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DO PRE- AND POST-GAME ANXIETY LEVELS AND VISUAL MEMORY CHANGE FOR CHESS PLAYERS?

¿CAMBIAN, PREVIA Y POSTERIORMENTE AL JUEGO, LOS NIVELES DE ANSIEDAD Y MEMORIA VISUAL EN JUGADORES DE AJEDREZ?

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Abstract

Introduction: Chess is an educational sport of the mind that involves different types of items and rules but is based on creative intelligence. Improvement of cognitive function can lead to improvement of performance and quality. **Goals:** The aim of this study was to investigate state-trait anxiety levels and visual memory scores before and after chess games, whether there was any change in those scores, and if that change was related to gender. **Material and methods:** Twenty elite chess athletes (10 males, 10 females) who were participating in the Turkish Chess Championship, aged between 18 and 30, enrolled in the study voluntarily. Demographic data were recorded. The athletes were tested randomly 30 minutes before a game and 60 minutes after the game. The State-Trait Anxiety Inventory and Benton Visual Retention Test F form were administered. **Results:** Athletes' ages were 24±8.1 years, heights were 173.2±9.1 cm, body weights were 66.6±22.7 kg, and they had been playing chess for 12.6±4.1 years. There was no demographical difference found between groups when groups were divided according to gender ($p>0.05$). There was no statistically significant difference found between pre-game and post-game scores ($p>0.05$). When gender factors were evaluated, it was found that female athletes had higher pre-game and post-game Benton Visual Retention Test and anxiety scores. **Conclusions:** However, those results were not statistically significant between female and male groups ($p>0.05$). Male and female athletes' pre- and post-game results showed no statistically significant differences ($p>0.05$). To a certain extent, anxiety levels have beneficial effects for athletes, but it is important to determine the anxiety levels at which athletes start to perform badly. This level should be determined individually and must be controlled via behavior therapy, or medically, if needed. We think that training sessions performed for various anxious situations or different types of programs will improve athletes' performances.

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Key words: Chess, anxiety, visual memory.

Resumen

Introducción: El ajedrez es un deporte educativo de la mente que involucra diferentes tipos de elementos y reglas, pero se basa en la inteligencia creativa. La mejora de la función cognitiva puede conducir a una mejora del rendimiento y la calidad. **Objetivos:** El objetivo de este estudio fue investigar los niveles de ansiedad como rasgo característico y la puntuación en memoria visual antes y después de jugar al ajedrez, si hubo algún cambio en la puntuación y si ese cambio estaba relacionado con el género. **Material y métodos:** Veinte atletas de ajedrez de élite (10 hombres, 10 mujeres) que participaban en el Campeonato de Ajedrez de Turquía, con edades comprendidas entre 18 y 30, se inscribieron voluntariamente en el estudio. Se registraron datos demográficos. Los atletas fueron evaluados al azar 30 minutos antes de un juego y 60 minutos después del juego. Se administraron el State-Trait Anxiety Inventory y el cuestionario F del Benton Visual Retention Test. **Resultados:** La edad de los atletas era de 24 ± 8.1 años, la altura de 173.2 ± 9.1 cm, el peso corporal de 66.6 ± 22.7 kg y llevaban jugando al ajedrez durante 12.6 ± 4.1 años. No se encontraron diferencias demográficas entre los grupos cuando los grupos se dividieron según el género ($p>0.05$). No se encontraron diferencias estadísticamente significativas entre las puntuaciones previas y posteriores al juego ($p>0.05$). Cuando se evaluaron los factores de género, se descubrió que las atletas femeninas tenían una puntuación más alta en el Benton Visual Retention Test antes y después del juego y en los niveles de ansiedad. **Conclusiones:** Sin embargo, esos resultados no fueron estadísticamente significativos entre el grupo de hombres y el de mujeres ($p <0.05$). Los resultados de los atletas masculinos y femeninos antes y después del juego no mostraron diferencias estadísticamente significativas ($p <0.05$). Hasta cierto punto, los niveles de ansiedad tienen efectos beneficiosos para los atletas, pero es importante determinar los niveles de ansiedad en los que los atletas comienzan a desempeñarse mal. Este nivel debe determinarse individualmente y debe controlarse mediante terapia conductual, o médicamente, si fuese necesario. Creemos que el entrenamiento con sesiones realizadas bajo diversas situaciones de ansiedad o diferentes tipos de programas mejorarán el rendimiento de los atletas.

