The Effect of Physical Fitness and Healthy Behavior Toward Concentration, Anxiety and Cortisol Hormone

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Abstract. This study aimed to get empirical evidence and facts of how the correlation and contribution between physical fitness, healthy behavior towards concentration, anxiety and salivary cortisol hormone response on the elementary school students. The method is one-shot case study with a population of elementary school students in West Java. The data were taken at random based on geographic characteristics, approximately in ten months. Its taken was physical fitness, healthy behavior, anxiety, salivary cortisol hormone response. The results showed: 1) there was a significant correlation between physical fitness with concentration level at p-0.000, amount of contribution is 24.6%; 2) there was a significant correlation between physical fitness with anxiety at p-0.003, amount of contribution is 4.9%; 3) there was a significant correlation between physical fitness with salivary cortisol hormone response at p-0.015, amount of contribution 3.9%; 4) there was a significant correlation between physical fitness with concentration level at p-0.000, amount of contribution is 6.6%; 5) There was a significant correlation between physical fitness with anxiety at p-0.000 amount of contribution is 9%; 6) There was a significant correlation between physical fitness with salivary cortisol hormone response at p-0.244 amount of contribution is 0.3%.

1. Introduction

Anxiety can happen to anyone, anytime and anywhere. From infants to the elderly age anxiety will occur. Anxieties have various reasons and depend on each individual, situation and condition. The incremental anxiety is a natural reaction to the problems, it is in fear will be a negative effect both for herself and the environment.

Nowadays, promiscuity teenagers are truly alarming and dangerous if left without the guidance of parents, teachers and others. Behavior of teenagers can be supplied with positive activities such as extracurricular sports activities, arts and others. Extracurricular activities are informal activities which very beneficial for students. Extracurricular activities that can be followed by students are a team sport that is basketball, volleyball, soccer, and futsal. While of the individual sport activities are karate, badminton, taekwondo, athletics and others. By participating in extracurricular activities are expected to influence the increased concentration, as described by G.Trost article’s titled physical education, physical activity and academic performance, stated that physical education and physical activity done regularly will affect the physical fitness and learning achievement students. Other studies said that the effect of physical education and physical activity could affect academic achievement in children; the
study was conducted on 214 children during the second half of the Dawn et al in Tarleton State University. The impact of physical activity in extracurricular as presented in research results Niels Egelund by Medical Daily reported that in loaded within seconds of health says that exercise is done while going to school through walking or cycling is elevated in the level of concentration remained 4 hours later. Physical activity causes significant changes in the endocrine system and associated with protein metabolism. Endocrine glands secrete hormones into the circulation, binds to specific receptors on target cells, and the effect on the expression of specific gene. At the cellular level, the hormone can be modify the properties of the membrane and activate second messengers that cause changes in transcription and translation processes. In the muscle cells, cortisol is the only hormone that stimulates protein degradation. (Mooren & Volker, 2005). Cortisol is a catabolic hormone secreted classified on the state of physical and psychological stress. At the time of a person's emotions are in a negative state such as stress, anxiety, fear, and frustration, the body will secrete the hormone cortisol. The release of the hormone cortisol may activate the sympathetic nervous system, which is marked by an increase in heart rate. Cortisol levels in the blood are high also can reduce a person's ability to think and react. The cortisol hormones also decrease in mood and muscle fatigue. (Wolfe, 2001, Guyton & Hall, 2000). In addition the benefits of physical activity expressed by Leslee J Scheuer et al that with regular physical activity will improve cognition function and increase the response substantively brain and responsible for maintaining the health of neurons. According to explanation, the researchers want to analyze how the effect of physical fitness and healthy behavior on the concentration, anxiety salivary cortisol response and physical education achievement of elementary students for human development standard.

2. Research Problems

In accordance with the explanation of the background and the facts, the research problems are formulated in the form of a research question:

1. How the amount of physical fitness contribution to the concentration?
2. How the amount of physical fitness contribution to the anxiety?
3. How the amount of physical fitness contribution to the salivary cortisol response?
4. How the amount of healthy behavior contribution to the concentration?
5. How the amount of healthy behavior contribution to the anxiety?
6. How the amount of healthy behavior contribution to the salivary cortisol response?
The aim of study:
1. To obtain empirical evidence about of physical fitness and healthy behavior that is associated with concentration, anxiety, and salivary cortisol response towards physical education and physical education achievement.
2. This study is expected to open a new information that implements the importance of physical fitness and healthy behavior are applied in everyday life that can be useful to improve concentration, decrease levels of anxiety or stress, and improve academic performance, especially school physical education.

