

# Development of a Self-perceived Soccer Competence Scale

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The purpose of this study was to develop a self-rating scale capable of measuring the self-perceived soccer competence of soccer players. A total of 206 Japanese male college soccer players completed a questionnaire based upon 60 items selected from a preliminary study. Exploratory factor analysis was applied to obtain a factor structure of self-perceived soccer competence. Participants were also asked to score their own abilities as soccer players out of a possible hundred. The players' self-evaluated soccer ability scores were used as a criterion variable. Exploratory factor analysis yielded 10 subscales for the scale: situationally specific passing and ball control skill, speed, dribbling skill, physical strength, endurance, defending skill, leadership, motivation, long kick skill and heading skill. The scale contained individual ball techniques and group skill (situationally specific passing and ball control, leadership, dribbling skill, defending skill, long kick skill and heading skill), physical fitness (speed, physical strength and endurance) and mental toughness (motivation), thus it seems that the scale covered enough area to evaluate a soccer player's self-perceived soccer competence. Additionally, the players who had displayed lower soccer ability scores showed significantly lower scores on the self-perceived soccer competence scale as compared to players who had displayed higher soccer ability scores. This result suggests that the criterion-referenced validity of the scale developed was verified. The results showed that the self-perceived soccer competence scale has the potential to multi-dimensionally and precisely reflect the soccer competence of Japanese college soccer players.

**Keywords:** Soccer competence scale, Japanese college soccer players, Criterion-referenced validity

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## 1. Introduction

While it is widely noted that the coaching behavior adopted by coaches bears an important significance with regards to the coaching outcomes of sports coaching, it is also important to pay attention to how players react to such coaching behavior, and consider coaching situations as an avenue of interaction between coaches and players. For such interactions to be effective and bring about significant coaching outcomes, there is a need to elucidate the key factors influencing the coaching behavior of coaches and how players react to instruction by their coaches. It is with this in mind that we chose to focus on sports-related competence as a key factor influencing players for this study.

The concept of competence proposed by White (1959) is defined as "an organism's capacity to interact effectively with its environment." In addition, as the concept of competence included in it the tendency to pursue that ability, the concept of effectance motivation was conceptualized as well. Harter (1978) defined competence as self-perception, and explained effectance motivation from the standpoints of intrinsic motivation, perceived competence and perceived control. Following that, Harter (1982) developed *The Perceived Competence Scale for Children* as a means to measure perceived competence in the following four domains: cognitive, social, physical and general self-worth. The Japanese version of this scale was composed by Sakurai (1983), who reported at the time of the study that a relatively

high correlation between physical competence and physical education scores was recorded.

Acknowledging the research by Sakurai (1983), Ito (1987) developed a scale that was capable of measuring sports-related competence with reference to physical competence subscales, and launched a study into how competence affects sports behavior. In his study, Ito defined sports-related competence as “the mindset and confidence that through hard work, one will be able to control one’s environment” and named this concept perceived physical competence. The study showed that perceived physical competence stems from a combination of two factors, namely, perceived physical ability, which illustrates one’s level of perception regarding one’s physical ability through comparisons with others, and perceived control, which refers to the perception of the extent to which one is able to control the results one attains through hard work and practice. In addition, the study reported that the higher the physical ability perceived, the more time one had spent doing sports and the more frequent one engaged in sports. This result supported the view of Klint and Weiss (1987) that people who perceived themselves to be competent at sports actively continued participating, and conversely, people who lacked the same sense of competence stopped participating in sports. Acknowledging their findings, Okazawa et al. (1996) set out to create a new sports competence scale that included peer and teacher acceptance in addition to the existing factors of perceived physical ability and perceived control, contributing to further progress in the development of scales that measure physical competence.

Undoubtedly, the development of scales has seen significant progress if we consider the fact that physical competence has come to be differentiated and expanded with the introduction of such factors as perceived physical ability, perceived control, and peer and teacher acceptance. However, it is important to bear in mind the uniqueness that sets each sport apart from other sports, given the diverse range of sports and varying modes of execution that exist in the sporting arena. It is this notion that led Sugihara (2003) to suggest that perceived competence in the sporting arena differs greatly in accordance to the sport in question. For example, if we take a moment to consider baseball and soccer, while baseball is governed by its own playing style (batting, pitching, etc.) wherein baseball skills are required, soccer

brings with it a unique playing style (controlling the ball with one’s feet and dribbling, etc.) that is different from that of baseball and requires a high level of soccer skills. Sugihara asserts that as the skills required for playing these two sports are different, the competence perceived by players differs in accordance to the sport. In other words, existing scales that relate to the sporting arena in general may be inadequate in evaluating the competence perceived by players when they are engaging in their respective sports.

