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ORIGINAL ARTICLE

Does the level of anxiety affect process of learning judo throws?

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ABSTRACT

Background and study aim – Relation between anxiety and sport performance presents important topic in sport psychology. Studies prove that elevated anxiety may improve motor learning due to maximum allocation of all physical and mental resources in mastering a motor task. The main goal of this paper is to identify differences in anxiety and self-confidence before and after the process of learning a new motor task. Material and Methods - The level of anxiety during the learning process of 12 judo throwing techniques (side, leg, hand, sacrificial throws) was measured with a questionnaire CSAI-2C on 130 subjects. Subjects were asked to complete a questionnaire at the beginning and at the end of the learning process. Results – The results of this study showed that throwing techniques can be classified into three groups: 1.) there is no decrease or increase of anxiety and self – confidence (Tsuri-goshi, Osoto-gari, Tai-otoshi, Ippon-seoi-nage, Morote-seoi-nage and Okuri-ashi-harai); 2.) increase of anxiety and decrease in self – confidence (Harai-goshi); 3.) decrease of anxiety and increase of self – confidence (Ouchi-gari, Koshi-guruma, Uki-waza, Soto-makikomi and Tomoe-nage). Conclusions - The obtained results indicate the need for a different approach in teaching of throwing techniques to maximize the effectiveness of the learning process. Teacher or coach will have the biggest role in managing this perception of difficulty with use of proper teaching methods. Teaching of techniques should be based on difficulty and not only based on group of techniques they belong to.

Keywords: Physical activity psychology, Teaching process, Throwing techniques, Judo techniques, Conative dimensions, Questionnaire.

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INTRODUCTION

Influence of anxiety on sport performance has attracted much research attention in the past decades. Several models and theories have been used to clarify relationship between anxiety and performance. One of these models being multidimensional theory which is based on two-dimensional relationships between cognitive anxiety, somatic anxiety, self - confidence and performance (Martens et al.,1990). Cognitive anxiety is mental manifestation of anxiety that includes thoughts of worry and negative expectations. Somatic anxiety is physiological manifestation of anxiety and Self – confidence is belief in successfully performing the task. Multidimensional anxiety theory states that cognitive anxiety follows negative linear relationship with performance. Somatic anxiety follows inverted-U shaped relationship with performance, while self-confidence is hypothesized to have a positive linear relationship with performance.

Many studies tested the proposed relationship over the past decades. Cognitive anxiety was found to have negative linear trend with performance in individual and team sports (Burton, 1988; Parnabas et al., 2014). Self – confidence had positive linear trend with judo performance (Jeon, 2016). Slightly elevated levels of somatic anxiety can have positive effect on performance, but more successful combat sport athletes had lower levels of somatic anxiety then less successful athletes (Mojtahedi, et al., 2023). Judo athletes in competition marked as losers had higher levels of cognitive anxiety, and winners had more self-confidence (Filaire, et al., 2001). In other combat sport results are similar as winners had lower levels of cognitive and somatic anxiety and higher self-confidence then losers (Chapman et al., 1997).

Important factors that can influence anxiety in combat sports are age, gender, and competition level. Older combat sport athletes presented lower magnitudes of anxiety (Freire et al., 2020; Escobar-Molina et al., 2015). Also, males were less anxious than females in combat sports (Merino Fernandez et al., 2019). Some research shows that education level can also influence anxiety levels in judokas (Kolayis & Sari, 2011). Although many researchers investigated relationship between anxiety and sport performance it is important to distinguish motor learning from sport performance, because anxiety may affect motor skill differently as proficiency increases (Raglin, 1992). Learning has been described as: "*A set of processes associated with practice or experience leading to relatively permanent changes in the capability for responding*" (Schmidt, 1988). Current findings are ambiguous with respect to the effects of stress and anxiety on motor learning as some have reported benefits (Duncko et al., 2007; Oudejans & Pijpers, 2009), others impaired motor learning (Noteboom, 2001), while some have reported no effect (Calvo, Alamo & Ramos, 1990).

Research in judo suggests that during learning of less demanding ne waza motor tasks anxiety remains unchanged, because of low initial levels, but during learning of more demanding tasks it decreases (Segedi, Žanetić & Sertić, 2021). Process of motor learning and performance can be hindered by anxiety influenced due to task difficulty, abilities of an individual, experience, and other internal and external factors (Bortoli & Robazza, 1994). Although it is believed that anxiety impairs performance of difficult task, in controlled situations, people who have slightly elevated levels of anxiety can be closer to the maximum allocation of all physical and mental resources in mastering a motor task (Calvo, 1985).

