Profile of high-performing college soccer teams: An exploratory multi-level analysis

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Abstract

Purpose: To determine the profile of high-performing college soccer teams through the use of exploratory hierarchical linear modeling (HLM) based on a socio-cognitive approach.

Design and Measures: A correlational design was employed in this study. The sample consisted of 340 college soccer players of both genders (178 female and 162 male), representing 17 different teams (8 female and 9 male) ranked in the top-32 of the National Association of Intercollegiate Athletics (NAIA). Numerous demographic and soccer-related variables represented level-1 in the HLM model. Group Environment Questionnaire and Team Assessment Diagnostic Measure were entered as level-2 variables, representing cohesion and team mental models, respectively. Perceived performance potential (PPP) served as the dependent variable. Objective performance scores were correlated with PPP, attesting a moderate to high-level of criterion related validity ($r = .78$).

Results: The final model suggested that: (1) International athletes perceive their performance lower than others, (2) different field positions share different covariance coefficients with PPP, and (3) perception of social cohesion from a group, rather than individual, standpoint is positively associated with perceptions of team performance.

Conclusions: High performing teams have clearly defined task-related and team-related goals. Accordingly, social rather than task related factors may represent a competitive edge, further energizing the interactions and performance of top-ranked teams. International athletes perceive team performance lower than locals, perhaps due to differences in preferred game-style and acculturation experiences. Players from different field positions (i.e., goalkeepers, defensive, and offensive players) relate differently to team performance in college soccer.

Keywords: Team expertise; Team Mental Models; Cohesion; HLM; Soccer.

Profile of High-Performing College Soccer Teams: An Exploratory Multi-Level Analysis

There is a general agreement that people achieve more when working in synchrony towards a shared goal: “the whole is greater than the sum of its parts.” In this regard, team expertise is a cross-domain research topic and numerous scholars seek to understand how successful sport teams, airline pilots, music orchestras, and even global diplomats evolve implicit and explicit coordination mechanisms (Salas, Rosen, Burke, Goodwin, & Fiore, 2006). Nonetheless, capturing team expertise is challenging because both individual and team-level factors influence the development of high-performing teams (Eccles & Tenenbaum, 2004). In a nutshell, previous research suggests that team expertise is about finding the “ideal mix” of individuals’ backgrounds and skills, while promoting team values and coordination (i.e., synchronized action and effort among teammates) (see Gratton & Erickson, 2007). Therefore, we advanced an exploratory hierarchical linear model considering both individual and team-level factors related to team performance. Specifically, we assessed the influence of soccer players’ personal characteristics on team performance. We subscribed to a socio-cognitive approach based on the notion that teammates’ social dynamics (e.g., cohesion) influence individuals beliefs and cognitions (e.g., performance expectations), which in turn influence team members’ social dynamics (Eccles & Tenenbaum, 2014). To this extent, social cognition has been defined as “information processing in social setting” (Frith, 2008, p. 2033) and considered the result of how social stimuli influence perceptions of group processes. Moreover, with numerous frameworks to choose from (e.g., collective-efficacy, leadership), we opted to limit the scope of our inquiry to the notions of team cohesion and team mental models. From a theoretical standpoint, cohesion has been associated with the development of team processes such as team mental models (Carron & Hausenblas, 1998), while found to be moderated by a number of personal factors (see Carron, Colman, Wheeler, & Stevens, 2002) considered in the model tested herein. Finally, both cohesion and team mental models have been linked to team performance and expertise in sports (Carron, Eys, & Burke, 2007; Eccles & Tenenbaum, 2004).

Team Cohesion

Team cohesion is defined as "a dynamic process that is reflected in the tendency of a group to stick together and remain untied in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs" (Carron, Brawley, & Widmeyer, 1998, p. 213). Task and social cohesion are the two sub-dimensions underlying the overarching notion of team cohesion. Task cohesion refers to the degree that members of a team bond to accomplish a task, thus remaining united to achieve shared performance related goals. Social cohesion pertains to the notion of teammates bonding for social reasons, thus reflecting the extent that members of a team like to interact and enjoy each other's company (Carron, Eys, & Burke, 2007; Carron, Widmeyer, & Brawley, 1985; Widmeyer, Brawley, & Carron, 1985). Based upon the notions of task and social cohesion, Carron et al. (1985) proposed the Conceptual Model of Group Cohesion for Sport. This framework considers each athlete's perceptions about his/her particular social and task attraction to the team ("I, my, or me" perceptions). Furthermore, this framework considers athletes' perceptions about "team unity" ("us, our, or we" perceptions), as related to "the similarity, closeness, and bonding, within the team as a whole around the group task" (Widmeyer et al., 1985, p. 17). In the present study, "I" beliefs were entered as level-1 factors, and "us" beliefs were treated as level-2 factors, with performance serving as the dependent variable.

It is important to note that performance has also been hypothesized to influence team cohesion and vice-versa (Carron et al., 2002). In fact, the relationship between cohesion and performance has been extensively studied across domains, and two meta-analytic reviews have summarized the magnitude of the cohesion-performance relationship (Carron et al., 2002; Mullen & Copper, 1994). Mullen and Copper's meta-analysis (1994) included 49 studies from general, military, and sport psychology. Results revealed a significant, positive, and small effect size (*d*) for the cohesion-performance relationship ($d = .25$, $p < .01$). In another meta-analytic review, Carron et al. (2002) found a large effect size for the cohesion-performance relationship in sports. Carron et al. also reported a strong relationship between performance and social ($d = .70$) and task cohesion. ($d = .61$).

Research based on Carron et al.'s (1985) Conceptual Model of Group Cohesion for Sport has also revealed that team members' attributes may serve as moderators of the cohesion-performance relationship (Carron et al., 2002; Carron et al., 2007). To this extent, Carron and Hausenblas (1998) have long noted that team member attributes influence group structure which in turn impact the cohesion-performance relationship. Based on this rationale, we focused on statistically modelling the influence of team members' attributes (individual characteristics, level-1 variables) on team performance. In particular, we examined the influence of both team members' *demographic* and *role attributes* on team performance. Pertaining to team members' demographic attributes, we assessed athlete gender and nationality. This is consistent with previous research suggesting that the cohesion-performance relationship differ among female and male teams, and that cultural issues may impact group cohesion in sports (Popp, Hums, & Greenwell, 2010). Furthermore, we used class status (i.e., freshman, sophomore, junior, senior) as an indicator of athletic experience, another factor influencing performance in college sports (Watt & Moore, 2001).

