The Effect of Physical Exercise on Students' Level of Attention and Distress

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Abstract- *Physical exercise has been proven to be associated with attention and distress. However, there is no research has yet been done to show that physical activity has a direct impact on both attention and distress. This study aims to determine if there is a significant effect of physical exercise on the students' level of attention and distress. There were three treatments or interventions utilized in this study: physical exercise for 10 minutes, 5 minutes, and no exercise at all. The Kessler Psychological Distress Scale (K10) was used to evaluate the level of distress of the participants, and the Sustained Attention to Response Task (SART) was used to measure the level of attention of the participants. Thirty (30) undergraduate students from various nationalities in Adventist University of the Philippines were selected and were randomly assigned into 3 treatment groups: 10 minutes group (n = 10), 5 minutes group (n = 10), and no exercise group (n = 10). They were given the task to do the pre-test and post- test before doing the interventions. Between-subject experimental design was utilized, and the data from the K-10 Psychological Distress Scale and the SART Test were analyzed using the paired sample t-test, and One-Way ANOVA statistics were also used to analyze the SART Test results. Results revealed that, the no physical exercise intervention did not have significant effect on the distress level (t=2.02, df=9, p=.074), the same as with the 5-minutes physical exercise intervention that showed no significant effect on the distress level (t = 0.836, df= 9.00, p = .425), while the 10-minutes physical exercise intervention showed that there is a significant effect on the distress level (t9= 2.64, p=.027). Also, the control group and the 5-minute physical exercise intervention did not show any significant difference, while the 10-minute physical exercise showed that there is a significant effect on the level of attention (t9= 3.4, p=.008). Results implied that 10-minute physical exercise is a very effective way to reduce the distress level compared with having only 5-minute physical exercise or no exercise at all. In addition, the 10-minute physical exercise is the only intervention that can improve the attention level. It is recommended to replicate the same concept of the experiment to different age groups and perhaps with a different amount of time in the physical exercise intervention with a greater number of participants.*

Keywords*: physical exercise, attention, distress, positive psychology*

I. INTRODUCTION

Stress is an inevitable part of human life. Furthermore, stress is a widespread phenomenon in all humans (Shahsavarani, Abadi, & Kalkhoran, 2015). In addition, people encounter stressful events every day to various degrees. Thus, stress responses are normal reactions to environmental conditions with stressful situations, and can be considered adaptive in nature. Moreover, Shahsavarani et al. (2015) said that all people have experienced the stress phenomenon throughout their history and human history.

This is the reason why it is not right to say that the stress phenomenon is a new concept in human lives. Nonetheless, the condition of this world, followed by the increase in stressful events and strain, makes all the people subject to the stress phenomenon.

The first and most generic definition of stress that was proposed by Hans Selye (cited in Fink, 2016): "stress is the nonspecific response of the body to any demand." In this manner, stress is usually referred to as humans respond to a certain situation with a stressor. On the other hand, "Distress is the result of a person's inability to cope or adapt due to failure or overload." (McMillan, 2020). Another name for distress is negative stress. It is called the negative stress because it brings about negative effects on the affected people. Distress can be both acute (short-term) or chronic stress (long-term), depending on the duration of the stress. Many people, if not all, experienced distress, and one of the groups of people who are prone to this is students. Prolonged distress may lead to anxiety and depression. According to the World Health Organization (WHO, 2017a), there are more than 200 million people in the world (3.6% of the population) who suffer from anxiety. Meanwhile, there have been 322 million people (4.4% of the population) around the world who suffered from depression, and nearly half came from Southeast Asia and West Pacific region.

Many negative effects come with distress. One of them is the fact that distress can interfere with one's attention. Onik Imaniar (2018) reported that attention and distress are related to each other because when individuals are experiencing distress, their attention will be affected. People nowadays have been trying to figure out ways to reduce stress and improve their coping mechanisms in response to stressful conditions. Erica (2013) said that the use of physical exercise has its benefits in reducing stress. Scientists have found that regular participation in aerobic exercise has been shown to decrease overall levels of tension, elevate and stabilize mood, and improve sleep. Exercise and stress research has typically focused on aerobic exercise. There have been consistent findings that people report feeling calmer after a 20- to 30-minute session of aerobic exercise, and the calming effect can last for several hours after exercise (Erica, 2013). Furthermore, the recommendations for exercise in the role of stress management fit with the current health recommendations (Jackson, 2006). There are several studies that have been conducted already about how exercise can reduce stress and distress. However, there is no study yet that indicates the direct effect of physical exercise specifically on both distress and attention. Therefore, this experimental study aims to determine the effect of physical exercise on students' level of attention and distress.