The acquisition of a new motor task occurs under controlled conditions, and slightly elevated levels of anxiety could have a beneficial effect on the acquisition of a motor task (Hordacre et al., 2016). However, high anxiety levels can have a negative impact on the acquisition of more complex motor task. At excessively high levels of anxiety, people are not able to compensate for the cognitive deficit modelled by worry, so motor learning is hindered (Eysenck & Eysenck, 1985). The inventory that was used to measure anxiety and self-confidence in most studies was the Competitive State Anxiety Inventory-2 (CSAI2; 1). Although at first it was used to

measure somatic and cognitive anxiety, later also a self - confidence subscale was also included in the CSAI-2. Identifying differences in anxiety before and after the process of learning a new motor task will provide valuable information to coaches/teachers in the teaching of new motors tasks.

MATERIAL AND METHODS

Sample of participants

The sample of subjects consisted of 130 students (female = 62; male = 68) from the Faculty of Kinesiology who attended classes of the subject Judo within the second year of their study. All the subjects had first contact with judo techniques during the Judo lessons. Participants gave written consent for participating in research and the use of personal information in scientific purposes. In accordance with the Declaration of Helsinki, this research was approved by the Ethics Committee of the Faculty of Kinesiology, University of Zagreb (108/2023).

Testing procedure

A questionnaire CSAI-2C (Stadulis et al., 2002), adapted to evaluate the performance of judo techniques, was used for anxiety assessment. The questionnaire is composed of 15 items assessing three dimensions of competitive anxiety (every dimension is assessed by five items): cognitive anxiety, somatic anxiety, and self-confidence in a five-point Likert-type scale from 1 (very little) to 5 (very much). Items for assessment the Self-confidence dimension are inversely scaled variables regarding items for assessment other two dimensions. That means that higher values in these items reflect a better result for the subject, unlike other items in which a better result is expressed by lower values. The result of the subjects in each dimension is the arithmetic mean of the five items.

Subjects were asked to complete an anxiety questionnaire at the beginning and at the end of the learning process of two new motor tasks from the group of judo throws; 1) Side throws (Koshi guruma, Tsuri goshi, Harai goshi,); 2) Leg throws (Okuri ashi harai, Osoto gari, Ouchi gari); 3) Sacrificial throws (Tomoe nage, Uki waza, Soto makikomi); 4) Hand throws (Ippon seoi nage, Morote seoi nage, Tai otoshi). The learning process was conducted over two 90-minute sessions. Respondents completed the questionnaire at the beginning of the first session, after new technical elements were presented (demonstrated) to them, and at the end of the second session, after a total of 180 minutes of learning process.

Statistical analysis

Statistica v.14.0.1.25. software was used for statistical analysis. For analysing grades, nonparametric statistics was used. x^2 test was performed to assess differences between the anxiety levels at the beginning and at the end of learning process. Average values as indicator of descriptive parameters are used to describe initial and final measurement score of anxiety dimensions.

RESULTS

Results of side throwing techniques from table 1. are describing level of anxiety change between initial and final measurement after learning process. Anxiety scores present significant changes in KOSHI_SOM (x^2 = 9.71; p = .02) and KOSHI_COG (x^2 = 10.07; p = .02) factors. Moreover, Harai Goshi throw exerted significant changes in all three dimensions. Scores of KOSHI_SELF,TSURI_COG and HARAI_COG increased while all other dimensions decreased score after learning process.

Table 1. x^2 test for side throw techniques (Koshi guruma, Tsuri goshi, Harai goshi).

	x^2	*p*	Score_I	Score_FIN
KOSHI_SOM	9.71	.02*	1.80	1.65
KOSHI_COG	10.07	.02*	2.58	2.56
KOSHI_SELF	6.94	.14	3.03	3.07
TSURI_SOM	6.03	.11	1.79	2.01
TSURI_COG	8.21	.08	2.68	2.84
TSURI_SELF	5.81	.21	2.96	2.83
HARAI_SOM	18.77	.00*	1.95	1.70
HARAI_COG	12.94	.01*	2.82	2.85
HARAI_SELF	13.97	.01*	2.81	2.63

*Note. * x^2 – hi square coefficient; p – level of significance, SOM – somatic factor; COG – cognitive factor; SELF – self-confidence factor; Score_I – average score of initial measurement; Score_FIN – average score of final measurement; * - marked values are significant when p < .05.*

In leg throwing techniques (Table 2) only OUCHI_COG (x^2 = 12.67; *p* = .01) dimension showed significant change between initial 5, and final measurement. Scores of leg throws did not differ significantly after learning process.

