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The Scale of Observing the Opponent in Sport: Validity and Reliability Study

Sporda Rakibi Gözlem Ölçeği: Geçerlik ve Güvenirlik Çalışması

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ABSTRACT

This study aimed to develop a valid and reliable measurement tool, the Scale of Observing the Opponent in Sport (SRAS), to identify focal points athletes consider when observing their competitors. Combining qualitative and quantitative steps, the scale's development included focus group interviews, essay writing, expert review (Lawshe technique), assumption analyses, and exploratory and confirmatory factor analyses. The initial 36-item pool was expanded to 46 items based on expert feedback, and a 5-point Likert-type (5=Always, 1=Never) trial form was administered to 508 active athletes. Exploratory Factor Analysis (EFA) revealed a 4-factor, 30-item structure, subsequently confirmed through Confirmatory Factor Analysis (CFA) on 491 observations. Factors were named based on literature review: "Tactics-Strategy" (n=6, α=.86), "Communication" (n=5, α=.73), "Technical-Physical" (n=11, α=.92), and "Image" (n=8, α=.86). The overall scale demonstrated high reliability (α=.93), and the explained variance ratio was 55.941%. Despite abundant research on athlete motivation, the lack of instruments measuring critical observation factors underscores this study's significance. The SRAS fills this gap, providing a valid and reliable tool to assess observation levels in active athletes, potentially contributing to performance enhancement strategies and talent identification.

Keywords: Observation, opponent, athlete, validity, reliability

ÖZ

Bu araştırmanın amacı, sporcuların rakiplerini gözlemlerken dikkate aldıkları özellikleri belirleyerek odak noktalarını tespit eden geçerli ve güvenilir bir ölçme aracı geliştirmektir. Lawshe tekniği ile hazırlanan ölçeğin aday formunda niteliksel adımlar kapsamında odak grup görüşmeleri ve kompozisyon yazdırma, niceliksel adımlar kapsamında sayıltı analizleri ile geçerlik ve güvenirlik analizlerine yer verilmiştir. Uzman görüşleri sonrası 36 maddelik madde havuzu 46 maddeye ulaşmış ve 5'li Likert tipi (5=Her Zaman, 1=Hiçbir Zaman) denemelik form 508 aktif sporcuya uygulanmıştır. Açımlayıcı Faktör Analizi (AFA) ile 4 faktörlü 30 maddelik yapı elde edilmiş ve 491 gözlem ile Doğrulayıcı Faktör Analizi (DFA) uygulanmıştır. Faktör isimlendirmeleri literatür ışığında yapılmış, Cronbach alfa iç tutarlık katsayıları; "Taktik-Strateji" (n=6) için .86, "İletişim" (n=5) için .73, "Teknik-Fiziksel" (n=11) için .92 ve "İmaj" (n=8) için .86, ölçeğin tamamı için .93 olarak hesaplanmıştır. Açıklanan varyans oranı %55.941'dir. Sporcu motivasyonu üzerine birçok çalışma yapılmış olmasına rağmen, gözlem yaparken hangi faktörlerin önemli olduğunu ölçen bir çalışmaya rastlanmaması bu çalışmanın önemini vurgulamaktadır. Bu araştırma, sporcu gözleminde dikkate alınması gereken faktörleri belirlemeyi amaçlamaktadır. Elde edilen sonuçlar, Sporda Rakibi Gözleme Ölçeği'nin (SRGÖ) geçerli ve güvenilir olduğunu kanıtlamıştır

Anahtar Kelimeler: Gözlem, rakip, sporcu, geçerlik, güvenirlik

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Introduction

Sport is widely recognized as a complex phenomenon encompassing a range of positive and negative emotions, including competition, excitement, success, and failure. From the perspective of athletes, sport represents a mental, physical, and tactical endeavor aimed at competing and achieving victory. Conversely, for spectators, sport is often viewed as an artistic process that elicits excitement and engagement. In a broader context, sport is a scientific formation, developed and sustained through disciplines such as anatomy, orthopedics, physiology, biomechanics, and psychology (Fişek, 1985). Sport is further characterized by its creation of a complex, multi-layered network involving competition, support, conflict resolution, and the establishment of new connections, resulting in a wide array of interpersonal relationships (Izquierdo, & Anguera, 2021). Within the emotionally charged context of sport, athletes employ various strategies to achieve success, one of which may involve observing the behavior and performance of their opponents. Both athletes and coaches can potentially glean valuable insights about their opponents through careful observation.

Observation plays a crucial role in our perception of the world around us. Athletes, like all individuals, engage in both voluntary and involuntary observation. In the realm of sports, particularly at the professional level, opponent observation is a critical determinant of performance. Athletes must instantaneously react to stimuli from both central and peripheral vision to effectively observe their opponents (Asar et al., 2022). The capacity to accurately perceive and interpret opponent movements is essential in dynamic sports where player interactions are contingent upon opponent behavior and situational context (Sands et al., 2017). However, coaches and athletes may prioritize different aspects when observing their opponents. Professional and expert athletes rely on perceiving their opponents' body kinematics for precise predictions, whereas expert observers, such as coaches, focus more on the opponent's initial positioning (Makris & Urgesi, 2015). This discrepancy may stem from coaches' greater emphasis on technical and tactical dimensions. The ability to observe movement encompasses concepts related to observing a person or a similar model, either live or via video, who successfully executes the desired motor skill (Neuman & Gray, 2013). Beyond these factors, athletes may glean valuable insights from observing an opponent's attitude and behavior before and after competition, reactions to the opponent and referee, facial expressions, relationships with their environment, and popularity. In essence, the athlete engages in a process of connecting with and analyzing their opponent. All of these facets can be considered as vital to an athlete's success as physical training. Indeed, most athletes exhibit a strong desire to know their opponents and their characteristics in advance. This underscores the importance of gathering information about opponents through observation. It evokes Heider's attribution theory, which posits that individuals attribute their success or failure to four factors: ability, effort, luck, and task difficulty. These factors can be examined through three dimensions: locus of control (internal or external), stability (permanent or variable), and controllability (controllable or uncontrollable). Athletes tend to attribute success or failure to specific situations. For athletes, factors beyond an opponent's technical and tactical attributes, such as deceptive tactics, physical characteristics, and mental state, can offer crucial clues about their own potential for success. Therefore, an athlete who fails to gather sufficient information about their opponent through observation may encounter obstacles on their path to victory.

