



## STRATEGY OF A TOUGH MIND: OPTIMIZING STUDENTS' COGNITIVE FUNCTION THROUGH GOAL SETTING TRAINING IN FUTSAL

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### Abstract

This study aims to examine the effect of goal setting training in futsal sports on improving students' cognitive function. In an era filled with academic and mental stress, a good level of cognition is critical to academic achievement and student well-being. Sports, including futsal, have been shown to provide broad benefits in cognitive development. However, the effect of goal setting training in the context of futsal on students' cognitive functions is still under-studied. This study used an experimental method with a pre-test post-test control group design. The research participants consisted of 35 students (age  $16.80 \pm 0.79$  years) who took part in futsal extracurricular activities. They were randomly divided into an experimental group (20 students) and a control group (15 students). Cognitive function measurement instruments include attention, memory, language, visual, and executive function tests that have been tested for reliability and validity before and after the intervention. The results showed that there was a significant difference in improving cognitive function between the experimental group and the control group. These findings provide strong evidence that goal setting training in the context of futsal can be an effective strategy to improve students' cognitive function. By increasing motivation, focus, and ability to manage goals, this training has a positive impact on students' cognitive development. The practical implication of this research is the importance of integrating goal setting training programs in sports activities, especially futsal, in order to improve the quality of learning and student academic achievement.

### Keywords:

*Criminal Behavior, Mental Activity, Cognitive Function, Futsal*

### Introduction

Adolescence is a period that is vulnerable to being influenced by the environment and is a period when adolescents seek self-identity, tend to prioritize action over thought processes, and have high curiosity (Stephens et al., 2021). However, at the same time, adolescents also face risks of negative behavior and health problems that can threaten their well-being (O'Reilly, 2020; Dang et al., 2022; Poudel et al., 2022). The National Narcotics Agency reports that students launder about 27% of the number of drug users in Indonesia in 2021, and this figure continues to increase every year. In addition, the Ministry of Health of the Republic of Indonesia underlined the increase in HIV cases which are now dominated by young people. The latest information shows that around 51% of newly detected HIV cases involve adolescents. In addition to risks to health, adolescents are also prone to



be involved in criminal behavior such as motorcycle gangs, brawls, mugging, and murder (Na & Gottfredson, 2013; Duncan et al., 2014; Slaughter et al., 2019).

Even though adolescence is often faced with various risks and challenges, in fact, this period is also a very productive time in terms of individual development (Bougher, 2018; Jansen & Kiefer, 2020). During adolescence, there is great potential to develop abilities such as creative thinking, critical thinking, and discovering talents and other positive abilities. In the context of education, cognitive function is very important for students. Cognitive function involves a variety of conscious mental activities, including attentional abilities, memory, executive function, language, and spatial visuospatial (Forte et al., 2019; Hendrayana et al., 2020; Northoff et al., 2020). Thus, adolescence is not only a challenging period, but also provides great opportunities for individual development and growth, especially in terms of cognitive abilities and other positive reinforcement.

In this context, physical activity and sports such as futsal can have a significant relationship (Biddle et al., 2019; Erickson et al., 2019; Vazou et al., 2019). Futsal, as a dynamic and intense type of sport, can provide special benefits in the development of adolescent cognitive function. A study conducted by Negara et al. (2019) showed that playing futsal regularly three times a week can provide optimal benefits in increasing brain neuroplasticity in adolescents and stimulating their cognitive function. For example, when playing futsal, teenagers must use their attention skills (Tedesqui & Glynn, 2013; Ivarsson et al., 2015; Papanikolaou, 2017) to stay focused on the ball, teammates and opponents. This ability to maintain focus indirectly involves cognitive functions that enable adolescents to make the right decisions (Furley & Memmert, 2015) and implement effective strategies in games (Vaeyens et al., 2007; Lefferts et al., 2019; van Steenbergen et al., 2019). In addition, futsal also involves memory skills (Furley & Wood, 2016; Knöllner et al., 2022; Millard et al., 2022), where adolescents need to remember and apply the game rules, team tactics, and technical moves learned (Buszard et al., 2017). Executive functions, such as planning, monitoring, and evaluating, are also involved when adolescents plan and execute actions in fast and dynamic play situations (Verburgh et al., 2014; Scharfen & Memmert, 2019).