Regarding team members' role attributes, we explored the influence of individuals' soccer charteristics (i.e., field position, laterality, starter status) on team performance. In this regard, field position has been linked to the development of group processes and performance in team sports (Filho, Gershgoren, Basevitch, Schinke, & Tenenbaum, in press). For instance, midfielders occupy centralized positions where the access to information is maximized, whereas other players (goalkeepers, defenders and offensive players) have unique assignments during competition (Di Salvo et al., 2007). Also noteworthy, laterality has been proposed as a factor linked to performance in team sports (Carey et al., 2001). Specifically, Carey et al. noted that left-footed players are rare and thus may have advantages because (a) defenders are most practiced against right foot opponents, and (b) left-footed plays are more likely to access visuo-spatial creativity networks in the right cerebral hemisphere. Finally, athletes' starter status have been found to influence team dynamics, with higher status athletes (e.g., starters) showing greater perceptions of satisfaction and cohesion than lower status athletes (e.g., substitutes) (see Jeffery-Tosoni, Eys, Schinke, & Lewko, 2011). Previous research on expert performance in soccer revealed that highly skilled athletes tend to possess greater awareness of their performance outcomes than their less skilled counterparts (Basevitch, Ward, Ericsson, Ehrlinger, & Filho, 2010). Accordingly, given starters are (in principle) the more skilled players, it is plausible that they evaluate performance differently than substitutes. In all, we examined the relationship among athletes' personal factors (i.e., starter status, laterality, field position and college experience), perceptions of cohesion (social and task), and team performance. Moreover, we were also interested in testing the influence of team mental models on team performance.

Team Mental Models

The term “Team Mental Models” (TMM) has been used to denote research on team cognition because it clearly conveys that “the locus of interest is on team functioning, and it is stated broadly enough to encompass both similarity and accuracy properties” (Mohammed, Ferzandi, & Hamilton, 2010, p. 4). More specifically, TMM is defined as “the collective task and team relevant knowledge that team members bring to a situation” (Cooke, Salas, Cannon-Bowers, & Stout, 2000, p. 153). Accordingly, TMM are thought to enhance team performance through the development of (a) coordination mechanisms, and (b) task-specific and team related knowledge (see Eccles & Tenenbaum, 2004; Ward & Eccles, 2006).

Team coordination was recently defined as “the process of arranging team members’ actions so that, when they are combined, they are in suitable relation for the most effective result” (Eccles & Tran, 2012, p. 32). Noteworthy, the importance of explicit and implicit coordination mechanisms has been noted by scholars from various domains (Eccles & Tenenbaum 2004; Entin & Serfaty, 1999; Mohammed et al., 2012). Explicit coordination refers to verbal communication used to facilitate division of labor among teammates, whereas implicit coordination pertains to the ability of teammates to articulate team level actions without the need for verbal communication (Ward & Eccles, 2006). To this extent, Entin and Serfaty (1999) noticed that naval teams adapt to highly stressful situations by creating implicit coordination mechanisms.

When developing team coordination, one should also keep in mind that team actions must be synchronized in function, time, and space. In this regard, Eccles (2010) has proposed *action type, action timing* and *action location* as the three important antecedents of team coordination. Action type pertains to one’s expectation or anticipation of an upcoming action made by a teammate. The accuracy of this anticipatory mechanism is crucial to one’s ability to prepare him/herself to future events. Action timing relates to the ability of team members to correctly align their actions “on the fly,” thus avoiding “too early” or “too late” responses. Lastly, Eccles highlighted that optimal coordination is environmentally situated at a specific space. Hence, it is important that teammates anticipate what is about to happen “where” (space).

Team expertise has also been linked to the similarity and accuracy of *task-specific* and *team-related knowledge* (Cooke et al., 2000). Task-related knowledge is task-specific and idiosyncratically distributed among team members. Team-related knowledge refers to “knowledge held by teammates and their collective understanding of the current situation” (Cooke et al., 2000, p. 154), and involves communal understanding of team procedures, strategies, and contingency plans. According to Mohammed et al. (2010), task-related knowledge specifies “what needs to be accomplished” by each team member, whereas team-related knowledge refers to work coordination (i.e., “how work needs to be accomplished”). Of note, both task-specific and team related knowledge have been found to be associated with team performance in open skill motor tasks (Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers (2000).

The importance of team and task-related knowledge is particularly evident in soccer matches. For instance, goalkeepers possess highly task-specific knowledge, which is also essential to overall team performance (Ward & Eccles, 2006). On the other hand, team performance is also dependent on the tactical knowledge of all players who enter the pitch. Thus, soccer players must hold common knowledge (i.e., team-related knowledge) regarding their team strategies (e.g., team formation such as 1-4-3-3 or 1-3-5-2). It is also important to note that task-specific and team-related knowledge are developed over time, and especially in moments of action (i.e., *during* practice and training) (see Eccles & Tenenbaum, 2004). Accordingly, we collected data at the end of the competitive cycle, in agreement with the notion that a group of individuals undergo a process of development before evolving task-specific and team-related knowledge. Moreover, we relied on the expert-performance approach, thus only focusing on the performance dynamics (i.e., moderating variables) of highly-ranked soccer teams.

In all, we sought to determine the profile of high-performing college soccer teams through the use of exploratory hierarchical linear modeling (HLM) based on a socio-cognitive approach reflecting the notions of cohesion and TMM. We expected that demographic and soccer related variables would predict perceived performance potential (see Figure 1). This is consistent with the overall notion that individual characteristics (e.g., gender, nationality, field position) moderate perceptions of team outcome (Carron et al., 2007). Furthermore, we expected that (at least) one latent factor representing group perceptions of socio-cognitive factors (i.e., Cohesion and TMM) would add explicative power to subjective accounts of team performance. This is congruent with (1) the theoretical notion that socio-cognitive factors are linked to team expertise (see Eccles & Tenenbaum, 2004), and (2) methodological guidelines on parsimonious HLM model, in which latent factors must be added on a "one by one" basis (Raudenbush & Bryk, 2002).

