

Concentration Level Differences between Athletes of Body Contact and Non-Body Contact Sports

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Abstract

Background: Concentration is one of the components of cognitive function, which is important for athletes in all sport branches. Every branch of sports has their own different characteristics, body contact or non-body contact, seen from the aspects of game activity that have direct or indirect physical contact, rules of the sports, behavior of the athlete and psychological demands. Basically, both sports branches need good level of concentration in order to display their best performance. The study aimed to determine the difference of concentration level between athletes of body contact and non-body contact sports.

Methods: This study was an analytic observational study with cross-sectional design, conducted in the Indonesian National Sport Committee (*Komite Olahraga Nasional Indonesia*, KONI) Secretary Office in September 2015. Primary data were taken using the instrumental concentration test namely Grid Concentration Test. One hundred ninety three athletes were obtained and grouped in body contact (111 athletes) and non-body contact sports (82 athletes). Statistical analysis was performed using the non-parametric test of Mann-Whitney.

Results: The result showed that the difference in the athlete's concentration level between body contact and non-body contact sports was not significant ($p=0.151$). Nevertheless, the data collection of this study showed that body contact sports had a better concentration level than non-body contact sports however the data was not statistically significant.

Conclusions: There is no significant difference in concentration level between athletes of body contact and non-body contact sports.

Keywords: Athlete, concentration level, body contact, non-body contact

Introduction

Indonesia has shown glorious achievements in Asia and the world level. However, in the last few years, the athlete's performance in Indonesia is far behind the previous achievements, including badminton.¹ In past events, Indonesia managed to win medals at the Singapore and Malaysia Open. On the other hand, Indonesia could not win medals at the Indonesia Open. It seems ironic, if the country itself does not reach the target. It does not rule out that the possibility of this incident occurred due to factors that disrupted the athlete's concentration during a match, such as the excessive cheering crowd since the match is held in their own country. It certainly led to the disruption of the athlete's concentration,

resulting in the inability to achieve their best performance. Thus, it can be said that concentration may have been one of the factors that influences succession of achievement.²

Concentration is the component of cognitive function, which is important for athletes in every sports branch.² Every branch of sports has its own different characteristic, body contact or non-body contact, based on the aspect of game activity that have direct or indirect physical contact, rules of the sports, behavior of the athlete, and psychological demands.³ Basically, both sport branches need a good concentration ability to display their best performance.² Yet, until currently, there are no studies on the level of concentration in both sports, even by the Indonesian National Sport Committee (*Komite Olahraga Nasional*

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Indonesia, KONI). Therefore, this study aimed to observe the difference of concentration level between body contact and non-body contact sports among KONI West Java's athletes.

Methods

This study was an unpaired analytic comparative categorical study with a cross-sectional study design, and was conducted in September 2015 at KONI Sport Center. The study was previously approved by the Health Research Ethics Committee, Faculty of Medicine, Universitas Padjadjaran, Bandung. Primary data were collected using the instrumental concentration test namely Grid Concentration Test.

Population of this study were KONI West Java's athletes who lived and practiced in KONI West Java's training center for the National Sports Week (*Pekan Olahraga Nasional*, PON) XIX Championship 2016 in Bandung. The population sample was 200 athletes. The inclusion criteria were met by 193 athletes who were in good physical condition, based on the examination conducted by KONI. Meanwhile, 7 athletes who did not pay attention during the test, and did not follow instructions given for the test were excluded from the study. The 193 athletes were grouped in body contact (111 athletes) and non-body contact sports (82 athletes). The sample exceeded the minimum sample of 49 athletes for each group through the unpaired analytic comparative categorical measurement.

Furthermore, data on sex, age, sports group, and level of concentration of athletes were put into characteristics of subject in this study. Sex was categorized as male and female, while age of respondents was divided into groups of teenager aged 12–25 and adult aged 26–45. Then, the sports groups were divided into 2 groups: sports with body contact and non-body contact. Additionally, concentration levels were divided into 5 groups: excellent (>21), good (16–20), sufficient (11–15), less (6–10), and poor (<5).

