

## Investigation of the Relationship Between the Self-Efficacy and Cognitive Flexibility of Karate Referees\*

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Research Article

Received: 25.12.2023

Accepted: 22.02.2024

DOI: 10.25307/jssr.1409943

Online Published: 29.02.2024

### Abstract

The present study aims to examine the relationship between the self-efficacy and cognitive flexibility of karate referees. A total of 138 referees, 88 male and 50 female, working in the Turkish Karate Federation participated in the study. The mean age of the referees was 38.09±13.43 years, mean body weight was 74.33±13.46 kg, mean height was 170.23±8.09 cm, and mean active refereeing period was 9.95±8.84 years. The Referee Self-Efficacy Scale developed by Myers et al. (2012) and adapted into Turkish by Karaçam and Pulur (2017) as well as the Cognitive Flexibility Scale developed by Martin ve Rubin (1995) and adapted into Turkish by Çelikkaleli (2014) were applied to the referees. Independent Samples T-test, One-Way ANOVA test, Pearson correlation test and descriptive statistics were applied to the data obtained. According to the results of the Pearson correlation analysis, a significant positive correlation was found between the referees' self-efficacy and cognitive flexibility levels ( $p<0.05$ ). The results of the independent samples t-test showed that there was a significant difference in the level of self-efficacy between the males and females ( $p<0.05$ ). Moreover, self-efficacy level was found to be significant in relation to refereeing class ( $p<0.05$ ). In conclusion, it was determined in the study that the self-efficacy levels of the karate referees increased in parallel with their cognitive flexibility levels, the male participants had higher self-efficacy levels compared to the female participants, and self-efficacy levels increased in parallel with refereeing class.

**Keywords:** Karate, Referee, Self-efficacy, Cognitive flexibility

## Karate Hakemlerinin Öz Yeterlikleri ile Bilişsel Esneklikleri Arasındaki İlişkinin İncelenmesi

### Öz

Bu araştırmanın amacı; karate hakemlerinin öz yeterlikleri ile bilişsel esneklikleri arasındaki ilişkinin incelenmesidir. Araştırmaya Türkiye Karate Federasyonu'nda görev yapan 88 erkek ve 50 kadın olmak üzere toplam 138 hakem katılmıştır. Hakemlerin yaş ortalaması 38.09±13.43 yıl, vücut ağırlığı ortalaması 74.33±13.46 kg, boy uzunluğu ortalaması 170.23±8.09 cm, faal hakemlik süreleri ise 9.95±8.84 yıl olarak tespit edilmiştir. Hakemlere Myers ve ark. (2012) tarafından geliştirilen, Karaçam ve Pulur (2017) tarafından Türkçeye uyarlanmış Hakem Öz Yeterlik Ölçeği ve Martin ve Rubin (1995) tarafından geliştirilen ve Çelikkaleli (2014) tarafından Türkçeye uyarlanmış Bilişsel Esneklik Ölçeği uygulanmıştır. Elde edilen verilere Bağımsız Gruplar T-testi, Tek Yönlü ANOVA testi, Pearson korelasyon testi ve tanımlayıcı istatistikler uygulanmıştır. Pearson korelasyon analizi sonucuna göre hakem öz yeterlilik seviyesi ile bilişsel esneklik düzeyi arasında pozitif yönde anlamlı bir ilişki tespit edilmiştir ( $p<0.05$ ). Bağımsız gruplar t-testi sonuçlarında ise öz yeterlilik seviyesinde erkeklerin kadınlara göre anlamlı bir farklılık gösterdiği tespit edilmiştir ( $p<0.05$ ). Bunun yanı sıra öz yeterlik seviyesi hakemlik klasmanına göre de anlamlı bulunmuştur ( $p<0.05$ ). Sonuç olarak, yapılan çalışmada karate hakemlerinin öz yeterlik seviyeleri arttıkça bilişsel esneklik düzeylerinin arttığı, erkeklerin kadınlara oranla öz yeterlilik seviyelerinin yüksek olduğu ve klasman arttıkça öz yeterlilik seviyesinin de yükseldiği tespit edilmiştir.