Methods

Participants

Three hundred and forty college soccer players of both genders (178 female -52.40%; and 162 male - 47.60%) representing 17 different teams (8 female and 9 male) affiliated to the National Association of Intercollegiate Athletics (NAIA) agreed to participate in the study. The 17 teams represented in this study were from nine different states (Alabama, California, Florida, Iowa, Kansas, Kentucky, Michigan, Montana, and Ohio). Participants were 20.38 years old on average (*SD* = 2.12) and had 14.66 years (*SD* = 3.92) of experience in the sport. On average, the participants had been playing for their respective teams for 2.40 years (*SD* = 1.11). They were predominantly Caucasians (70.60%) and "other races" (15.20%). Black/Afro-Americans represented 6.60%, and Hispanic/Latinos represented 4.20% of the total sample size. American Indian/Alaskan Native represented .09% (*n* = 3). Two Japanese (*n* = 2) and one Korean also participated in this study. Five student athletes (i.e., 1.50%) chose not to report their ethnic background.

Instrumentation

Demographic Questionnaire. A detailed demographic form was utilized to collect normative data. Specifically, participants' age, nationality, ethnicity, starter status (i.e., starter or substitute), field position (i.e., goalkeeper, defender, midfielder, offense), laterality (i.e., right or left footed), years of experience in soccer, and class (i.e., freshman, sophomore, junior, senior) were obtained. This data were deemed important to characterize the study's sample. Furthermore, this information was used to estimate the linkage between participants' soccer experience and profile, and perceived team performance.

Group Environment Questionnaire (GEQ; Widmeyer et al., 1985). The GEQ, a conceptually-driven instrument, has been the primary choice of sport psychologists interested in studying cohesion in team sports for the past 25 years (Carron et al., 2002; Carron et al., 2007). Hence, given its theoretical and applied representativeness, the GEQ was chosen as the measurement tool pertaining to cohesion. Specifically, the GEQ is an 18-item measure, with anchors ranging from 1 (i.e., *strongly disagree*) to 9 (i.e., *strongly agree*), which measures team cohesion as related to the following four dimensions: (a) Individual Attraction to the Group-Social (ATG-S; e.g., "Some of my best friends are on this team."); (b) Individual Attraction to the Group-Task (ATG-T; e.g., "I like the style of play on this team."); (c) Group Integration-Social (GI-S; e.g., "Our team would like to spend time together in the off-season."), and (d) Group Integration Task (GI-T; e.g., "Our team is united in trying to reach its performance goals."). Of note, ATG-S and ATG-T aim at capturing each athlete's perceptions concerning his/her particular social and task attraction to the team individual. On the other hand, GI-S and GI-T aim at capturing each athlete's perceptions of the team "as a whole". Notwithstanding, there is empirical evidence supporting the factorial properties of the instrument, as well as its content, concurrent and predictive validities (Carron et al., 1998). Furthermore, Carron et al. (1998) reported that Cronbach alphas for the four hypothetical dimensions of the GEQ are for the most part satisfactory (i.e., $\alpha \geq .70$). In the present study, items were reversed when needed and Cronbach alpha coefficient ranged from .56 to .75. The entire scale's alpha reliability was .85.

Team Assessment Diagnostic Measure (TADM; Johnson et al., 2007).The TADM was designed to measure sharedness of team-related knowledge. This 15-item questionnaire, with anchors ranging from 1 (i.e., *strongly disagree*) to 5 (i.e., *strongly agree*), reflects the following five factors: (a) General Task and Team Knowledge (GTTK; e.g., "My team usually discusses our goals and attains the agreement of each other."); (b) General Task and Communication Skills (GTC; e.g., "My team communicates with each other while performing our task."); (c) Attitudes towards Group Teammates and Task (GTT; e.g., "My team takes pride in our work."), (d) Team Dynamics and Interactions (GTI; e.g., "My team solves problems that occur while doing our task."), and (e) Team Resources and Working Environment (TRWE; e.g., "My team knows the environmental constraints when we perform our work."). These factors were found to have satisfactory reliability coefficients (i.e., $\alpha \geq .75$) and to account for 82% of the variance on sharedness of team-related knowledge (Johnson et al., 2007). In this study, Cronbach alpha coefficients ranged from .74 to .84 and the entire scale's alpha reliability was .91.

Team Outcome Questionnaire (TOQ; see Coleman, 2011; Appendix H). The TOQ consists of 9 items that describe goals related to team skills, strategy, effort, competitive outcomes, and fitness. These areas were selected based on a content analysis of team performance expectations conducted by Brawley, Carron and Widmeyer (1992). The TOQ uses a Likert-type scale ranging from 0 (i.e., *low expectations*) to 4 (i.e., *high expectations*) to measure perceived performance potential (PPP) in team sports. An exploratory factor analysis resulted in a unidimensional scale with homogeneous items accounting for 54.71% of the variability on team performance expectation. Internal consistency across all items was satisfactory resulting in a Cronbach alpha coefficient of .89.

The TOQ was utilized to assess perceived performance potential (PPP), which is a subjective account of a team's performance from the perspective of a team member. In fact, PPP is a cross-domain topic pertaining to the performance of working teams in business, sports, and the military (Stumpf, Doh, & Tymon, 2010). Furthermore, the notion of PPP is also congruent with a current probabilistic, rather than deterministic, view of performance in sports (Kamata, Tenenbaum, & Hanin, 2002). In particular, subjective reports may better represent an athletes' performance experience as purely objective scores may misrepresent referee mistakes, an outstanding performance from an opposing individual or team, among other situational and environmental constraints (e.g., bad weather, injury) (see Chelladurai, 2007). Moreover, a subjective account of performance was deemed methodologically appropriate as cohesion and TMM scores represented self-perceptions rather than objective values. Notwithstanding, team's objective performance (mean points as measured by the number of wins, ties and losses) were correlated with TOQ scores, resulting in a .78 coefficient, which thereby suggest a moderate to high degree of criterion-related validity regarding the notion of PPP.