On that note, this study focuses solely on soccer, a sport that boasts an estimated 4.5 million participants (Sasakawa Sports Foundation, 2009) and ranks as the number one most often played sport among teenagers, and aims to develop a scale capable of measuring soccer competence. In this study, among the various components that make up physical competence, we paid special attention to the factor perceived physical ability (Ito, 1987) in developing our scale. In particular, as the factor perceived physical ability, which comprises such elements as “a sense of superiority regarding sporting ability as compared to others” and “self-confidence with sports,” reflects one’s self-perceived competence with regards to sports, we decided on an aim of developing a scale capable of measuring self-perceived soccer competence. Owing to the fact that more and more combinations of techniques become possible as a player improves in terms of skill, one’s play of soccer is said to develop according to a particular, known sequence (Takii, 1995). In other words, we expect players who are more experienced and skilled to command a firmer and more detailed grasp of the elements that are relevant to soccer competence, and to be better able to accurately perceive their own competence. In addition, Ooft’s assertion (1994)—we begin to think rationally and become capable of objectively evaluating ourselves when we reach around 16 years of age—is largely consistent with existing knowledge of how self-perception develops (Vanden et al., 2006). Therefore, for this study, we have chosen to target college soccer players belonging to the Kanto University Football League who are both above 16 years of age, and highly experienced and skilled when it comes to soccer.

## 2. Preliminary study

### 2.1. Aim

To develop a self-perceived soccer competence scale, our aim for the preliminary study was to design questions that would facilitate the self-evaluation of one's competitive ability in soccer while we elucidated the criteria with which college soccer players judge their competitive ability as soccer players.

### 2.2. Methods

We surveyed our participants, which comprised 110 male college soccer players from divisions one and two of the Kanto University Football League (25 strikers, 47 midfielders and 33 defenders with an average competitive soccer experience of  $13.5 \pm 2.2$  years), using a paper-based questionnaire. The implementation of the survey saw the authors of this study travelling down to the various participating universities to briefly explain the aims and other details of the survey. The questionnaires were then distributed to the candidates who agreed to participate in the survey for them to fill out, and were collected back on-site once they were completed. The average amount of time required to complete the questionnaire was approximately 15 minutes. In the questionnaire, the candidates were requested to score themselves on their self-evaluated soccer ability based on the assumption that the ideal soccer player would be awarded the maximum score of 100 points. The ideal soccer player in question here refers to the soccer player that the candidates themselves were striving to become. After scoring themselves on their self-perceived soccer competence, the candidates were asked to give reasons, with respect to technique and tactics, physical fitness as well as other considerations, for why they scored themselves the way they did in a free response segment.

### 2.3. Findings

After categorizing the answers to the free response segment, it was found that technique, as used by college soccer players in evaluating soccer competence, comprises such elements as passing (kicking) skill and ball stopping skill, both predicated on skills relating to controlling the ball,

dribbling, heading and tackling. In addition, criteria relating to tactics included situational judgment, a combination of situational awareness and prediction ability, and understanding of tactics. With regards to physical factors, endurance, speed, agility, muscular strength, flexibility, balance and body frame were viewed as criteria relevant to the evaluation of soccer competence. Apart from concentration and mental strength, which is made up of motivation, fighting spirit and tolerance, the other criteria relevant to the evaluation of soccer competence that were raised include attitude towards everyday life, which is made up of personal body management and dietary habits, and communication skill, which comprises leadership.

### 2.4. Selection of items for survey

The abovementioned survey items relating to the various criteria for evaluating competence were drawn up with reference to the answers to the free response segment. Two faculty members specializing in physical education and sports psychology, two postgraduate students with experience competing in and coaching soccer who are majoring in sports psychology and sports sociology respectively, and one postgraduate student with no experience in competing in or coaching soccer who is majoring in psychology in physical education were entrusted with the task of carrying out the selection. The survey items were selected based on the considerations of whether they reflected the various criteria gleaned from the answers to the free response segment, whether they were easy to understand and whether they might bias the answers that were to be recorded. On that note, 60 items that encompass all of the above criteria were finally designated as items for measuring self-perceived soccer competence.

## 3. Main study

### 3.1. Aim

Our aim for the main study was to create a scale capable of quantifying and measuring self-perceived soccer competence based on the 60 items selected in the preliminary study, and examine the reliability and validity of the developed scale.