**Anahtar kelimeler:** Karate, Hakem, Öz yeterlik, Bilişsel esneklik

\* This research was presented as a summary paper at the ERPA 2023 International Education Congresses

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## **INTRODUCTION**

Self-efficacy and cognitive flexibility are of great importance in terms of having advanced levels of careful and accurate decision-making skills and the ability to manage stress internally in the best way possible (Tuero et al., 2002). Referees play a crucial role in the entire progression of a competition from beginning to end. In this process, it is very important for referees to make the most accurate decisions against fast changing positions that may develop during the competition, particularly in branches such as karate that involve contact. Karate is a Far Eastern-based combat sport that is identified with Japanese culture and is based on unarmed defense against controlled punching and kicking techniques (Çağlar, 2020). Since it is a fast and dynamic sports branch with a high level of competition, athletes need to react as quickly as possible to moves from the opponent (Anderson & Pierce, 2009). Due to the characteristics of karate, it is necessary for referees to possess developed self-efficacy and cognitive flexibility. These characteristics may vary depending on the classification and background of the referees (Guillén & Feltz, 2011). In karate, referees are divided into classifications. These are Prospective Referee, Regional Referee, National Referee and International Referee, respectively. Self-efficacy in referees refers to the individual's internal evaluation of their ability to successfully fulfill their duties and to solve or eliminate any problems encountered (Karaçam & Pular, 2017). It is very important for referees to be confident, apply the rules in the best way and improve themselves in terms of self-efficacy.

Cognitive flexibility is defined as the ability to organize information processing strategies and acquisitions in order to respond to situations that may occur in one's surroundings (Adıgüzel, 2018; Kara et al., 2020). Especially considering the requirement of referees to decide quickly on different and unpredictable positions during the competition, it is necessary that their cognitive flexibility be at a sufficient level (Karadeniz, 2004).

For this reason, it is thought to be very important to determine the factors affecting cognitive flexibility, which is one of the determining factors of referee performance. In addition, it is thought that determining the relationship between referee self-efficacy and cognitive flexibility can be an important criterion, especially in referee training and especially in referee appointments. When the literature is examined, it is observed that there is not enough research on cognitive flexibility skills in both karate and other sports branches. It is thought that the research will contribute to the literature in order to emphasize the importance of cognitive flexibility in referees. In this context, the present study aims to investigate the relationship between the self-efficacy and cognitive flexibility levels of karate referees.

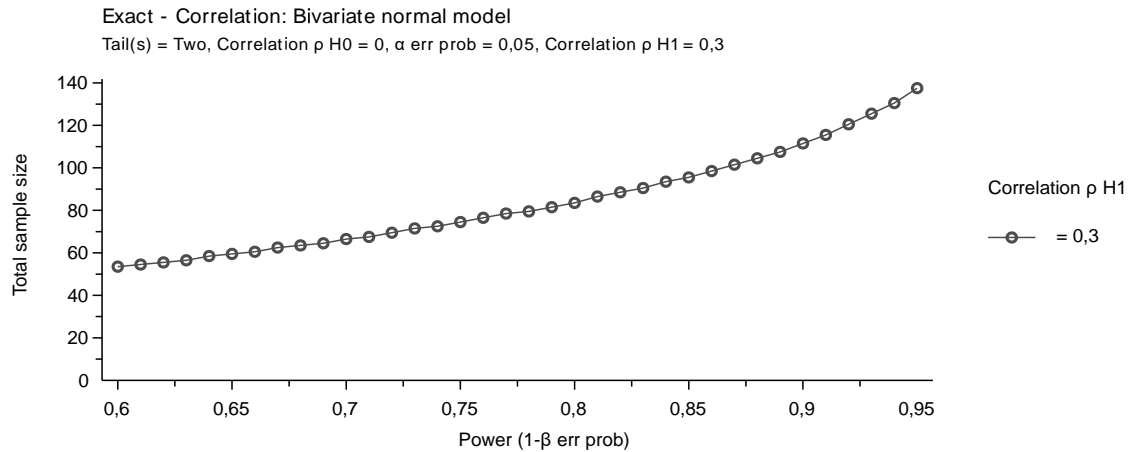
## **MATERIAL AND METHOD**

### **Research Model**

In this study, we used a quantitative and relational survey design. This type of experimental design aim to determine the existence and/or degree of change between two or more variables (Karasar, 2009). In addition, we used the criterion sampling method; purposive sampling is a sampling method that is suitable for individuals with specific, limiting and hard-to-reach individual characteristics (Erkuş, 2013).

## Study Group

Power analysis method was used to determine the sample group of the research, and according to 95% confidence ( $1-\alpha$ ), 95% test power ( $1-\beta$ ) and  $p=0.3$  Pearson correlation analysis, it was determined that the number of samples for this research should be at least 138 (Graphic 1). A total of 138 referees (88 male and 50 female) from the Turkish Karate Federation constituted the study group. The mean age of the referees was  $38.09\pm 13.43$  years, the mean body weight was  $74.33\pm 13.46$  kg, the mean height was  $170.23\pm 8.09$  cm, and the mean active refereeing period was  $9.95\pm 8.84$  years.



**Graphic 1.** Power analysis result

## Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Gazi University (Code:E-77082166-604.01.02-626463). The participants were informed about the tests before the study. Participation in the study was voluntary and the subjects signed an Informed Consent Form.

## Data Collection Tools

The Referee Self-Efficacy Scale with 18 items and 5 sub-dimensions and the Cognitive Flexibility Scale with 12 items were applied to the karate referees participating in the study. The scales were administered face-to-face.