Procedures

Institutional Review Board approval was obtained prior to the commencement of this study. Participants were educated about the overarching theme of the study and signed an informed consent form. Data were collected during the NAIA finals, a single-elimination tournament involving the top 32 teams in this college division. Specifically, NAIA college soccer coaches were contacted, and upon agreement, a time was scheduled to meet their respective players. The athletes were informed about the study rationale, and upon voluntary agreement, were asked to sign the written informed consent. Participants received a package of questionnaires (i.e., GEQ, TADM, and the demographic form), presented in a randomized order to control for learning and motivational effects. Data were collected one day before a decisive playoff game at the national tournament. Specifically, data collection occurred in a quiet environment (meeting rooms) and coaches were not present during data collection. Participants had played a median of 20 matches (M = 19.7, SD = 1.39) over the season prior to the study, consistent with the notion that a group of individuals undergo a process of development before becoming a “team” (Eccles & Tenenbaum, 2004).

Data Analysis

A two-level hierarchical linear model (HLM) was tested with individual variables representing level-1 and team-level constructs representing level-2. Figure 1 is a schematic descriptive summary as well as a graphic representation of all variables considered in the HLM analysis. The dependent variable PPP was transformed into percentage scores to allow for ease of interpretation of the estimated regression coefficients. Furthermore, with the exception of

ATG-T and ATG-S scores, all level-1 variables were dummy coded as follow: (a) *gender* (0 = female / 1 = male); (b) *nationality status* (0 = local citizen / 1 = international); (c) *laterality* (0 = left footed / 1 = right footed); (d) *starter status* (0 = substitute / 1 = starter); (e) *class status* with its four independent entries as freshman, sophomore, junior, senior (0 = no / 1 = yes); and (f) *field position* with its four independent clusters being goalkeeper, defender, midfielder, and offensive player (0 = no / 1 = yes). As such, the dummy coded variables were treated as fixed effects, whereas ATG-T and ATG-S scores (ranging from 1 to 9) were conceptualized as random effects in the tested model. Furthermore, level-1 variables were treated as raw, non-centered scores given that there was (1) an interest in estimating the unique contribution of each level-1 predictor, and (2) no occasion in which a value of zero represented either an undesirable or unreasonable score. Level-2 variables were treated as random effect and consisted of all TADM subscales (i.e., GTTK, GTC, GTT, GTI and TRWE) and the group level scales from the GEQ measure (i.e., GI-S and GI-T). Due to space limitations, only the unconditional and the final model were defined in the text. Prior to the model test, descriptive and psychometric analyses were computed for all TADM and GEQ subscales.

Results

Demographics

Prior to the regression analysis, the frequency distribution of the dummy coded variable was computed. All variables exceeded the minimum 5% response rate suggested as a guideline for survey, regression based studies in the human and social sciences (Creswell, 2008). The participants were primarily in their junior (i.e., 33.2%) and freshman (i.e., 29.7%) years. Sophomores and seniors represented 16.9% and 19.8% of the total sample size, respectively. The majority of players were right-footed (i.e., 72.3%) and “starters” (i.e., 61.3%), whereas the remaining 27.7% were left-footed with 38.7% identifying themselves as "substitutes." Goalkeepers constituted 11.1% of the total sample size; defenders, midfielders and offensive players represented 30.1%, 36.1% and 22.7%, respectively. Overall, 66.8% of the total sample size was American citizens, whereas the remaining 33.2% identified as international student-athletes.

Psychometrics

Reliability Analyses. Means, standard deviation, statistical range and estimates of internal consistency reliability of the model's variables are presented in Table 1. Means represent aggregated scores in accordance with HLM standard procedures. Most internal consistency coefficients were above the minimal cut-off value of .70. The exceptions were the ATG-S and ATG-T subscales with values of .56 and .63, respectively. Given that this high measurement error could not be corrected, as item analysis did not warrant the removal of any item, these subscales scales were not included in the level-1 HLM model as initially proposed. Indeed, scholars have suggested psychometrical revisions of the GEQ, particularly advocating for either (1) a simpler (i.e., with less sub-dimensions) factorial solution (Carless & De Paola, 2000), or (2) a modified questionnaire containing only positively worded items (Eys, Carron, Bray, & Brawley, 2007).

Correlational Analyses. Correlation coefficients are presented in Table 2. The values across the GEQ subscales (i.e., ATG-T, ATG-S, GI-T, and GI-S) ranged from .23 to .51, suggesting that task and social cohesion shared variance but are still relatively independent constructs. Correlation coefficients involving the TADM subscales (i.e., GTTK; GTC; GTT; TDI; TRWE) were between.48 and .76, indicating a higher degree of convergent validity among the team mental model factors measured in this study. Noteworthy, given that level-2 variables must be entered on a "one by one" basis in HLM models, any potential multicolinearity threat ($r > .70$) could be identified and controlled for upon model testing. Moreover, coefficients among the GEQ, TADM, and TOQ composite scores ranged from .25 to .55, hence suggesting a degree of convergent validity, while also signaling a degree of divergent validity, and thus reduced multicolinearity threats. As noticed before, TOQ scores and objective performance scores showed a correlation of .78, thereby indicating a moderate to high degree of criterion-related validity.

Unconditional Model

Once the psychometric properties of each scale were found to be reliable, we tested the initial unconditional model (defined below) in which no independent variables were used. Results indicated significant variation in the means of PPP across soccer teams. Specifically, the intra-class correlation for this model indicated that 9.5% of the PPP was due to between-groups differences. Hence, a hierarchical solution was warranted as outcome scores (slopes) differed by team membership. The grand mean estimate was $\gamma_{00} = 82.22$ ($p < .01$), and represents the average value of PPP across soccer teams. Furthermore, the value reliability of the sample was appropriated (i.e., < .70), indicating that 86.5% of the variation in the PPP means reflect true variation between soccer teams. The deviance for this model was of χ^2 (2) = 2662.46, thus establishing an initial goodness-of-fit index for subsequent model comparison.