## 3.2. Methods

### 3.2.1. Participants and questionnaire

Our participants comprised 228 male collegiate players playing in divisions one and two of the Kanto University Football League. Among the responses recorded, after eliminating incomplete and incorrectly filled out surveys, we designated the remaining 206 responses (46 strikers, 86 midfielders and 74 defenders with an average soccer experience of  $13.5 \pm 2.3$  years, making for an effective response rate of 90.3%) as our analysis set. The implementation of the survey saw the authors of this study travelling down to the various participating universities to briefly explain the aims and other details of the survey. The average candidate took approximately ten minutes to complete the questionnaire. In the questionnaire, the candidates were first asked to fill out their soccer experience, position and the categories to which their clubs belonged on the cover sheet. As with the preliminary study, candidates were then requested to score themselves on their self-evaluated soccer ability based on the assumption that the ideal soccer player would be awarded the maximum score of 100 points. The responses to the self-evaluated ability segment were used as a criterion variable to verify whether results attained through the scale developed for this study reflect the soccer ability evaluated by the soccer players themselves.

Next, to create a scale capable of quantifying self-perceived soccer competence, a survey was conducted using a questionnaire titled “Self-perceived competence as a soccer player” that was based on the 60 items selected in the preliminary study. At the top of the questionnaire, candidates were instructed to “consider how well each of the following items applies to you as a soccer player and circle the corresponding number” and asked to give their responses based on a seven-point rating scale (with “7” being “applies to me perfectly” and “1” being “does not apply to me at all”).

### 3.2.2. Statistical processing

For the items concerning self-perceived soccer competence, exploratory factor analysis using the principal factor method and Promax rotation was carried out to examine the factor solution based on the criteria of the damping condition and constructability of the eigenvalues, and items with a factor loading of .50 and above in terms of absolute value were designated

as factor-related items. In addition, to examine the reliability of the respective factors, Cronbach's  $\alpha$  coefficient was calculated for each of the factors. The validity of the analysis model suggested by the exploratory factor analysis was ascertained by a confirmatory factor analysis. The unweighted least squares method was used as the estimation method of the confirmatory factor analysis, and the goodness of fit for the model and data was evaluated using the GFI (goodness of fit index) and AGFI (adjusted goodness of fit index).

The total scores of each of the factor-related items relevant to self-perceived soccer competence and total score across all items, which were obtained using the above analyses, were calculated as the scores for each subscale and the total score across all subscales. During the course of these calculations, reverse-scored items were analyzed by being reverse processed and scored. Next, to examine the relationship between the soccer ability scores (out of a possible hundred) and the scores obtained using the scale developed for this study, the soccer ability scores obtained were categorized into a high-scoring group, an average-scoring group and a low-scoring group using the mean  $\pm 1/2$  SD method. Then, to comparatively analyze the self-perceived competence of the players belonging to each group, after using one-way analysis of variance to validate the mean values of the scores for each subscale and the total score across all subscales, Bonferroni's multiple comparison was conducted for the total and subscale scores that registered a statistically significant difference between the groups. The analysis was conducted using PASW18.0 and Amos18, and the threshold for statistical significance was set at 5%.

## 3.3. Results

### 3.3.1. Extraction and naming of factors

The exploratory factor analysis yielded 14 factor solutions. However, three items that constituted factors but lacked constructability with regards to inter-item relation, two items that were judged to be ambiguous in terms of constructability and two items that showed a higher factor loading than the other factors were eliminated. In addition, 14 items that showed a low factor loading of less than .50 in terms of absolute value with respect to any factor and one item that showed a factor loading of .50 and above in terms of absolute value with respect to two factors



were also eliminated. When the factor analysis was reattempted after eliminating these 22 items, ten factor solutions were obtained. However, because the Cronbach's  $\alpha$  coefficient, which illustrates the internal consistency of a factor, for the tenth factor was a low .59, one item that was discovered to improve the

$\alpha$  coefficient to .67 when eliminated was removed. The factor analysis conducted following that saw ten factor solutions being extracted in the end, with all the factors registering an  $\alpha$  coefficient of .65 and above. The values for the factor patterns and inter-factor correlation are shown in **Table 1**.

