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An Examination of Coach and Player Relationships According to the Adapted LMX 7 Scale: A Validity and Reliability Study

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The current study aims to test the reliability and validity of the Leader–Member Exchange (LMX 7) scale with regard to coach–player relationships in sports settings. A total of 330 professional soccer players from the Turkish Super League as well as from the First and Second Leagues participated in this study. Factor analyses were performed to test the construct validity of the LMX 7. Exploratory factor analysis revealed a one-factor solution for the LMX 7. Confirmatory factor analysis showed acceptable fit indices ($\chi^2_{(14)} = 31.36$; $p = .001$; $\chi^2/df = 2.24$; GFI = .95; CFI = .97; SRMR = .05). Cronbach`s alpha ($\alpha = .84$) and construct reliability ($CR = .85$) indicated that the reliability of the LMX 7 was quite good. Factorial Invariance ($\Delta\chi^2_{diff} = 4.49$; $p > .05$) across samples provided cross-validation using Multi-Group Confirmatory Analysis (MGCFA). The MGCFA supported the model of league invariance. Evidence of cross validation and configural, metric, and scalar invariance tests suggested that the LMX 7 scale preserves its factor structure, factor loadings, factor variances, and item uniqueness equally well. Chi-square difference tests revealed full invariance ($\Delta\chi^2_{(6)} = 11.45$; $p > .05$) and partial scalar invariance ($\Delta\chi^2_{(6)} = 9.46$; $p > .05$). Overall, these results show that the LMX 7 scale is reliable and valid for examining coach–player relationships.

Keywords: LMX Theory, coach–player relationship, confirmatory factor analysis, measurement invariance, soccer

INTRODUCTION

In the last decade, coach–player relationships have been the subject of great interest among researchers (Yang & Jowett, 2013), as these relationships have interpersonal dynamics that influence the quality of players' and coaches' personal experiences, the degree of successful coaching, the performance success of the players, and the level of psychological well-being (Jowett & Cockerill, 2003; Lyle, 2002; Poczwardowski, Barott, & Jowett, 2006; Yang & Jowett, 2013).

Initial research examining the dynamics evident between players and their coaches has primarily utilized either the Multidimensional Model of Leadership in Sports (Chelladurai, 1993) or the Mediational Model of the Coach–Player Relationship (Smoll, Smith, Curtis, & Hunt, 1978). In both models, the coach's leadership role has been stressed as having a major influence on players' sporting successes or failures (Fletcher & Roberts, 2013). Smith, Smoll, and Hunt (1977) developed a Coach Behavior Assessment System (CBAS) that allowed for directly observing and coding coaches' leadership behaviors. This system attempts to measure coaches' behaviors, players' perceptions and recollections of these behaviors, players' attitudinal responses in different situations, and coaches' leadership behaviors during practices and games. Scholars have focused on the relations between coaches and players and on how these relationships contribute to maximizing the players' performances. Carron and Bennett (1977) adapted the Fundamental Interpersonal Relations Orientation (FIRO), which is based on Schutz's (1966) theory of interpersonal behavior, to examine the sources of coach–player

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compatibility or incompatibility. Schutz's (1966) theory examines the compatibility of needs and behavior between the leader and each individual follower, and Carron and Bennett (1977) also used this theory to examine the degree of compatible and incompatible coach–player dyads (Horne & Carron, 1985). Recently, coach–player relationship studies have been conducted to examine the close bond or quality of the relationship. For example, Poczwardowski, Barott, and Peregoy (2002) proposed a context for coach–player dyads. Additionally, Wylleman (2000) developed the Sports Interpersonal Relationships Questionnaire (SIRQ), and Lavoi (2004) designed an instrument that measures the relational quality of coach–player dyads. Jowett and Ntoumanis (2004) contributed to the measurement of relationship quality by designing the Coach-Athlete Relationship Questionnaire (CART-Q).

Yet none of these theories addressed the distinct coach–player relationship process nor considered the active role of players in terms of relationship quality and process. Still, an important exception to these theories is the leader-member exchange (LMX) approach developed by Danserau, Graen, and Haga (1975), Graen and Cashman (1975), Graen (1976) and later extended by Graen and Uhl-Bien (1995). Within the LMX model, the roles of the followers are acknowledged as important components in the leadership process, where the reciprocal nature of the leader-member relationship is accentuated for determining its quality (see Figure 1).

Meanwhile, followers' self-concepts play a crucial role in determining the type of relationship they develop with the leader (House & Shamir, 1993). In this respect, a leader and a follower develop a personalized relationship in which followers define themselves in terms of their roles in relation to the leader and derive their self-worth from appropriate role behavior as reflected through the leader's appraisals. Hence, the primary motivation lies in enhancing the relationship partner's wellbeing to derive mutual benefits (Brewer & Gardner, 1996).