Table 2. x^2 test for leg throwing techniques (Okuri ashi harai, Osoto gari, Ouchi gari).

	x^2	*p*	Score_I	Score_FIN
OKURI_SOM	1.01	.60	1.51	1.49
OKURI_COG	2.40	.66	2.32	2.32
OKURI_SELF	2.24	.69	3.21	3.21
OSOTO_SOM	0.29	.86	1.52	1.52
OSOTO_COG	4.00	.41	2.44	2.37
OSOTO_SELF	4.60	.33	2.98	3.11
OUCHI_SOM	7.76	.06	1.53	1.67
OUCHI_COG	12.67	.01*	2.48	2.41
OUCHI_SELF	3.63	.46	3.20	3.04

*Note. * x^2 – hi square coefficient; p – level of significance, SOM – somatic factor; COG – cognitive factor; SELF – self-confidence factor; Score_I – average score of initial measurement; Score_FIN – average score of final measurement; * - marked values are significant when p < .05.*

Table 3. x^2 test for sacrificial techniques (Tomoe nage, Uki waza, Soto makikomi).

	x^2	*p*	Score_I	Score_FIN
TOMOE_SOM	28.40	.00*	1.95	1.57
TOMOE_COG	11.94	.02*	2.72	2.27
TOMOE_SELF	16.56	.00*	2.80	3.40
UKI_SOM	61.72	.00*	1.79	3.02
UKI_COG	8.03	.09	2.62	2.30
UKI_SELF	10.10	.04*	2.89	3.33
SOTO_SOM	3.84	.43	1.82	1.67
SOTO_COG	4.34	.36	2.64	2.41
SOTO_SELF	4.24	.37	2.87	3.12

*Note. * x^2 – hi square coefficient; p – level of significance, SOM – somatic factor; COG – cognitive factor; SELF – self-confidence factor; Score_I – average score of initial measurement; Score_FIN – average score of final measurement; * - marked values are significant when p < .05.*

Differences of anxiety in sacrificial techniques are presented in Table 3. In Tomoe nage throw all presented results were significant. Score of somatic and cognitive dimension was lower while self-confidence score was higher on final measurement. Somatic and self-confidence dimensions of Uki waza throw showed significant higher score after learning process, while cognitive dimension presented lower but not significant scores on final measurement. There was no differences after learning process in Soto makikomi throw.

Table 4 presents x^2 test for hand throw techniques. In all observed dimensions there was no significant differences between initial and final measurements. Scores in IPPON_SOM; IPPON_SELF; MOROTE_SOM; MOROTE_SELF; TAI_SOM and TAI_COG were higher after learning process.

Table 4. x^2 test for hand throw techniques (Ippon seoi nage, Morote seoi nage, Tai otoshi).

	x^2	*p*	Score_I	Score_FIN
IPPON_SOM	1.00	.80	1.45	1.48
IPPON_COG	1.69	.79	2.36	2.25
IPPON_SELF	2.45	.65	3.14	3.23
MOROTE_SOM	2.06	.72	1.42	1.49
MOROTE_COG	3.09	.54	2.32	2.27
MOROTE_SELF	3.55	.47	3.09	3.22
TAI_SOM	2.42	.66	1.45	1.55
TAI_COG	1.20	.88	2.38	2.48
TAI_SELF	4.25	.37	2.97	2.93

*Note. * x^2 – hi square coefficient; p – level of significance, SOM – somatic factor; COG – cognitive factor; SELF – self-confidence factor; Score_I – average score of initial measurement; Score_FIN – average score of final measurement; * - marked values are significant when p < .05.*

DISCUSSION

The 180 minutes of learning process had different effect on motor tasks in group of side throwing techniques (Koshi waza). There was no observed change in anxiety levels during learning of Tsuri-goshi technique but there was positive effect marked as decrease of cognitive and somatic anxiety and increase of self-confidence for technique Koshi-guruma. For the technique Harai-goshi which is more complex for execution there is significant increase in cognitive anxiety and decrease in self-confidence. Increase in anxiety can be explained by very complex structure of the throw which demands high level of motor abilities (Kano, 1994). Harai-goshi is executed standing on one leg, bending the trunk, and swinging the other leg at the same time while holding the uke on the side of the body, which requires a high level of strength, coordination, and dynamic balance. Students struggle with execution during initial learning time which results in increase of anxiety levels and decrease in self – confidence.

Learning of Harai-goshi will require longer learning time and coach needs to implement different learning methods. For learning of complex techniques analytic learning method in which students learn new motor tasks in phases will be more adequate than synthetic learning method in which students perform whole motor task. Also, it is important to emphasize specific methodological procedures during learning process such as tendoku renshu, uchi komi and pushi gari. Tendoku renshu is methodological procedure in which practitioner executes techniques without partner. In first stages of motor learning, use of tendoku renshu will develop proprioceptive feedback, sensation of body position and movement (Tuthill & Azim, 2018). Use of uchi komi will develop the sensation of the body position in relation to the partner, and the use of pushi gari will develop the strength and stability of the trunk necessary for the execution of the throw. For the group of leg throws