In the context of futsal game practice, it is possible to improve cognitive function by using the goal setting exercise method. Goal setting theory relates to the effect of setting goals, challenges, and feedback on performance in setting a goal (Locke & Latham, 2013). This goal setting approach is a systematic process designed in response to an accurate evaluation of individual needs, aspirations, and abilities. In the context of futsal training, the goal setting strategy is very important and should not be ignored. Setting students' goals in a structured and intentional (Bean & Forneris, 2016) is a crucial step, as this allows them to independently manage and monitor their progress and achievements (Diment, 2014; Gillham & Weiler, 2013; Jeong et al., 2021).

Therefore, it is assumed that to achieve maximum training results, it is important to match the training goals or goal setting. If the goals set have not been reached, then students are encouraged to keep trying to achieve these goals. Thus, goal setting plays a crucial role in helping students to improve their performance and achievements in futsal game practice, as well as improve their cognitive function.



### Methods

This study used an experimental method with a pre-test post-test control group design (Fraenkel et al., 2022). The sample in this study were 35 students who took part in the futsal extracurricular activity at SMAN 8 Bandung with an average biological age of  $20 \pm 1.07$  years (see Table 1 regarding the physical characteristics of the sample). Samples were taken using the total sampling technique from the population which was divided using random assignment. Two groups were used, namely the experimental group and the control group. The experimental group received goal setting exercises in futsal, while the control group received practice without goal setting manipulation in futsal. Research instruments used in this study include cognitive function (attention, memory, language, visual, executive function) (Hendrayana et al., 2020), measurement of attention with a concentration grid test; memory measurement by digit span test; language, visuospatial, and executive functions with academic potential tests. The instrument was given twice to the subject, before (pre-test) and after (post-test) the treatment was given.

Table 1. Physical characteristics of the subjects

Data	Mean $\pm$ Sd	Min	Max	N
Age	16.80 $\pm$ 0.79	16	18	35
Height (cm)	161.9 $\pm$ 5.43	146	169	
Weight (kg)	54.54 $\pm$ 6.46	43	71	
Body Mass Index	20.88 $\pm$ 2.90	11	28	

Research protocol, ensure that the sample is in good health and can participate in the activities given. Then the samples provided information and socialization regarding the aims and purposes of the research. Furthermore, research subjects were asked to fill out informed consent. Preliminary data regarding cognitive function was collected through cognitive function tests. The research intervention was carried out for eight weeks, three times per week, by implementing a goal setting exercise program. After the intervention was completed, the final data was measured using the same test instrument as the initial test. The collected data were then analyzed using a paired sample t-test to see an increase in the optimization of cognitive function in the intervention group, and an independent t-test to compare the gain scores between the experimental and control group data. At the end of the study, the data were analyzed and conclusions drawn according to the research objectives.

### Result

The results of this study are data on students' cognitive function scores which are research subjects in futsal extracurricular activities at SMAN 8 Bandung. The summary of the data can be found in Table 2 which describes information about cognitive function scores.

Table 2. Cognitive Function Pre-Test and Post-Test Data

Group	Pretest	Min	Max	Posttest	Min	Max	N
	$\bar{x} \pm sd$			$\bar{x} \pm sd$			

<b>Experiment</b>	144.75 ± 27.10	102	200	162.10 ± 23.93	128	209	20
Control	148.87 ± 26.21	107	192	151.33 ± 25.44	111	190	15

Table 2 explains that the mean value and standard deviation of the pre-test cognitive function of the experimental group was  $144.75 \pm 27.10$  and that of the control group was  $148.87 \pm 26.21$ . While the mean value and standard deviation of the post-test cognitive function of the experimental group was  $162.10 \pm 23.93$  and the control group was  $148.93 \pm 24.86$ . The summary description of the results of the pretest and posttest cognitive functions of futsal extracurricular students at SMAN 8 Bandung can be seen in Figure 1 as follows.