The purpose of observation extends beyond merely focusing on the opponent's visible characteristics. In competitive sports, opponents may employ deceptive tactics or conceal their movements to mislead observers, thereby reducing available information and increasing the likelihood of prediction errors (Urgesi et al., 2011). Consequently, misleading behavior in observation can be considered commonplace. Understanding both prosocial (e.g., congratulating the opponent) and antisocial (e.g., feigning injury) behaviors of opponents is crucial in sports contexts (Kavussanu et al., 2006). The social environment, including opponents, significantly influences athletes' goal setting, strategy selection, emotion management, and self-reflection at various performance stages (Sakalidis et al., 2022). Anticipating opponents' movements is a vital skill in sports. Research suggests that combining visual-perceptual training with motor practice of observed patterns can enhance an athlete's ability to read opponents, particularly in striking sports (Brenton et al., 2019). Furthermore, in sports with frequently changing opponents, adaptability in visual search behavior is associated with skill level, emphasizing the importance of adjusting to different adversaries (Rosker & Rosker, 2021).

The observation of opponents in sports encompasses a complex interaction of visual cues, body kinematics, and social dynamics, all of which significantly impact athletes' performance and decision-making processes. A comprehensive understanding and analysis of opponents' behaviors enable athletes to enhance their strategic planning, anticipation skills, and overall performance in competitive settings. The Scale of Observation of Opponents in Sport (SRAS), developed to address

this need, plays a crucial role in advancing athlete success. A review of the existing literature reveals that both athletes and coaches employ various strategies to observe their competitors. However, it has been identified that there is a lack of a standardized measurement tool that assesses the specific characteristics of opponents that athletes focus on and the levels at which these observations occur. Addressing this gap in sport psychology provided the primary motivation for the present study. Accordingly, the objective of this research is to develop a valid and reliable instrument to identify the factors that athletes prioritize when observing their opponents, as well as to determine which aspects are given more or less attention.

Methods

This study aimed to ascertain the factors that athletes prioritize when observing their competitors, specifically delineating which features are given greater emphasis and which are less underscored. To achieve this, the study endeavors to construct a valid and reliable measurement instrument. An ordinal summation scaling approach, anchored in subject responses, was employed for this purpose. The present study, in which the scaling approach through graduated sums was used among the approaches based on subject responses, was conducted as a basic research. This approach facilitates the extraction of inferences from the participants' responses, enabling a more nuanced comprehension of their observational focus. Within the context of this foundational research, the ranked sums scaling method was utilized to evaluate the athletes' responses. This approach allowed the athletes not only to furnish responses but also to interpret the inferences derived from these responses. The respondent-centered scaling approach, as elucidated by Crocker (2012), was adopted as a benchmark, utilizing ranked sums based on subject responses to ensure a rigorous appraisal of the observed features. Ethics committee approval for this study was obtained from Hatay Mustafa Kemal University, Social and Human Sciences Scientific Research and Publication Ethics Committee (July 04, 2024, Decision No: 07, Issue No: 02). Written consent was obtained from all the participants.

Participants

This investigation, designed to identify the factors prioritized by active athletes when observing their competitors, utilized two distinct study groups. Exploratory factor analysis (EFA) was conducted on the first group, comprising 508 observations from active athletes, to explore and establish the targeted measurement model. Initial data collection for the EFA occurred in July 2024, with voluntary participation from active athletes. Following assumption analyses, the number of valid observations was reduced to 494. The descriptive statistics of these volunteer participants, prior to hypothetical analyses, included: 255 women and 253 men, 296 individual athletes and 212 team athletes, with experience levels ranging from 1-3 years (178 athletes), 4-6 years (101 athletes), 7-9 years (92 athletes), to 10 or more years (137 athletes).

Confirmatory factor analysis (CFA) was subsequently conducted on a second set of observations from 491 active athletes in August 2024, along with assessments of convergent and divergent validity, to further substantiate the construct validity of the scale. The development of the scale form involved meticulous application of various procedural steps to ensure its robustness and accuracy.

Scale Development and Formation of the Candidate Scale Form

The following stages outline the process undertaken to develop the trial and final versions of the scale, incorporating feedback from both experts and athletes.

Stage 1 (Focus Group Interview): This study employed the convenience sampling method, a qualitative research technique that involves selecting participants based on their accessibility and availability to the researcher (Andrade, 2021). Within this framework, focus group interviews were conducted with two distinct groups: five academicians who are experts in the field of scale development, and 20 active athletes. The interviews took place in June 2024, during times that were mutually convenient for all participants. The primary focus of these interviews was to discuss the development of the item pool and the structure of the Likert scale.

Stage 2 (Printing Composition for Target Audience Athletes): To enhance the reliability and validity of the item pool, 35 active athletes (individual and team athletes) were asked to provide written essays on the characteristics they consider when observing their competitors. These essays were analyzed and converted into structured items.