The personalized relationships that followers form with their leaders are based primarily on followers' attribution of desirable qualities to the leaders, occurring when followers operate on the relational level of self and when their selfhood is defined in terms of the relationship with the leader coupled with a desire to become like the leader. Followers in this type of relationship are dependent on and vulnerable to leader influence (Howell & Shamir, 2005). With respect to the leader–follower dyad, coach and players form relationships in their work environment that primarily involve direct face-to-face interactions rather than remote organizational connections. Such relationships are largely characterized as person-specific rather than purely role related (Hains, Hogg, & Duck, 1997). In such cases, the motivation to sustain such relationships is intrinsically determined by joint engagement in activities and the personal satisfaction derived from working closely together. In conclusion, this theory describes how leaders develop unique relationships with each of their subordinates (Dierendonck, Blanc, & Breukelen, 2002; Harris, Li, & Kirkman, 2014). The characteristics of the leader–subordinate relationship proposed in the LMX Theory are similar to those of the coach–player relationship (Case, 1998). Therefore, one may apply the LMX Theory and the concept of the dyadic relationship between leader and followers to the coach–player relationship in sports contexts. The present study introduces new evidence by adapting a scale to elucidate the quality of coach–player relationships.

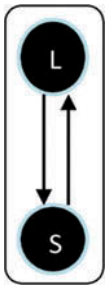

FIGURE 1 The Vertical Dyads.

Leader–Member Exchange (LMX) Theory

The LMX theory proposes that each leader-subordinate relationship is a vertical pair, as it shows that leaders do not exhibit a uniform leadership style towards all members of a working unit, and since this variation of the behavior the LMX examines these vertical dynamic relationships (Dierendonck et al., 2002; Nortcraft & Neale, 1990; Varma, Srinivas, & Stroh, 2005). This model was initially called the "Vertical Dyad Linkage" (VDL) model of leadership (Dansereau, Graen, & Haga, 1975) before it evolved into two diverse lines of development. The first branch of development from the early VDL approach is most commonly referred to as the LMX model, although it has also been called the "Leadership-Making" model. The second branch of development from the VDL approach, which differs from the LMX approach, is referred to as the "Individualized Leadership" model by Dansereau et al. (Schriesheim, Castro, & Cogliser, 1999).

Although the initial theory was subsequently revised, its focus remained on the leadership process. Before the advent of the LMX model, it was thought that leaders did not behave differently towards their followers and used Average Leadership Style (ALS; Northouse, 2001). The LMX model shows that leaders do not exhibit an ALS in relation to all members in a working unit; rather, they develop different types of relationships with each of their subordinates through a series of work-related exchanges (Blanc & Roma, 2012). With this discovery, subsequent

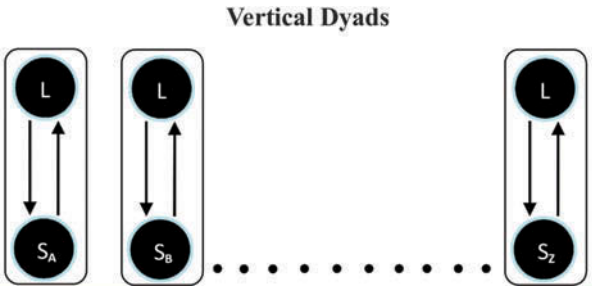

FIGURE 2 The Vertical Dyads: The leader forms special relationships with all of his or her subordinates. Each of these relationships is special and has its own unique characteristics (Northouse, 2001).

research has focused on the ways in which leaders develop different relationships with each follower (Dierendonck et al., 2002; Nortcraft & Neale, 1990; Varma et al., 2005). This is summarized in Figure 2.

In early literature, Graen, Liden, and Hoel (1982) compared LMX and ALS predictions among 48 analysts and computer programmers in large public utility and found LMX to be a far superior predictor. Ferris (1985) replicated these results in a field study on nurses and their superiors. The literature reviewed above clearly supports the concept of unique relationships or exchanges existing between a leader and each subordinate (Dienesch & Liden, 1986). Based on the current literature, empirical evidence demonstrates that leaders engage in many different behaviors intended to increase team effectiveness, including structuring the team, helping individual members improve their contributions to the team, and working with the team as a whole (Breukelen, Leeden, Wesselius, & Hoes, 2012).

There are four main factors that distinguish the LMX Theory from other leadership theories. First, the LMX Theory is a definitive theory. It defines the working groups that make high-level, mid-level, and low-level contributions to the organization. Second, the LMX Theory is the only leadership approach that incorporates the concept of dyadic relationships in the leadership process. Third, the LMX Theory suggests the importance of communication in leadership. Fourth, many studies support the idea that the applications related to the LMX Theory are positively correlated with favorable organizational outcomes. It was suggested that the leader–member relationship is positively correlated with member retention (Graen et al., 1982) and organizational commitment (Kent & Chelladurai, 2001), satisfaction with supervision (Schriesheim & Gardiner, 1992), supervisory ratings of job performance (Graen, Novak, & Sommerkamp, 1982), autonomy (Scandura, Graen, & Novak, 1986), satisfaction with work (Vecchio & Gobdel, 1984), and frequency of promotions (Wakabayashi, Graen, Graen, & Graen, 1988). Others positive correlations include performance, organizational loyalty, innovativeness, institutional citizenship behavior, authority, procedural and distributive justice and career development (Dionne, 2000; Graen & Uhl-Bien, 1995; Northouse, 1997).

In addition to these factors, the LMX Theory also addresses the issue of group inclusion, in which subordinates may be considered in or out of the group, depending on the manner in which they work and communicate with their leaders (Dansereau et al., 1975). In-group members generally take responsibility for performing critical duties for the success of a unit and communicate with others more comfortably. Out-of-group members are those who interact in a formal way with their leaders and who perform daily duties within a unit (Liden & Graen, 1980). While common trust, respect, appreciation, and interaction are privileged in the in-group relationships, formal communications, based on work descriptions, are privileged in the out-of-group relationships (Northouse, 2001). This is shown in Figure 3.

