivational responses (Haerens, Aelterman, Vansteenkiste, Soenes & Van Petegem, 2015).

Several of the relationships revealed between coach perceived dimensions of the environment and athletes' autonomous motivation were less conceptually coherent. The negative relationship between coach perceived autonomy supportive and task-involving dimensions of the environment and athletes' autonomous motivation suggest a possible misinterpretation of the environment coaches assume they create for the athletes on their team. There are a number of possible explanations for this anomaly. Similar to the discussion provided earlier, coaches may be overly positive when rating themselves. This could be indicative of a 'better-than-average' (Alicke & Govorun, 2005) effect where individuals rate the behaviors used and environment created in comparison to a normatively endorsed standard. Furthermore, although coaches and athletes were asked to reflect and respond to the questions asked over the same period (i.e., the past 3 – 4 weeks), the resources they draw from and the critical moments they consider to inform their perceptions of the environment may be very different (Keegan et al., 2011). Although a number of the associations found between coach reports of the environment and the different forms of athlete motivation were as predicted, there are clearly many questions that remain to be answered in relation to how coaches' perceptions of the environment they create impact upon the quality of athletes' participation in sport. Answering these questions is of particular importance if coaches are to be educated to modify the environment they create to promote more adaptive and autonomous forms of motivation in their athletes.

The positive relationship found between coach perceived social support and athletes' autonomous motivation suggests that when coaches report themselves to create a warm, supportive and caring environment on their team, athletes tend to value the activity and take part out of personal interest and enjoyment. In line with our hypotheses, and consistent with findings from previous studies that considered coaches' perceptions of the environment (Curtis et al., 1979), coach-perceived use of controlling behaviors positively predicted

athletes' controlled and amotivation. This is a promising finding and suggests that if coaches are educated and have the opportunity to be more aware of why it is important to create a less controlling motivational environment, athletes will exhibit lower levels of controlled and amotivation.

An additional unique aspect of this study was the inclusion of an objective assessment of the motivational environment to predict athletes' motivation. When coaches were observed to emphasize the importance of effort, improvement and working cooperatively (i.e., were more task-involving), athletes reported greater autonomous motivation. For these young grassroots level athletes, coaches' emphasis on self-referenced criteria for success, as observed by an independent coder, was associated with more intrinsic and self-determined reasons for participation. This supports previous research that employed self-report measures to test the relationship between perceived task-involving environments and indicators of athlete motivation in sport (Sarrazin et al., 2002). Also in line with our hypotheses, when observers rated the environment as more potently controlling, athletes reported more controlled reasons for participating and indicated they were more amotivated. Our findings are consistent with the associations found between athlete and coach reports of the environment with controlled and amotivation. In addition, present findings are aligned with results from studies in PE that used observational measures to examine the relationship between the teaching environment and student motivation (De Meyer et al., 2013). The present findings suggest that to some extent athletes, coaches and observers may have a shared understanding with regards to the disempowering, and in particular controlling features of the environment and these predict more maladaptive motivational responses in the form of controlled and amotivation.

A final objective of the present research was to examine the contribution of the different perspectives of the environment on athlete motivation. There are currently no

studies that have examined the different perspectives of the environment assessed in the current study (athlete, coach and observer reports) on athlete motivation when considered in the same model (Keegan et al., 2011). We hypothesized that by triangulating the motivational environment (i.e., model 4) to predict athletes' autonomous, controlled and amotivation, we would have a better model fit. The current findings indicated no significant improvement in fit for controlled and amotivation when comparing the complex model (i.e., model 4) to a model including only athletes' perceptions of the environment (i.e., model 1). However, in the present study, the inclusion of athlete, coach and observer reports of the environment predicting athletes' autonomous motivation demonstrated a significant improvement in model fit compared to when athletes' self-reports were included alone. In addition, the observed task-involving features of the environment remained significantly positively correlated with athletes' autonomous motivation when both athletes' and observers' reports were included in the model together.

It could be argued that the finding on the significant link between observed task-involving behavior and athletes' autonomous motivation is in contrast to suggestions that athletes' perceptions of the environment might mediate the relationship between the objective environment and athletes' responses to sport, including the quality of their motivation (Horn, 2002). It is possible that the different targeted assessments of the environment tap into unique facets of the motivational coaching environment and the objective measure might identify more implicit features of a task-involving environment than athletes are aware of and report on. Despite the improvement in model fit, the additional variance accounted for was relatively minor and so conclusions should be interpreted with appropriate caution.