Stage 3 (Literature Review): A comprehensive literature review was conducted to identify relevant studies, such as the "Small Muscle Motor Skills Observation Form" (Toran, 2011) and the "Observational Collective Competence Scale in Sport" by Şenel et al., to provide additional evidence and support for the study. The item pool, developed through qualitative steps,

was then re-evaluated by active athletes and experts and refined into appropriate sentence-based items.

Stage 4 (Content Validity Ratio (CVR) Analysis of the Scale): Following the completion of the relevant phases, the item pool and candidate scale form were finalized. To ensure clarity and applicability, the candidate scale form was read aloud to 10 active athletes, and their feedback was collected. Based on their input, a 36-item trial form was developed. Subsequently, the candidate scale form was distributed to 11 expert academicians for evaluation, both online and in written form. Two key criteria were employed in this evaluation: "Representativeness," which assessed the alignment of the scale items with the theoretical framework, and "Comprehensibility," which evaluated how easily the target audience could understand the items. The experts were requested to provide feedback for both the "Representativeness" and "Comprehensibility" criteria using a 3-point scale: 3 (Good), 2 (Should be improved), and 1 (Bad), along with any additional suggestions or opinions. The form utilized the Lawshe technique for content validity ratio (CVR) calculation, aiming to produce a value within the range of -1 (absolute rejection) to +1 (absolute acceptance), indicative of the degree of agreement among experts regarding the relevance and clarity of each item. The formula for calculating the CVR is presented in Equation 1. The CVR is calculated using the following formula:

CVR=Nu/(N/2) – 1(Equality.1)

Nu represents the number of experts who rated the item as "good." while N represents the total number of experts who evaluated the item. This formula generates a CVR value that ranges from -1 to +1:

A CVR of +1 indicates unanimous agreement among the experts that the item is "good."

A CVR of 0 indicates that only half of the experts rated the item as "good."

A CVR of -1 indicates unanimous agreement that the item is "bad."

If an item receives a CVR of 0 or a negative value, it does not meet the content validity criteria and should be removed from the scale (Ayre & Scally 2014; Lawshe, 1975; Wilson, et al., 2012). In the context of this study, the critical CVR value for 11 experts, at a significance level of α=0.05 was determined to be 0.699 (Lawshe, 1975). This means that items with a CVR below 0.699 did not meet the required content validity threshold. Based on expert feedback, two items failed to meet the content validity criterion (CVR < 0.699). One item was recommended for removal based on expert opinions. Thirteen new items were suggested and added to the trial form. As a result, the initial 36-item form was revised to a 46-item trial form after the expert evaluation and content validity analysis. In addition to the CVR assessment, the experts were also consulted regarding the most appropriate Likert scale format. The consensus was that a 5-point Likert scale (5: Always, 4: Frequently, 3: Occasionally, 2: Rarely, 1: Never) would be the most suitable for this study.

Stage 5 (Administration of the Trial Form to the Target Audience): Following expert review and CVR analysis, the finalized 46-item, 5-point Likert trial form was administered to 508 active athletes through both face-to-face and online methods.

Stage 6 (Exploratory Factor Analysis (EFA) & Confirmatory Factor Analysis (CFA)): The 508 collected observations underwent preliminary assumption analyses to ascertain their suitability for factor analysis. These analyses included checks for missing data, adequacy of the observation set, outliers, multicollinearity, factorability of the correlation matrix (R), normality, and linearity. Subsequently, hypothesis analyses were conducted separately for two distinct sets of observations.

Data Analysis

This study employed exploratory and confirmatory factor analyses as quantitative methods to identify the characteristics athletes consider when observing their competitors and the relative importance of these factors. To evaluate scale reliability, Cronbach's alpha internal consistency values and composite reliability values were calculated. Additionally, preliminary analyses were performed to assess the data's suitability for factor analysis, including determining the number of factors and their loading values.

Regarding sample size adequacy for exploratory factor analysis (EFA), various recommendations exist. Krichbaum et al. (2011) suggest a minimum of 125 participants for a 25-item questionnaire, while Cheong et al. (2017) recommend at least five times as many participants as items. Vielma-Aguilera et al. (2023) propose a minimum of ten participants per item for both EFA and CFA, and Echeverri et al. (2019) suggest a sample size exceeding 500 is sufficient for scale validation using EFA. Considering the 508 observations obtained in the current study, it is concluded that the sample size is adequate based on these recommendations.

Analysis of central tendency measures (mode, median, and mean) for scale items indicated a near-normal distribution due

to their close proximity. Further, outlier detection using Mahalanobis distances and Z scores revealed all Z values fell within the range of -2.91 to 3.27. Adhering to Tabachnick's criteria (-4, +4), no individual outliers were identified within the dataset.

While a Z score range of -4 to +4 is commonly employed to assess multi-item scale structures and identify underlying factors (Vannatta, 2005), Mahalanobis distances were also analyzed to detect multiple outliers. Using the Chi-squared distribution as a benchmark (χ2 46;0,001=86.661), 34 observations exceeding this value were excluded, leaving 474 observations for subsequent analyses.

Acknowledging the potential challenge in achieving perfect linearity for all variables (Kara et al., 2023), the analyses proceeded under the assumption of linear relationships. To assess normality, individual items were examined, revealing close alignment between central tendency measures and skewness/kurtosis coefficients, thus confirming univariate normality (Can, 2018). Skewness values for the 46 items ranged from .149 to -1.282, while kurtosis values ranged from 1.234 to -1.234. These values comfortably fall within the acceptable range for normality (-3.3 to +3.3 for skewness and -7 to +7 for kurtosis) as suggested by Bernstein (2000).