**Table 1** Factor analysis results of soccer competence scale and reliability coefficients of subscales

Item	Factor									
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
<b>F1 Situationally specific passing and ball control skill (<math>\alpha = .90</math>)</b>										
34 Able to stop the ball in a position that makes the next play easier	.888	-.081	.068	-0.05	.053	-.129	-.026	.049	-.192	.199
51 Able to control the ball even in the case of a strong pass	.808	-.093	.053	.124	.035	-.002	-.159	.103	-.013	-.047
18 Able to stop the ball properly even when marked by other players	.759	-.080	.179	.080	-.055	-.027	-.008	.022	-.010	-.011
13 Often makes mistakes when passing (R)	-.744	-.101	.176	-.025	-.040	-.035	-.093	.259	.114	.086
1 Able to control the ball properly even when moving	.680	.000	.205	-.014	-.042	-.003	.073	.005	-.036	.016
3 Remains situationally aware while making a play	.667	.157	-.166	.008	.054	-.043	.108	-.043	.064	-.065
46 Maintains a wide field of vision while making a play	.662	-.071	.093	-.091	-.071	.062	.119	-.124	.145	.000
16 Always makes the current play with the next play in mind	.603	.266	-.116	-.082	-.089	-.001	.034	.240	.079	-.160
28 Able to make strong and accurate short passes	.527	-.134	-.008	-.011	.005	.236	-.144	.052	.175	.107
<b>F2 Speed (<math>\alpha = .93</math>)</b>										
15 Confident with short-distance sprints	.022	.950	-.022	-.058	-.073	.041	-.032	.068	.048	.022
49 Nimble-footed	.014	.900	.069	-.054	.051	.046	.034	-.008	-.022	.034
19 Able to shake off opponents using one's speed	-.005	.830	.168	-.065	.040	.016	-.094	.043	.088	-.004
4 Superior in terms of physical ability	-.017	.607	-.016	.189	-.002	.047	-.016	-.012	-.008	.314
<b>F3 Dribbling skill (<math>\alpha = .89</math>)</b>										
43 Able to dribble past opponents	-.059	.146	.857	.002	.027	.007	-.072	.066	.036	-.065
25 Superior in terms of dribbling technique	.140	-.114	.834	-.025	-.011	.035	.005	-.030	-.051	-.019
57 Able to take the initiative and be a good playmaker all by oneself	.027	.145	.746	-.017	-.012	-.024	.053	-.122	.055	.079
2 Good at feinting to deceive the opponent while dribbling	.039	.076	.728	.108	.003	-.074	.083	-.035	-.012	-.122
<b>F4 Physical strength (<math>\alpha = .86</math>)</b>										
26 Thin and frail in terms of body frame (R)	-.047	-.004	.038	-.973	.007	.128	-.017	.142	.060	.194
40 Does not stumble when clashing with opponents	-.097	-.095	.093	.755	.023	.058	.027	.122	.135	.101
8 Does not fall down even when tackled by opponents	-.098	-.031	.009	.717	-.012	-.012	-.005	.082	.192	.139
52 Good form with a strong core	.225	-.025	.045	.641	-.008	.195	.007	.107	-.034	.015
<b>F5 Endurance (<math>\alpha = .88</math>)</b>										
55 Poor stamina (R)	.006	-.016	.076	-.063	-.940	.151	.033	.079	.053	-.062
44 Has the stamina to run continuously for 90 minutes	-.032	.020	.009	-.043	.835	-.070	.083	.081	.057	.051
36 Maintains a high physical output during matches	-.003	-.030	.100	-.034	.765	.165	-.068	.050	.070	-.154
<b>F6 Defending skill (<math>\alpha = .76</math>)</b>										
7 Able to see through feints employed by the opponent	-.007	.068	.007	-.083	-.127	.790	-.070	-.023	-.053	-.025
38 Confident with defending one-on-one	-.164	-.019	.055	.176	.004	.722	.098	-.032	-.008	.061
54 Often dribbled past (R)	-.117	-.195	.140	-.231	-.034	-.653	.049	.135	.047	.083
27 Good at anticipating the opponent's passes and plays	.075	-.162	-.001	-.313	.117	.561	.118	.002	.057	.048
<b>F7 Leadership (<math>\alpha = .85</math>)</b>										
56 Able to motivate the team to achieve its goals	-.023	-.042	.099	-.005	-.050	-.068	.858	.070	.044	.064
22 Able to bond the team as one	.017	-.079	.000	.040	-.016	.021	.822	.007	-.073	.051
32 Able to give tailored advice to teammates	.172	.057	-.078	.024	.098	.069	.591	.097	.051	-.051
<b>F8 Motivation (<math>\alpha = .72</math>)</b>										
14 Participates actively in training sessions and matches	.167	-.003	-.122	.028	.037	-.027	-.080	.853	-.150	.042
39 Strong desire to win for both practice and actual matches	-.147	.100	.024	.030	-.006	-.056	.236	.671	-.027	-.137
<b>F9 Long kick skill (<math>\alpha = .75</math>)</b>										
20 Able to make many kinds of kicks	.292	.029	.056	-.073	.000	-.185	-.044	-.076	.699	.016
9 Good at making long passes	.100	-.024	-.194	.113	-.004	-.056	.036	-.055	.695	.045
<b>F10 Heading skill (<math>\alpha = .67</math>)</b>										
23 Superior in terms of jumping ability	.045	.238	.061	-.033	.042	-.036	.042	-.086	-.163	.792
33 Confident with heading	-.063	.035	-.190	-.003	-.053	.008	.048	-.004	.101	.664
Inter-factor correlation	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
F1	-	-.114	.254	-.185	.119	.035	.305	.146	.371	-.053
F2		-	.407	.264	-.003	.081	-.071	-.045	-.069	.308
F3			-	.004	.009	-.107	-.022	.034	.028	.028
F4				-	.003	.340	.094	.267	.184	.499
F5					-	.312	.214	.343	-.042	.046
F6						-	.352	.295	.057	.385
F7							-	.236	.342	.235
F8								-	.220	.247
F9									-	.189
F10										-