The variables in this study consisted of body contact and non-body contact sports as independent variables with nominal scale and concentration level as dependent variable with ordinal scale.

The instrument used to measure the level of concentration among athletes was Grid Concentration test adopted from Harris and Harris⁵ which had been tested for validity and reliability. The Grid Concentration Test is a measurement tool for testing concentration

in the form of tables containing numbers 00–99 randomly. Respondents were asked to connect the numbers with a line starting from the smallest number to the next larger number in one minute. An assessment was conducted by calculating the highest score. The score obtained from this test was then categorized.

The data used in the calculation of this study were categories of concentration levels between body contact and non-body contact sports. Since the data was ordinal scale and the data distribution was not normal, non-parametric Mann-Whitney hypothesis testing was conducted to compare the unpaired groups. Significance of the result was based on the value of p , where $p < 0.05$ indicated significant difference between the two variables.

Results

According to the subject characteristic distributions on sports branches, female dominated with 51% in body contact and 52% in non-body contact sports. Furthermore, in terms of age, the two sports branches were dominated by adult 73% in body contact sports and 82% in non-body contact sports. Moreover, the level of concentration of both sports branches was dominated by the group of athletes with a level of concentration that fell into the less category, 63% in body contact sports and 60% in non-body contact sports (Table 1).

The subject characteristic distributions on concentration level showed that all variables, teenager or adult, male or female, as well as body contact and non-body contact sports, dominated the category of less the concentration level. The acquisitions of a good level of concentration are all on the body contact sports with a total of 4 athletes, i.e. in Judo and Martial Arts with 2 athletes each. While in non-body contact sports, there was not one athlete who had good concentration level. In addition, the poor category of concentration level was more in athletes of non-body contact sports as much as 15%, while in athletes of body contact sports was only 6% (Table 2).

The result of subject characteristic distributions on concentration level showed the difference of concentration level between body contact and non-body contact sports, where sports with body contact was slightly higher than the non-body contact with an average difference (0.49). Therefore, due

to the value of $p > 0.05$, it can be concluded that there is no significant difference in concentration level between athletes of body contact and non-body contact sports (Table 3).

Discussions

Sports play a role in maintaining the brain function, increasing brain plasticity and even accelerating their cognitive function.⁶ It is strengthened by many studies that examined the relationship between sports and cognitive function. Most of the studies report positive results between the effect of exercise with cognitive function, either in molecular, cellular, and behavioral.⁶⁻⁸

Concentration is defined as focusing on the relevant cues in the environment, maintaining that attentional focus over time, having awareness of the situation and performance errors.² Therefore, concentration is part of the cognitive function and a necessity that every athlete should have. If athletes have a good concentration, the optimal accomplishment will be easily achieved.² However, result of this study showed that more than half of the sample population consisting of 101 athletes (59%) fell into the less category of concentration level, while athletes who showed good category in concentration level consisted only of 4 athletes (2%). When compared with the non-athlete subjects, it

was still higher than the athlete's. The study conducted by Nurcahyono⁹ in Indonesia shows the measurement for concentration ability among 43 vocational school students has a mean of 14.91 that is higher than the athletes in this study (8.18). In fact, the contribution of concentration is significantly affecting the athlete's performance. A study conducted by Mashuda¹⁰ on softball athletes in Indonesia states that concentration has the highest contribution compared to muscle strength. Therefore, it could be concluded that a good concentration is an important factor that every athlete in every sports branch should have.¹⁰

According to the type of sports, it is grouped into 2 categories, body contact and non-body contact.¹¹ Basically, both sports need a good level of concentration in order to achieve optimal performance.² However, statistical test results conducted in both categories show the same result of less category level of concentration. Even in the non-body contact sports there were none with a good category result, whereas in the body contact sports there were only 4 athletes. Moreover, the poor category of concentration level was more in athletes with non-body contact as much as 15%, while the athletes with body contact was only 6%.