Dienesch and Liden (1986) and Graen (1976) asserted that a high-quality interpersonal exchange relationship between a member and the immediate supervisor enhances mutual respect and support. In contrast, low-quality relations between a leader and a member reduce mutual trust and support. Moreover, research on LMX has shown that significant associations between a leader and a follower are predictive of outcomes at the individual, group, and

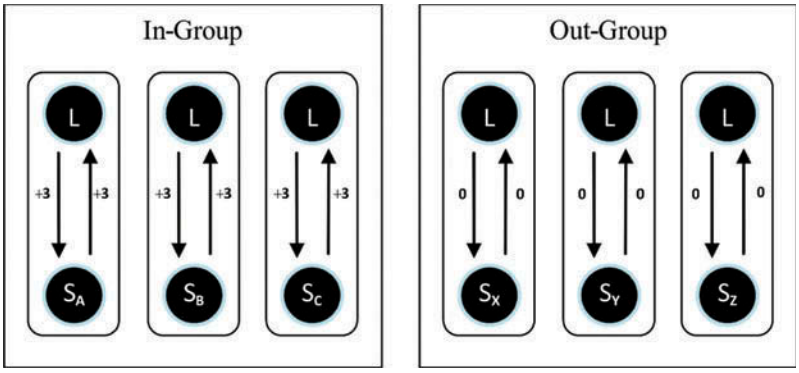

FIGURE 3 In-Groups and Out-Groups.

organizational levels of analysis. In an empirical study, Sias and Jablin (1995) concluded that differential treatment by supervisors was based on their perceptions of employees and that employees usually discussed these incidents with coworkers to make sense of them. In another study, Breukelen et al. (2012) conducted research among 152 employees in a water company and asked them to indicate the degree or frequency of such varied behavior by their supervisor. The correlations among their responses strongly indicated that they perceived leaders differentiating their behavior. Employees with a high-quality LMX relationship reported a lower degree of differential treatment within their work unit than that reported by employees with a low-quality LMX relationship (Breukelen et al., 2012). Two studies together indicated that differential relationships among leaders and the subordinates who report directly to them in their work units are associated with low-quality or high-quality LMX relationships (Blanc & Roma, 2012).

The previously discussed theoretical progression of LMX is illustrated by the changes in LMX measurement instruments over the years (Gerstner &Day, 1997). The LMX construct has been operationalized with a number of different measures, and various LMX scales have ranged from 2 to 25 items (Schriesheim et al., 1999). Compared with other LMX measures, a seven-item LMX scale should demonstrate a high level of reliability and show strong correlations with other variables and should be commonly used and fully acceptable (Gerstner & Day, 1997; Graen & Uhl-Bien, 1995). The most frequently used LMX measure is the LMX 7 Scale, which has a five-point response scale format (Gerstner & Day, 1997; Schriesheim et al., 1999). Scores in the upper ranges are indicative of strong, high-quality LMXs, whereas scores in the lower ranges are indicative of low-quality exchanges (Northouse, 2001). Even so, few scholars have used LMX to measure coach–player relationships (Breukelen et al., 2012). Those who have done so have not attempted to develop an instrument measuring the coach–player relationship. Therefore, this study is the first reliability and validity study of LMX. In addition, during the last decade, scholars have focused on measuring the quality of relationships between coaches and players (Yang & Jowett, 2013). However, their measurements were based on an investigation of common practices and group dynamics in team sports and coaching, and they have not clearly indicated the active role of players in terms of relationship quality in the coach–player relationship process (Breukelen et al., 2012). In contrast, the LMX Theory proposes that subordinates' motivations and abilities influence the quality of the leader–member relationship such that they may reinforce the various benefits of these relationships. Thus, LMX may have useful implications for the field of sports science (Case, 1998). In addition, the LMX Theory focuses on the development of different dyadic relationships between leaders and the distinct subordinates within a team. As such, subordinates will react and influence the leader and the relationship as members of a group, not just as individuals. It is also vital to remember that most teams consist of players with different skills. To attain the best results, coaches should consider the different skills, talents, and experiences of each of the players on a team (Breukelen et al., 2012). The LMX Theory is one that emphasizes that leaders should adjust their leadership styles according to the differing behaviors of the members of their team rather than using an ALS toward all members of their team or unit (Graen, et al., 1982).

Lastly, whereas exchanges between leaders and members are initially limited and only gradually gain greater social and psychological benefits, the model helps the leader–member relationship achieve maturity. At this time, these relationships can be characterized as similar to charismatic relationships, as they show high levels of trust between the leaders and subordinates with regard to issues ranging from self-interests to collective interests. In general, LMX partners show high levels of respect, trust, affection, and obligation (Blanc & Roma, 2012). The characteristics of the leader–subordinate relationship proposed in the LMX Theory are similar to those of the coach–player relationship (Case, 1998). Therefore, it is necessary to examine the role of players in these dyadic high-quality charismatic relationships (Howell & Shamir, 2005). Thus, LMX contributes to the sports context as a new approach to measuring the quality of relationships between coaches and players.