(R): Reverse-scored item

The first factor included four items related to one's skill for stopping the ball, such as being "able to control the ball even in the case of a strong pass," and two items related to passing skill, such as "able to make strong and accurate short passes." Furthermore, because three items related to situational awareness and anticipation ability, such as "remains situationally aware while making a play" and "always makes the current play with the next play in mind," were also included in the factor, the first factor was named "situationally specific passing and ball control skill" ( $\alpha = .90$ ). As the second factor comprised four items related to speed, such as "confident with short-distance sprints" and "able to shake off opponents using one's speed", it was named "speed" ( $\alpha = .93$ ). As the third factor comprised four items related to dribbling skill as represented by "superior in terms of dribbling technique," it was named "dribbling skill" ( $\alpha = .89$ ). As the fourth factor comprised four items related to physical strength, such as "thin and frail in terms of body frame" and "does not stumble when clashing with opponents," it was named "physical strength" ( $\alpha = .86$ ). As the fifth factor comprised three items related to physical output during matches as represented by "has the stamina to run continuously for 90 minutes," it was named "endurance" ( $\alpha = .88$ ). As the sixth factor comprised four items related to gaining control of the ball while on the defense, such as "confident with defending one-on-one," it was named "defending skill" ( $\alpha = .76$ ). As the seventh factor comprised items related to the actualization and continuation of team goals, such as "able to bond the team as one," and items related to peer advice, such as "able to give tailored advice to teammates," it was named "leadership" ( $\alpha = .85$ ). As the eighth factor

comprised the two items "participates actively in training sessions and matches" and "strong desire to win for both practice and actual matches" and showed a high factor loading for items related to motivation and fighting spirit, it was named "motivation" ( $\alpha = .72$ ). As the ninth factor comprised two items related to long kick skill, such as "good at making long passes," it was named "long kick skill" ( $\alpha = .75$ ). As the tenth factor comprised items related to heading strength, such as "confident with heading" and "superior in terms of jumping ability," it was named "heading skill" ( $\alpha = .67$ ). In addition, the total score across all the subscales ( $\alpha = .79$ ) was calculated by summing up the scores for each of the subscales.

Next, a confirmatory factor analysis of the factor structure obtained from the exploratory factor analysis yielded a GFI of 0.922 and AGFI of 0.906.

### 3.3.2. Relationship between total & subscale scores and soccer ability scores

The differences between the total score across all subscales and the scores for each subscale for each of the three groups, which were divided up based on the soccer ability scores obtained, were examined. The examination saw statistically significant differences recorded for the total score across all subscales and the scores of four subscales, namely, "situationally specific passing and ball control skill," "leadership," "defending skill" and "heading skill" (see **Table 2**). When a multiple comparison conducted on the scores that registered statistically significant differences, the high-scoring and average-scoring groups registered significantly higher scores than the low-scoring group with respect to the total score across all subscales. With respect to the subscale scores of

**Table 2** Scoring comparison of subscales and overall total based on soccer ability scores obtained

Subscale	High-scoring group	Average-scoring group	Low-scoring group	F value	Multiple comparison results
	(n = 49)	(n = 95)	(n = 62)		
F1 Situationally specific passing and ball control skill	38.3±5.7	36.2±7.1	32.0±8.7	10.81**	High-scoring, Average-scoring > Low-scoring
F2 Speed	15.6±6.4	14.6±6.1	13.4±6.4	n.s.	—
F3 Dribbling skill	15.4±4.8	14.5±4.5	13.7±5.6	n.s.	—
F4 Physical strength	16.0±5.5	16.3±4.7	15.6±5.6	n.s.	—
F5 Endurance	13.1±4.3	13.5±3.8	11.9±5.2	n.s.	—
F6 Defending skill	16.8±4.0	15.9±3.7	14.3±4.0	6.07**	High-scoring, Average-scoring > Low-scoring
F7 Leadership	13.8±3.0	12.3±3.2	11.2±3.0	9.69**	High-scoring > Average-scoring, Low-scoring
F8 Motivation	11.0±2.2	10.9±1.9	11.0±2.3	n.s.	—
F9 Long kick skill	8.7±2.1	8.5±2.4	7.9±2.8	n.s.	—
F10 Heading skill	8.0±3.2	7.4±2.7	6.6±2.2	3.55**	High-scoring > Low-scoring
Overall total	156.7±18.5	150.2±16.6	137.7±22.4	14.89**	High-scoring, Average-scoring > Low-scoring

\*\* $p < .01$ , n.s.: not significant

“situationally specific passing and ball control skill” and “defending skill,” the high-scoring and average-scoring groups registered significantly higher scores than the low-scoring group. In addition, with respect to “leadership,” the high-scoring group registered a significantly higher score than the average-scoring and low-scoring groups. Finally, with respect to “heading skill,” only the high-scoring group registered a significantly higher score as compared to the low-scoring group.