Besides, if viewed from the mean value of concentration level, it indicated that body contact (8.39) had higher result than non-body contact sports (7.90). Based on that,

Table 1 Subject Characteristic Distributions on Sports Branch

Characteristic	Sports Branch	
	Body Contact (n=111)	Non-Body Contact (n=82)
Age (years)		
Teenager (16 - 25)	30 (27)*	15 (18)
Adult (26 - 45)	81 (73)	67 (82)
Sex		
Male	54 (49)	39 (35)
Female	57 (51)	72 (65)
Concentration Level		
Excellent (>21)	0 (0)	0 (0)
Good (16-20)	4 (4)	0 (0)
Sufficient (11-15)	30 (27)	21 (25)
Less (6-10)	69 (63)	49 (60)
Poor (<5)	8 (6)	12 (15)

Note: *) Number and percentage

Table 2 Subject Characteristic Distributions on Concentration Level

Variable	Concentration Level				
	N	Good	Sufficient	Less	Poor
Age (years)					
Teenager (16-25)	45	0(0%)	16 (35.6%)	27 (60%)	2 (4.4%)
Adult (26-45)	148	4 (2.7%)	35 (23.6%)	91 (61.5%)	18 (12.2%)
Total	193	4 (2.1%)	51 (26.4%)	118 (61.1%)	20 (10.4%)
Sex					
Male	93	3 (3.2%)	17 (18.3%)	61 (65.6%)	12 (12.9%)
Female	100	1 (1%)	34 (34%)	57 (57%)	8 (8%)
Total	193	4 (2.1%)	51 (26.4%)	118 (61.1%)	20 (10.4%)
Sports Branch					
Body Contact					
Judo	20	2 (10%)	8 (40%)	10 (50%)	0 (0%)
Martial Arts	22	2 (9%)	5 (23%)	15 (68%)	0 (0%)
Taekwondo	14	0 (0%)	4 (29%)	9 (64%)	1 (7%)
Kempo	31	0 (0%)	10 (32%)	18 (58%)	3(10%)
Fencing	14	0 (0%)	3 (21.4%)	8 (57.1%)	3 (21.4%)
Wrestling	4	0 (0%)	0 (0%)	4 (100%)	0 (0%)
Boxing	6	0 (0%)	0 (0%)	5 (83%)	1 (17%)
Total	111	4 (4%)	30 (27%)	69 (63%)	8 (6%)
Non-Body Contact					
Sports Climbing	27	0 (0%)	9 (33%)	13 (48%)	5(19%)
Athletics	15	0 (0%)	5 (33%)	9 (60%)	1 (7%)
Gymnastics	15	0 (0%)	4 (25%)	10 (63%)	1 (12%)
Archery	13	0 (0%)	0 (0%)	13 (100%)	0 (0%)
Weightlifting and Body Building	12	0 (0%)	3 (24%)	4 (34%)	5 (42%)
Total	82	0 (0%)	21 (25%)	49 (60%)	12 (15%)

it could be concluded that sports with body contact showed a higher level of concentration compared to sports with non-body contact but the data was not statistically significant.

These result contradicted with the theory suggesting there are differences between the two sports level of concentration, whereas the sports with non-body contact showed a higher level of concentration compared to body contact. This was due to the need for a sharper and focused concentration to achieve better results of the target, since the characteristic of this sport is demanding the aspects of precision, accuracy, consistency, and high level of concentration, while body

contact sports uses strategies, tactics, aggressiveness, and high courage.³ Apart from the characteristics, the nature of the individual or team sports might also affect the ability of the athlete's concentration. Especially in sports with body contact which are usually in teams, and able to mobilize the crowd such as, in football or in basketball. Since the number of supporters may cause the atmosphere of the game to become loud and noisy hence disrupt the players to remain concentrated. While non-body contact sports are generally individual sports, which are not drawing much crowd. They have a calmer atmosphere so that the athletes can mentally minimize