Research questions:

- Is there a significant difference in the level of distress before and after exercise?
- Is there a significant difference in the attention span of students before and after exercise?
- Which treatment condition has the best effect on the students?

II. LITERATURE REVIEW

Physical Exercise

Exercise is a planned and structured activity aimed at improving health and fitness. It includes aerobic, strength, flexibility, and balance exercises (Sisk, n.d.; Thompson, 2020). Aerobic activities such as walking, running, or cycling improve cardiovascular fitness and are especially effective for stress reduction (Chertoff, 2020; Robinson, Segal, & Smith, 2020). Beyond physical health, exercise can reduce depression, anxiety, and ADHD symptoms while boosting mood and memory (Simoneaux, 2020). Regular participation in physical exercise has also been linked to improved sleep, higher energy levels, and better emotional regulation (Erica, 2013). These benefits show that exercise is not merely a physical practice but a holistic intervention with psychological, social, and biological impacts.

Attention

Attention is the selective focus of mental resources, enabling individuals to filter information and concentrate on relevant tasks (Cummings & Sanders, 2019). Research distinguishes between overt (observable) and covert (internal) attention, often likened to a "spotlight" focusing consciousness (Stazicker, 2010). Exercise has been linked to improvements in attention and cognitive performance (Hillman et al., 2009; Donnelly et al., 2016). Studies on children and adolescents suggest that physical activity can enhance working memory, processing speed, and inhibitory control (Scudder et al., 2014; Li et al., 2017). These findings highlight that attention is not a fixed trait but a cognitive ability that can be shaped by environmental and behavioral factors such as physical exercise. Thus, understanding the mechanisms of attention helps explain why exercise may positively influence academic and daily functioning.

Distress

Distress refers to emotional suffering resulting from stressors that exceed coping abilities (McMillan, 2020). Symptoms include worry, fatigue, and impaired functioning, with prolonged distress leading to anxiety or depression (McLachlan & Gale, 2018). Students are especially vulnerable to distress due to academic demands and social pressures (Shahsavarani et al., 2015). Research shows that distress affects not only mental health but also physiological systems such as immunity and cardiovascular function (WHO, 2017). If left unmanaged, distress can impair problem-solving, decision-making, and interpersonal relationships. Therefore, interventions that reduce distress are essential in preventing more severe psychological disorders and promoting overall well-being.

Physical Exercise, Distress, and Attention

Studies consistently show that physical exercise reduces stress and distress (Kim & McKenzie, 2014; Koo & Kim, 2018) and improves mood and quality of life (Arent, Landers, & Etnier, 2011; Atlantis et al., 2017). Research also shows exercise enhances attention and executive function in children and adolescents (Best, 2010; Li et al., 2017). Particularly, aerobic exercise has been effective in improving attentional capacity, even among individuals with ADHD (Silva et al., 2015; Rassovsky & Alfassi, 2019). Furthermore, Northey et al. (2018) highlighted that the benefits of exercise extend across the lifespan, from children to older adults, suggesting a universal effect on cognitive and emotional health. By combining findings across these domains, it becomes evident that physical exercise has dual benefits: alleviating psychological distress while simultaneously sharpening attentional control.

III. METHODS

Research Design

This study was conducted using the experimental between-groups design. The study was a randomized controlled trial that involved comparing three groups of people, where each was given a different condition to examine the effects of physical exercise on the level of attention and distress.

Population & Sampling Technique

There were thirty students from various nationalities from the Adventist University of the Philippines who were selected. The participants' ages range from 18 to 22 years old. The sampling methods being used were random sampling. The participants were assigned to 3 conditions and interventions: 10 minutes of exercise, 5 minutes of exercise, and no exercise at all. Each group has 10 participants.

Data Gathering

The researchers of this study followed some procedures in order to achieve the objectives of this work. First, they prepared an informed consent through the Google Form and distributed it to the participants that are suitable with the criteria that they have. The purpose of that informed consent is to inform the individuals about the possible disadvantages and the advantages of participating in this study. In this study, 10 participants are randomly assigned to the control group, and the remaining 20 participants are randomly assigned to the two categories for the experimental groups. Second, they conduct the study through a Zoom meeting. In the Zoom meeting, they explained the step-by-step instructions on what they are going to do. After that, they conduct the study according to the instructions that they have made and explained. Lastly, after they have done the study, they thank the participants for participating in their experimental study, and ask the participants whether they have found out their hypothesis and whether it affects their performance while they do the activity. They also do not forget to tell the participants their title and the main purpose of their study.

