Advances in Applied Psychology
Vol. 3, No. 3, 2018, pp. 34-37
http://www.aiscience.org/journal/aap
ISSN: 2471-7169 (Print); ISSN: 2471-7193 (Online)

The Effects of Moderate Exercise on Depressive Symptoms

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Abstract

Mood-state depression affects nearly everyone on a daily basis. These daily "ups" and "downs" can last for a minute or days in some cases. These moods can influence the way information is processed and can affect performance. The purpose of this study was to investigate potential changes in an individual's perceived mood-state depression after acute aerobic exercise. Sixty-eight participants (females=39) completed the study. Individuals who were moderately depressed improved their mood after five minutes of acute exercise. There is a high likelihood that individuals will experience a depressed mood, and a short bout of moderate physical activity is a way to decrease symptoms of depression and increase overall physical activity

Keywords

Exercise, Depression, Mood

Received: April 23, 2018 / Accepted: June 15, 2018 / Published online: August 10, 2018

1. Introduction

Just as research has documented the physiological benefits of regular physical activity, research has also documented the psychological benefits of exercise [12, 9, 12, 8] including decreases in stress, anxiety, and depression [25]. The National Institute of Mental Health [17] supports the positive benefits of physical exercise as a treatment for stress, depression, anxiety, and other manifestations of psychological dysfunction, which is an important development, due to the fact that many health care professionals now prescribe exercise as a treatment for emotional disorders [27]. Exercise is, in many cases, as effective as other forms of treatment, including psychotherapy and antidepressant drugs [5, 6, 26, 18, 29].

Up to 25 percent of the American population may suffer from mild to moderate depression and anxiety [2, 6, 17]. This depression can be further identified as either "trait" or "state" depression. Trait depression is more commonly referred to as mood-disorder depression. This mood-disorder depression is what is considered clinical depression. Clinical depression affects about eight percent of women, with men around half that number [4, 9, 12,]. Clinical depression accounts around 20% of all health care costs [22]. "State" depression on the other hand is considered a depressed mood/affect/emotion. Buckworth and Dishman [4] define this type of "state" depression in terms of mood or emotions. Mood is considered a type of affective state, which can last for a minute or for days and can influence the way information is processed and can affect performance. Emotions are brief responses of negative or positive feelings which can cause some problematic measurement issues.

Several researchers have reported how exercise can change one's mood [2, 7, 25]. The majority of the reported research on mood has focused upon the relationship between chronic (as opposed to acute) bouts of exercise with changes in psychological states or personality traits. Several researchers have examined acute exercise on short-term mood benefits.

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Motl [15] reported improvements in swimmers. Lane and Lovejoy [9] also reported changes, this time with participants in an aerobic dance class.. While these studies did demonstrate changes, something to remember is that acute bouts of exercise are not necessarily dose-sensitive, meaning that a 20-minute bout of moderate exercise could be as beneficial as a 40-minute bout [31]. Sometimes the beneficial effects of exercise are not evident until sometime following an acute bout of exercise. In the case of anxiety reduction, this observation is referred to as the delayed anxiolytic response [19]. This hardiness "effect" has been shown in numerous research studies [25, 28]. Subjects who meet at least the minimal amounts of exercise per week show this protector which Buckworth and Dishman [4] argue is due to lower resting HRs and BPs, common adaptations to regular exercise, rather than small reactions to the stress sensors. Larger effects of exercise on anxiety reduction are shown when the exercise is aerobic (e.g., running, swimming, cycling) as opposed to nonaerobic (e.g., handball, strength training) [11, 30].

The research is uncertain on the cause-effect relationship between acute aerobic exercise and mood-state depression. Therefore the purpose of this study was to investigate potential changes in an individual's perceived mood-state depression after acute aerobic exercise. The guiding research question of this study was to examine whether or not moderate bouts of acute exercise, in 5, 10, and 15 minutes, will improve moderate depressive symptoms as measured by the CES-D.

2. Method

Subjects (age 18-35) were recruited from physical education classes at a large institution in the southern United States. Subjects were asked to complete a survey consisting of demographic questions (gender, race, age, year in school) and the NASA/JC Physical Activity Scale (PAS) [23]. The PAS assesses the amount of physical activity an individual completes during the preceding month. Subjects were then asked to complete the Center for Epidemiological Studies-Depression (CES-D), a 20-item inventory that measures an individual's perceived experience of symptoms associated with depression during the previous week [21]. The CES-D uses a Likert-like scale (0 = *rarely or none of the time*, 1 = *some or little of the time*, 2 = *moderately or much of the time*, and 3 = *most or almost all of the time*) to ask questions such as "I was bothered by things that usually don't bother me", "my sleep was restless", and "I thought my life had been a failure." Test-retest correlations has shown this scale to have good reliability (r=0.85) and demonstrated good validity when compared with similar scales [21]. The CES-D reports the scores as symptoms and not used as a diagnostic tool [21]. Participants were placed into one of the three groups based upon their scores (scores=0-60): not depressed (scores below 15), mild to moderate depression (scores 15-21) and severely depressed (scores 22 and higher). Those who scored 15-21 on the survey (n=68) were asked to continue their participation. Even though the CES-D is not meant to be used as a diagnostic tool, the researchers felt it important to refer those who scored in the "severely depressed" category to the Campus Health Center. Participants who scored below 15 were omitted from further participation in the study. It was believed that low scores may be more indicative of temporary or situational feelings.