Level-1 Model

$PPPj = \beta_{0j} + r_{ij}$,

Level-2 Model

$\beta_{0j} = \gamma_{00} + u_{0j}$

where,

β_{0j} is the intercept. andr_{ij} is the residual

γ_{00} is the grand mean outcome (PPP) in the population

u_{0j} is a random effect for soccer team j

Level-1 Modeling

Model 1A. Coefficients, standard error, and *p*-value for all tested variables are given in in Table 3. Noteworthy, this model included all individual level-1 variables (see Figure 1) with the exception of ATG-T and ATG-S, which were excluded due to high measurement error. The value reliability of the sample increased to 88.4% and deviance decreased to χ^2 (2) = 2590.16 when compared to the unconditional model. Nonetheless, this model was not considered final as the variables "gender," "laterality," "starter status," and none of the classes' status entries (i.e., freshman, sophomore, junior, senior) were significant. Furthermore, the dummy coded entry "midfielders" did not yield significant results, and thus was also excluded from the next tested model.

Model 1B. Results for all tested variables are given in Table 4. All independent variables included in this model (i.e., nationality, goalkeeper, defender, offensive player) were found to be significant ($p < .05$). Specifically, international players (γ_{10} = - 4.09, p = .02) were found to have lower perceptions of team performance than their non-international counterparts. Predicted scores on PPP were also different depending on one's field position, with the exception of "midfielders". Specifically, estimated PPP coefficients for goalkeepers (γ_{20} = 4.50, p = .04), defensive (γ_{30} = 5.23, $p < .01$) and offensive (γ_{40} = 5.38, $p < .01$) players showed slightly different magnitudes. Noteworthy, the values for the sample reliability (i.e., 88.6%) and deviance [$\chi 2$ (2) = 2630.16] were indicative of a better model fit when compared to the unconditional model. Accordingly, the next step involved the consideration of group-level variables.

Level-2 Modeling

Model 2 (Final Model). The results for this model are provided in Table 5 and its terms are defined below.

Level-1 Model

$$PPP_{ij} = \beta_{0j} + \beta_{1j}*(Nationality_{ij}) + \beta_{2j}*(Goalkeeeper_{ij}) + \beta 3j*(Defense_{ij}) + \beta_{4j}*(Offense_{ij}) + r_{ij}$$

Level-2 Model

$$\beta_{0j} = \gamma_{00} + \gamma_{01}*(GI\text{-}S\_Mean_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

β_{0j}: Mean for PPP for group j considering GI-S scores, and controlling for international, goalkeeper, defensive player, and offensive player status (0 or 1, dummy variables).

β_{1j}: The predicted change in PPP when “international” is equal to one in soccer team j, controlling for all other independent variables.

β_{1j}: The predicted change in PPP when “goalkeeper” is equal to one in soccer team j, controlling for all other independent variables.

β_{2j}: The predicted change in PPP when “defensive player” is equal to one in soccer team j, controlling for all other independent variables.

β_{3j}: The predicted change in PPP when “offensive player” is equal to one in soccer team j, controlling for all other independent variables.

r_{ij}: It represents the deviations of PPP from its predicted value for individual i in group j.

Congruent with guidelines on multi-level inquiries (Raudenbush & Bryk, 2002), an a priori exploratory analysis was conducted to determine which level-2 variables must be included in the model on a “one by one” basis. This analysis revealed that including TDI, GI-T and GI-S would produce similar contributions to a potential final model. The inclusion of TDI and GI-T into the regression matrix did not yield significant intercepts, and thus these terms were excluded from further analysis. However, the inclusion of GI-S yielded a significant coefficient (γ_{00} = 54.26, p < .01) while also representing an overall improvement to the previously tested Model 2. Specifically, reliability of the sample mean remained high (88.5%) and deviance scores were lowered to χ^2 (2) = 2624.79. Computation of the pseudo R-square score indicated that this model represented an improvement of 5% to the unconditional model. Perhaps more importantly, the final model (product of an exploratory analysis and which terms are defined below) made theoretical and applied sense, as athletes’ “individual characteristics” such as field position and nationality, as well as teammate’s perception of social cohesion have been proposed as potential moderators of team performance (Carron et al., 2007).

In essence, this final model suggested that (1) “being an international player” is negatively associated with PPP scores (γ_{10} = - 3.93, p = .02); (2) different field positions share different covariance coefficients with PPP (i.e., goalkeepers γ_{20} = 4.61, p = .04; defensive players γ_{30} = 5.19, p < .01; offensive players γ_{40} = 5.43, p < .01), with the exception of “midfielders” where no significant effect was found; and (3) perception of social cohesion from a group standpoint (i.e., GI-S aggregated scores) is positively related to PPP (γ_{01} = 3.88, p <.01). Therefore, considering the final coefficients estimated for this sample (see Table 5), the lowest “error free” hypothetical PPP value (i.e., 54.21 out of 100) would (a) be given by the equation $PPP = 54.26 + 3.88 *(1) - 3.93*(1) + 4.61*(0) + 5.19*(0) + 5.43*(0)$; and (b) represent an international midfielder whose team's aggregated GI-S scores is the lowest possible (i.e., 1). The maximum hypothetical PPP score (94.56 out of 100) would (a) be given by the equation $PPP = 54.26 + 3.88 *(9) - 3.93*(1) + 4.61*(0) + 5.19*(0) + 5.43*(1)$; and (b) represent an offensive player whose team's aggregated GI-S perception is the highest possible (i.e., 9).

Discussion

Few researchers have examined the characteristics and components that predict successful performance of sport teams (Eccles & Tran, 2012; Raab & Johnson, 2007).The dynamic nature and complexity of team sports (e.g., coordination, communication, and cohesion) make it difficult to study the relationship among individual and team characteristics, and team performance. Nonetheless, researchers in recent years have attempted to elucidate the components (and relationship among them) that are required to achieve team success and expertise (Eccles & Tenenbaum, 2004; Fiore et al., 2007). We examined how individual characteristics (i.e., demographic factors and soccer characteristics) and team socio-cognitive factors (i.e., cohesion and team mental models) were related to perceived team performance (i.e., PPP) using a multilevel analysis approach. The findings indicated that individual (i.e., nationality and field position) and team factors (i.e., social cohesion) significantly contributed to the prediction of perceived performance. In the following sections, the predictive value of each individual and team socio-cognitive factor is discussed.