Palabras clave: ajedrez, ansiedad, memoria visual.

INTRODUCTION

Chess is an educational sport of the mind that involves different types of items and rules but is based on creative intelligence. There is archaeological evidence that chess was played 4000 years ago in Egypt (Köksal, 2006). Various researchers have shown that playing chess enhances cognitive functions, problem solving, mental flexibility, and short-term memory and visual memory. Improving the cognitive functions may improve the performance and ability of athletes. Especially for Olympic athletes, it is known that athletes undergo cognitive training for anxiety during games and sporting events in addition to physical training (Garland and Barry, 1991).

Athletes who participate in competitions at different levels face stress factors. Physiological responses may vary according to the levels of the stress factors. For example, when the psychophysiological responses of adolescent athletes to chess problems of different difficulty levels were examined, stress responses and heart rate variability were found to increase (Fuentes-García et al., 2019). It is further known that the change in physiological

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responses to similar stresses may vary depending on whether the athlete has a high or low performance level (Fuentes-García et al., 2019).

Athletes who are between the ages of 13 and 24 years old particularly point out that they have anxiety during games and competitions but not in their daily activities. To a certain level, anxiety can be accepted as normal. However, athletes with high levels of anxiety affecting their performances will need professional help (Coombes et al., 2009). There are pharmacological and non-pharmacological methods to control anxiety that affects the performance of athletes. Professional help is not required with pharmacological treatments. It is known that neuro-biofeedback exercises, which are among the non-pharmacological methods, have positive effects on reducing anxiety in elite female swimming athletes and thus contribute to mental performance (Faridnia et al., 2012).

The anxiety symptoms observed in athletes cannot be diagnosed as specific anxiety disorders according to the DSM-IV.

Sports-related anxiety can be defined as the tendency to respond with anxiety and tension due to perceiving competition as a threat. Subtypes of sports-related performance anxiety are state anxiety, trait anxiety, somatic anxiety, cognitive anxiety, behavioral anxiety, performance anxiety, facilitating anxiety, weakening anxiety, and pre-during-post-game/competition anxiety (Coombes et al., 2009).

Many studies have been conducted to investigate the effects of anxiety on sports performances of athletes (Oudejans and Pijpers, 2010; Cerit et al., 2013; Dönmez, 2013). The best known theory is the so-called inverted U theory. According to this theory, anxiety has beneficial effects on the performance of athletes to a certain extent. To obtain maximum beneficial effect, optimal anxious situations are needed. However, anxiety above that level will begin to harm the athlete and will affect the athlete's physical, motor, and cognitive functions adversely (Coombes et al., 2009). When the current literature is examined, it is seen that the psychophysiological needs of chess players are not fully understood and cannot be met (Fuentes et al., 2018).

The aim of this study was to investigate state-trait anxiety levels and visual memory scores before and after games, whether there is a change in these levels, and whether that change is related to gender among chess athletes.

MATERIAL AND METHODS

Participants

Twenty elite chess players from the Turkish Chess Championship were enrolled in this study (10 women, 10 men). Prior to the study, all participants were informed of all benefits and risks of the study, and the study was conducted in accordance with the Declaration of Helsinki.

Procedures

The State-Trait Anxiety Inventory (STAI) and the Benton Visual Retention Test F (BVRT) form were administered 30 minutes prior to games and 60 minutes after the games (Başbuğ, 2009; Potvin et al, 2013).