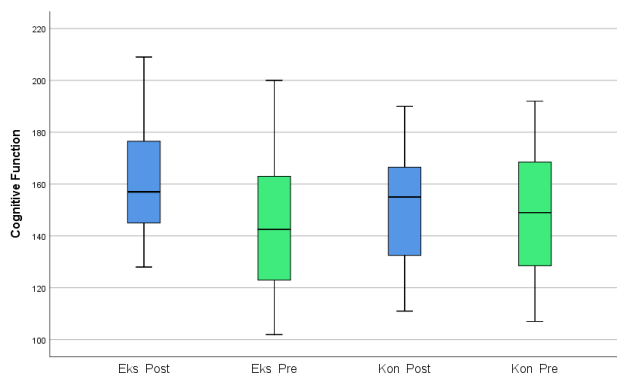


Fig 1. Box plots of cognitive function of the experimental and control groups

The data used in this study fulfilled the test requirements, which were normally distributed. In testing the hypothesis, this study used the analytical test method on SPSS 25 software. The tests used included the paired sample t-test to see the increase in cognitive function before and after the intervention and the independent sample t-test to compare the differences between the two group. Further information about the test results can be found in table 3.

Table 3. Cognitive Function paired sample t-test results for the experiment group and the control group

Data		$\bar{x} \pm sd$	Different	t-count	Sig.
Experiment	Pre	144.75 ± 27.10	- 17.350	-7.975	0.000
	Post	162.10 ± 23.93			
Control	Pre	148.87 ± 26.21	-2.467	-1.629	0.126
	Post	151.33 ± 25.44			

Based on the results of the analysis test in table 3, it can be concluded that there is a significant mean difference between the pretest and posttest in the experimental group. The average difference reaches -17.350, with a significance value of 0.000, which is smaller than the specified significance threshold of 0.05. This shows a significant increase in cognitive function after applying the goal setting treatment in the experimental group. Meanwhile, in the control group, there was no significant increase in cognitive function (sig. > 0.05). This indicates that without the goal setting



treatment, there was no significant change in cognitive function in the control group. Thus, the results showed that the goal setting treatment had a significant positive effect on improving cognitive function in the experimental group compared to the control group which did not receive the same treatment.

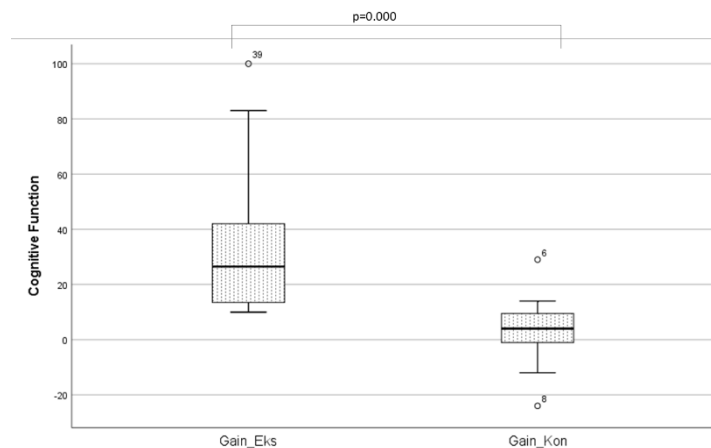


Fig 2. Box plot regarding the gain score of independent sample t-test

The result of independent t-test statistical analysis on cognitive function experiment groups (33.12%) compare to control groups (3.27%). There is significant difference at p-value 0,000\*.