For controlled and amotivation, a different story emerged. When included alongside athletes' perceptions, coach perceived and observed controlling dimensions of the environment became non-significant when predicting controlled and amotivation. This might

suggest a mediating role of athletes' perceptions between the observed environment and controlled and amotivation. However, the relationship between observed and perceived reports of a controlling environment were non-significant and so the criteria for mediation were not met. However, it is possible that with an increased sample size of coaches that this relationship would have been significant, especially given the significant bivariate correlation between the two variables and notable estimate within the MLM analyses. The question of added "variance accounted for" and mediation clearly warrants further attention. In light of the present findings (based on results for autonomous motivation) we would suggest that when it is logistically possible, researchers might attempt to include assessments of the environment from the perspective of athlete, coach *and* observer.

Limitations and Future Directions

There are a number of limitations to discuss with respect to the current study. The first relates to the different assessments of the motivational coaching environment. Specifically, the MMCOS provided a more situational assessment of the coaching environment that is what a coach is observed to do at one point in time compared to the coach and athlete questionnaires that were referenced at a more contextual level (i.e., over past 3-4 weeks). Although the point of observation occurred within the 3-4 week time window, there was multiple times in which an athlete could have interacted with his/her coach. This may explain some of the modest relationships found between observed and perceived dimensions of the environment and is referred to in the literature as context by measurement confound (Lorenz, Melby, Conger & Xu, 2007). While there is value in understanding how situational assessments relate to more general response, in future studies it is important to reference the questionnaire to the specific session being observed and reexamine the interplay between coach, athlete and observer reports of the motivational environment. Alternatively researchers could conduct multiple observations, perhaps rating the coach during both

training and matches during the 4-week time window. Although beyond the scope of this paper, observing coaches during training and matches may be more preferable to making only one observation or even multiple observations in one setting (e.g., training), particularly considering that a different environment is likely to be created in the two contexts (Chaumeton & Duda, 1988). This would provide more information regarding how athletes construct their perceptions of the environment as well as the relative contribution of the two contexts to those perceptions.

A second limitation relates to the lower reliability coefficients noted for the some of the dimensions of the athlete and coach-perceived reports of the environment in the athlete and coach samples from the four participating countries, The complexity of the research and the need to back-translate and ensure consistency in administration of the self-report scales in the four countries provided particular logistical challenges. This may explain why some of the reliability values for self-report measures were below the normatively recognised cut points. Although these lower levels of reliability might offer an explanation for the lack of convergence between the different measurement perspectives, the emergence of a number of significant associations across the environmental dimensions in relation to the self-reports suggest the impact of the reliability levels on the findings to be relatively minor. Nevertheless, future researchers using the EDMCQ-C should continue to explore psychometric properties of the measure when completed by athletes and by coaches, particularly in multi-country research. In general, the reliability of the observational reports was good to very good in all four countries.

Within the current study we also recruited a relatively homogenous, albeit representative, sample of athletes and coaches participating at the recreational level in grassroots soccer. In future studies it will be interesting to test the relationships between the different perspectives of the environment and athletes' motivation in adult and more elite

populations, particularly as age emerged as a negative predictor of controlled and amotivation. It would also prove fruitful to examine the targeted relationships in an individual sport context. We might expect to find more significant findings, particularly for associations between the coach-perceived and observed dimensions of the environment and athlete responses. In an individual sport, the session being assessed includes a direct interaction between coach and athlete. In this type of environment, the messages emphasized by the coach are specifically targeted towards one individual therefore are more likely to be 'picked up' by that athlete and hold direct relevance for their motivation.

An additional and important direction for future research is to further examine the integration of the two theoretical frameworks. Although a multidimensional view was adopted in the present study, and this was clearly grounded within Duda's (2013) conceptualization of the environment as empowering and disempowering, there are additional dimensions of the environment within SDT, such as structure, that hold implications for athletes' and students' motivation (Curran et al., 2013; Jang, Reeve & Deci, 2010). Examining how these dimensions of the environment associate with one another and where similarities and differences exist is critical for a coherent and parsimonious integration of the two theories. In future, adopting observational approaches alongside self-report measures can further contribute to these efforts.