In addition to the specific objectives of this study are as follows:
1. Analyze physical fitness contribution to concentration.
2. Analyze physical fitness contribution to anxiety.
3. Analyze physical fitness contribution to the salivary cortisol response.
4. Analyze healthy behavior contribution to the concentration.
5. Analyze healthy behavior contribution to anxiety.
6. Analyze healthy behavior contribution to the salivary cortisol response.

3. Research methods
The research conducted is one shot case study, the data from elementary school students in West Java were taken at random based on geographic characteristics of the location of the school. Population and samples is common object, which are all source of data from a research and have the general properties of objects to be studied. Thus, the population will provide information about the needs in research. In this study, researchers took population in elementary students. Samples are part of the population, which is considered to represent the study population; sample selection techniques must be in accordance with the general properties of the research objectives. For the purposes of this study used the number of
samples adapted to the elementary student population by sex, geographic characteristics and grade (4, 5 and 6). See Table of 3.1 below.

4. Date and location of the research
First and Second years; getting data physical fitness, healthy behavior, concentration, salivary cortisol hormone response and physical education achievement of all students in elementary school in West Java.

| No  | Time                  | School                                                      | Sample | Note                                                                 |
|-----|-----------------------|-------------------------------------------------------------|--------|----------------------------------------------------------------------|
| 1.  | Tuesday, 5 May 2015   | SDN Awilega Desa Pager Alam, Kec Taraju, Kab Tasikmalaya   | M=11; F=5 | Characteristic: High Land; Hinterland; weather 20° – 30°C; Altitude: 1.030 dpl. |
| 2.  | Thursday, 7 May 2015  | SDN Sunten Jaya II, Desa Sunten Jaya, Kec Lembang, Kab Bandung Barat | M=10; F=6 | Characteristic: High Land; Rural areas; weather 18° – 28°C; Altitude: 1.270 dpl. |
| 3.  | Tuesday, 11 Aug 2015  | SDN Cisitu 2 Kota Bandung                                   | M=11; F=10 | Characteristic: High Land; Urban areas; weather 22° – 32°C; Altitude: 920 dpl. |
| 4.  | Friday, 14 Aug 2015   | SDN Karang Pawitan I, Kab Karawang                         | M=6; F=14 | Characteristic: Lowland; Urban areas; weather 32° – 37°C; Altitude: 25 dpl. |
| 5.  | Saturday, 15 Aug 2015 | SDN 5 Kab Pangandaran                                      | M=14; F=9  | Characteristic: Lowland; Beach areas; weather 35° – 38°C; Altitude: 5 dpl. |
| 6.  | Friday, 21 Aug 2015   | SDN Girimukti, Kp Ciketer, Desa Cijedil, Kec Cugenan, Kab Cianjur | M=8; F=9  | Characteristic: Middleland; Rural areas; weather 28° – 34°C; Altitude: 329 dpl. |
| 7.  | Saturday, 22 Aug 2015 | SDN Padamakmur, Kp. Babakan Pekalongan, Desa Padaluyu, Kab Cianjur | M=9; F=7  | Characteristic: Middleland; Rural areas; weather 28° – 34°C; Altitude: 300 dpl. |
| 8.  | Tuesday, 25 Aug 2015  | SDN Bunut, Kota Sukabumi                                  | M=10; F=6 | Characteristic: High Land; Urban areas; weather 22° – 32°C; Altitude: 720 dpl. |
| 9.  | Wednesday, 26 Aug 2015| SDN Dayeuhluhur Kulon, Kab Sukabumi                        | M=7; F=9  | Characteristic: High Land; Rural areas; weather 22° – 32°C; Altitude: 735 dpl. |
| 10. | Saturday, 5 Sept 2015 | SDN Dadap II, Kec Palimanman, Kab Indramayu                | M=11; F=9  | Characteristic: Lowland; Urban areas; weather 33° – 38°C; Altitude: 17 dpl. |

Ket: Altimeter → Garmin 910XT

Processing and Data Analysis.
Processing and data analysis techniques with SPSS v.20 software that will be carried out in this study are as follows:

a. Analysis prerequisite test is a test of normality with the Kolmogorov-Smirnov at p-value > 0.05.

b. Levene's test of homogeneity with the p-value > 0.05.

c. Analysis of the hypothesis 1 to 8 using the pearson correlation test p-value < 0.05.