Individual Characteristics

Gender. Results indicated that gender did not significantly contribute to the prediction of PPP. This is somewhat surprising, because gender differences were observed in previous studies examining the relationship between social (e.g., cohesion) variables and performance in the sport setting (Carron et al., 2002). Furthermore, gender differences have been observed in various other cognitive variables (e.g., spatial abilities; Cahill, 2005). However, it seems that in predicting perceived team performance gender differences were minute. In the current study, the level of the players and teams were relatively similar (i.e., the top 32 teams in the nation) regardless of gender. Thus, it is reasonable to assume that females and males perceived their performance in a similar manner. Future studies should examine the influence of gender on the relationship between PPP and other socio-cognitive factors such as efficacy and leadership.

International status (international/local). In regards to differences between international and local (i.e., American) players, findings suggested that international players perceived their team's performance at a lower level than local players did. Two possible explanations for these findings are that (a) international players usually come to the USA after playing at higher levels of competition, and (b) international soccer players have higher performance expectations (Popp et al., 2010). Thus, these factors might influence players' perception of success and may lead to a more realistic or "pessimistic" perception of team performance. Future studies should gather qualitative data using in-depth interviews to gain access to the players' thoughts and understand the rationale for the differences between international and local players. Finally, team-building interventions aimed at converging players' performance expectations (e.g., setting common team goals and norms), as well as at facilitating acculturation experiences of international players, should be implemented by coaches and sport psychologists working in team sport settings.

Class status (freshman/sophomore/junior/senior). Class status was not a significant predictor of PPP. It appears that the number of years playing soccer at the collegiate level may not be associated with perceived performance. Previous studies have shown that the more experienced and skilled athletes are better able to evaluate their own individual performance

(Basevitch et al., 2010). However, college players at this level are close in age and soccer experience, and thus may share a similar understanding of what constitutes optimal and less than optimal performance in team sports. Studies based on the expert-novice paradigm or with a broader target sample (e.g., comparing younger versus older professionals) may elicit potential differences in individuals' perceptions of team performance.

Starter Status. However, the findings relating to starter status were not significant. Indeed, high-performing teams tend to be less influenced by the formal labeling and status of their members (e.g., starter and substitute, CEO and employee, airline pilot and co-pilot). This so called "leveling effect" is essential to achieve optimal coordination and performance outcomes under time and environmental constraints (Gratton & Erickson, 2007). It is also possible that the starter role in collegiate soccer does not differentiate among skill levels given that substitutions are unlimited, thus allowing for frequent changes in teams' lineups during official matches (see rules at http://www.naia.org). In addition, all the teams surveyed for the current study qualified to the final tournament, and players were likely to be mentally prepared and aware of their role differences. Furthermore, typically coaches only bring the top 16-18 players to the tournament. This number of players may represent an ideal team size (i.e., not too large, not to small) that aggregates all resources needed for optimal performance. To this extent, size has been found to moderate team performance, with too large or too small teams being associated with poorer collective outcomes (Carron et al., 2007).

Although no differences were found between starts and substitutes, it is important to continue studying the influence of individual rank on expertise development and, perhaps most importantly, on psychological well-being in team sports. Again, previous research has shown that higher ranked athletes show greater perceptions of social cohesion and personal satisfaction for ability utilization (Jeffery-Tosoni et al., 2011). There are also research on how rule modification may maximize the participation of all team members, particularly in leagues (Hill & Green, 2008). Overall, advancing knowledge on how to promote psychological well-being among athletes from different skill levels remains a paramount purpose of sport psychology.

Laterality. Dominance of left/right leg did not provide any predictive value to the model. Thus, the perception of team performance is not different among left and right-footed soccer players. The players' understanding of their own role (i.e., task-specific knowledge) in relation to the team's overarching goals and coordination dynamics (i.e., team related knowledge) may be more important to performance than laterality by itself. To this extent, Wood and Aggleton (1989) conducted and extensive historical survey on the linkage between laterality and performance ratings among soccer, cricket and tennis players. They found no evidence that left-handed/footed players possess any neurological innate advantage over right-handed/footed players. Thus, the unusually high proportion of left-handed/footed elite athletes is probably due to the fact that right-handers/footers are unaccustomed to face left-handed/footed opponents, thus lacking specific schemas to defend from their strategies and movements.

Field positions (goalkeeper/defender/midfielder/offensive). The findings suggest that prediction of PPP is dependent on the player's field position, with exception of midfielders in which no effect was found. In soccer, each position has different objectives and demands (Di Salvo et al., 2007). Thus, perhaps the differences in perceived team performance among the positions stem from the manner in which they evaluate their team performance. For example, if a game ends in a 3-3 tie, offensive players might perceive team performance as a positive outcome, while defenders and goalkeepers will perceive team performance as a negative result, with midfielders perceiving the outcome with mixed feelings. Thus, in adapting this rationale, the evaluation of team performance is relative to the objectives and demands of the player's field position.

Notwithstanding, the lack of predictive power for midfielders may reflect the hybrid characteristics of this position, marked by both defensive and offensive requirements. In fact, midfielders occupy centralized positions, where there is great visibility to teammates and coaches, and the access to information is maximized (Di Salvo et al., 2007). Overall, applied interventions geared at helping players understand and gain knowledge of their teammates' perspective and positional demands should include (a) encouraging players to switch positions during practice, and (b) team discussions on the demands, similarities and idiosyncrasies of each position are warranted.

Team Socio-Cognitive Factors

Cohesion. Perceptions of team social (and not task) cohesion contributed to the predictive value of the model. Noteworthy, in Carron et al.'s (2002) meta-analysis similar results were found, where the relationship was stronger between performance and social cohesion (d = .70) compared to task cohesion (d = .61). Perception of team task cohesion did not differ among teams and individual players probably because all the teams were high-ranked and qualified for the tournament play-offs. Additionally, players were focused on the task and on the preparations for the tournament, which could have also eliminated task differences among teams. Indeed, clear goal and roles are essential to team productivity, and high-performing teams are usually strong about their direction and task assignments (Carron et al., 2007; Eccles & Tenenbaum, 2004). With all high-ranked teams possessing clear tasks and goals, positive affect and a mutual accountability support network may be a better discriminant of team performance. Accordingly, social rather than task related factors may represent a competitive edge, further energizing the interactions and performance of top-ranked teams. Of note, these findings mirror research in the business domain in which developing social cohesion is a priority of large companies and world class CEOs (e.g., Google, Nokia). Specifically, transnational companies invest in areas for social interaction within their companies (e.g., workout facilities, restaurants, break areas), as well as numerous socialization and network building practices outside the work environment (e.g., outreach programs, volunteer opportunities) (Gratton & Erickson, 2007). These efforts collectively aim to foster strong social relationships, developing the mutual trust needed to promote innovation and improve efficiency. Therefore, it is the social aspect that makes critical performance differences when working team members are clear on their task responsibilities.