A final point relates to the relevance of this research for the role of coach education programs aimed at modifying the motivational environment created e.g., Empowering Coaching™ (Duda, 2013). It would be interesting to examine whether the interrelationships between different perspectives of the environment, and the relationship with athletes' motivation, become more significant following a coach education program. This is particularly relevant to the more empowering dimensions of the environment, where athletes, coaches and observers seem to identify and pull from different cues when making the ratings

(as evidenced by the non-significant findings in the present study). Going forward, the MMCOS could be used as part of the education process to encourage coaches to self-reflect on the environment created for their athletes.

Conclusion

This study examines the relationship between multiple perspectives of the coaching environment, drawing from an integrated AGT and SDT-based perspective and athlete motivation in a multi-country sample of coaches and athletes. Features of the athlete, coach and observed multidimensional motivational coaching environment were shown to predict athletes' motivation to take part in sport. In general, empowering and disempowering features of the environment (Duda, 2013) predicted adaptive and maladaptive responses, respectively however a number of non-significant associations also emerged. Overall, results provide partial support for previous AGT and SDT-based findings that have employed self-report measures alone and emphasise the need to collect multi-method data to extend AGT and SDT-based research, when the time and resources are available to do so.

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Table 1

Descriptive statistics and reliability values for dimensions of motivational environment and athlete motivation across country

		Country			
		England	France	Greece	Spain
AS	Mean	4.00 (.60) /4.31 (.44) /1.29 (.53)	3.86 (.63) /4.11(.56) / .97 (.58)	4.03 (.59) /4.47 (.34) / .96 (.46)	4.16 (.64) / 4.64 (.31) / .91 (.46)
	Reliability	.71 / .47 / .82	.37 / .22 / .92	.59 / .82 / .96	.60 / .50 / .69
TI	Mean	4.24 (.52) / 4.47 (.40) /1.82 (.42)	4.13 (.64) / 4.32 (.34) /1.81 (.45)	4.11 (.53) / 4.53 (.27) /1.81 (.34)	4.32 (.57) / 4.73 (.27) / .78 (.43)
	Reliability	.85 / .68 / .70	.78 / .50 / .82	.75 / .76 / .89	.81 / .74 / .59
RS	Mean	3.92 (.68) / 4.43 (.56) /1.80 (.44)	3.79 (.76) / 4.10 (.56) /1.84 (.50)	3.84 (.68) / 4.61 (.38) /1.48 (.34)	4.13 (.73) / 4.60 (.37) /1.07 (.57)
	Reliability	.44 / .39 / .70	.43 / .77 / .92	.27 / .77 / .89	.48 / .36 / .70
CO	Mean	2.35 (.73) / 2.10 (.44) /1.23 (.50)	2.35 (.71) / 2.50 (.57) /1.28 (.48)	2.43 (.66) / 2.23 (.34) /1.26 (.33)	2.27 (.74) / 2.55 (.52) /1.14 (.63)
	Reliability	.75 / .64 / .89	.58 / .38 / .95	.65 / .73 / .97	.65 / .62 / .80
EI	Mean	2.15 (.80) / 1.58 (.44) / .66 (.33)	2.33 (.81) / 2.09 (.70) / .64 (.41)	2.46 (.77) / 1.81 (.49) / .57 (.49)	2.45 (.83) / 1.98 (.49) / .53 (.43)
	Reliability	.81 / .76 / .74	.66 / .59 / .63	.70 / .71 / .97	.66 / .66 / .57

Note: Mean values – Athlete / Coach / Observer reports, SD in parentheses; Reliability values – Alpha coefficient athlete questionnaire / Alpha coefficient coach questionnaire / Intra-class correlation for observed variable; AS = autonomy support; TI = task-involving; RS = relatedness support; CO = controlling; EI = ego-involving