On the other hand, Multicollinearity was evaluated using Tolerance and Variance Inflation Factor (VIF) values. The 46 items yielded Tolerance values between 0.300 and 0.599 and VIF values between 1.731 and 3.326. Only item 35 exhibited Tolerance (0.177) and VIF (5.60) values outside the acceptable range, leading to its exclusion from further analysis. The remaining 45 items, with Tolerance values >0.20 and VIF values <5, indicated the absence of multicollinearity within the dataset.

Type I error may occur in the presence of autocorrelation of the errors expressing the correlation between the error terms that occur at different time points of the model (Jenson et al., 2007). In this context, the Durbin-Watson (D-W) value for all items was calculated as 1.949 and it was concluded that the errors were independent of each other (Kalaycı, 2010).

Furthermore, in assessing the factorability of the correlation matrix (R), a crucial assumption for factor analysis, the Kaiser-Meyer-Olkin (KMO) value was found to be .949 in the "Measurement of Sampling Adequacy Test." Bartlett's Test of Sphericity also indicated that the relationships between items were significantly different from zero. According to the criteria outlined by Hutcheson and Sofroniou (1999) and interpreted by Dağlı (2015), KMO values between 0.5 and 0.7 are considered moderate, 0.7 to 0.8 good, 0.8 to 0.9 very good, and 0.9 and above excellent. The obtained value of 0.949 clearly indicates excellent factorability. The significance of Bartlett's Test of Sphericity (p<.05) further confirms that the relationships within the correlation matrix are meaningful and the structure is suitable for factor analysis (Gürbüz & Şahin, 2014). The high KMO statistic of 0.949 reinforces the conclusion that the matrix is well-factorable. Consequently, the null hypothesis of Bartlett's Test of Sphericity, which posits no significant relationships between items, is rejected (χ2 = 11859.238, p<.05).

Table 1.
Descriptive information about gender, sport category and duration of sportsmanship parameters of participant active athletes

		N	%
Gender	Female	255	50.2
	Male	253	49.8
Sport Category	Individual Sports	296	58.3
	Team Sports	212	41.7
Duration of Sportsmanship	1-3 Years	178	35
	4-6 Years	101	20
	7-9 Years	92	18
	10 Years and over	137	27
Total			100.0

Table 1 shows the descriptive statistics of the participating active athletes. To further establish the construct validity of the Scale of Observing the Opponent in Sport, additional data was collected from 491 active athletes. The analyses aimed to determine estimated error variances, standardized factor loadings, goodness-of-fit criteria, and Cronbach's alpha reliability coefficients for the scale. The 30-item scale, finalized before CFA, was administered to this target group, and the resulting 491 observations were subjected to preliminary assumption analyses, including checks for missing data, linearity, normality, sample size adequacy, and multicollinearity.

Following missing data analysis, central tendency measures (mode, median, and mean) and their relative positions were

evaluated to assess normality. The close proximity of these values indicated univariate normality. Furthermore, analysis of skewness and kurtosis values revealed a generally negative distribution, with skewness values between 0.110 and -1.287 and kurtosis values between 1.227 and -1.319. While the typical range for skewness in univariate normality is ±1 (Göldağ, 2019), values between -3.3 and +3.3 are also considered acceptable (Bernstein, 2000). The obtained results met these criteria, confirming the normality assumption. Outlier analysis was performed using Mahalanobis distances for multiple outliers and Z values for single outliers. Mahalanobis values exceeding the critical value (χ2 30;0,001=59.703) led to the exclusion of 30 observations. Additionally, with Z values ranging between 2.127 and -2.249, no single outliers were detected. Consequently, the subsequent analyses proceeded with the remaining 461 observations.

To assess potential multicollinearity, Variance Inflation Factor (VIF) and Tolerance values were examined. The analysis revealed VIF values ranging from 1.561 to 3.522 and Tolerance values between 0.284 and 0.614. As all Tolerance values exceeded 0.20 and all VIF values remained below 5, the absence of multicollinearity was confirmed. Following these preliminary analyses, and considering Tabachnick's criteria (Tabachnick & Fidell, 2015), the observation set of 461 was deemed suitable for confirmatory factor analysis (CFA). Consequently, CFA was conducted on this dataset, utilizing the 30-item scale form.

Results

Validity Results

The initial dataset for EFA consisted of 508 observations, which was reduced to 474 after preliminary assumption analyses. The explained variance values, indicating the extent to which the sub-dimensions represent the variables in the dataset, ranged from .811 to .465. While values below .10 for these indicators are generally considered problematic, relying solely on numerical thresholds might not be sufficient. To gain further insight into the functionality of the items, additional methods were employed, including the "Scree Plot," "Percentage of Total Variance Method," "Kaiser Method," and "Explained Variance Criterion" (Çokluk et al., 2012). Assuming that a plateau in the scree plot signifies the emergence of a new factor, the region between two points is interpreted as a factor (Kara et al., 2023). Figure 1 illustrates a clear plateau after the 5th point, suggesting a 4-factor structure for the Scale of Observing the Opponent in Sport. The Kaiser Method, which identifies factors with eigenvalues greater than 1, also supports a 4-factor solution. However, the eigenvalue exhibiting a decreasing acceleration from the outset requires further interpretation. To provide a more objective assessment of the main breaking points, the explained variance table is presented below. This table will help clarify the factor structure and address any potential ambiguities.

Figure 1. Slope Inclination Graph

The Percentage of Total Variance method, a statistical criterion employed across various domains, assesses the contribution of individual factors to the overall variance within a dataset. This technique aids in identifying the principal factors, with an additional contribution of less than 5% signaling the attainment of the maximum number of factors (Kalaycı, 2010). Within this context, Table 3 reveals a four-factor structure.