Purpose and Hypotheses

The purpose of the current study was to test the reliability and validity of the LMX 7, which is typically applied to business contexts, in a sports setting to gain insight into the quality of coach–player relationships. This is the first scale adaptation study that aims to measure coach and player relationships with the Adapted LMX 7 Scale that is based on the basic tenets of the LMX Theory. The adaptation of the LMX items occurred within the framework of the LMX Theory by considering coach–player relationship constructs. According to Cronbach and Meehl (1955), the measured items should exhibit high-level item correlations and internal consistency coefficients. Therefore, it was hypothesized that the internal consistency reliability would be greater than .70.

The LMX Theory posits that the evaluation of coach–player relationships should be a one-dimensional construct. Therefore, the second hypothesis is that the factor analyses for the construct validity of the LMX instrument should support a one-factor model. In previous studies, Cronbach and Meehl (1955) have stated that construct validity can be further assessed using various methods, such as by measuring group differences. Moreover, DeVellis (1993) stated that known-groups validation, which can be classified as either construct or criterion-related validity, can indicate that a scale discriminates members of one group from another based on the scale's scores. Hence, one possibility is that players in the TSL and other leagues (i.e., the First and

Second Leagues) differ because of coach–player relationships. The researcher based this subject on standards set for Turkish Professional Soccer Leagues. It is possible that famous talented players accumulate in Super Leagues. However, it is believed that these players can meet their basic needs and require more motivational outcomes than relationship quality (Vlachopoulos & Michailidou, 2006). Additionally, it is assumed that a more senior coaching staff affect these elite players by keeping them together, having more success against teams in Super Leagues. Although one possibility is that famous talented players accumulate in Super Leagues, it may actually be that these players have their basic needs and motivational outcomes met by high-quality relationships offered by the more senior coaching staff employed in the Super Leagues, as these coaches are better able to support their talented players' success (Vlachopoulos & Michailidou, 2006). Therefore, the coach–player relationship quality may be higher in the TSL than in the other leagues. The third hypothesis is that the mean scores of the LMX should differentiate TSL players from those in other leagues.

METHOD

Participants

A total of 330 ($N = 330$) male soccer players ($M_{age} = 23.38 \pm 4.62$ years) voluntarily participated in this study. The sample consisted of 152 players from the Turkish Super League and 178 players from other leagues (92 players from the First League and 86 players from the Second League). The players' average amount of soccer experience was 9.3 ± 4.5 years.

Data Collection Instruments

LMX 7 Scale

The LMX 7 Scale was developed by Graen and Uhl-Bien in 1995. The LMX 7 scale is a one-dimensional, five-point Likert scale consisting of seven questions. A sample item is the following: "I have enough confidence in my coach that I would defend and justify his or her decision if he or she was not present to do so." The highest score is worth 5 points and the lowest score is worth 1 point for each answer (Appendix). The relationships between coaches and players can be assessed as Very High (30–35 points), High (25–29 points), Average (20–24 points), Low (15–19 points), or Very Low (7–14 points). Receiving a high score reflects having a strong/high-quality coach–player relationship.

Procedure

Permission was initially obtained from the coaches (technical directors) to conduct the study. Then, the researcher contacted the coaches who further approved the request to allow their players to participate in the study. The researcher visited the team's clubs or training places after informing the players of the purposes and procedures for the study. The players were asked to complete questionnaire forms. Before starting the questionnaires, the players were informed that all of their responses were confidential. The questionnaire took 10 to 15 minutes to complete, and those who completed the questionnaire were thanked for spending their time in the study. Data were collected from participants during their winter break camp and training season.

Translation of the LMX 7

The LMX, which is originally written in English, was translated into Turkish using the back-translation technique (Vallerand, 1989). This technique requires the contributions of four bilingual translators. Translators A and B, who were bilingual university faculty members with doctorate degrees in Sports Psychology, independently translated the LMX from English into Turkish. Following discussions, the translators reached a consensus regarding a preliminary Turkish version, which was then independently translated from Turkish back into English by Translators C and D, who were bilingual faculty members with doctorate degrees in English. A comparison of the version that was retranslated into English by Translators C and D with the original English LMX revealed that the item meanings were identical. Therefore, the preliminary Turkish version agreed upon by Translators A and B was retained.

Data Analysis

The data were randomly separated into two subsamples using a split file method. Pre-analysis tests examining the suitability of the data from this study for factor analysis were computed, as recommended by Comrey (1978). Missing values, homogeneity of variance, normality, linearity, outliers, and multicollinearity assumptions were examined during preliminary data analyses. The Kaiser-Meyer-Olkin (KMO) and Barlett's Test of Sphericity (BTS) measures for sampling adequacy revealed that the KMO was .86 and that the BTS_{21} was 714.39, $p = .001$. Moreover, the sample sizes for both subsamples were adequate for conducting EFA and CFA, as suggested by Hair, Black, Babin, and Anderson (2010). The general rule for EFA is that the sample size should have a ratio of 5–10 participants per variable, whereas for CFA, a sample size of 100–150 participants should suffice when each factor has communalities of the variables of .60 or higher. After examining the data, the first subsample ($n = 173$, Sample 1) was tested using an EFA with a varimax rotation with the number of factors not specified. The second subsample ($n = 157$, Sample 2) was analyzed using a CFA. Given that the validity of an instrument is strongest when different measures of validity are presented within a study (Messick, 1989), following the EFA and CFA, the data from the soccer players were