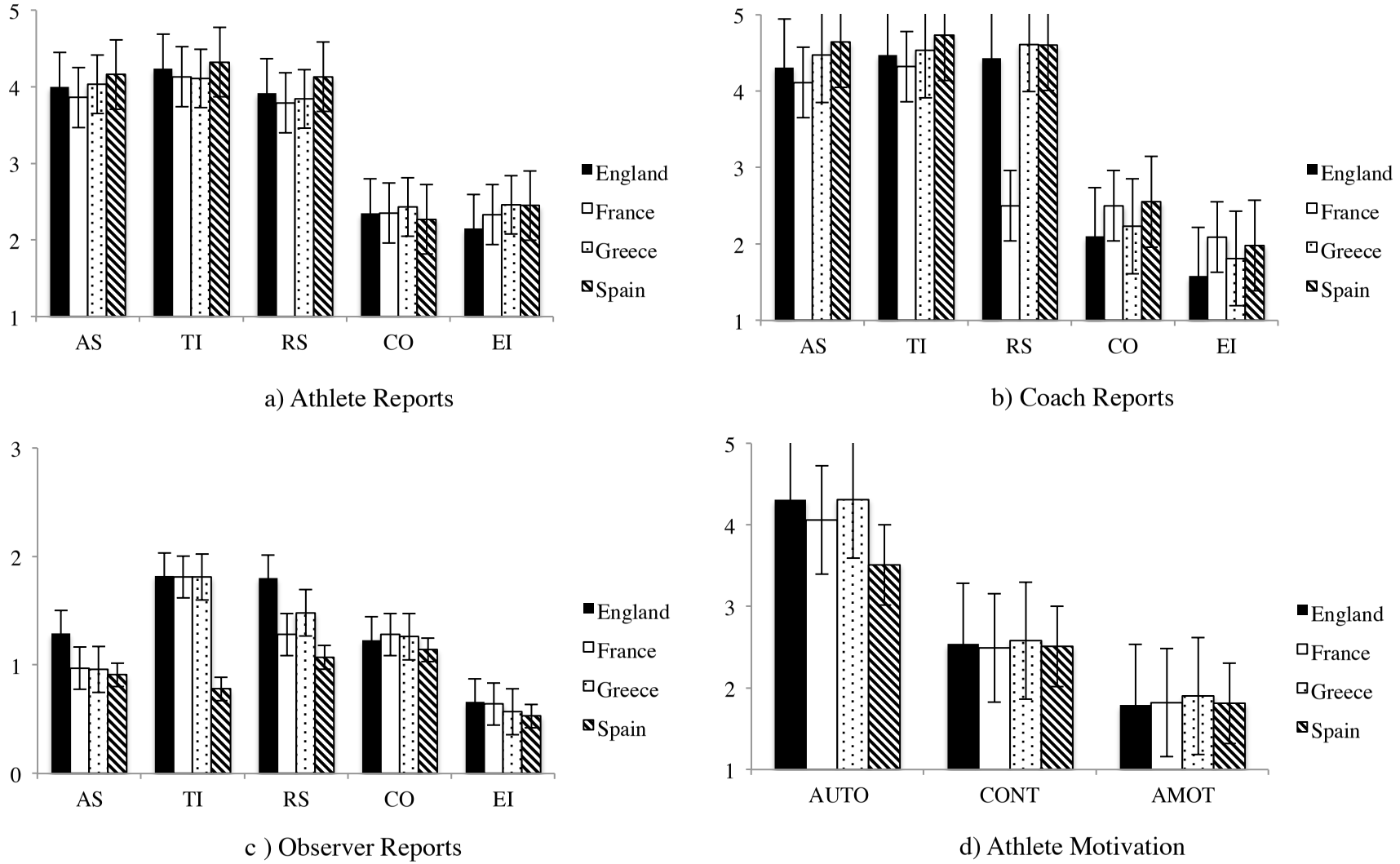

Figure 1 – Cross country differences in multidimensional motivational environment and athlete motivation (AS = autonomy support; TI = task-involving; RS = relatedness support; CO = controlling; EI = ego-involving; AUTO = Autonomous; CONT = Controlled; AMOT = Amotivation)