### Discussion

From the several statements above, the researcher concludes that goal setting has a significant impact on the development of individual skills. Goal setting is an effective method to improve students' cognitive abilities in studying futsal. Therefore, it is concluded that goal setting can be used to improve individual performance in dealing with various activities and challenges in life. Historically, goal setting has been considered one of the most effective psychological strategies for improving performance. What this means is that historically, goal setting has been considered one of the most effective psychological strategies for increasing performance. By setting goals, students will be more independent and know a lot about the development of their abilities (Baghurst et al., 2015). Goal setting has proven to be a very successful method of increasing performance. students can become more independent and have a better understanding of the development of their abilities. These goals have a very important role in skills development. Therefore, setting goals is a very important aspect in increasing mastery of a desired skill. The advantages of goal setting By focusing on specific behaviors that students can change, teachers can help students toward better goals for what to do as part of the learning process. By focusing on goals, it makes it easier to determine the success criteria of learning objectives. Providing opportunities for students to be able to use a variety of specific-purpose techniques to produce changes in students (Staufenbiel, Lobinger, & Strauss, 2015). But besides that there are also weaknesses in goal setting, namely the reluctance of students to behave so that the goal setting that has been made is not achieved. The strength and weakness of student behavior is determined by the nature of the goal setting to be achieved. The tendency of students to





strive harder to achieve a goal when the goal is clear, understandable and useful. The more difficult a goal is to understand, the greater the student's reluctance to behave (Fam, Konovessis, Ong, & Tan, 2018).

### Conclusion

In this study, it was proven that goal setting training in futsal can improve students' cognitive function, confirming the importance of integrating goal setting training as a main part of the training program to improve students' mental and cognitive qualities. However, this research has a weakness in terms of focusing on students in the context of futsal practice, which indicates that the results and findings obtained may not be directly applicable to other populations or in different sports contexts. To increase the generalizability of the findings, future studies can involve a wider variety of populations and sports and explore the relationship with exercise performance. In addition, research can investigate other factors that influence the relationship between goal setting and cognitive functioning, such as motivation, self-efficacy, and environmental factors. The findings from this study provide a strong foundation for further development in optimizing cognitive function through the application of goal setting in sports contexts.

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### References

- Baghurst, T., Tapps, T., & Kensinger, W. (2015). Setting Goals for Achievement in Physical Education Settings. *Strategies*, 28(1), 27–33. <https://doi.org/10.1080/08924562.2014.980876>
- Bean, C., & Forneris, T. (2016). Examining the Importance of Intentionally Structuring the Youth Sport Context to Facilitate Positive Youth Development. *Journal of Applied Sport Psychology*, 28(4), 410–425. <https://doi.org/10.1080/10413200.2016.1164764>
- Biddle, S. J. H., Ciaccioni, S., Thomas, G., & Vergeer, I. (2019). Physical activity and mental health in children and adolescents: An updated review of reviews and an analysis of causality. *Psychology of Sport and Exercise*, 42(May), 146–155. <https://doi.org/10.1016/j.psychsport.2018.08.011>



