

EXERCISE AND COGNITIVE FUNCTION: AN EXPERIMENTAL STUDY OF YOUNG CHILDREN FOLLOWING TAEKWONDO

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Abstract

At the maturity stage of children's cognitive function, it is a stage that needs to be considered in the development process. Taekwondo training itself is one of the exercises that is able to maximize development and improve the cognitive function of elementary school children. This study aims to determine the effect of taekwondo training on the cognitive function of elementary school children. The method used in this research is an experiment with a one group pre-test post-test design. The subjects in this study were 16 people, consisting of 8 men and 8 women with an age range of 7-11 years. The research instrument used was the Stroop Color child Test. The results of this study show that there is a significant influence from the results of taekwondo training on the cognitive function of elementary school children. This research concludes that taekwondo training has a significant influence on the cognitive function of young children. In other words, taekwondo training had a significant impact on the cognitive function of these children.

Keywords: *Young Children, Cognitive Function, Stroop Color Word Test, Taekwondo*

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INTRODUCTION

As time goes by, a child will definitely experience physical and mental changes (Senlin, 2018). This developmental phase is a very crucial phase for children's development, such as psychological development, cognitive abilities, social development, and progress in the educational process (Wahyuningrum, 2022). There are 4 stages of children's cognitive development according to age according to Piaget's theory, every activity and stimulus provided must be appropriate to the age stage. The 4 categories are 0-2 years sensorimotor sensory stage (0-2 years), preoperational (2-7 years), concrete operational (7-11 years), and formal operational (11 years to adulthood). In this research the author focuses

on children aged 7-11 years or the concrete operational stage (Bujuri, 2018). Because at this stage children are starting to enter elementary school age, children will begin to be directly involved in the environment and become part of society. According to previous studies, cognitive development in elementary school-aged children begins with the development of the ability to observe, observe relationships and solve simple problems (Stephanie et al., 2016). It was stated in other studies (Bujuri, 2018; Saputra et al., 2019) that knowledge about human development is very important to understand as a guide in understanding a person's needs and character, including elementary age children or concrete operational stages.

One of the phenomena that arises due to children's inadequate development at the concrete operational stage is low memory, difficulty distinguishing letters, difficulty accepting new knowledge related to memory, unable to complete tasks completely, impulsive or reckless (Yuliawan, 2016). According to previous research (Kadri et al., 2019) revealed that "Sport and physical activity, however, seem to play a major role in the development of cognition, memory, selective attention and motor reaction time" which means that sport and activity are components important for the development of cognition, memory, selective attention, and motor reaction time in individuals. (Desai et al., 2015) also stated that children's participation in activities and physical activity can train cognitive functions and psychosocial functions. Even though psychosocial and cognitive are very important for young children because they are the determining components in achieving an achievement, there have been many studies that show how important the role of psychology is in improving young children's ability to face problems that exist at each phase of their development, one of which is in making decisions. decision of course (Komarudin et al., 2023).

Doing sports in childhood has a positive influence on children's cognitive and emotional functions (Chen, 2022). Many studies have examined martial arts activities in various aspects, which show that martial arts sports can increase

fitness levels, emotional, motor and cognitive abilities (Santos, 2022). Regular taekwondo training has a positive effect on improving physical fitness and growth and development of cognitive function in children, taekwondo training in childhood is very effective in facilitating their development (Cho et al., 2017)

One of these martial arts sports is taekwondo, the author chose a martial art originating from Korea because it has developed rapidly throughout the world, including Indonesia. This martial art not only trains aerobic and anaerobic abilities, but can also improve cognitive function or at least prevent the decline in cognitive function. Since the 1950s, Taekwondo has transformed into a modern sport throughout the world. 3 Until now, the development of the sport of Taekwondo has been very rapid. In 2005 there were 165 member countries and in 2016 there were 206 member countries spread across five continents in the world. 4 Taekwondo's rapid development also occurred in the city of Semarang. In 2009 the number of dojangs was recorded at 106 and to date in 2016 it has increased rapidly to 148 dojangs (Hidayat H, 2019).

Taekwondo was significantly associated with more positive self-appraisals and body image, and stronger beliefs that taekwon-do affects physical health. Research results reveal that taekwondo involves more psychological aspects besides motivation (Febrianty et al., 2021). Based on the explanation above, the author is interested in conducting research that analyzes the cognitive aspects of young children during training. The author sees that research like this is still very limited, especially in Indonesia. Meanwhile, the results of this cognitive aspect analysis are very necessary for trainers, parents and teachers in dealing with young children so that they can act and provide treatment according to their path. The author specifically chose young martial arts students in the hope of being able to train them provides analysis results in the form of need characteristics and the dominance of cognitive aspects. The author hopes that the results of this research can become a reference for coaches, teachers and parents and will no longer

ignore the cognitive psychological aspects of young children, especially at the growth stage.

METHOD

Research methods are scientific methods used to collect data with certain goals and benefits. According to (Sugiyono, 2019), research methods can be interpreted as scientific procedures for obtaining data for a specific purpose. Based on the previous problem formulation, the method used in this research is the experimental method. The aim is to obtain data about the results of the treatment of the independent variable on the dependent variable (Hastjarjo, 2019). (Mandolesi et al., 2018) explains that experimental research aims to find a causal relationship between two factors through author's manipulation by eliminating interference from other factors. Experiments are always carried out to observe the effects of a treatment (Linhares et al., 2022).