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State-Trait Anxiety Inventory Tests

The STAI was constructed by Spielberger et al. in 1970 to determine the anxiety levels of subjects older than 14 years of age. The Turkish validity and reliability were established in 1983. Answers that can be given for questions of the State Anxiety Inventory are (1) not at all, (2) somewhat, (3) moderate, and (4) very much so. Answers that can be given for the Trait Anxiety Inventory are (1) almost never, (2) sometimes, (3) often, and (4) almost always. There are two kinds of expressions in the scales: direct and reverse. Direct expressions show negative emotions and reverse expressions show positive emotions. During evaluation of the results for the latter expressions, 1-point answers are evaluated as 4 points and 4-point answers are evaluated as 1 point. Four points for a direct expression show high anxiety. One point for a reverse expression shows high anxiety, whereas 4 points show low anxiety for a reverse expression. The State Anxiety Inventory test consists of 10 reverse expressions. Those are the 1st, 2nd, 5th, 8th, 10th, 11th, 15th, 16th, 19th, and 20th questions. The Trait Anxiety Inventory test consists of 7 reverse expressions. Those are the 21st, 26th, 27th, 30th, 33rd, 36th, and 39th questions. Reverse expressions' total weighted points are subtracted from direct expressions' total weighted points. These results are then summed with 50 values for the State Anxiety Inventory and 35 values for the Trait Anxiety Inventory. Those results are the patients' anxiety scores. Results of the questionnaire range between 20 and 80 points.

A final score of 36 points or fewer reveals no anxiety, while a score of 37 to 42 shows slight anxiety and 43 or above shows high anxiety. Subjects whose final score is 60 or above 60 need professional help and medical treatment (Çetinkaya et al., 2008).

Benton Visual Retention Test

The BVRT is an individually administered test for people who are 8 years of age or older. The test was found to be reliable in normal populations. The test was designed with three equivalent forms (C, D, and E forms) and multiple choice forms (F and G). The BVRT F form was used in our study.

The administrator of the BVRT told participants the following: "I am going to show you some cards that contain one or more figures. After this, I am going to show you 4 figures. I want you to find the same one as the first figure that was shown." The first card and its figure(s) were shown to the subject for 10 seconds. Then the subject was asked to find the same figure on the next card. Fifteen cards were shown to the subject, who was asked to find the same figures.

Participants' answers were noted and checked. A score of 14-15 points is high, 12-13 points is good, 11 points is medium, 10 points is low-medium, and a score of 9 points shows visual memory at the borderline (Amieva et al., 2006).

Statistical Analysis

All data were analyzed with SPSS 22.0. A descriptive statistical method was used to identify data. The kurtosis/skewness test was used to determine the normality of the data distribution. The Wilcoxon signed rank test was used to detect intra-group differences, and the Mann-Whitney U test was used to detect differences between groups. Statistical significance was taken as $p<0.05$. The results are given as median ± standard error.

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RESULTS

Twenty subjects (10 males, 10 females) were enrolled in the study. Subjects' ages were 24±8.1 years, heights were 173.2±9.1 cm, body weights were 66.6±22.7 kg, and they had been playing chess for 12.6±4.1 years. No demographical difference was found between the groups when participants were divided into groups according to gender (Table 1) (p>0.05).

Table 1. Demographic data (median ± standard error)

	Males (n=10)	**Females (n=10)**	***p-value* ***
Age (years)	27.4±10	19.8±1.7	*0.19*
Height (cm)	177±10	168.5±5.8	*0.11*
Body weight (kg)	78.6±24.5	51.5±5.3	*0.06*
History of chess (years)	14.6±4.4	10±1.6	*0.11*

*Mann-Whitney U test.

State Anxiety Inventory scores were 47.9±15.8, Trait Anxiety Inventory scores were 44.6±7.4, and BVRT scores were 13.2±1.8 at 30 minutes before the games. The same tests were done 60 minutes after the games. State Anxiety Inventory scores were 41.4±16.3, Trait Anxiety Inventory scores were 42.8±9.6, and BVRT scores were 14.6±0.5 after the games. There were no statistically significant differences found between pre- and post-game scores (p>0.05). When gender factors were evaluated, it was found that female athletes had higher pre-game and post-game BRVT and anxiety scores. However, those results were not statistically significant between the female and male groups (Table 2) (p>0.05).