Table 2

Bivariate correlations between study variables aggregated across countries

	M(SD)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 ATH AS	4.03 (0.62)	1																	
2 ATH TI	4.20 (0.57)	.68**	1																
3 ATH RS	3.93 (0.72)	.49**	.53**	1															
4 ATH CO	2.36 (0.71)	-.21**	-.27**	-.20**	1														
5 ATH EI	2.38 (0.81)	-.21**	-.30**	-.21**	.65**	1													
6 COA AS	4.42 (0.44)	-.00	.04	.05	-.01	.00	1												
7 COA TI	4.54 (0.34)	.07*	.07*	.11**	.01	-.06	.68**	1											
8 COA RS	4.48 (0.49)	.09**	.08*	.07*	-.03	-.08*	.60**	.66**	1										
9 COA CO	2.35 (0.49)	-.09**	-.10**	-.07*	.13**	.20**	-.12**	-.09**	-.17**	1									
10 COA EI	1.86 (0.55)	-.01	-.03	-.01	.02	.09**	-.32**	-.30**	-.26**	.61**	1								
11 OBS AS	1.00 (0.51)	.05	.09**	.06	-.04	-.10**	.20**	.05	.12**	-.23**	-.08*	1							
12 OBS TI	1.51 (0.62)	-.06	-.03	-.09**	-.00	-.11**	-.09**	-.22**	-.04	-.37**	-.19**	.36**	1						
13 OBS RS	1.49 (0.55)	-.06	-.02	-.06	-.01	-.12**	-.15**	-.25**	-.13**	-.22**	.00	.55**	.62**	1					
14 OBS CO	1.22 (0.49)	-.07*	-.10**	-.10**	.09**	.06	-.29**	-.13**	-.30**	.11**	-.03	-.40**	.08*	-.21**	1				
15 OBS EI	0.59 (0.43)	.01	-.04	-.05	.01	.07*	-.06	-.12**	-.25**	.08*	.15**	-.03	.09*	.08*	.26**	1			
16 AUTO	4.04 (0.69)	.21**	.24**	.13**	.00	-.05	-.15**	-.17**	.00	-.17**	-.11**	.06	.37**	.17**	.04	.01	1		
17 CONT	2.53 (0.81)	-.07*	-.06	-.05	.35**	.34**	-.01	-.01	-.03	.03	-.03	-.03	.03	-.04	.09*	-.02	.25**	1	
18 AMOT	1.84 (0.95)	-.16**	-.19**	-.11**	.36**	.33**	.02	.03	-.01	-.04	-.09**	-.01	.05	.03	.06	-.01	-.02	.56**	1

Note. * p <0.05, ** p <0.01; ATH = Athlete variable; COA = Coach variable; OBS = Observed variable; AS = autonomy support; TI = task-involving; RS = relatedness support; CO = controlling; EI = ego-involving

Table 3

Multilevel analyses between observed and athlete perceived dimensions of the environment

	Athlete Perceptions				
	Autonomy Support (*SE*)	Controlling (SE)	Task-involving (*SE*)	Ego-involving (SE)	Relatedness Support (*SE*)
Fixed Part: Observation					
Autonomy Supportive	0.10 (0.07)	-0.01 (0.08)	0.10 (0.08)	-0.02 (0.11)	0.14 (0.08)+
Task-involving	-0.02 (0.06)	-0.05 (0.08)	0.01 (0.07)	0.07 (0.11)	-0.06 (0.07)
Relatedness Supportive	-0.13 (0.07)	0.06 (0.09)	-0.09 (0.08)	-0.11 (0.10)	-0.13 (0.09)
Controlling	-0.10 (0.07)	0.16 (0.08)+	-0.09 (0.08)	0.10 (0.11)	-0.13 (0.08)+
Ego-involving	0.05 (0.07)	-0.03 (0.08)	-0.02 (0.08)	-0.07 (0.13)	-0.01 (0.08)
Random Part: Intercept-Only Model					
T.L.V	0.03 (0.01)	0.05 (0.02)	0.06 (0.01)	0.14 (0.03)	0.05 (0.02)
A.L.V	0.36 (0.02)	0.45 (0.02)	0.27 (0.01)	0.52 (0.03)	0.47 (0.02)
Random Part: Multiple Predictor Model					
T.L.V	0.03 (0.01)	0.05 (0.02)	0.05 (0.01)	0.13 (0.03)	0.04 (0.01)
A.L.V	0.36 (0.02)	0.45 (0.02)	0.27 (0.01)	0.52 (0.03)	0.47 (0.02)
Test of Significance					
Reference model	1643.04	1861.15	1449.28	2024.66	1895.34
Δ -2LL	1634.11	1856.80	1443.74	2019.45	1883.94
χ^2 *(df)*	8.93 (5)	4.35 (5)	5.54 (5)	5.21 (5)	11.4 (5)*