cross-validated to estimate their generalizability to the population for Sample 1 and Sample 2. Moreover, establishing measurement invariance is a prerequisite for meaningful comparisons across groups. This study reviewed multigroup factorial invariance of the LMX, which was evaluated using configural and metric invariances across samples and leagues. To further assess the LMX's factorial invariance, a scalar invariance analysis was conducted to compare the LMX means of soccer players from the different league categories. Moreover, a chi-square difference test was conducted to assess the cross-validation between configural-metric and factorial invariance of the measurement models and between configural-metric and metric-scalar invariance. Cronbach's alpha (α) values and construct reliability (CR) values were used to test the reliability of the LMX.

RESULTS

Construct Validity

EFA

EFAs identify the factor structure or model for a set of variables, often involving determining the number of existing factors as well as the pattern of the factor loadings (Stapleton, 1997). The LMX 7 is a new tool designed to measure coach–player relationships. Therefore, an EFA was used to determine the extent to which the item measurements, or the observed variables, were related to one latent construct. An EFA was conducted on the data from Sample 1 (n = 173) using a varimax rotation to determine whether the structure was one-dimensional. Analysis of the data revealed that the structure of the LMX had one factor that explained 51% of the variance among the items on the scale, and the eigenvalue was 3.33. In this one-dimensional resolution, item total correlations for the first subsample were between .48 and .66, and factors varied between .61 and .79 (Table 1).

CFA

A CFA was conducted to examine the construct validity of the LMX. A CFA output includes a number of fit indices. Each Structural Equation Modeling (SEM) program (e.g., Amos, Lisrel, Eqs, etc.) includes a slightly different set of indices; however, all programs contain the key analyses, such as chi-square, CFI (Comparative Incremental Fit), RMSEA (Root Mean Square Error of Approximation), and SRMR (Standardized Root Mean Square Residual). In the current study, when the chi-square value is divided by the degrees of freedom (*df*), a resulting number that is smaller than 2.0 is considered very good, and a resulting number that is between 2.0 and 5.0 is considered acceptable (Hair et al., 2010). Hu and Bentler (1999) empirically examine various cut offs for many of these measures, and one should use a combination of the CFI (good models ≥ .95) with the SRMR (good models < .08) to measure a model's fit. A rule of thumb for the GFI and other incremental indexes is that values greater than approximately .90 may indicate a reasonably good fit of the researcher's model (Bentler, 1990) The confirmatory factor analysis results for the LMX 7 indicate that the independent model coefficient has a relatively high value ($\chi^2_{(21)}$ = 705.58). This result indicates that the variance-covariance matrix obtained from the dataset is appropriate for testing and that there is a sufficient relationship between the latent variables and the manifests. The fit indices for Sample 2 are $\chi^2_{(14)}$ = 31.36; p = .00; χ^2/df = 2.24; GFI = .95, CFI = .97; NNFI = .96; SRMR = .04; RMSEA = .08 (see Table 2). Therefore, the factor structure of the LMX for Sample 2 can be considered acceptable. These coefficients indicate that the one-dimensional model, which was predicted within the scope of the research regarding Sample 2, best explains the relations observed among the items ($\Delta\chi^2_{(7)}$ = 525.98; p < .05). Figure 4 presents the parameter estimates that are related to this model.

Measurement Invariance

Cross-Validation Sample Analyses

For the data obtained from the first and second applications, factor loads were compared using the r_c software (Scholz, 2007) for computations of noncentral distribution, revealing that the consistency between the factor loads obtained from Sample 1 and Sample 2 was .99. The first stage examined

TABLE 1
The Results of the EFA

Items	*I-T Cor.*	*Factor Loading*
1. Do you know where you stand with your coach … do you usually know how satisfied your coach is with what you do?	.53	.648
2. How well does your coach understand your job problems and needs?	.66	.765
3. How well does your coach recognize your potential?	.61	.728
4. Regardless of how much formal authority he or she has built into his or her position, what are the chances that your coach would use his or her power to help you solve problems with your work?	.66	.774
5. Again, regardless of the amount of formal authority your coach has, what are the chances that he or she would "bail you out" at his or her expense?	67	.787
6. I have enough confidence in my coach that I would defend and justify his or her decisions if he or she was not present to do so.	.48	.606
7. How would you characterize your working relationship with your coach?	.57	.695

TABLE 2
Cross-Validity Results Across Samples

Model	$\chi^2_{(df)}$	χ^2/df	*GFI*	*NNFI*	*CFI*	*RMSEA*	*SRMR*	$\Delta\chi^2_{(df)}$
CFA								
Independent Model	$557.34_{(21)}$*	26.54	—	—	—	—	—	—
One-Dimension	$34.36_{(14)}$*	2.24	.95	.90	.97	.08	.04	$522.98_{(7)}$
Cross-Validation								
Configural Invariance	$90.40_{(28)}$*	3.23	—	.93	.96	—	.04	—
Equality of the Factorial Structure	$94.89_{(35)}$*	2.71	—	.95	.96	—	.06	$4.49_{(7)}$