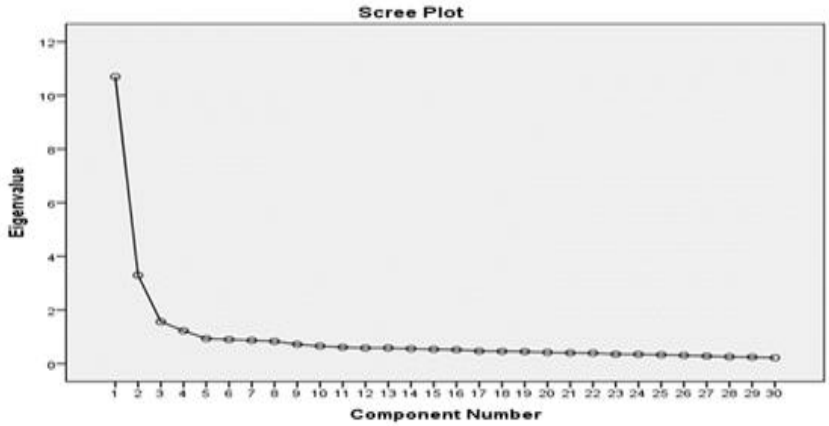

Figure 1. *Slope Inclination Graph*

Table 2
Total Variance Explained

Component	Initial Core Values			Total extraction of squared loads		
	Total	Variance	Cumulative	Total	Variance	Cumulative
1	10.697	35.658	35.658	5.822	19.408	19.408
2	3.295	10.983	46.641	4.149	13.831	33.239
3	1.564	5.215	51.856	3.973	13.243	46.482
4	1.226	4.085	55.941	2.838	9.459	55.941
30	.198	761	100.000			

Considering the explained variance criterion, while Chen et al. (2014) acknowledge that the percentage of explained variance might occasionally fall below the recommended 30% threshold, Büyüköztürk (2018) suggests an ideal ratio of 30% or higher for unidimensional scales. However, in social sciences, a generally accepted range lies between 40% and 60%. In this study, the achieved explained variance of 55.941% is notably favorable. Supporting this perspective, Direktör and Nuri (2019) deemed a 46.3% explained variance acceptable for a single-factor scale. Similarly, Demir (2023) emphasized the significance of exceeding 40% explained variance in social sciences research. Additionally, Büyüköztürk (2012) proposed a minimum of 30% explained variance for scale acceptability.

Therefore, when considering all criteria collectively, the presence of a 4-factor structure is strongly supported. Horn's (1965) parallel analysis, which compares randomly distributed experimental indicators with eigenvalues, further corroborates this 4-factor structure. The analysis, based on the total variance explained table, reveals eigenvalues greater than 1 for four factors, collectively accounting for approximately 56% of the total variance. As detailed in Table 3, factor 1 explains 19.408% of the total variance, factor 2 explains 13.831%, factor 3 explains 13.243%, and factor 4 explains 9.459%. Table 3 also provides a list of items excluded from the analysis along with the reasons for their exclusion.

Table 3.
Exploratory Factor Analysis Item Inferences and Reasons

Communalities<0.30 (Items)	Items with Factor Loadings Below 0.45	Binary Items	Rational Reasons
17-40-44	39-42-45	5-10-14-25-33	16-18-19-35

Following exploratory factor analysis, items 18, 19, 16, and 35 were removed as they failed to form a factor. Additionally, items 17, 40, and 44 were excluded due to communalities values less than 0.30. Items 39, 42, and 45, with factor loading values below 0.45, were also deemed unsuitable. Furthermore, items 5, 10, 14, 25, 31, and 33, exhibiting overlapping characteristics due to factor loading differences less than 0.10, were removed. Consequently, the initial 46-item form was refined to a 30-item, 4-factor structure explaining 56% of the variance. Table 3 presents the final scale structure, including the retained items and their corresponding communality values.

Table 4.
Common Variances, Factor Loadings and Aggregated Factors of The Items

No	Items	Factor 4	Factor 3	Factor 2	Factor 1	Common Factor Variance (h2)
M32	Providing a Pleasure to Watch	.505				.501
M34	Social Media Interactions	.719				.567
M36	Projected Image	.811				.674
M37	Popularity in his Branch	.722				.591
M38	Past Sporting Achievements	.591				.507
M41	Leadership Qualities	.578				.531
M43	Sporting Earnings	.715				.563
M46	Family Relationships	.706				.534
M4	Physical Skills		.465			.444
M20	Competition Concentration		.557			.507
M21	Physical Stamina		.729			.634
M22	Speed And Agility		.755			.674
M23	Power and Strength Level		.798			.721
M24	Flexibility Level		.668			.490
M26	General Fitness		.689			.581
M27	On-Field Behaviour (Impression)		.564			.540
M28	Physical Readiness		.704			.634
M29	Reflexes		.631			.562
M30	Techniques Specialized in		.603			.520
M9	Body Language			.533		.435
M11	Communication with The Referee			.657		.505
M12	Communication with Own Team Members			.650		.575
M13	Attitude Towards The Audience			.698		.577
M15	Spirit of Fair Play			.468		.334
M1	Defence Strategy				.639	.488
M2	Offence Techniques				.683	.536
M3	Game Dominance				.681	.604
M6	Game Building Ability				.736	.644
M7	Position Diversification				.765	.669
M8	Tactical Actions				.699	.639
	Explained Variance Values	%19.40	%13.83	%13.24	%9.45	%55.94
	Cronbach's Alpha Values	.86.	.92	.73.4	.86.4	.93

The total variance values of the items and their raw versions are presented in Table 5. The analysis revealed a total explained variance of approximately 56%. Cronbach's alpha internal consistency reliability coefficients were calculated for

each factor and the overall scale: Factor 1 (.864), Factor 2 (.734), Factor 3 (.920), Factor 4 (.863), and the entire scale (.930). Table 4 further outlines the nomenclature, number of items, and reliability values for each dimension, considering their relational status, language, and expression features within the context of existing literature.