Table 2. Pre- and post-game visual memory and anxiety results (median ± standard error)

	Pre-game	**Post-game**	***p-value* ****
Benton Visual Retention Test Scores			
All participants (n=20)	13.2±1.8	14.6±0.5	*0.26*
Males (n=10)	12.8±2.6	14.3±0.6	*0.32*
Females (n=10)	13.8±0.5	14.8±0.5	*0.10*
***p-value** *	*1.0*	*0.4*	
State Anxiety Inventory Scores			
All participants (n=20)	47.9±15.8	41.4±16.3	*0.29*
Males (n=10)	39.3±11.4	36.5±12.5	*1.0*
Females (n=10)	56.5±16	46.3±20	*0.14*
***p-value** *	*0.11*	*1.0*	
Trait Anxiety Inventory Scores			

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All participants (n=20)	44.6±7.4	42.8±9.6	*0.39*
Males (n=10)	40±7.1	37.3±9.7	*0.19*
Females (n=10)	49.3±4.5	48.3±6.5	*1.0*
p-value *	*0.11*	*0.11*	

* Mann-Whitney U test, ** Wilcoxon signed rank test.

DISCUSSION

As a result of our study, the pre- and post-game anxiety scores and BVRT scores of chess athletes showed no differences. Additionally, those results showed no differences according to gender.

In the literature, pre- and post-game anxiety scores have been evaluated in many studies. However, this was not previously done for chess athletes. Hacıcaferoğlu et al. investigated anxiety levels for participants in Turkish folk dance competitions. In that study, female athletes, younger athletes, and athletes who started to participate in competitions later than other athletes were found to have higher anxiety levels (2015). Dönmez's study of basketball players showed that both State and Trait Anxiety Inventory scores were higher for female athletes than male athletes. Scores were also found to be related to licensed years of sports participation. Players with 0-3 licensed years had higher anxiety levels than those with 8-11 licensed years or more than 12 licensed years (2013). Başaran et al. found no differences between female and male athletes for trait anxiety scores; however, state anxiety scores were higher for male athletes than female athletes. State and trait anxiety score levels also differed with sports branches and the history of participation in that study (2009).

Civan et al. showed that state anxiety levels were higher for athletes who were participating individually than in those participating on teams, but this was not related to age or gender (2010). Karabulut et al. showed that anxiety levels for male football players of 13-15 years of age were high. This was related to some factors like having a highly educated father. However, the age of the athlete and the athlete's history of sports participation were not found to be related to trait anxiety level (2013). Bingöl et al. found no relationships between gender, age, sports participation history, or the which university at which the athlete was educated (2012). Erbaş et al. showed no relationships of state anxiety levels with age, sports participation history, time spent in games, or the status of elite male basketball players (2012).

Elite wrestling athletes' state anxiety scores were higher before weighing than after weighing. This was thought to be related to athletes' concerns about reaching their weight categories or not (Tazegül, 2016). Çoksevim et al. showed that STAI scores and Brief Symptom Inventory Severity Index scores were higher before game evaluations than after game evaluations. Their study found this to be related to excitement, pride, high levels of concentration, and wanting to be a champion, which increased the mental performances of the athletes (2008). Cerit et al. claimed that having higher pre-game anxiety scores had positive effects for elite female basketball players on in-game performance (2013).

In the literature, there are limited studies investigating the effects of anxiety on athletes' cognitive functions. Hadwin et al. showed no differences for children with high and low levels of anxiety in terms of basic cognitive functions; however, children with higher anxiety levels

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took more time to perform their tasks (2005). Lapointe et al. showed that anxiety levels affected the short-term memory and attention of their participants, who were 18-65 years old, and further found that this was the result of anxiety on cognitive functions (2013). Potvin et al. studied patients without dementia who were over 66 years of age, and low or medium anxiety levels were found to improve verbal functions and general cognitive functions. Medium or high anxiety levels also improved short-term visual memory among the patients with lower levels of education (2013). Mutchnick et al. showed that anxiety scores were higher for subjects who received cardiopulmonary bypass operations at younger ages. However, this was not shown to have any relationship with cognitive functions (2012).