### 3.4. Discussion

The following segments detail how the reliability and validity of the scale developed was examined.

#### 3.4.1. Reliability

The internal consistency coefficient for each factor is as follows: .90 for “situationally specific passing and ball control skill,” .93 for “speed,” .89 for “dribbling skill,” .86 for “physical strength,” .88 for “endurance,” .76 for “defending skill,” .85 for “leadership,” .72 for “motivation,” .75 for “long kick skill,” .67 for “heading skill” and .79 for the total score across all subscales. As all factors with the exception of “heading skill” registered a high level of reliability of .70 or higher, and even the .67 recorded for “heading skill” has been judged to be a level of fair consistency in other research (Kato & Ishii, 2003), the internal consistency coefficients recorded were judged to be within the acceptable range.

#### 3.4.2. Content Validity

The soccer competence scale comprises such factors as “situationally specific passing and ball control skill,” “speed,” “dribbling skill,” “physical strength,” “endurance,” “defending skill,” “leadership,” “motivation,” “long kick skill” and “heading skill.”

Experts are of the view that soccer is based upon technique, tactics and physical fitness, which are in turn supported by mental toughness, such as motivation (Ooft, 1994; Kinoshi, 1999). In addition, the coaching guideline published by the Japan football association in 2010 also outlined technique, decision-making (understanding of the game and intelligence gathering), communication (relationships), fitness (physical and mental) as necessary requirements of soccer players. We believe that the scale developed for this study adequately covers the dimensions of technique, tactics, physical fitness and mental strength

as outlined by the above sources.

With regards to technique, specific indicators such as dribbling technique, striking technique using one’s feet (or head), one’s technique for receiving the ball and tackling technique (Worthington, 1980), and with regards to tactics, specific components such as understanding of tactics, decision-making ability (Ooft, 1994) have been raised. Keeping this in mind while we consider the factors constituting the scale developed for this study, we can raise “dribbling skill,” “long kick skill” and “heading skill” as factors relating to technique, and “leadership” as a factor relating to tactics. In addition, because it is believed that one’s ability to utilize tactics in accordance to one’s surroundings and circumstances improves as one becomes better able to freely control the ball (Takii, 1995), we can consider “situationally specific passing and ball control skill” and “defending skill” as factors relating to both technique and tactics.

With regards to physical fitness, specific indicators such as endurance, muscular strength, speed and flexibility have been outlined (Worthington, 1980; Weineck, 2002). As the scale developed for this study included “endurance,” “speed” and “physical strength” as factors related to physical fitness, we believe that, with the exception of flexibility, it reflects the physical fitness expected of a soccer player. While the exclusion of flexibility remains an issue to be resolved, because Worthington (1980) described the importance of flexibility based on its relationship with demonstrated power, the evaluation of flexibility can be seen to have been reflected by the subscale scores of “speed” and “physical strength” obtained using the scale developed for this study.

Ooft (1994) asserted that the rate of progress for training, mastery and match results are influenced heavily by whether one’s motivation is strong or weak. As can be understood from this, with regards to mental toughness, specific indicators such as motivation, which form the foundation for improving and actualizing one’s competitive ability, can be raised. While the aspiration and persistence have been cited as specific components of such motivation (Worthington, 1980), because the subscale factor “motivation” measures motivation and fighting spirit, the aspect of motivation can be considered to have been reflected by the scale developed for this study.

To sum up, the self-perceived soccer competence scale developed for this study was judged to satisfactorily encompass the necessary indicators for

measuring the competitive ability of soccer players.

### 3.4.3. Criterion-referenced validity

When a comparative examination of the three groups, which were divided up based on the soccer ability scores obtained, with respect to the total score across all subscales was conducted, players in the high-scoring group registered a significantly higher score than players in the low-scoring group. This means that there is a relationship between the soccer ability scores obtained from the players, which are used as a criterion variable, and the total score across all subscales, and suggests that the total score across all subscales reflects the soccer ability scores obtained from the players.