Note. T.L.V = team level variance, A.L.V = athlete level variance. + p <0.10, * p <0.05, ** p <0.01, *** p < 0.001. χ^2 *(df)* = represents difference from the reference model

Table 4

Multilevel analyses between coach and athlete perceived dimensions of the environment

	Athlete Perceptions				
	Autonomy Sup (*SE*)	Controlling (SE)	Task-involving (*SE*)	Ego-involving (SE)	Relatedness Sup (*SE*)
Fixed Part: Coach Perceptions					
Autonomy Supportive	-0.17 (0.09)*	-0.05 (0.11)	-0.07 (0.10)	0.13 (0.15)	-0.04 (0.11)
Task-involving	0.17 (0.11)	0.09 (0.14)	0.09 (0.13)	-0.08 (0.19)	0.29 (0.15)*
Relatedness Supportive	0.13 (0.07)+	-0.07 (0.09)	0.10 (0.08)	-0.13 (0.12)	0.01 (0.09)
Controlling	-0.19 (0.07)**	0.30 (0.09)**	-0.17 (0.08)*	0.36 (0.12)**	-0.19 (0.09)*
Ego-involving	0.10 (0.06)	-0.13 (0.08)+	0.08 (0.07)	-0.06 (0.11)	0.12 (0.08)
Random Part: Baseline Variance Component Model					
T.L.V	0.03 (0.01)	0.05 (0.02)	0.06 (0.01)	0.14 (0.03)	0.05 (0.02)
A.L.V	0.36 (0.02)	0.45 (0.02)	0.27 (0.01)	0.52 (0.03)	0.47 (0.02)
Random Part: Multiple Predictor Model					
T.L.V	0.02 (0.01)	0.04 (0.01)	0.05 (0.01)	0.10 (0.02)	
A.L.V	0.35 (0.02)	0.45 (0.02)	0.27 (0.01)	0.52 (0.03)	
Test of Significance					
Reference model	1643.04	1861.15	1449.28	2024.66	1895.34
Δ -2LL	1601.27	1824.58	1424.89	1989.43	1870.37
χ^2 *(df)*	41.77 (5)***	36.57 (5)***	24.39 (5)***	35.23 (5)***	24.97 (5)***

Note. T.L.V = team level variance, A.L.V = athlete level variance. + p <0.10, * p <0.05, ** p <0.01, *** p < 0.001. χ^2 *(df)* = represents difference from the reference model

Table 5

Multilevel analyses between perspectives of the environment and athlete motivation