**Referee Self-Efficacy Scale:** The Referee Self-Efficacy Scale was first developed by Myers, et al. (2012). The scale was adapted to Turkish by Karaçam and Pular (2017) with an additional physical competence factor after a validity and reliability study. The Referee Self-Efficacy Scale is a Likert-type rating scale with 18 items and 5 sub-dimensions. The scale has five sub-factors, with 5 items on physical competence, 3 items on game knowledge, 3 items on decision making, 3 items on pressure and 4 items on communication. The rating options of the scale items are: "1-2 Low, 3 Moderate and 4-5 High". There is no reverse-scored item in the scale and high scores obtained from each item of the scale indicate that the self-efficacy in relation to that item is high in the individual. Cronbach's Alpha coefficients of the scale sub-dimensions ranged between .71 and .88, but were found to be .90 for the entire scale (Karaçam & Pular, 2017). Within the scope of this research, Cronbach's Alpha coefficient was found to be .89 for the entire scale.

**Cognitive Flexibility Scale:** In order to measure the cognitive flexibility level of the students participating in the study, the Cognitive Flexibility Scale (CFS) developed by Martin and Rubin (1995) and its Turkish validity and reliability study by Çelikkaleli (2014) were used. The CFA is a Likert-type scale consisting of 12 items graded from (1) "Strongly disagree" to (6) "Strongly agree". Items 2, 3, 6 and 10 are reverse scored. High scores on the scale indicate high levels of cognitive flexibility. Cronbach's Alpha coefficients of this scale were found to be .74. (Çelikkaleli, 2014). Within the scope of this research, Cronbach's Alpha coefficient was found to be .79 for the entire scale.

### Data Analysis

In order to evaluate the data obtained from the participants, Independent Sample T-Test, One-Way ANOVA Test, Pearson Correlation Analysis and descriptive statistics were applied in the SPSS 26.0 package program. The significance level for this study was determined as  $p < 0.05$ .

## FINDINGS

**Table 1. The Relationship Between the Referees' Cognitive Flexibility and Self-Efficacy Scores**

Variables	N	Mean	sd.	r	p
Self-Efficacy Total Score	138	85.35	6.01	.295	.001*
Cognitive Flexibility Total Score	138	60.14	7.89		

According to the analysis results in Table 1, a positive significant relationship was detected between the referee self-efficacy total score and cognitive flexibility total score ( $p < 0.05$ ).

**Table 2. Comparison of the Referees' Self-Efficacy Scores by Gender**

Variable	Gender	N	Mean	sd.	t	p
Self-Efficacy Total Score	Female	50	83.33	7.56	-2.472	.016*
	Male	88	86.46	4.65		

According to the analysis results in Table 2, it was determined that the self-efficacy scores of karate referees showed a significant difference according to gender ( $p < 0.05$ ).

**Table 3. Comparison of the Referees' Cognitive Flexibility Scores by Gender**

Variable	Gender	N	Mean	sd.	t	p
Cognitive Flexibility Total Score	Female	50	61.51	6.50	1.424	.157
	Male	88	59.38	8.51		

According to the analysis results in Table 3, it was determined that the cognitive flexibility scores of karate referees did not show a significant difference according to gender ( $p > 0.05$ ).

**Table 4. Comparison of the Total Self-Efficacy Scores by Refereeing Class**

Variable	Refereeing Class	N	Mean	sd.	f	p
Self-Efficacy Total Score	Prospective	25	83.71	6.75	3.203	.026*
	Regional	26	82.06	7.88		
	National	55	86.67	5.39		
	International	32	85.69	4.81		

According to the analysis results in Table 4, it was determined that the self-efficacy total score showed a significant difference according to the refereeing class ( $p < 0.05$ ).

**Table 5. Comparison of the Cognitive Flexibility Total Scores by Refereeing Class**

Variable	Refereeing Class	N	Mean	sd.	f	p
Cognitive Flexibility Total Score	Prospective	25	59.64	6.00	2.604	.055
	Regional	26	64.64	5.61		
	National	55	60.01	8.52		
	International	32	58.21	8.04		

According to the analysis results in Table 5, it was determined that the cognitive flexibility total score did not show a significant difference according to the refereeing class ( $p > 0.05$ ).