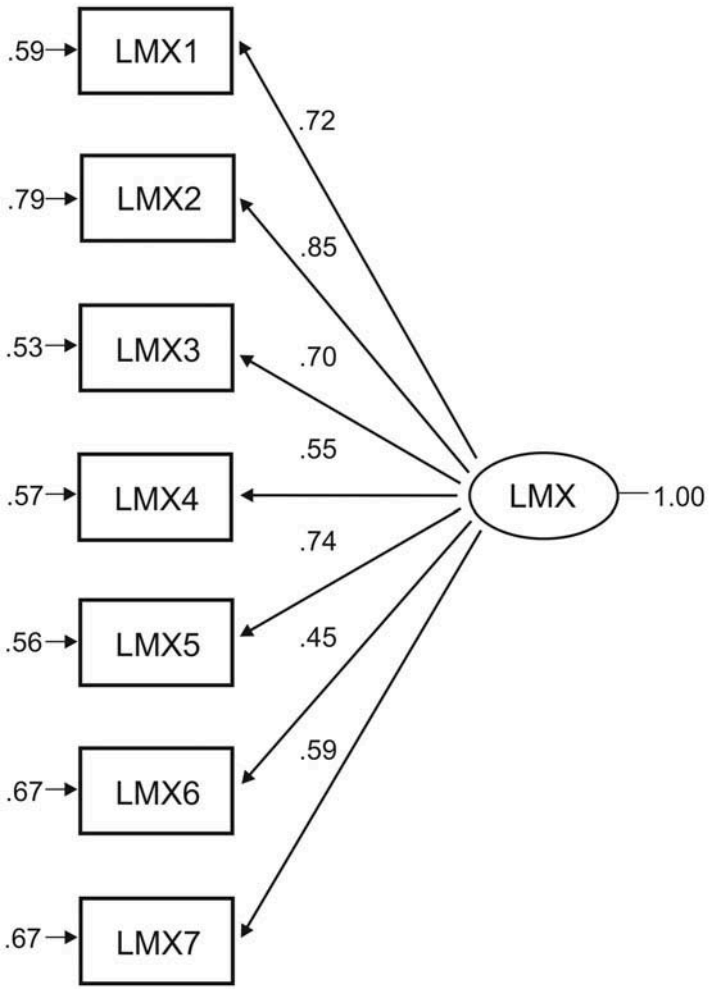

FIGURE 4 The results of the CFA.

whether a one-factor model adequately fits the data for the two groups (Configural Invariance) using the Multi-Sample confirmatory factor analysis method. The consistency coefficients for this model were $\chi^2_{(28)} = 90.40$; $p = .00$; $\chi^2/df = 3.23$; CFI = .96; NNFI = .93; SRMR = .04 and RMSEA = .12. These coefficients show that the "baseline" model has a minimum level of cross-validity. In other words, the model is suitable for both covariance matrices. The second stage examined whether the factor loadings were equivalent across the two groups (Metric Invariance). The results showed that the consistency coefficients for this model were $\chi^2_{(35)} = 94.89$; $p = .00$; $\chi^2/df = 2.71$; CFI = .96; NNFI = .95; SRMR = .06 and RMSEA = .10. A chi-square difference test was conducted to determine the cross-validation of the measurement model, revealing that equalizing the factor loadings did not result in a significant deterioration of the model ($\Delta\chi^2_{(7)} = 4.49$; $p > .05$). This finding further supports the cross-validity of this model.

Analysis of League Invariance

Multigroup invariance was performed across the Super League and the First and Second Leagues combined by testing cross validity and configural, metric, and scalar invariance. The fit indices for the hypothesis model were reported with χ^2, *p*, χ^2/df, CFI, NNFI, SRMR, and RMSEA values. The LMX hypothetical model was tested separately across two samples. The model fit indices for the LMX model regarding the Super League were obtained as $\chi^2_{(5)} = 6.21$; $p = .29$; $\chi^2/df = 1.24$; GFI = .98; CFI = 1.00; NNFI = .99; SRMR = .02; RMSEA = .04 (CI 90% = .00–.13). Regarding the other leagues, $\chi^2_{(5)} = 7.57$; $p = .18$; $\chi^2/df = 1.51$; GFI = .98; CFI = .99; SRMR = .02; NNFI = .99 and RMSEA = .05. (CI 90% = .00–.13). A configural invariance test was performed between the two samples by running multigroup confirmatory factor analysis (MGCFA) to constrain the factorial structure to ensure consistency across leagues. The fit indices for this model are $\chi^2_{(28)} = 118.96$; $p = .00$; $\chi^2/df = 4.24$; RMSEA = .14 (CI 90% = .12–.17); CFI = .93; NNFI = .90; and SRMR = .07. Metric invariance was performed by constraining factor weights to ensure consistency across groups. The results showed that the fit indices for this model were $\chi^2_{(34)} = 130.41$; p = .00;$\chi^2/df = 3.83$; RMSEA = .13 (CI 90% = .11–.16); SRMR=.09; CFI = .93; and NNFI = .91. In addition to factor weights, all items' intercepts were constrained between the two leagues. The results were $\chi^2_{(38)} = 139.87$ $p = .00$; $\chi^2/df = 3.58$; CFI = .92, NNFI = .92; RMSEA = .13 (CI 90% = .11–.15); and SRMR = .09 (see Table 3). The Mean Vector of Independent Variables was –.26 (t = –3.17). Thus, it is concluded that the LMX mean score for the Super League is greater than that of the other leagues.