Nieuwenhuys and Oudejans showed that shooting performances were lower under anxiety; however, 4 months of shooting exercises in anxious situations improved visual attention and cognitive performances (2011). Oudejans and Pijpers found that dart players exercising under low anxiety levels preserved their motor functions under high anxiety levels (2010). Yurdakul et al. showed good visual memory and attention with 12 weeks of movement education in 8-year-old children (2012).

CONCLUSIONS

To a certain extent, anxiety levels have beneficial effects for athletes. However, it is important to determine the anxiety levels at which athletes start to perform badly. This level should be determined individually and must be controlled via behavior therapy, or medically, if needed.

In chess, visual memory is needed just like cognitive functions for success. For this reason, training programs conducted for anxious situations will improve athletes' performances.

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REFERENCES

Amieva, H., Gaestel, Y., Dartigues, J.F. (2006). The multiple-choice formats (forms F and G) of the Benton Visual Retention Test as a tool to detect age-related memory changes in population-based studies and clinical settings. *Nature Protocols*, *1*(4), 1936-1938.

Başaran, H.M., Taşğın, Ö., Sanioğlu, A, Taşkın, K.E. (2009). Examination of the level of state-trial anxiety of sportsmen according to some variables. *Selçuk Universıty Journal of Social Science*, *21*, 534-542.

Baştuğ, G. (2009). Bayan voleybolcuların müsabaka dönemi kaygı ve umutsuzluk düzeylerinin incelenmesi. *Selçuk Üniversitesi Beden Eğitimi ve Spor Bilim Dergisi*, *11*(3), 15-20.

Bingöl, H., Çoban, B., Bingöl, Ş., Gündoğdu, C. (2012). Üniversitelerde öğrenim gören taekwondo milli takım sporcularının maç öncesi kaygı düzeylerinin belirlenmesi. Selçuk Üniversitesi. *Beden Eğitimi ve Spor Bilimleri Dergisi*, *14*(1), 121-125.

Cerit, E., Gümüşdağ, H., Evli, F., Şahin, S., Bastık, C. (2013). Elit kadın basketbol oyuncularının yarışma öncesi kaygı düzeyleri ile performansları arasındaki ilişki. *Sport Sciences*, *8*(1), 26-34.

Civan, A., Arı, R., Görücü, A., Özdemir, M. (2010). Bireysel ve takım sporcularının müsabaka öncesi ve sonrası durumluk ve sürekli kaygı düzeylerinin karşılaştırılması. *Uluslararası İnsan Bilimleri Dergisi*, *7*(1), 193-206.

Coombes, S.A., Higgins, T., Gamble, K.M., Cauraugh, J.H., Janelle, C.M. (2009). Attentional control theory: Anxiety, emotion, and motor planning. *Journal of Anxiety Disorders*, *23*(8), 1072-1079.

Çetinkaya, S., Nur, N., Ayvaz, A., Ozdemir, D. (2008). Depression, anxiety levels and coping strategies with stress in continuous ambulatory peritoneal dialysis (CAPD) and hemodialysis (HD) patients in a university hospital. *Archives of Neuropsychiatry*, *45*(3), 78-85.

Online ISSN: 2659-5699
DOI: 10.24310/JPEHMjpehm.v2i1.6625

Çoksevim, B., Sarıtaş, N.N., Kaya, M., Pepe, O. (2008). Kikboksculardа maç öncesi ve sonrası durumluluk, süreklilik, kısa semptom envanteri bulguları. *Türkiye Kikboks Federasyonu Spor Bilimleri Dergisi*, *1*, 22-27.

Dönmez, K.H. (2013). Samsun ilinde yapılan üniversitelerarası basketbol müsabakalarına katılan sporcuların durumluk kaygı ve sürekli kaygı düzeylerinin incelenmesi. *The Journal of Academic Social Science Studies*, 6(5), 243-248.