When a more detailed examination was conducted using the subscale scores, the average scores for each subscale were higher for the high-scoring group as compared to the low-scoring group, with the high-scoring group registering significantly higher scores for “situationally specific passing and ball control skill,” “leadership,” “defending skill” and “heading skill.” However, the difference between the groups was statistically insignificant with regards to “speed,” “dribbling skill,” “physical strength,” “endurance,” “motivation” and “long kick skill.”

Worthington (1980) suggested a six-stage process with regards to learning soccer skills based on (1) motivation, (2) basic movements, (3) physical fitness, (4) individual ball technique, (5) group skill and (6) team skill, with the earlier stages laying the foundation for the realization of the later stages. In particular, he mentioned cooperation and the application of tactics as the key elements of the sixth stage—team skill. Considering this process for learning soccer skills, among factors that registered a statistically significant difference between the two groups, “heading skill” corresponds to individual ball technique, and “situationally specific passing and ball control skill” and “defending skill” to not only individual ball technique, but also group skill, one of the later stages. In addition, “leadership” corresponds to team skill, the final stage. On the other hand, among factors that did not register a statistically significant difference, it may be observed that “motivation” corresponds to motivation, “speed,” “physical strength” and “endurance” to physical fitness, and “dribbling skill” and “long kick skill” to individual ball technique. In other words, with regards to the process for learning soccer skills, the subscale

scores reflecting the stages after “(4) individual ball technique” were significantly higher for the high-scoring group as compared to the low-scoring group, while the subscale scores reflecting the stages from “(1) motivation” to “(4) individual ball technique” failed to register statistically significant differences.

As the participants surveyed for this study are soccer club members from universities that make up the Kanto University Football League who participate in club activities six times a week, it may be assumed that even players belonging to the low-scoring group would have the same extent of soccer technique as players belonging to the high-scoring group with respect to the first half of the process for learning soccer skills. Therefore, for the subscales corresponding to stages in the process up until “(4) individual ball technique,” “motivation,” “speed,” “physical strength,” “endurance,” “dribbling skill” and “long kick skill,” statistically significant differences were not recorded. The only subscale relating to individual ball technique for which the high-scoring group recorded a significantly higher score than the lower-scoring group was “heading skill.” It may be conjectured that the reason for this is that, as suggested by Koshiyama et al. (2004), the peculiarity inherent in heading, or striking the ball with one’s head, and the increased need for balls high enough to go over the heads of the tightly grouped defense guarding the goal, reflect the importance of tactics for heading skill in modern soccer that goes beyond just individual ball technique.

As there is a statistically significant difference between the high-scoring and low-scoring groups with respect to the total score across all subscales, possibly owing to the disparity in competence with respect to the later stages of the process for learning soccer skills, the criterion-referenced validity of the scale developed was considered verified.

### 3.4.4. Construct validity

The confirmatory factor analysis yielded a GFI of 0.922 and AGFI of 0.906. While a GFI of 0.900 and above is taken as the criteria for model adoption (Oishi & Tsuzuku, 2009), it has been put forth that in the event that the AGFI is markedly lower than the GFI, it is difficult to pronounce the model a good one (Toyoda, 1992). As the GFI and AGFI obtained for this study are both higher than 0.900, the goodness of fit between the model and data was judged to be good.



#### 4. Conclusion and future research issues

In this study, we first conducted a preliminary study in which the criteria used by college soccer players to evaluate soccer competence was elucidated using a paper-based questionnaire that incorporated a free response segment, following which survey items that reflected the various criteria raised were drawn up and selected. In the main study that followed, with the aim of developing a scale capable of quantifying and measuring self-perceived soccer competence, a multiple-choice questionnaire was drawn up based on the survey items selected in the preliminary study and administered with players belonging to the Kanto University Football League as the survey candidates. The scale developed comprised “situationally specific passing and ball control skill,” “speed,” “dribbling skill,” “physical strength,” “endurance,” “defending skill,” “leadership,” “motivation,” “long kick skill” and “heading skill.” These factors can be considered to satisfactorily encompass the necessary indicators for measuring the self-perceived competitive ability of college soccer players. Furthermore, as the  $\alpha$  coefficients for all factors and the total across all subscales of the scale developed either matched or exceeded the reference value, the internal consistency of the new scale was validated. In addition, the goodness of fit between the model and data for the new scale was good, and it was observed that, with respect to the total score across all subscales and the subscale scores for “situationally specific passing and ball control skill,” “leadership,” “defending skill,” which correspond to the later stages of the process of learning soccer skills, and “heading skill,” which represents an important though peculiar element of individual ball technique, the high-scoring group, which was categorized as such based on the criterion variable of soccer ability scores obtained, registered higher scores than the low-scoring group.