## DISCUSSION AND CONCLUSION

In the study, when the concepts of self-efficacy and cognitive flexibility were examined, a significant positive relationship was found between the total scores of self-efficacy and cognitive flexibility ( $p < 0.05$ ). In this context, it was observed that the level of cognitive flexibility increased in parallel with self-efficacy. When the literature was examined, a limited number of studies directly involving two parameters were found. It was reported that the self-esteem of basketball referees in decision-making increased as their self-efficacy increased, their careful decision-making styles increased with increasing self-efficacy, and their procrastinating and panic decision-making styles decreased with increasing self-esteem in decision-making (Kılıç & Öner, 2019). Similarly, it was found that improving the parameters related to the cognitive processes of referees with different levels of experience in the branch of football is very important in terms of analyzing highly complex positions in the match and correct decision-making performances (Aslan et al., 2021). Therefore, when a general evaluation is made for karate referees, according to the data obtained in the study, as in other studies, it was seen that cognitive flexibility increased in line with self-efficacy while decision-making styles and self-esteem also increased in line with self-efficacy.

When the karate referees are evaluated according to their classifications, it is noteworthy that there is a significant difference between the self-efficacy levels of national and international referees. In a different study, the empathic tendencies and referee self-efficacy of volleyball referees were examined and according to the data obtained, it was determined that there was a difference between the degree of refereeing, empathic tendency and referee self-efficacy levels (Sevinç et al., 2021). In a similar study titled "Investigation of the Problem-

solving and Decision-making Skills of Karate Referees", no significant difference was found in the decision-making levels of karate referees based on the year of refereeing, but a significant difference was found based on gender and refereeing classification. In the same study, the problem-solving skills of karate referees were found to differ based on gender, years of refereeing and refereeing class, in parallel with this study. It was reported that increased seniority and refereeing experience had a positive effect on the decision-making and problem-solving skills of karate referees (Bektaş & Öztürk, 2022). These studies conducted on both volleyball and karate referees overlap with the results of the present study. As the level of classification and international competition officiating experience increased in referees, their self-efficacy levels increased in parallel.

No significant relationship was found between the refereeing classes according to the total score of cognitive flexibility ( $p>0.05$ ). In previous studies examining referee classifications according to the cognitive flexibility levels of referees, no difference was found in terms of gender and educational status, knowledge level, attitude level, and behavior level with different classification types of football referees, in parallel with this study (Karlı, 2022). In another study, contrary to these two studies, basketball referees' perceived stress levels and levels of coping with stress were found to differ according to classification (Yılmaz, 2023). It was found that while the findings obtained from the study conducted on football referees supported this study, in the study conducted on basketball referees, it was determined that classification exhibited a positive difference.

There was a significant relationship between the total scores of referee self-efficacy and gender ( $p<0.05$ ). However, there was no significant relationship between the cognitive flexibility total score and gender ( $p>0.05$ ). When the literature was evaluated, according to a similar study conducted on volleyball referees, the self-efficacy level of volleyball referees was examined and it was determined that refereeing self-efficacy differed significantly according to gender, age, sport age, education level and refereeing classification ( $p<0.05$ ). When this difference was evaluated, it was stated that gender, age, sport age and refereeing level were among the determinants of volleyball referees' self-efficacy levels (Koçak, 2019). According to a different study conducted on volleyball referees, the empathic tendencies and referee self-efficacy of volleyball referees were examined, and according to the results obtained, it was emphasized that gender was among the determinants of the empathic tendency and referee self-efficacy levels of volleyball referees (Sevinç et al., 2021). In this context, the fact that the self-efficacy levels of male karate referees were found to be high in the present study also supports the findings obtained in the studies in the literature.

In previous studies examining gender differences in referees, cognitive flexibility level and decision-making styles were examined and it was seen that male participants made more avoidant decisions compared to female participants (Atılğan & Tükel, 2019). In another study, on the contrary, the cognitive emotion regulation levels and decision-making skills of basketball referees were examined, and it was determined that female basketball referees tended to have a more procrastinatory decision-making style and that procrastinatory decision-making style differed according to gender (Ali, 2023). When the study results and information in the literature are evaluated, it can be said that the results are complex in terms of gender.

In conclusion, it was observed that the increase in the self-efficacy levels of karate referees tend to increase the level of cognitive flexibility. According to the classification evaluation, it was observed that the self-efficacy levels of karate referees with high classification who officiate internationally were remarkably high. When analyzed in terms of gender, it was found that males were statistically higher than females in self-efficacy and females were higher than males in cognitive flexibility, although not statistically significant. In the literature comparison, it is clear that the results for these characteristics exhibit complexity. In the general evaluation, it can be concluded that increasing the self-efficacy and cognitive flexibility levels of karate referees can reduce stressful and incorrect decision making. It can be suggested that referees with high refereeing class and high levels of self-efficacy and cognitive flexibility be assigned to competitions with high levels of stress where decision-making becomes difficult.

**Conflicts of Interest:** The authors declare that they have no conflict of interest.

**Authors' Contribution:** All four authors have made a substantial and intellectual contribution to the study and approved it for publication.

**Ethical Approval Board Name:** Ethics Committee of Gazi University

**Date:** 21.03.2023

**Code:** E-77082166-604.01.02-626463

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