The independent variable in this study was taekwondo training while the dependent variable was the cognitive function abilities of children aged 7-11 years. In the experimental process, the author provided taekwondo training with moderate intensity and volume of 50%-80% consisting of basic movement exercises, poomsae, and taekwondo kicks. The research population was young children from the Sukabumi Academy Taekwondo Dojang. There are 16 young children who will be used as the research population. The sampling technique in this research is purposive sampling technique, which is a technique for determining samples with certain considerations (Sugiyono, 2019). The instrument used in this research was the Stroop Color Word Test (SCWT), which was discovered in 1935 by psychologist John Ridley Stroop. As stated in (Periáñez et al., 2021) The validity of the SCWT is still being developed and updated today, so that this test to measure cognitive function can still be used.

The Stroop color word test is a test to measure cognitive function that has been widely used by many researchers. Quoted in (Wahyudi et al., 2019) SCWT is a test used to measure cognitive function, especially executive function, attention

and concentration. There are 30 columns of different color words that the subject must complete. The test involves where each word has a different color. The subject will be directed to read the color of the ink, the tester will calculate the reading time and reading accuracy. There is no standard version of the Stroop test with respect to test materials, administration, or scoring. So many authors developed this test without changing the theory of the Stroop effect. The test instrument will use Indonesian which is easy for children to understand. The author chose the Stroop color word test because this test instrument is easy to carry out, saves money and time.

RESULT AND DISCUSSION

Table 1. Statistical Description.

Test	Minimum	Maximum	Sum	Mean	Std. Deviation
Initial test	15.71	25.96	339.29	21.2056	3.20683
Final test	9.69	22.68	256.73	16.0456	4.00700

Based on Table 1, it can be seen that in the initial test the average score was 21.2056, the standard deviation was 3.20683, the lowest score was 15.71, the highest score was 25.96, and the total score was 339.29. Meanwhile, in the final test, the average score was 16.0456, the standard deviation was 4.00700, the lowest score was 9.69, the highest score was 22.68, and the total score was 256.73. Next, the author carried out a normality test, which can be seen in Table 2.

Table 2. Normality Test.

Test	Statistic	df	Sig.
Initial test	0,952	16	0,521
Final test	0,964	16	0,737

Table 2 shows the results of the data normality test using the Shapiro-Wilk Test. Based on Table 2, it can be seen that the initial test obtained a statistical value of 0.952, df 16, and Sig. of 0.521. Meanwhile, the final test obtained a statistical value of 0.964, df 16, and Sig. of 0.737. Based on the test results, both

data obtained a Sig value. > 0.05 so that both data are declared "Normal Distribution". Therefore, the author uses a parametric approach in conducting hypotheses. The results of the hypothesis test can be seen in Table 3.

Table 3. Hypothesis Testing

Tes	t	df	Sig. (2-tailed)
Initial test-Final test	7,632	15	0,000

Table 3 shows the results of hypothesis testing using Paired Sample t-Test. Based on Table 3, it can be seen that the calculated t value is 7.632 with a Sig value. (2-tailed) of 0.000. Based on the test results, the Sig. (2-tailed) < 0.05 so H_0 is accepted. So it can be stated that there is a significant influence of Taekwondo training on the cognitive function of young children.

Discussion

Based on gender, the respondents consisted of eight men and eight women. The results showed that the examination results for men and women were inconsistent both before and after the test. In previous research quoted from (Roy & Kefia, 2018) it was found that gender does not affect children's cognitive performance. In this study, the Stroop color word test was used to assess the cognitive function of children aged between 7 and 11 years. There were significant changes after 21 weeks of training, twice a week.

Research (Bae & Roh, 2021) shows that regular taekwondo practice can have an impact on many things, including increasing children's self-confidence in interacting with other people. Over 16 weeks, taekwondo training improved the mood, social skills and cognitive function of children aged 7 to 12 years in multicultural families in Korea. (Cho, 2017) found that taekwondo could help undergraduate students learn cognitive functions over the course of eight weeks. The co test values were very different between the experimental and control groups. In the philosophy of the meaning of Taekwondo, things like self-control, respect, truth, perseverance, goal setting, and focus are key. Taekwondo is a training method based on physical activity and cognitive activity. One example of

the cognitive complexity of physical activity and Taekwondo training is Poomse, which is a series of body movements carefully choreographed and performed with technical precision in a specific sequence.

Taekwondo training is very good for brain development, taekwondo not only improves one aspect of oneself, but also improves cognitive function (Cho, 2017). In research conducted on students, (Sook, 2021) found that although practicing taekwondo once a week for 16 weeks did not have a significant impact on the results of the Stroop word color test, practicing once a week could improve physical abilities and mental health. Further findings (Muslima & Himam, 2018) show that, compared to other modern martial arts techniques, taekwondo can improve psychosocial health over six months of training. This finding is thought to be due to the fact that taekwondo training prioritizes respect, humility, responsibility, perseverance, and honor over other aspects of training.

CONCLUSION

Based on the research that has been conducted, the author can conclude that taekwondo training has a significant influence on the cognitive function of young children. In other words, taekwondo training had a significant impact on the cognitive function of these children. Apart from that, after participating in taekwondo training, young children showed an increase in cognitive function abilities. So the author can suggest that taekwondo training is an appropriate exercise for young children because apart from being able to have taekwondo skills, young children can experience increased cognitive function.

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Exercise and Cognitive Function: An Experimental Study of Young Children Following Taekwondo

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