Table 5.
Factor Names and Reliability Coefficients

Number of Factors	Factor Names	Item Count	Cronbach Alfa
Factor 1	Tactics-Strategy	6	.86
Factor 2	Communication	5	.73
Factor 3	Technical-Physical	11	.92
Factor 4	Image	8	.86
Total Scale			.93

Based on the literature review, the factors were appropriately named as follows: the 1st factor was designated as "Tactics-Strategy," the 2nd factor as "Communication," the 3rd factor as "Technical-Physical," and the 4th factor as "Image." All factors exceeded the critical acceptance threshold for the reliability coefficient (>0.60), indicating that the measurement tool yielded reliable results

Reliability Results

The confirmatory factor analysis yielded standardized loading values for each factor as follows: For the 1st factor, the standardized loading values ranged from 0.80 to 0.64, with the 8th item being the most strongly explanatory. For the 2nd factor, the standardized loading values ranged from 0.65 to 0.55, with the 12th item emerging as the most explanatory. For the 3rd factor, the standardized loading values ranged from 0.81 to 0.71, with the 22nd item being the most strongly explanatory. For the 4th factor, the standardized loading values ranged from 0.73 to 0.64, with the 41st item identified as the most explanatory.

Further analysis, as proposed by Kara et al. (2023), involved examining T values to assess potential differences between participants providing extreme positive or negative responses to the items, thus evaluating item discrimination properties. All T values fell within the critical range of -1.96 to +1.96, indicating satisfactory item discrimination. These T values provide additional support for the inclusion of all 30 items in the final scale. Figure 2 presents the standardized values and corresponding T values for each item.

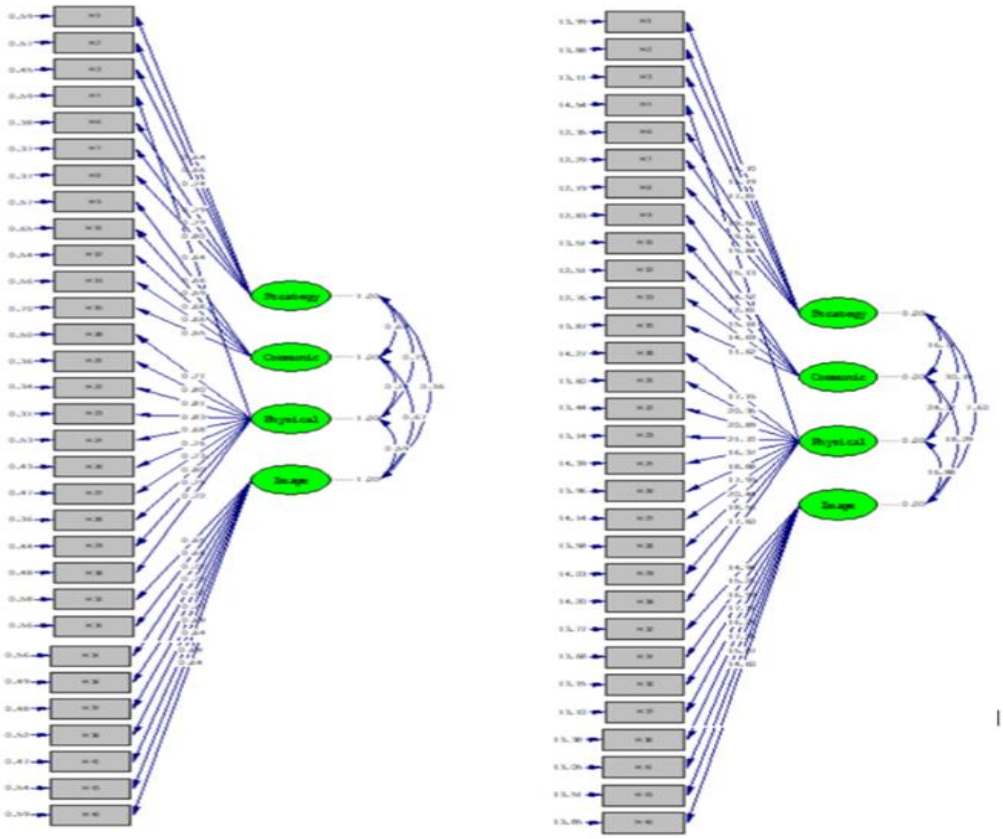

Figure 2. *Standardized Values of the Tested Model and Significance Levels of t Values (p≤=.05)*

Figure 2 reveals high values for all standardized relationship coefficients, further confirming the strong associations between items and their respective factors. Additionally, all t values associated with the scale items were found to be significant, providing further evidence for the validity of the measurement model. Importantly, the model's goodness-of-fit criteria, serving as supplementary evidence, clearly indicate a strong fit between the model and the observed data from the study group (Çokluk et al., 2012). This alignment between the theoretical model and empirical observations further strengthens the validity and reliability of the developed scale.