Team mental models (TMM). Team mental models have only recently been studied in the sport environment (Eccles & Tran, 2012). Thus, the inclusion of TMM components to explore sport team settings was relatively innovative. Notwithstanding, the lack of predictive power of TMM sub-components (i.e., general task and team knowledge, general task and communication skills, attitudes towards group teammates and task, team dynamics and interactions, and team resources and working environment) does not necessarily mean that performance of elite soccer teams is not linked to TMM. Instead, it is likely that these results reflect a “ceiling-effect” given that expert teams are all characterized by optimal implicit and explicit coordination dynamics. Hence, rather than focus on high-ranked teams only, future studies may (a) consider a different paradigm (expert-novice approach) in comparing bottom to top ranked teams, and (b) accompany the evolution of TMM through developmental approaches and longitudinal growth-models. Future studies should also focus on developing sport specific TMM measurement tools, which may be used to capture and eventually develop intervention programs aimed at improving team performance.

Conclusions, Limitations and Future Avenues

This study advanced knowledge on team expertise by assessing both individual and team-level properties associated with subjective accounts of team performance. First, we learned that task-related and TMM factors did not discriminate among high-performing teams. Hence, social rather than task related and TMM factors may represent a competitive edge among top-ranked teams. Second, we encourage coaches and practitioners to be sensitive to cultural differences, as "locals" and international players are likely to differ in performance expectations. Lastly, players from different field positions related differently to team performance. Hence, team discussions on the similarities and idiosyncrasies of each team role may be beneficial to enhance collective performance.

From a theoretical standpoint, these findings reinforce the importance of testing for the specific effects of task and social cohesion on team performance (Carron et al., 1985; Eys et al., 2007). Individuals from different competitive backgrounds (e.g., recreational, collegiate, professional) may have different social and task attractions to their social groups (Carron et al., 2007). Moreover, these findings corroborate the assumption that members' demographic and role attributes should be accounted for when studying the linkage between team processes (cohesion, TMM) and performance in sports (Carron et al., 2007; Eccles & Tenenbaum, 2004).

The results of this study are not without limitations. In particular, results are limited in scope, in the sense that not all team-level constructs (e.g., collective-efficacy, leadership, communication) were entered in the HLM model. Results are also limited in terms of generalizability, as our target sample was restricted to high-ranked college soccer teams. The lack of a TMM sport specific measurement tool (at the time of the study) is also noteworthy. The reliance on regression coefficients constitutes an exploratory rather than a confirmatory or experimental approach, and thus the results presented herein are neither definitive nor causal in nature. Also noteworthy, the low reliability values found for the ATG-T measure were somewhat surprising given the players competed at a high level (i.e., US College), and as such individual perceptions towards the task were expected to be higher. In this regard, it is been proposed that skilled athletes perceive their individual contributions to the team in a highly idiosyncratic manner, and consequently nomothetic psychometric measures may not fully (and reliably) capture their experiences (Hanin, 2007). Future studies should consider using updated psychometric instruments, as well as qualitative methods, in measuring ones' self-perceptions and meta-cognitive experiences.

In view of these limitations, future studies should consider different team-level constructs (e.g., collective-efficacy, leadership) and be grounded in a distinct theoretical orientation (e.g., dynamic systems perspective). Targeting different sub-population groups and developing sport specific measurement tools, as particularly related to TMM, are also avenues for future research. Specifically, sport psychologists should critically analyze which non-sport latent constructs are relevant (i.e., the theoretical and applied concepts, derived from non-sport team building research, relevant to sport and exercise psychologists) and should be operationalized trough the development of sport specific measurement tools (see Brawley & Paskevitch, 1997). Finally, experimental trials and longitudinal studies are welcomed to identify causal links and the developmental nature of high-performing teams, respectively.

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Table 1

Descriptive Statistics and Reliability Estimates for the GEQ and TADM

	Descriptive Statistics			
Scale	*M*	*SD*	*Range*	*Alpha*
GEQ				
ATG-S[a]	7.29	1.45	1.2-9	.63
ATG-T[b]	6.96	1.59	2-9	.56
GI-S[c]	6.71	1.25	1.25-9	.72
GI-T[d]	6.80	1.44	2-9	.75
Total GEQ	6.94	1.17	2.79-9	.84
TADM				
GTTK[e]	4.23	.56	2-5	.75
GTC[f]	3.84	.68	1.67-5	.84
GTT[g]	4.14	.63	1.33-5	.77
TDI[h]	3.89	.65	2-5	.81
TRWE[i]	3.99	.64	1.33-5	.77
Total TADM	4.02	.53	2.20-5	.93
TOQ	77.78	82.25	22-100	.89

Note.: [a] Individual Attraction to the Group-Social. [b] Individual Attraction to the Group-Task. [c] Group Integration-Social. [d] Group Integration Task. [e] General Task and Team Knowledge. [f] General Task and Communication. [g] Attitudes Towards Group Teammates and Task. [h] Team Dynamics Interactions. [i] Team Resources and Working Environment.

Table 2

Matrix Correlation among GEQ, TADM and TOQ

	ATG-S	ATG-T	GI-S	GI-T	GTTK	GTC	GTT	TDI	TRWE	TOQ
ATG-S[a]		.47**	.51**	.49**	.27**	.39**	.41**	.46**	.44**	.31**
ATG-T[b]			.23**	.45**	.25**	.35**	.34**	.38**	.41**	.34**
GI-S[c]				.57**	.36**	.47**	.52**	.54**	.51**	.36**
GI-T[d]					.49**	.60**	.62**	.63**	.63**	.54**
GTTK[e]						.53**	.52**	.59**	.54**	.50**
GTC[f]							.60**	.69**	.66**	.53**
GTT[g]								.69**	.65**	.48**
TDI[h]									.76**	.53**
TRWE[i]										.55**

Note.: [a] Individual Attraction to the Group-Social. [b] Individual Attraction to the Group-Task. [c] Group Integration-Social. [d] Group Integration Task. [e] General Task and Team Knowledge. [f] General Task and Communication. [g] Attitudes Towards Group Teammates and Task. [h] Team Dynamics Interactions. [i] Team Resources and Working Environment.