(Ashi waza) three techniques were observed: Okuri-ashi-hari, Osoto-gari and Ouchi-gari. There was no change in anxiety levels for techniques Okuri-ashi-harai and Osoto-gari. For the technique Ouchi-gari cognitive anxiety after learning process decreased. For group of hand throws (Te waza) observed techniques were Ippon-seoi-nage, Morote-seoi-nage and Tai-otoshi and for all hand throwing techniques there was no change in anxiety levels after learning process. For the group of sacrificial techniques (Sutemi waza) observed techniques were: Uki-waza, Soto-makikomi and Tomoe-nage. For all techniques cognitive anxiety decreased and self-confidence increased. Sacrificial throws require a large throwing amplitude, which can seem complex and intimidating although the structure of the throw is not complex. Coach/teacher has the biggest role for thriving of the athletes and can have significant influence on anxiety in athletes especially during learning of Sutemi waza, and it is necessary to emphasize encouragement of students (Smith, Smoll & Cumming, 2007; Davis et al., 2021). But also, during teaching of more demanding techniques teacher/coach needs to use kinematic feedback and not just social reinforcement (Wallace & Hagler, 1979). To reduce the fear of falling in throwing techniques with a large amplitude such as sacrificial techniques, it is necessary to include methodical exercises such as rolling falls in advanced conditions such as rolling forward fall over obstacles or partners.

Based on these findings all throws can be classified into three groups: 1.) throws in which the learning process of 180 minutes did not result in reduction or increase in anxiety or self – confidence (Tsuri-goshi, Osoto-gari, Tai-otoshi, Ippon-seoi-nage, Morote-seoi-nage and Okuri-ashi-harai); 2.) throws in which the learning process of 180 minutes resulted in increase of anxiety and reduction in self – confidence (Harai-goshi); 3.) throws in which the learning process of 180 minutes resulted in decrease of anxiety and increase of self – confidence (Ouchi-gari, Koshi-guruma, Uki-waza, Soto-makikomi and Tomoe-nage). Research in judo suggests that initial execution of structurally less demanding throws is performed with basic expertise due to simple structure of throws and lower demand of motor abilities, especially coordination (Sertić, Milanović & Vuleta, 2002). Also, in previous research on this topic that was focused on ground techniques (Ne waza) anxiety remained unchanged during learning of less demanding motor tasks, because of low initial levels, but during learning of more demanding tasks it decreased (Segedi, Žanetić & Sertić, 2021). In previous research there was no increase in anxiety such as during learning of harai-goshi which learning will require longer learning time because of its complexity. Increase in anxiety levels does not have to be a negative circumstance in the learning process because people who have slightly elevated levels of anxiety can be closer to the maximum allocation of all physical and mental resources in mastering a motor task (Calvo, 1985). The acquisition of a new motor task occurs under controlled conditions, and slightly elevated levels of anxiety could have a beneficial effect on the acquisition of a motor task (Hordacre et al., 2016).

The teacher/trainer has the biggest role in learning of new motor tasks. Teacher needs to use adequate teaching methods, learning methods and methodological procedures so students can progress in learning of difficult techniques. With proper feedback and greater number of repetitions, students will acquire basic technique expertise and as the adoption of the technique increases, anxiety will decrease and self-confidence increase. It is important to note that subjects in this research were students of Kinesiology who belong to a selected population of motorically highly capable individuals and anxiety levels may differ in different populations such as children or motorically less capable individuals.

CONCLUSION

Based on these findings all throws can be classified into three groups: 1.) throws in which the learning process of 180 minutes did not result in decrease or increase in anxiety or self – confidence (Tsuri-goshi, Osoto-gari, Tai-otoshi, Ippon-seoi-nage, Morote-seoi-nage and Okuri-ashi-harai); 2.) throws in which the learning

process of 180 minutes resulted in increase of anxiety and decrease in self – confidence (Harai-goshi); 3.) throws in which the learning process of 180 minutes resulted in decrease of anxiety and increase of self – confidence (Ouchi-gari, Koshi-guruma, Uki-waza, Soto-makikomi and Tomoe-nage). Perception of difficulty of task will have major role in initial levels of anxiety and self – confidence and not just structural complexity of judo throw. Teacher/ coach will have the biggest role in managing this perception of difficulty with use of proper teaching methods, learning methods and methodological procedures in learning process. Teaching of techniques should be based on difficulty and not only based on group of techniques they belong to.

AUTHOR CONTRIBUTIONS

Ivan Segedi: conceptualization, methodology, formal analysis, investigation, writing–original draft preparation, writing–review and editing, supervision, project administration. Dominik Družeta: conceptualization, methodology, validation, investigation, writing–original draft preparation, formal analysis, data curation. Vedran Dukarić: methodology, data curation, validation, formal analysis, data curation, writing–original draft preparation. Tomislav Rupčić: methodology, writing–review and editing, supervision. Hrvoje Sertić: conceptualization, writing–review and editing, supervision.

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No potential conflict of interest was reported by the authors.

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