- Bougher, L. D. (2018). Revisiting parental influence in individual political development: Democratic parenting in adolescence. *Applied Developmental Science, 22*(4), 284–300. <https://doi.org/10.1080/10888691.2017.1288125>
- Buszard, T., Masters, R. S., & Farrow, D. (2017). The generalizability of working-memory capacity in the sport domain. *Current Opinion in Psychology, 16*(16), 54–57. <https://doi.org/10.1016/j.copsyc.2017.04.018>
- Dang, H. M., Ho, H., & Weiss, B. (2022). The ‘big four’ health risk behaviors among Vietnamese adolescents: co-occurrence and socio-cultural risk factors. *Health Psychology and Behavioral Medicine, 10*(1), 379–398. <https://doi.org/10.1080/21642850.2022.2057314>
- Diment, G. M. (2014). Mental skills training in soccer: A drill-based approach. *Journal of Sport Psychology in Action, 5*(1), 14–27. <https://doi.org/10.1080/21520704.2013.865005>
- Duncan, D. T., Hatzenbuehler, M. L., & Johnson, R. M. (2014). Neighborhood-level LGBT hate crimes and current illicit drug use among sexual minority youth. *Drug and Alcohol Dependence, 135*(1), 65–70. <https://doi.org/10.1016/j.drugalcdep.2013.11.001>
- Erickson, K. I., Hillman, C., Stillman, C. M., Ballard, R. M., Bloodgood, B., Conroy, D. E., Macko, R., Marquez, D. X., Petruzzello, S. J., & Powell, K. E. (2019). Physical Activity, Cognition, and Brain Outcomes: A Review of the 2018 Physical Activity Guidelines. *Medicine and Science in Sports and Exercise, 51*(6), 1242–1251. <https://doi.org/10.1249/MSS.0000000000001936>
- Forte, G., Favieri, F., & Casagrande, M. (2019). Heart rate variability and cognitive function: A systematic review. *Frontiers in Neuroscience, 13*(JUL), 1–11. <https://doi.org/10.3389/fnins.2019.00710>
- Fraenkel, J. R., Wallen, N., & Hyun, H. H. (2022). How to Design and Evaluate Research in Education. In *McGraw-Hill Higher Education (Eleventh)*. McGraw-Hill Education.
- Furley, P., & Memmert, D. (2015). Creativity and working memory capacity in sports: Working memory capacity is not a limiting factor in creative decision making amongst skilled performers. *Frontiers in Psychology, 6*(FEB), 1–7. <https://doi.org/10.3389/fpsyg.2015.00115>
- Furley, P., & Wood, G. (2016). Working Memory, Attentional Control, and Expertise in Sports: A Review of Current Literature and Directions for Future Research. *Journal of Applied Research in Memory and Cognition, 5*(4), 415–425. <https://doi.org/10.1016/j.jarmac.2016.05.001>
- Gillham, A., & Weiler, D. (2013). Goal setting with a college soccer team: What went right, and less-than-right. *Journal of Sport Psychology in Action, 4*(2), 97–108. <https://doi.org/10.1080/21520704.2013.764560>
- Hendrayana, Y., Negara, J. D. K., Nuryadi, Gumilar, A., & Lesyiana, M. (2020). The impact of beta brain waves in improving cognitive function through brain jogging applications. *International Journal of Human Movement and Sports Sciences, 8*(6), 73–77. <https://doi.org/10.13189/saj.2020.080713>
- Ivarsson, A., Johnson, U., Andersen, M. B., Fallby, J., & Altemyr, M. (2015). It Pays to Pay Attention: A Mindfulness-Based Program for Injury Prevention With Soccer Players. *Journal of Applied Sport Psychology, 27*(3), 319–334. <https://doi.org/10.1080/10413200.2015.1008072>