During the exercise (cycle ergometer) section of the study, each subject was fitted with a chest strap heart rate monitor (HEART talker, New life Technologies) and calculated 70% of their maximal heart rate. This was used as an indicator for work rate. Participants were then introduced to the use of the 10-item Borg's Scale for Perceived exertion (RPE) [3] and instructed to stay within the "Moderate" range on the scale. Warm up and familiarization with the cycle ergometer was performed with the YMCA warm-up protocol, which is used to begin moderate amounts of exercise [20]. The subjects proceeded to exercise for the first five-minute bout. Every 30 seconds, the subjects were asked whether they were still in the "moderate" range on the RPE. If during any of that time the subjects were above or below moderate, appropriate resistance was added or removed. After the first five minutes, participants were asked to complete the CES-D. If they scored below 15 they were finished with the study. If however, they were still in the 15 to 21 ranges on the CES-D they continued to exercise for an additional five minutes. The protocol was repeated for a total of 15 minutes.

Data was collected and analyzed using a 2 (gender) by 4 (race) repeated measures analysis of variance (ANOVA). A Multiple Analysis of Variance (MANOVA) was also conducted to determine if there were any significant differences between CES-D scores and PAS results as a function of gender and race. Demographic information was collected and reported. Statistical significance was set at the 0.05 level.

3. Results

Demographic information are reported in Table 1. Results from the exercise portion of the study indicated that CES-D scores (mean=17.5) from those who originally were "mild to moderately depressed" were significantly lower (mean=10.3) after the first five minute bout of exercise (Wilks' Lambda =.204, F = (1, 13) 50.829, p<.0001.).

Table 1. Frequency of the Subjects.

Group		Frequency
Race	Male	29
	Female	39
	White	35
	Black	13
	Hispanic	18
	Other	2

Table 2 describes the repeated measures and a MANOVA of CES-D scores and PAS as a function of Gender and Race.

Table 2. Wilks' Lambda for Repeated Measure and Multivariate Analysis of Variance for CES-D and Physical Activity Rating as a function of Gender and Race.

Effect	df	Wilks Lambda	F
Time	1	0.204	50.83*

	CES-D			PAS		
Source	df	MS	F	df	MS	F
Gender	1	0.39	0.005	1	0.23	0.07
Race	3	11.93	0.147	3	5.55	1.75
Gender * Race	2	15.54	0.203	2	4.43	1.39
p<.001*						

4. Discussion

All participants in the experimental group decreased their depression scores after five minutes of moderate exercise. These results do confirm prior research that supports the role of exercise on depressive symptoms [30], yet don't support the need that the exercise be structured and regular [30]. These findings show that a moderate single dose can improve symptoms of depression.

A depressed mood may be caused by a broken relationship, poor performance on exam, or just a bad day; all of which can cause a person to be put into a temporary state of depression. How a person views certain "bad" events is a consequence of a number of factors including coping skills. Yet, it is these symptoms that left untreated result in mood-disorder depression. The single dose of five minutes of exercise, which was equivalent to brisk walking, did significantly improve the symptoms. When individuals are feeling "down" or "lonely" they can take a quick stroll around the building, up a flight or two of stairs, and even walking back and forth to the bathroom can possibly help shed some of the symptoms.

No significant differences were found with gender or race for the CES-D score or the PAS. Thus in this study, no significant differences existed in women and men on reporting depressive symptoms This was a bit surprising, but recent studies have been showing that incidence rates between genders as closing [30]. It also might be that this study focused on mood-state depression and not clinical depression where race and gender differences have been established.

5. Conclusion

Our findings supports prior research and confirms that moderate amounts of exercise are indeed beneficial [6, 24, 30, 31, 32]. Whether or not it was the exercise or a temporary shift in attention is beyond the scope of this study, but what is important is that 60% of the general population is not physically active enough to meet healthy requirements and that at some point in a person's life there is a high likelihood that individuals will experience depression; our research determined thata short bout of moderate physical activity in as little as five minutes, is a way to decrease symptoms of depression and increase overall physical activity.

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