Table 3 Descriptive Data Analysis

Concentration Level	Sports Branch			p-value
	Body Contact (n=111)	Non-Body Contact (n=82)	Total	
Mean (SD)*	8.39 (3.65)	7.90 (3.41)	8.19 (3.56)	
Median	7	7	7	
Interval (Min-Max)	15 (3-18)	12 (3-15)	15(3-18)	
Excellent (>21)	0 (0%)	0 (0%)	0(0%)	0.151
Good (16-20)	4 (4%)	0 (0%)	4 (2.1%)	
Sufficient (11-15)	30 (27%)	21 (25%)	51 (26.4%)	
Less (6-10)	69 (63%)	49 (60%)	118 (61.1%)	
Poor (<5)	8 (6%)	12 (15%)	20 (10.4%)	

Notes:*) Standard Deviation

the dispersion of their concentration.¹² Moreover, in individual sports; the athlete obtains feedback individually most of the time as opposed to the team sports, in which feedback is mostly presented to the team as a whole. The provided feedback will help boost their confidence which will increase the performance of the athletes. This is discovered in a study conducted by Elferink-Gemser et al.¹² in Groningen, who stated the level of concentration in individual sports is higher than in group sports. Furthermore, emotion is one of the factors that affect concentration, when emotion goes out of control surely it will interfere the athletes in maintaining their concentration.^{2,12} The study conducted by Sukadiyanto¹¹ in Indonesia showed that the emotional reaction for sports with body contact are higher than non-body contact. Since in body contact sports athletes are constantly in direct contact with the opponent, resulting in a surge of emotional outburst and preventing athletes for maintaining their concentration. Unlike sports with non-body contact, where there is a separator so that there is no direct physical contact with the opponent and if a player violates the separator, it will be counted as a violation. These conditions minimize the appearance of emotional outburst of athletes in non-body contact sports, thus the athletes can fully maintain their concentration without disruption.

Moreover, the contrary result by the above theory was influenced by several factors such as emotion, physical condition, gender, age, experience and knowledge, including educational level. There are two kinds of emotion, positive and negative. Positive emotion includes feelings of pleasure, joy,

and passion, while negative emotion includes feelings such as anger, anxiety, and boredom.¹¹ The negative emotion can prevent athletes from maintaining their concentration.² Furthermore, in this study psychological examination was not conducted to assess the psychological state of the athletes whether it is good or bad. Second, regarding the physical condition of each individual, who has a different ability of brain function in selecting a number of available information so this affect the ability of individuals for focusing their attention.¹³ A physically exhausted condition also affects concentration. The study conducted by Faber et al.¹⁴ founded the effect of fatigue with visual selective attention. The third factor is gender. The study conducted by Elferink-Gemser et al.¹², showed that male has a higher level of concentration than female. While in this study, both sports branches are dominated by female as much as 51.5%. Then, the fourth factor is age. In addition, the increase in someone's age will be followed by growth of the brain, therefore increasing the capability of brain to process information.¹³ Knowledge and experience factors also contribute in the effort of focusing the attention toward unidentified patterns, thus it can be concluded that individual knowledge and experience make athletes easier to maintain their concentration.¹³ The last factor is the level of education. The higher educational level, the easier for someone to concentrate well.¹⁵ Therefore, the possibility of negative emotional factor, exhaustion experienced by athletes, such as after physical activities or strenuous physical training, the population is dominated by female, and lack of knowledge and experiences, also low educational level will

reduce the concentration ability of athletes at the time of the concentration test. However, all these factors have not been explored in more depth. The limitations of this study are the cross-sectional method that only describes the level of concentration at that moment, and the data retrieval time is not homogeneous for each sports branch as it is also taken in the middle of exercise time, ideally, the concentration test should be conducted after one day of free practice.

This study concludes that there is no significant difference in the level of concentration between sports with body contact and non-body contact, and shows the state of sufficient and less concentration level in most athletes is extremely concerning. This becomes a specific issue that must be considered, hence, it is worth exploring what causes this condition as well as the solution, and what interventions can solve the problem, because if the concentration is not good it will have an impact on the performance of athletes and may interfere succession of the achievement. Moreover, KONI have to provide training programs to increase the concentration level among athletes. For further studies, it is necessary to analyze the correlation or interaction between sports types with the ability of concentration, to find out whether body contact and non-body contact sports affect the concentration ability of athletes or not as well as the effect of the level of concentration on the performance of athletes.

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