Table 6.
Goodness of Fit Criteria and Generated Values

Compliance Measurement	Perfect Fit	Good-Acceptable Fit	Obtained Value
χ2/sd	<2	<5	3.2
RMSEA	0≤RMSEA≤ .05	.05≤ RMSEA≤ .08	.05≤ .072 ≤ .08
SRMR	0 ≤ SRMR ≤ .05	.05≤ SRMR ≤ .10	.05≤ .069 ≤ .08
NFI	.95 ≤ NFI ≤ 1.00	.90 ≤ NFI ≤ .95	.95 ≤ .96≤ 1.00
NNFI	.97 ≤ NNFI ≤ 1.00	.95 ≤ NNFI ≤.97	.95 ≤ .97 ≤ .97
CFI	.97 ≤ CFI ≤ 1.00	.95 ≤ CFI ≤ .97	.95 ≤ .95 ≤ .97
GFI	.95 ≤ GFI ≤ 1.00	.90 ≤ GFI ≤ .95	.90 ≤ .90 ≤.95
AGFI	.90 ≤ AGFI ≤ 1.00	.85 ≤ AGFI ≤ .90	.85 ≤ .85≤ .90

References: (Munro, 2005; Schreiber vd., 2006; Şimşek, 2020; Hooper and Mullen 2008; Schumacker and Lomax, 2004; Lenz vd., 2010; Wang and Wang, 2019).

Within the scope of model fit, the χ2/sd indicator (χ2: 1277 and sd: 399) was calculated as 3.2. A low Chi-square value signifies a good model fit (Kline, 2014; Sumer, 2000), and the study's findings fall within the acceptable critical value range. Other model fit indices were also calculated: RMSEA = .072, SRMR = .069, NFI = .96, NNFI = .97, CFI = .95, GFI = .90, and AGFI = .85. These values, falling within acceptable limits, indicate that the model serves its intended purpose (Jöreskog & Sörbom, 1993). Thus, the model fit for the developed 4-factor, 30-item opponent observation scale in sport was confirmed.

To further assess the scale's psychological construct validity, Table 6 presents the following factor values: the square of the maximum shared variance (MSV), the average variance extracted (AVE), the average of the square of the maximum shared variance (ASV), and the composite reliability values (CR).

The study's findings reveal that the calculated AVE values, aligned with convergent and divergent validity evidence for the factors and intra-factor structures, are greater than 0.5 (AVE > 0.5). Additionally, all CR values surpass their corresponding AVE values (Yaşlıoğlu, 2017). This observation fulfills the condition that CR values, considered a fundamental criterion for convergent validity, should exceed AVE values, representing the average variance explained (CR > AVE).

Divergent validity, signifying weaker inter-factor relationships compared to intra-factor relationships in multi-factor structures, denotes the distinctness of separate factors. In this study, the MSV values exceeded the ASV values, supporting this notion. Furthermore, fulfilling the divergent validity criterion, AVE values were greater than MSV values. Collectively, these findings indicate that the divergent validity criteria are generally met.

Analyzing convergent reliability values (CR), which offer additional evidence, all values met the required threshold of .70. Table 7 presents these values alongside the necessary criteria, further substantiating the scale's convergent validity.

Table 7.
Convergent and Divergent Validities and Combining Reliability Values of the Scale

Factors	AVE	MSV	ASV	CR
1	0.53	0.50	0.185	0.86
2	0.55	0.50	0.185	0.73
3	0.56	0.50	0.185	0.92
4	0.50	0.50	0.185	0.86
Criteria CR>AVE	AVE>.50	MSV<AVE	ASV<MSV	CR>.70

In the current scaling study, Cronbach's alpha reliability analysis coefficients were obtained from the 491 observations utilized in the analyses. The final 30-item scale, applied to the active athlete study group, yielded the following reliability coefficients: Factor 1 (.86), Factor 2 (.73), Factor 3 (.92), Factor 4 (.86), and the overall scale (.93). These findings confirm the high reliability of The Scale of Observation of Opponent in Sport (SRAS) as a measurement tool, thereby establishing its psychological construct validity.

Conclusion and Recommendations

Sport, encompassing both positive and negative emotions like excitement, competition, success, and failure, often drives athletes to employ various strategies, including observing their rivals, in pursuit of victory. Observation enables athletes to analyze opponents' behavior and performance, thereby enhancing their strategic planning, anticipation skills, and overall on-field performance. The Scale of Observing the Opponent in Sport (SRAS), developed to measure athletes' focus on technical, tactical, physical, and communication aspects of their opponents, is thus crucial for athletic success.

This study aimed to identify the factors active athletes prioritize when observing their competitors. Data collected from two groups of athletes underwent exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to assess the scale's construct validity and reliability.

The initial data collection in July 2024 for EFA involved 508 observations, reduced to 494 after assumption analyses. This data provided detailed descriptive statistics on athlete demographics and sports backgrounds. The second data collection in August 2024 involved 491 active athletes for CFA, testing the scale's validity and reliability. The scale development process encompassed six stages: focus group interviews, essay writing by target athletes, literature review, content validity ratio analysis, trial form administration, and EFA/CFA. Expert opinions were sought throughout these stages to create and refine scale items.

EFA results revealed that the explained variance values of the scale items were between .811 and .465, with four factors explaining 55.941% of the total variance. These factors represent key elements athletes consider when observing opponents:

- Tactics-Strategy (α = .86): Focus on opponents' game plans, strategies, and tactical decisions.
- Communication (α = .73): Observation of opponents' verbal and nonverbal communication.
- Technical-Physical (α = .92): Evaluation of opponents' technical skills and physical capabilities.
- Image (α = .86): Focus on opponents' overall image and projected personality traits.

The Scale of Observing the Opponent in Sport (SRAS) demonstrated high reliability, with a Cronbach's alpha internal consistency coefficient of .93 for the whole scale. Confirmatory factor analysis (CFA) further supported the validity of the four-factor structure, indicating a good model fit. The CFA model fit indices were within acceptable ranges: $\chi 2/sd$ = 3.2, RMSEA = .072, SRMR = .069, NFI = .96, NNFI = .97, CFI = .95, GFI = .90, and AGFI = .85. These values suggest that the model aligns well with the observed data, providing evidence for its validity and the appropriateness of the four-factor structure. Overall, the SRAS has been shown to be a reliable and valid instrument for assessing the factors that athletes focus on when observing their opponents.