- Jansen, K., & Kiefer, S. M. (2020). Understanding brain development: Investing in young adolescents' cognitive and social-emotional development. *Middle School Journal*, 51(4), 18–25. <https://doi.org/10.1080/00940771.2020.1787749>
- Jeong, Y. H., Healy, L. C., & McEwan, D. (2021). The application of Goal Setting Theory to goal setting interventions in sport: a systematic review. *International Review of Sport and Exercise Psychology*, 0(0), 1–26. <https://doi.org/10.1080/1750984X.2021.1901298>
- Knöllner, A., Memmert, D., Lehe, M. Von, Jungilligens, J., & Scharfen, H. (2022). *Specific relations of visual skills and executive functions in elite soccer players*. August, 1–10. <https://doi.org/10.3389/fpsyg.2022.960092>
- Lefferts, W. K., DeBlois, J. P., White, C. N., Day, T. A., Heffernan, K. S., & Brutsaert, T. D. (2019). Changes in cognitive function and latent processes of decision-making during incremental ascent to high altitude. *Physiology and Behavior*, 201, 139–145. <https://doi.org/10.1016/j.physbeh.2019.01.002>
- Locke, E. A., & Latham, G. P. (2013). *New Developments in Goal Setting and Task Performance*. Routledge.
- Millard, L., Breukelman, G. J., Mathe, N., Shaw, I., & Shaw, B. S. (2022). A review of the essential visual skills required for soccer: Beyond 20–20 optometry. *Frontiers in Sports and Active Living*, 4(3). <https://doi.org/10.3389/fspor.2022.965195>
- Na, C., & Gottfredson, D. C. (2013). Police Officers in Schools: Effects on School Crime and the Processing of Offending Behaviors. *Justice Quarterly*, 30(4), 619–650. <https://doi.org/10.1080/07418825.2011.615754>
- Negara, J. D. K., Ilyas, E. I., Jusman, S. W., & Sekartini, R. (2019). The Effect of Futsal Toward Neuroplasticity. *3rd International Conference on Sport Science, Health, and Physical Education (ICSSHPE 2018)*, 11, 199–202.
- Northoff, G., Wainio-Theberge, S., & Evers, K. (2020). Is temporo-spatial dynamics the “common currency” of brain and mind? In Quest of “Spatiotemporal Neuroscience.” *Physics of Life Reviews*, 33(May), 34–54. <https://doi.org/10.1016/j.plrev.2019.05.002>
- O'Reilly, M. (2020). Social media and adolescent mental health: the good, the bad and the ugly. *Journal of Mental Health*, 29(2), 200–206. <https://doi.org/10.1080/09638237.2020.1714007>
- Papanikolaou, Z. (2017). *Attention in Young Soccer Players: The Development of an Attentional Focus Training Program*. 1270. <https://doi.org/10.1080/09751270.2011.11885162>
- Poudel, A., Lamichhane, A., Magar, K. R., & Khanal, G. P. (2022). Non suicidal self injury and suicidal behavior among adolescents: co-occurrence and associated risk factors. *BMC Psychiatry*, 22(1), 1–12. <https://doi.org/10.1186/s12888-022-03763-z>
- Scharfen, H. E., & Memmert, D. (2019). The relationship between cognitive functions and sport-specific motor skills in elite youth soccer players. *Frontiers in Psychology*, 10(APR), 1–10. <https://doi.org/10.3389/fpsyg.2019.00817>





- Slaughter, A. M., Hein, S., Hong, J. H., Mire, S. S., & Grigorenko, E. L. (2019). Criminal Behavior and School Discipline in Juvenile Justice-Involved Youth with Autism. *Journal of Autism and Developmental Disorders*, 49(6), 2268–2280. <https://doi.org/10.1007/s10803-019-03883-8>
- Stephens, W., Sieckelinck, S., & Boutellier, H. (2021). Preventing Violent Extremism: A Review of the Literature. *Studies in Conflict and Terrorism*, 44(4), 346–361. <https://doi.org/10.1080/1057610X.2018.1543144>
- Tedesqui, R. A. B., & Glynn, B. A. (2013). “Focus on What?”: Applying research findings on attentional focus for elite-level soccer coaching. *Journal of Sport Psychology in Action*, 4(2), 122–132. <https://doi.org/10.1080/21520704.2013.785453>
- Vaeyens, R., Lenoir, M., Williams, A. M., & Philippaerts, R. M. (2007). Mechanisms underpinning successful decision making in skilled youth soccer players: An analysis of visual search behaviors. *Journal of Motor Behavior*, 39(5), 395–408. <https://doi.org/10.3200/JMBR.39.5.395-408>
- van Steenbergen, H., Eikemo, M., & Leknes, S. (2019). The role of the opioid system in decision making and cognitive control: A review. *Cognitive, Affective and Behavioral Neuroscience*, 19(3), 435–458. <https://doi.org/10.3758/s13415-019-00710-6>
- Vazou, S., Pesce, C., Lakes, K., & Smiley-Oyen, A. (2019). More than one road leads to Rome: A narrative review and meta-analysis of physical activity intervention effects on cognition in youth. *International Journal of Sport and Exercise Psychology*, 17(2), 153–178. <https://doi.org/10.1080/1612197X.2016.1223423>
- Verburgh, L., Scherder, E. J. A., Van Lange, P. A. M., & Oosterlaan, J. (2014). Executive functioning in highly talented soccer players. *PLoS ONE*, 9(3). <https://doi.org/10.1371/journal.pone.0091254>