d. Selection and data coding to choose the data according to the measuring tool used (Likert-type attitude scale), which will be measured levels of validity and reliability.
5. Summary of research result

| Table 3. Summary of Correlation Statistical Analyzing |
|-----------------------------------------------------|
| **Result** | **Data** | **Pearson Correlation** | **r** | **R** | **Kesimpulan** | **n** | **Kontribusi** | **p-value** |
| 1 | PF – Concentration | | 0.496 | 0.246 | 24.60% | 0.000* | 181 | Significant |
| 2 | PF – Anxiety | | -0.222 | 0.049 | 4.90% | 0.003* | 181 | Significant |
| 3 | PF – Cortisol | | -0.197 | 0.039 | 3.90% | 0.015* | 152 | Significant |
| 4 | HLS – Concentration | | 0.258 | 0.066 | 6.60% | 0.000* | 181 | Significant |
| 5 | HLS – Anxiety | | -0.300 | 0.090 | 9.00% | 0.000* | 181 | Significant |
| 6 | HLS – Cortisol | | 0.057 | 0.003 | 0.30% | 0.244 | 152 | No Significant |

| Table 4. Summary of Linear Regressi Analyzing |
|---------------------------------------------|
| **Hypotesis** | **Data** | **Linear Regressi** | **Kontribusi** | **p-value** | **Regression** |
| 7 | PF, HLS – Concentration | | 0.536 | 0.287 | 28.7% | 0.000* | \( Y = -65.544 + 0.442 \)(PF) + 0.607 (HLS) |
| 8 | PF, HLS – Anxiety | | 0.355 | 0.126 | 12.6% | 0.000* | \( Y = 188.036 - 0.141 \)(PE) - 0.654(HLS) |
| 9 | PF, HLS – Cortisol | | 0.213 | 0.045 | 4.50% | 0.031* | \( Y = 0.224 - 0.001 \)(PF) + 0.001(HLS) |

Note: PF = Physical Fitness; HLS = Healthy Life Style.

According to the summary statistical analyzing:
1. There is a significant correlation between physical fitness with a concentration that is equal to 0.496; the amount of physical fitness contribution to the concentration 24.60%.
2. There is a significant correlation between physical fitness with the anxiety that is equal to -0.222; the amount of the physical fitness contribution to the anxiety 4.90%.
3. There is a significant correlation between physical fitness with the salivary cortisol response to students that is equal to -0.197; the amount of the physical fitness contribution to salivary cortisol response 3.90%.
4. There is a significant correlation between healthy behavior with a concentration that is equal to 0.258; the amount of healthy behavior contribution towards a concentration of 6.60%.
5. There is a significant correlation between healthy behavior to anxiety that is equal to -0.300; the amount of healthy behavior contribution towards anxiety 9.00%.
6. There is no significant correlation between healthy behavior with the salivary cortisol response that is equal to 0.057; the amount of healthy behavior contribution toward salivary cortisol response 0.30%.
7. There is significant correlation and prediction between physical fitness and healthy behavior to a concentration that is equal to 0.536. The amount of physical fitness and healthy behavior affect the concentration of 28.70%. To predict the effect of physical fitness and healthy behavior towards concentration that produced a regression formula \( y = -65.544 + 0.442 \)(KJ) + 0.607 (PHS).
8. There is significant correlation and prediction between physical fitness and healthy behavior to an anxiety that is equal to 0.355. The amount of physical fitness and healthy behavior affect the anxiety of 12.60%. To predict the effect of physical fitness and healthy behavior to anxiety produced a regression formula \( y = 188.036 - 0.141 \)(KJ) - 0.654 (PHS).
9. There is a significant correlation and prediction between physical fitness and healthy behavior to salivary cortisol response that is equal to 0.213. The Amount of physical fitness and healthy behavior contribution affect salivary cortisol hormone response 4.50%. To predict the effect of physical fitness and healthy behavior to the salivary cortisol hormone response produced a regression formula \( y = 0.224 \) to 0.001 (KJ) + 0.001 (PHS).
6. The Next Research
After analyzing the results achieved in the previous research the data obtained with satisfactory results. But data taken from the study subjects who come from ten schools with various types of geographic seemed less on elementary school student population in the province of West Java. Therefore, the plan will be made for next year is to multiply the data and completes all the disadvantages that it is necessary for this study. Data retrieval will be more tightly controlled and more selective so that there is no data in the exclude, so that all of them comply with the established procedure.

7. Conclusion
Based on the results of analysis, processing and interpretation of data, the results of this study concluded that:
1. There was a significant correlation between physical fitness with a concentration and the amount of contribution 24.60%.
2. There was a significant correlation between physical fitness with the anxiety and the amount of contribution 4.90%.
3. There was a significant correlation between physical fitness with the salivary cortisol response and the amount of contribution 3.90%.
4. There was a significant correlation between healthy behaviors with concentration and the amount of contribution 6.60%.
5. There was a significant correlation between healthy behavior with anxiety and the amount of contribution 9.00%.
6. There was no significant correlation between health behaviors with salivary cortisol response and the amount of contribution 0.30%.
7. There were significant correlation and predictions between physical fitness and healthy behavior simultaneously against concentration.
8. There were significant correlation and predictions between physical fitness and healthy behavior simultaneously against anxiety.
9. There were significant correlation and predictions between physical fitness and healthy behavior simultaneously against salivary cortisol response.

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