In conclusion, as the reliability, content validity, criterion-referenced validity and construct validity of the new scale developed for this study were verified, the study indicates the possibility of accurately quantifying and measuring the self-perceived competence of soccer players using a multi-dimensional approach that incorporates multiple perspectives.

However, future issues to be resolved were also uncovered during the course of this study. Among the subscales of the self-perceived soccer competence

scale developed for this study, “motivation,” “long kick skill” and “heading skill” were constituted by only two items. As it is acknowledged that a survey item number of four items per factor is ideal for simple scales with few items (Jackson & Marsh, 1996), there is a need for further investigation into these subscales. In addition, subscales relating to psychological factors were limited to “leadership” and “motivation” for this study. Apart from these subscales, psychological competitive abilities regarded as necessary for sportspeople include self-control, such as keeping one’s emotions in check, and the ability to relax, which helps one fend off mental turmoil, have been raised (Tokunaga, 2003). Therefore, with regards to subscales relating to psychological factors, we believe that there is a need for reinvestigation after adding survey items that are capable of reflecting such abilities.

#### References

- Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. *Human Development*, 21:34-64.
- Harter, S. (1982). The perceived competence scale for children. *Child Development*, 53:87-97.
- Ito, T. (1987). Effects of attributional style and perceived physical competence on sport behavior: An examination of causal attribution model about sport behavior of university students. *Japan Journal of Physical Education, Health and Sport Sciences*, 31:263-271. (in Japanese).
- Jackson, S. & Marsh, H. W. (1996). Development and validation of a scale to measure optimal experience: The flow state scale. *Journal of Sport and Exercise Psychology*, 18:17-35.
- Kato, H. & Ishii, M. (2003). A study of junior high school-aged soccer players’ psychological stress responses in their daily lives. *Japanese Journal of Sport Psychology*, 30:9-26. (in Japanese).
- Kinoshi, K. (1999). Three-dimensional soccer performance. *Soccer clinic* 2:44-47., *Baseball Magazine* Sha: Tokyo (in Japanese).
- Klint, K. A. & Weiss, M. R. (1987). Perceived competence and motives for participating in youth sport: A test of Harter’s competence motivation theory. *Journal of Sport Psychology*, 9:55-65.
- Koshiyama, K., Yoshimura, M. & Koga, H. (2004). Case study on jump heading instruction. *Journal of Hokkaido University of Education (Education)*, 54:145-152. (in Japanese).
- Nishimura, A., Ono, T., Nuno, K. & Nakayama, M. (2010). JFA U-14 Coaching Guideline. Japan Football Association: Tokyo. p.12. (in Japanese).
- Oishi, N. & Totake, H. (2009). Data analysis with Amos -use structural equation analysis easily-. Tokyo Toshoh: Tokyo, p.196. (in Japanese)
- Okazawa, Y., Kita, M. & Suwa, Y. (1996). Factorial structure of physical competence and its developmental tendency and sex difference. *Japanese Journal of Sport Education Studies*, 16:145-155. (in Japanese).
- Ooft, H. (1994). Coaching -Hans Ooft’s soccer-. (Translated

- by Y. Ohara,) Shogakukan: Tokyo, pp.36-37, p.80, p.113. (in Japanese).
- Sakurai, S. (1983). Development of the Japanese edition of the Harter's perceived competence scale for children. Japanese Journal of Educational Psychology, 31:60-64.
- Sugihara, T. (2003). Psychology of motor learning and motivation. Taishukan: Tokyo, p.138. (in Japanese).
- Sasakawa Sports Foundation. (2008). Sports life Data 2008. Sasakawa Sports Foudation: Tokyo, 2009, p.26. (in Japanese).
- Sasakawa Sports Foundation. (2010). Teenager's Sports life Data 2010. Sasakawa Sports Foudation: Tokyo, p.29. (in Japanese).
- Takii, T. (1995). Tactics of world soccer. Baseball Magazine Sha: Tokyo, pp.30-31. (in Japanese).
- Tokunaga, M. (2003). Mental toughness training. Taishukan: Tokyo, p.46. (in Japanese).
- Toyoda, H. (1992). Structual equation analysis with SAS. University of Tokyo Press: Tokyo, pp.99-118. (in Japanese).
- Vander, A. Y., Bakker, F., Biddle, S, Durand, M., & Seiler, R. (2006). Psychology for physical educators. (Translated by Sport Social Psychology Study Group) Taishukan: Tokyo, pp56-57. (in Japanese).
- Weineck, J. (2002). Optimal football training. (Translated by H.Togari, S. Yatsubayashi) Taishukan: Tokyo, p.15. (in Japanese).
- White, R. W. (1959). Motivation reconsidered: The concept of competence. Psychological Review, 66:297-333.
- Worthington, E. (1980). Teaching soccer skill. Henry Kimpton: London, p.13, p.24.



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