In conclusion, Multi-Group Invariance Analysis results showed that the RMSEA values did not support the fit of the one-factor model in the two separate samples of leagues but that the χ^2, χ^2/df, CFI, and SRMR values indicated that the one-factor model represented an acceptable fit to the seven-item LMX in the separate Super League and other leagues samples. The results indicated that the RMSEA value of the other leagues (.14) was larger, according to a recommended RMSEA cutoff value close to .08 (Hu & Bentler, 1999). However, Chen, Curran, Bollen, Kriby, and Paxton (2008) advise against identifying universal cutoff points from the RMSEA as a single way of assessing model fit and state that other fit indices are needed to evaluate an SEM. Additionally, it is difficult to justify a cutoff of .05, and the choice of cutoff values depends on model specifications, degrees of freedom, and sample size. The authors of the current study have observed higher rejection rates with decreasing sample size, lower rejection rates with increasing sample size, and rejection rates converging to zero with sample sizes of 800 and above. Thus, a larger RMSEA value may depend on sample size and degrees of freedom. The results showed that larger RMSEA values are associated with a higher number of parameters and a lower number of items, and the model was thought to be acceptable based on compliance with other fit indices. Furthermore, the coefficient shows that the observed covariance matrices were invariant between the Super League sample and that of the other leagues. Additionally, a chi-square difference test was conducted to assess the factorial invariance of the measurement models between configural-metric and metric-scalar invariance. The test statistic value for the chi-square difference between the configural and metric invariance indicated that the factor loadings were not significantly different from the full invariance of the model ($\Delta\chi^2_{(6)} = 11.45$; $p > .05$). In addition, the chi-square difference test between the metric and scalar invariance showed that the factor loadings were not significantly different from partial scalar invariance of the model ($\Delta\chi^2_{(6)} = 9.46$; $p > .05$). Hu and Bentler (1999) stated that SRMR values ≤ .08 and RMSEA values ≤ .06 indicate acceptable fit. The chi-square, χ^2/df, CFI, and SRMR fit indices revealed that the data were consistent with the hypothesized model, but the RMSEA values did not support the model. The cross validation, configural, metric and scalar invariance tests further support the measurement invariance of the one-factor LMX model. In addition, invariance tests supported full invariance and partial scalar invariance. Therefore, the factor structure, factor loadings, factor variances, and item uniqueness were invariant across the samples of the Super League and the other leagues.

Reliability

The Cronbach`s alpha (α) coefficient for Sample 1 was .84, and the total correlation coefficients for the items varied

TABLE 3
Multigroup Factorial Invariance Results Across Leagues

Model	$\chi^2_{(df)}$	χ^2/df	*GFI*	*NNFI*	*CFI*	*RMSEA*	*SRMR*	$\Delta\chi^2_{(df)}$
Groups								
Super League	$6.21_{(5)}$*	1.24	.98	.99	1.00	.04	.02	
Other Leagues	$7.57_{(5)}$*	1.51	.98	.99	0.99	.05	.02	
Factorial Invariance								
Configural Invariance	$118.96_{(28)}$*	4.24	—	.93	0.90	.14	.07	—
Metric Invariance	$130.41_{(34)}$*	3.83	—	.91	0.93	.13	.09	$11.45_{(6)}$
Scalar Invariance	$139.87_{(38)}$*	3.58	—	.92	0.92	.13	.09	$9.46_{(6)}$

between .48 and .67. The Cronbach`s alpha for Sample 2 was .81, and the total correlation coefficients for the items varied between .43 and .64. Moreover, CR was .85.

DISCUSSION

The purpose of this study was to adapt the LMX 7 Scale as a new instrument for measuring coach–player relationships. This scale is typically used in the sphere of business to measure relationship quality between leaders and members. It was modified and adapted to measure coach–player relationships for professional soccer players competing in Turkish soccer leagues. The scale was examined with regard to reliability, construct validity, and measurement invariance across samples and leagues of Turkish professional players.

The reliability of the LMX was encouraging. The Cronbach's alpha for both subsamples exceeded .80. Cortina (1993) recommends that Cronbach's alpha should be .80 or better. Moreover, CR was .84, with a recommended CR value close to .06 (Fornell & Larcker, 1981). Thus, the reliability of the LMX was statistically adequate for continuing the validity analysis. Therefore, this study supports the conclusion that the items reported in the Appendix consistently measure a one-dimensional construct (Cortina, 1993). Consistent with hypothesis 1, the LMX has high levels reliability, as this study's findings are in line with the expected scale.

Hypothesis 2 examined the construct validity of the LMX 7, which was tested using an EFA, a CFA, and cross-validation. The EFA results suggest that the LMX 7 has a single factor model. CFA supported the EFA's results. According to the results of the confirmatory factor analysis of the LMX 7, the independent model coefficient has a relatively high value ($\chi^2_{(21)} = 557.34$), showing that the fit indices of the one-dimensional solution are sufficient for explaining the relationship that is observed between the items in the second group ($\Delta\chi^2_{(7)} = 525.98$; $p < .05$).