Erbaş, M.K., Küçük, V. (2012). Üst düzey basketbolcularda durumluk kaygı düzeylerinin farklı değişkenlere göre karşılaştırılması. Selçuk Üniversitesi. *Beden Eğitimi ve Spor Bilimleri Dergisi*, 14 (2), 257-261.

Faridnia, M., Shojaei, M., Rahimi, A. (2012). The effect of neurofeedback training on the anxiety of elite female swimmers. *Annals of Biological Research*, *3*(2), 1020-1028.

Fuentes-García, J. P., Pereira, T., Castro, M. A., Santos, A. C., Villafaina, S. (2019). Psychophysiological stress response of adolescent chess players during problem-solving tasks. *Physiology and Behavior*, 112609. https://doi.org/10.1016/j.physbeh.2019.112609

Fuentes, J. P., Villafaina, S., Collado-Mateo, D., de la Vega, R., Gusi, N., Clemente-Suárez, V. J. (2018). Use of biotechnological devices in the quantification of psychophysiological workload of professional chess players. *Journal of Medical Systems*, *42*(3), 40.

Fuentes-García, J. P., Villafaina, S., Collado-Mateo, D., De la Vega, R., Olivares, P. R., Clemente-Suárez, V. J. (2019). Differences Between High vs. Low Performance Chess Players in Heart Rate Variability During Chess Problems. *Frontiers in psychology*, *10*.

Garland, D.J., Barry, J.R. (1991). Cognitive advantage in sport: The nature of perceptual structures. *The American Journal of Psychology*, 211-228.

Hacıcaferoğlu, S., Hacıcaferoğlu, B., Seçer, M. (2015). Halk oyunları branşına katılan sporcuların yarışma öncesi kaygı düzeylerinin bazı değişkenler açısından incelenmesi. *International Journal of Science Culture and Sport (IntJSCS)*, *3*(4), 288-297.

Hadwin, J.A., Brogan, J., Stevenson, J. (2005). State anxiety and working memory in children: A test of processing efficiency theory. *Educational Psychology*, *25*(4), 379-393.

Karabulut, E.O., Atasoy, M., Kaya, K., Karabulut, A. (2013). 13-15 yaş arası erkek futbolcuların durumluk ve sürekli kaygı düzeylerinin farklı değişkenler bakımından incelenmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi*, *14*(1).

Köksal, A. (2006). Eğitimde satranç. *Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi*, 17-27.

Lapointe, M.L.B., Blanchette, I., Duclos, M., Langlois, F., Provencher, M.D., Tremblay, S. (2013). Attentional bias, distractibility and short-term memory in anxiety. *Anxiety, Stress & Coping*, *26*(3), 293-313.

Mutchnick, M.G., Williams, J.M. (2012). Anxiety and memory test performance. *Applied Neuropsychology: Adult*, *19*(4), 241-248.

Nieuwenhuys, A., Oudejans, R.R. (2011). Training with anxiety: short-and long-term effects on police officers' shooting behavior under pressure. *Cognitive Processing*, *12*(3), 277-288.

Oudejans, R.R., Pijpers, J.R. (2010). Training with mild anxiety may prevent choking under higher levels of anxiety. *Psychology of Sport and Exercise*, *11*(1), 44-50.

Potvin, O., Bergua, V., Meillon, C., Le Goff, M., Bouisson, J., Dartigues, J.F., Amieva, H. (2013). State anxiety and cognitive functioning in older adults. *The American Journal of Geriatric Psychiatry*, *21*(9), 915-924.

Tazegül, Ü. (2016). To compare elite wrestlers' state of anxiety before-after weighing. *Journal of Academic Social Science Studies*, (46), 373-377.

Yurdakul, N.A., Çamlıyer, H., Çamlıyer, H., Karabulut, N., Soytürk, M. (2012). Sekiz yaş grubu çocuklarda hareket eğitiminin dikkat ve hafıza gelişimine etkileri. Selçuk Üniversitesi. *Beden Eğitimi ve Spor Bilimleri Dergisi*, *14*(1), 103-108.