	Athlete Motivation							
	Autonomous				Controlled			
Fixed Part	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
A_Age	-0.00 (0.02)	-0.01 (0.02)	0.01 (0.02)	0.02 (0.02)	-0.08 (0.02)***	-0.07 (0.02)**	-0.08 (0.02)**	-0.10 (0.02)***
A_AS	0.08 (0.04)+	-	-	0.08 (0.04)+	-0.05 (0.06)	-	-	-0.03 (0.06)
A_TI	0.29 (0.05)***	-	-	0.28 (0.05)***	0.09 (0.07)	-	-	0.07 (0.07)
A_ RS	0.05 (0.03)	-	-	0.05 (0.03)+	0.03 (0.04)	-	-	0.03 (0.04)
A_CO	0.03 (0.04)	-	-	0.03 (0.04)	0.23 (0.05)***	-	-	0.22 (0.05)***
A_EI	0.02 (0.03)	-	-	0.04 (0.03)	0.25 (0.04)***	-	-	0.25 (0.04)***
C_AS	-	-0.30 (0.14)*	-	-0.27 (0.13)*	-	-0.00 (0.11)	-	-0.01 (0.09)
C_TI	-	-0.37 (0.17)*	-	-0.23 (0.16)	-	-0.07 (0.15)	-	-0.13 (0.12)
C_RS	-	0.25 (0.11)*	-	0.21 (0.10)*	-	-0.06 (0.09)	-	-0.00 (0.08)
C_CO	-	-0.11 (0.11)	-	0.09 (0.10)	-	0.20 (0.09)*	-	0.05 (0.07)
C_EI	-	-0.13 (0.10)	-	-0.17 (0.09)+	-	-0.15 (0.08)+	-	-0.06 (0.06)
O_AS	-	-	-0.10 (0.09)	-0.07 (0.09)	-	-	0.11 (0.08)	0.14 (0.07)*
O_TI	-	-	0.47 (0.08)***	0.45 (0.08)***	-	-	0.03 (0.07)	0.06 (0.06)
O_RS	-	-	-0.06 (0.10)	-0.06 (0.10)	-	-	-0.14 (0.09)	-0.18 (0.07)*
O_CO	-	-	-0.03 (0.09)	-0.03 (0.09)	-	-	0.18 (0.08)*	0.13 (0.07)+
O_EI	-	-	-0.02 (0.09)	0.04 (0.09)	-	-	-0.10 (0.08)	-0.13 (0.06)+
Reference Model	T.L.V = 0.14 (0.03) A.L.V = 0.33 (0.02) -2LL = 1625.06				T.L.V = 0.04 (0.02) A.L.V = 0.63 (0.03) -2LL = 2097.59			
Random Part:								
T.L.V	0.15 (0.03)	0.10 (0.02)	0.07 (0.02)	0.06 (0.02)	0.01 (0.01)	0.03 (0.01)	0.02 (0.01)	0.01 (0.01)
A.L.V	0.29 (0.01)	0.33 (0.02)	0.33 (0.02)	0.29 (0.02)	0.54 (0.03)	0.62 (0.03)	0.63 (0.03)	0.55 (0.03)
Δ -2LL	1518.73	1605.55	1591.74	1470.50[A]	1950.68	2083.27	2080.09	1935.25
χ^2 *(df)*	117.04 (5)***	19.51 (5)***	33.32 (5)***	154.56 (10)***[A]	146.91 (5)***	14.32 (5)*	17.50 (5)***	162.34 (10)***

Athlete Motivation			
Amotivation			
Model 1	Model 2	Model 3	Model 4
-0.12 (0.02)***	-0.10 (0.03)**	-0.11 (0.03)***	-0.12 (0.03)***
-0.03 (0.07)	-	-	-0.03 (0.07)
-0.14 (0.08)+	-	-	-0.15 (0.08)+
0.04 (0.05)	-	-	0.04 (0.05)
0.29 (0.05)***	-	-	0.28 (0.06)***
0.22 (0.05)***	-	-	0.24 (0.05)***
-	-0.04 (0.13)	-	-0.04 (0.12)
-	0.11 (0.18)	-	0.06 (0.16)
-	-0.14 (0.11)	-	-0.05 (0.10)
-	0.10 (0.11)	-	-0.09 (0.10)
-	-0.18 (0.10)+	-	-0.09 (0.08)
-	-	0.10 (0.10)	0.12 (0.09)
-	-	-0.05 (0.09)	-0.04 (0.08)
-	-	0.01 (0.11)	-0.01 (0.10)
-	-	0.23 (0.10)*	0.13 (0.09)
-	-	-0.12 (0.10)	-0.12 (0.09)
	T.L.V = 0.08 (0.03)		
	A.L.V = 0.83 (0.04)		
	-2LL = 2350.21		
0.03 (0.02)	0.05 (0.02)	0.05 (0.02)	0.02 (0.02)
0.70 (0.04)	0.83 (0.04)	0.83 (0.04)	0.70 (0.04)
2189.80	2332.36	2331.65	2178.33
160.41 (5)***	17.85 (5)***	18.56 (5)***	171.88 (10)***

Note. ATH = athlete perceptions, COA = coach perceptions, OBS = observed environment. AS = autonomy support, TI = task-involving, RS = relatedness support, CO = controlling, EI = ego-involving. T.L.V = team level variance, A.L.V = athlete level variance. + p <0.10, * p <0.05, **

p <0.01, *** p < 0.005. χ^2 *(df)* = represents difference from the reference model where age was included as a single predictor, [A]indicates significant improvement in fit from model 1 to model 4