Hu and Bentler (1999) proposed that fit indices should examine both the CFI and SRMR (CFI $\geq$ .95 and SRMR $\leq$ .08). In this study, data-model fit indices were considered acceptable, given CFI = .97 and SRMR = .04 for Sample 2. The LMX 7's construct validity was further tested via cross-validation and an examination of the factor loadings and correlations, which were compared in a similar sample using the covariance matrix obtained from Samples 1 and 2. The results of the cross-validation analysis revealed that the one-factor structure of the LMX was valid and reliable. Consistent with hypothesis 2, the construct validity of the LMX instrument should support a one-factor model. The findings confirm that the LMX has one-factor, as predicted, for construct validity.

Finally, tests of measurement invariance revealed strong evidence that the same construct had been measured across different groups and that it is important to compare results across leagues. Measurement invariance was tested in the following sequence: cross validation, configural invariance, metric invariance and scalar invariance. First, the LMX hypothetical model was tested separately across two samples of leagues using cross-validation. This test showed a good fit for both the Super League and the other leagues. Next, MGCFA configural invariance confirmed that the structure was the same across leagues. This result suggests that the one-factor structure of LMX is consistent between both the Super League and the other leagues. Then, metric invariance was tested. Establishing metric invariance led to the conclusion that the meaning of values, as measured by the indicators of LMX, was the same in different leagues. Thus, despite league differences, players understood in a similar manner the meaning given to the values by their indicator. Additionally, these tests yielded a nonsignificant difference inχ^2 ($\chi^2_{diff} = 11.45$, $df = 6$, $p > .05$) and a nonsignificant difference in the chi-square values associated with these nested models (configural and metric invariance models). Moreover, the scalar invariance test on constraining the intercepts found the items to be the same across leagues, provided that the mean score of the Super League was greater than that of the other leagues (Mean Vector of Independent Variables is –.26; $t = -3.17$). Therefore, researchers can use the value instrument to compare value means across groups. In addition, the chi-square difference test between metric and scalar invariance showed that the factor loadings were not significantly different from the partial scalar invariance of the model ($\Delta\chi^2_{(6)} = 9.46$; $p > .05$).

In sum, the reliability of the LMX model was statistically adequate according to the Cronbach's alpha and CR. The EFA's results (Table 1) support that the LMX measures the one-dimensional structure of coach–player relationships. The CFA's results regarding fit indices confirm the factor structure of the LMX. The analysis of invariance across two samples provided evidence for the cross-validity of the seven-item LMX model. Based on the analysis of measurement invariance across leagues, the factor structure, item loadings, factor variances-covariance, and differential item functioning of the LMX model were comparable for the Super League and the other leagues. Overall, the present LMX model is an adapted instrument that is reliable and valid for use with a Turkish sample. Given the findings of the present study, future research should utilize the LMX to measure coach–player relationship quality.

CONCLUSIONS AND IMPLICATIONS

This study confirms that the LMX has the psychometric qualities that are essential for measuring coach–player relationships. Given the results regarding validity and reliability, the LMX shows that coach–player relationships are one-dimensional. Although the present study supports the LMX model, future research should confirm these results with larger sample sizes. Nevertheless, the LMX can play an

important role in the evaluation of teams, as it is designed to foster the development of coach–player relationships.

This study provides that researchers use the LMX 7 to measure coach–player relationships. The LMX may aid in identifying the types of experiences that are more likely to promote the development of relationship quality. These experiences may include the leadership of the coaches, the training plans supported by the teams, and the quality of the relationships among the teammates. Identifying which experiences are beneficial may support the coaches' ability to contribute to the teams' atmosphere and success.

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APPENDIX

Covariance Matrix

Listwise Covariances

	LMX1	*LMX2*	*LMX3*	*LMX4*	*LMX5*	*LMX6*	*LMX7*
LMX1	1.43						
LMX2	0.70	1.52					
LMX3	0.54	0.71	1.02				
LMX4	0.37	0.47	0.34	0.87			
LMX5	0.51	0.55	0.46	0.47	1.11		
LMX6	0.28	0.34	0.25	0.22	0.44	0.87	
LMX7	0.36	0.42	0.42	0.33	0.50	0.33	1.02

Covariance Matrix of Super and Other League

Listwise Covariances (Super League)

	LMX1	*LMX2*	*LMX3*	*LMX4*	*LMX5*	*LMX6*	*LMX7*
LMX1	1.165						
LMX2	0.643	1.505					
LMX3	0.286	0.567	0.792				
LMX4	0.303	0.444	0.420	0.702			
LMX5	0.387	0.562	0.463	0.459	0.981		
LMX6	0.178	0.356	0.262	0.215	0.391	0.725	
LMX7	0.285	0.469	0.531	0.396	0.479	0.437	0.957
Means	3.260	3.460	3.740	3.430	3.550	3.850	3.710

Listwise Covariances (Other Leagues)

	LMX1	*LMX2*	*LMX3*	*LMX4*	*LMX5*	*LMX6*	*LMX7*
LMX1	1.327						
LMX2	0.803	1.438					
LMX3	0.690	0.687	1.111				
LMX4	0.506	0.544	0.494	0.907			
LMX5	0.520	0.561	0.455	0.669	1.153		
LMX6	0.187	0.214	0.229	0.354	0.475	0.761	
LMX7	0.473	0.382	0.350	0.295	0.407	0.259	0.970
Means	3.160	3.190	3.510	3.190	3.110	3.560	3.240