Instrumentation

Kessler Psychological Distress Scale (K10), a global measure of distress, was used to evaluate the level of distress of the participants. Sustained Attention to Response Task (SART), designed by Robertson and Colleagues in 1997, was used to measure the level of attention of the participants. Both of the instrument was used as the pre-test or before the physical exercise intervention, and given after the physical exercise intervention (post-test).

Data Analysis

The data gathered in this study were coded and interpreted using Jamovi. One-way Analysis of Variance (ANOVA) was the statistical test used to determine if there were significant differences before and after the physical exercise interventions. An independent t-test was also used to determine if there was a significant difference between the three physical exercise interventions and the control group. The data gathered from the statistical analysis were presented in tabular form in the results section.

IV. RESULTS & DISCUSSION

The data for the K-10 Psychological Distress Scale were analyzed using the paired sample t-test, and the data for the SART test were analyzed using the One-Way ANOVA test. Results are presented based on the chronological order of the research question.

RQ1: Is there a significant difference in the level of distress before and after exercise?

	Mean	SD	t	df	*p*-value	Interpretation
K-10 Pre-Test	23.6	5.42	2.02	9	0.074	Not Significant

K-10 Post-Test	22.6	5.38

Table 1. *Difference Before and After Without Physical Exercise Intervention*

Table 1 presents the difference in K-10 Psychological Distress Scale Test results before and after, without any physical exercise intervention. It shows that the control group, receiving no physical exercise intervention, did not significantly lessen the distress level of the participants (t=2.02, df=9, p=.074). There is a difference between the pre-test result and the post-test result, but it was not large enough to make a significant difference from that of the pre-test. This implies that, without having physical exercise, there was no difference in terms of the distress level.

Table 2. *Difference Before and After 5 Minutes of Physical Exercise Intervention*

	Mean	**SD**	**t**	**df**	***p*-value**	
	Interpretation	**K-10 Pre-Test**	22.8	10.8	0.836	9
	0.425	Not Significant				
K-10 Post-Test	22.2	10.5				

Table 2 presents the difference in K-10 Psychological Distress Scale Test results before and after a 5-minute physical exercise intervention. It shows that the 5-minute physical exercise did not significantly lessen the distress of the participants (t = 0.836, df = 9.00, p = .425). Although it makes a difference in the score of the distress scale, it was not large enough to make a significant difference from that of the pretest or before the 5-minute physical exercise intervention.

Table 3. *Difference Before and After 10 Minutes Physical Exercise Intervention*

	Mean	**SD**	**t**	**df**	***p*-value**
	Interpretation	**K-10 Pre-Test**	21.5 2.64	9	5.42 0.027 Significant
K-10 Post-Test	18.7	5.77			

Table 3 presents the difference before and after the 10-minutes physical exercise intervention. The table reveals that the 10-minute physical exercise intervention have a significant difference on the distress level of the participants (t9= 2.64, p=.027). This indicates that 10 minutes of physical exercise can lessen one's distress level.

Discussion:

- No-exercise and 5-minute exercise groups showed no significant reduction in distress (p = .074 and p = .425, respectively).
- The 10-minute group showed a significant decrease in distress (t(9) = 2.64, p = .027).
- This supports prior findings that sufficient physical activity reduces stress (Koo & Kim, 2018; Aldana et al., 1996). It also aligns with WHO (2017) reports on exercise as protective for mental health. Thus, only longer exercise (10 min) produced measurable improvements in distress.

RQ2: Is there a significant difference in the attention span of students before and after exercise?

Table 4. *Differences of the SART Test Before and After Without Physical Exercise Intervention*

	Mean	SD	t	df	*p*-value		
	Interpretation SART Mistakes Pre-Test				10.4	6.17	1.19
SART Mistakes Post-Test	7.9	9 4.36	0.264	Not Significant			

Table 4 presents the differences in SART Test results before and after, without any physical exercise intervention. It shows that the control group, receiving no physical exercise intervention, did not significantly improve the attention of the participants (t=1.19, df=9, p=.264). There is a difference between the pre-test result and the post-test result as what is shown from the pre-test and post-test having 2.5 mean difference, but it was not large enough to make a significant difference from that of the pre-test.