Table 3

Multilevel Regression Estimates for Model 1A

Fixed Effect	Coefficient	SE	*t*-Ratio	*p*-value
Intercept, γ_{00}	67.16	10.27	6.54	< 0.01
Gender, γ_{10}	6.09	3.71	1.64	.10
Nationality, γ_{20}	-4.17	1.77	-2.35	.02
Laterality, γ_{30}	0.14	1.45	0.09	.92
Starter, γ_{40}	-1.67	1.35	-1.24	.22
Freshman, γ_{50}	4.36	8.48	0.51	.61
Sophomore, γ_{60}	6.30	8.53	0.74	.46
Junior, γ_{70}	3.38	8.47	0.40	.69
Senior, γ_{80}	2.06	8.49	0.24	0.81
Goalkeeper, γ_{90}	11.82	5.60	2.11	.04
Defense, γ_{100}	12.53	5.40	2.32	.02
Midfielder, γ_{110}	7.39	5.37	1.38	0.17
Offense, γ_{120}	12.56	5.42	2.32	.02
Random Effect	Variance	*df*	x^2	*p*-value
Intercept, u_0	49.53	16	128.79	<.01
Level-1 effect, r_{ij}	127.02			

Table 4

Multilevel Regression Estimates for Model 1B

Fixed Effect	Coefficient	SE	*t*-Ratio	*p*-value	Sig.
Intercept, γ_{00}	80.44	2.10	38.36	<.01	**
Nationality, γ_{20}	-4.09	1.709	-2.40	.02	*
Goalkeeper, γ_{30}	4.50	2.16	2.08	.04	*
Defense, γ_{40}	5.23	1.53	3.42	<.01	**
Offense, γ_{50}	5.38	1.69	3.18	<.01	**
Random Effect	Variance	*df*	x^2	*p*-value	
Intercept, u_0	50.98	16	137.77	<.01	**
Level-1 effect, r_{ij}	128.05				

Table 5

Multilevel Regression Estimates for Model 2 (Final)

Fixed Effect	Coefficient	SE	*t*-Ratio	*p*-value
Intercept, γ_{00}	54.26	8.6564	6.23	<.01
GI-S_MEAN, γ_{01}	3.88	1.09	3.56	<.01
Nationality, $_{10}$	-3.93	1.40	-2.81	<.01
Goalkeeper, γ_{20}	4.61	2.38	1.93	.05
Defense, γ_{30}	5.19	1.339	3.88	<.01
Offense, γ_{40}	5.43	1.90	2.85	<.01
Random Effect	Variance	*df*	x^2	*p*-value
Intercept, u_0	38.89	15	97.22	<.01
Level-1 effect, r_{ij}	128.17			

Level-1 Predictors
(Individual Characteristics)

Demographic Factors

- *Gender* (0 = Female, 1 = Male)
- *Nationality* (0 = Local Citizen, 1 = International)
- *Class Status*
  Freshman (0 = No, 1 = Yes)
  Sophomore (0 = No, 1 = Yes)
  Junior (0 = No, 1 = Yes)
  Senior (0 = No, 1 = Yes)

Soccer Characteristics

- *Laterality* (0 = Left footed, 1 = Right footed)
- *Starter Status* (0 = Substitute, 1 = Starter)
- *Field Position*
  Goalkeeper (0 = No, 1 = Yes)
  Defender (0 = No, 1 = Yes)
  Midfielder (0 = No, 1 = Yes)
  Offensive player (0 = No, 1 = Yes)

Level-2 Predictors
(Team Socio-Cognitive Factors)

Cohesion

- Group Integration Social (GI-S)
- Group Integration Task (GI-T)

Team Mental Models

- General Task and Team Knowledge (GTTK)
- General Task and Communication Skills (GTC)
- Attitudes towards Group Teammates and Task (GTT)
- Team Dynamics and Interactions (GTI)
- Team Resources and Working Environment (TRWE)

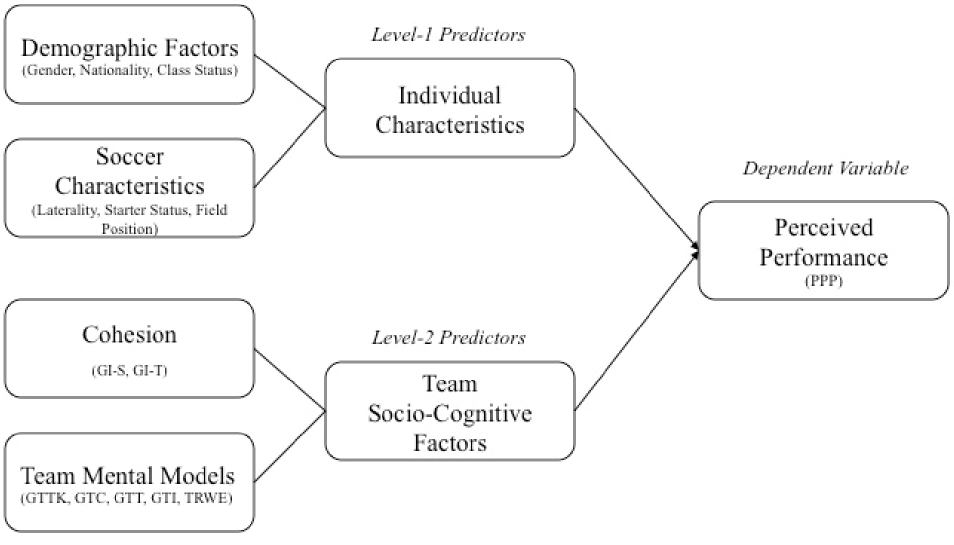

Figure 1. Definition and Representation of the Variable Considered in the Multilevel Equation.