Limitations and Future Directions

While this study offers valuable insights, it is not without limitations. Alternative measures like similar scale validity could have further strengthened the psychometric properties of the SRAS. However, the lack of existing instruments measuring opponent observation in sport precluded this approach. Additionally, the test-retest technique, which assesses consistency over time, was not employed due to the dynamic nature of the athlete population. Despite these limitations, the study's findings provide a comprehensive understanding of athletes' observational focus. This knowledge can contribute to a deeper understanding of their habits and strategies, potentially leading to interventions aimed at enhancing performance. Future research could explore the relationship between these observational factors and actual performance outcomes, and examine the impact of training programs designed to improve observational skills.

Recommendations

Identifying the factors athletes prioritize when observing opponents is crucial for coaches and sport scientists. The developed scale serves as an effective tool to understand athletes' observational habits and strategies, revealing the importance they place on tactical, communication, technical, and image-related factors.

This scale can be utilized in talent identification and performance analysis, particularly during the development of young athletes, to determine critical observational factors influencing performance. Coaches can also leverage this scale to enhance athletes' observation abilities and strategic thinking skills.

Researchers can employ this scale to compare observational habits across different sports and genders, potentially leading to the development of novel strategies and training programs that support athlete development. Further research can also investigate observational habits in specific sports and their impact on performance.

Finally, to enhance the scale's validity and reliability, it is recommended to test it in diverse cultural and geographical contexts. This approach would ensure the scale's generalizability and universality, facilitating a broader understanding of athletes' observational habits.

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RAKİP GÖZLEMLERKEN, O SPORCUNUN AŞAĞIDAKİ ÖZELLİKLERİNİ DİKKATE ALIRIM	Her Zaman	Sık Sık	Ara Sıra	Nadiren	Hiçbir Zaman
1. Savunma Stratejisi	5	4	3	2	1
2. Hücum Teknikleri	5	4	3	2	1
3. Oyun Hakimiyeti	5	4	3	2	1
6. Oyun Kurma Yeteneği	5	4	3	2	1
7. Pozisyon Çeşitlendirebilmesi	5	4	3	2	1
8. Taktik Hamleleri	5	4	3	2	1
9. Beden Dili	5	4	3	2	1
11. Hakemle olan iletişimi	5	4	3	2	1
12. Kendi takım üyeleri ile olan iletişimi	5	4	3	2	1
13. Seyirciye karşı tutumu	5	4	3	2	1
15. Adil Oyun Ruhu	5	4	3	2	1
4. Fiziksel Becerileri	5	4	3	2	1
20. Müsabaka konsantrasyonu	5	4	3	2	1
21. fiziksel dayanıklılığını	5	4	3	2	1
22. Hız ve çevikliğini	5	4	3	2	1
23. Güç ve kuvvet seviyesi	5	4	3	2	1
24. Esneklik seviyesi	5	4	3	2	1
26. Genel kondisyonu	5	4	3	2	1
27. Saha içi duruşu	5	4	3	2	1
28. Fiziksel hazırbulunuşluğu	5	4	3	2	1
29. Refleksleri	5	4	3	2	1
30. Uzmanlaştığı teknikler	5	4	3	2	1
32. Seyir zevki vermesi	5	4	3	2	1
34. Sosyal medya etkileşimleri	5	4	3	2	1
36. Yansıttığı İmajı	5	4	3	2	1
37. Branşındaki popülerliği	5	4	3	2	1
38. Geçmiş Sportif başarıları	5	4	3	2	1
41. Liderlik özellikleri	5	4	3	2	1
43. Sportif kazancı	5	4	3	2	1
46. Aile ilişkileri	5	4	3	2	1

OBSERVING THE OPPONENT, I TAKE INTO ACCOUNT THE FOLLOWING CHARACTERISTICS OF THAT ATHLETE	All the time	Frequently	Occasionally	Rarely	Never
1. Defence Strategy	5	4	3	2	1
2. Offence Techniques	5	4	3	2	1
3. Game Dominance	5	4	3	2	1
6. Game Building Ability	5	4	3	2	1
7. Position Diversification	5	4	3	2	1
8. Tactical Moves	5	4	3	2	1
9. Body Language	5	4	3	2	1
11. Communication with the referee	5	4	3	2	1
12. Communication with own team members	5	4	3	2	1
13. Attitude towards the audience	5	4	3	2	1
15. Spirit of Fair Play	5	4	3	2	1
4. Physical Skills	5	4	3	2	1
20. Competition concentration	5	4	3	2	1
21. physical endurance	5	4	3	2	1
22. Speed and agility	5	4	3	2	1
23. Strength and power level	5	4	3	2	1
24. Flexibility level	5	4	3	2	1
26. General fitness	5	4	3	2	1
27. In-field stance	5	4	3	2	1
28. Physical readiness	5	4	3	2	1
29. Reflexes	5	4	3	2	1
30. Techniques specialised in	5	4	3	2	1
32. Providing viewing pleasure	5	4	3	2	1
34. Social media interactions	5	4	3	2	1
36. Projected Image	5	4	3	2	1
37. Popularity in his branch	5	4	3	2	1
38. Past sporting achievements	5	4	3	2	1
41. Leadership characteristics	5	4	3	2	1
43. Sporting earnings	5	4	3	2	1
46. Family relations	5	4	3	2	1