Table 5. *Differences of the SART Test Before and After 5 Minutes of Physical Exercise Intervention*

	Mean	**SD**	**t**	**df**	***p*-value**		
	Interpretation SART Mistakes Pre-Test				7.20	7.96	
SART Mistakes Post-Test	5.80	8.69	1.04	9	0.324	Not Significant	

Table 5 presents the differences in SART Test results before and after a 5-minute physical exercise intervention. It shows that the 5-minute physical exercise did not significantly improve the attention level of the participants (t = 1.19, df = 9.00, p = .324). Although it makes a difference in the score of the SART Test, it was not large enough to make a significant difference from that of the pretest or before the 5-minute physical exercise intervention.

Table 6. *Differences of the SART Test Before and After 10 Minutes of Physical Exercise Intervention*

	Mean	SD	t	df	*p*-value	Interpretation
SART Mistakes Pre-Test	16.3	10.1	3.4	9	0.008	Significant
SART Mistakes Post-Test	8.4	9.06				

Table 6 presents the differences in SART Test results before and after the 10-minute physical exercise intervention. The table reveals that the 10-minute physical exercise intervention has a significant difference in the attention level of the participants ($t9$= 3.4, p=.008). This indicates that 10 minutes of physical exercise can improve one's level of attention.

Discussion:

- No-exercise and 5-minute exercise groups showed no significant improvement in attention.
- The 10-minute group showed a significant improvement (t(9) = 3.4, p = .008).
- This echoes Donnelly et al. (2016) and Silva et al. (2015), who found that physical activity enhances attention and concentration. The results suggest that short bouts (5 min) are insufficient, but 10 minutes of exercise significantly improves sustained attention.

RQ3: Which treatment condition has the best effect?

Table 7. *Differences in the SART Test Results from the Three Different Groups*

	F	*df*1	*df*2	*p*	η2	Interpretation
SART Pre-Test	3.144	2	27	0.059	0.055	Not Significant
SART Post-Test	0.331	2	27	0.721		Not Significant

Group Descriptive

	Groupings	N	Mean	SD	SE
SART_pretest	10 Minutes Exercise	10	7.20	7.96	2.52

	5 Minutes Exercise	10	16.30	10.10	3.19
	Without Exercise	10	10.40	6.17	1.95
SART_posttest	10 Minutes Exercise	10	5.80	8.69	2.75
	5 Minutes Exercise	10	8.40	9.06	2.86
	Without Exercise	10	8.00	4.50	1.42

Table 7 presents the SART test results differences between the three groups who received three different conditions. There is no significant difference on the SART pre-test among the three groups (t=3.144, df=27, p=.059). This almost shows that before the interventions, all of the participants had somehow different levels of attention because the p=value just differs 0.009 from the level of significance. However, this still means that all of the participants do not have a difference in their levels of attention. Furthermore, there is no significant difference as well on the SART post-test among the three groups (t=0.331, df=27, p=0.721). This indicates that, even after the physical exercise intervention for the two experimental groups in this research and one control group, there is still no significant difference. It implies that physical exercise intervention and no physical intervention have no effects on the attention levels of the participants.

Discussion:

- Comparing the three groups, ANOVA results showed no significant differences between groups overall. However, within-group comparisons indicated the 10-minute condition was the most effective, improving both distress and attention significantly.
- This confirms prior literature that a certain threshold of exercise duration is necessary to observe benefits (Hillman et al., 2009; Li et al., 2017). Thus, 10 minutes of exercise was the most beneficial intervention.

V. CONCLUSION AND RECOMMENDATION

From all the descriptions of the results above, it can be concluded that physical exercise can influence or lessen the distress level while at the same time improve the level of attention. However, the effectiveness can only be seen by doing a physical exercise for at least 10 minutes. There are many forms of physical exercise that can be done to reduce stress levels, such as aerobic exercise, which has been done in this study. Counselors may use a simple 10-minute or more physical exercise as an effective intervention for patients who have high distress levels or even for people who report that they have been stressed and need assistance. Future research may explore other forms of effective ways to reduce stress levels and improve attention levels in today's generation.

AUTHOR CONTRIBUTIONS

This research was carried out through the collective effort and teamwork of all authors. From conceptualization, design, data collection, and analysis to the writing and revision of the manuscript, each author contributed collaboratively. All authors worked together in every part of the study and

approved the final version of the paper. In addition, C. B. Cañesares served as the supervisor, providing guidance, feedback, and oversight throughout the entire research process to ensure the quality and integrity of the study.

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