



# Intuition: The BYU Undergraduate Journal of Psychology

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Volume 9 | Issue 1

Article 7

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2012

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### Recommended Citation

(2012) "Characteristics of Exercise that Influence Emotional Health Type, Intensity, and Duration," *Intuition: The BYU Undergraduate Journal of Psychology*. Vol. 9 : Iss. 1 , Article 7.

Available at: <https://scholarsarchive.byu.edu/intuition/vol9/iss1/7>

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# Characteristics of Exercise that Influence Emotional Health Type, Intensity, and Duration



by Karen Sullivan

*The importance of exercise in molding a healthy mind, body, and emotional perception has been well established in scientific research. A review of the recent literature examining type, intensity, and duration of exercise illustrates how to achieve the best emotional results. Because exercise is not naturally built in to the modern lifestyle, people need to make concerted effort to exercise in order to better deal with stress and experience positive emotions. Studies indicate that both animals and humans are better able to cope with stressors when able to voluntary exercise. However, not all exercise is alike. Aerobic exercise appears to be more beneficial than anaerobic exercise in improving emotion. Research suggests that those with originally low levels of positive emotions most significantly achieved an increase in positive emotions when they exercised at a low intensity. Manageable intensity and low duration work together to provide the best emotional results. Studies indicated that about 30 minutes of aerobic exercise at an intensity below the lactate-threshold is sufficient to produce achieve emotional benefits.*

## The Best Work Out for Improving Emotional Health

Anecdotal evidence and the scientific community agree that exercise has beneficial effects on cognition, longevity of life, and emotion (Backhouse, 2007). Physical education courses are part of the core curriculum in many public schools, physical therapists advise senior citizens to maintain activity, and angry children are often sent to run laps to blow off steam. All of this illustrates the public's belief that exercise is influential in creating a healthy mind, life, and emotional outlook.

The common belief in the importance of exercise has been supported by scientific research. Exercise is important in a variety of ways; from increased memory to increased longevity. A recent structural study of the brain found that aerobic exercise affects the size of the hippocampus (Inskeep, 2011). The hippocampus grew in those who participated in aerobic exercise, and this is implicated in better memory and remembering. Researchers were surprised to find that even seniors experienced an increase in hippocampus size leading to better cognition. The benefits of exercise are not, however, limited to increased cognitive ability. Another study examining the effects of exercise on lifespan found that those who participated in moderate exercise lived between 1.3 and 3.7 years longer than those who did not exercise, and they enjoyed an increased quality of life (Bumgardner, 2005). The importance of exercise is clear and yet, the average person still participates in little physical activity.

The rise of industrialization correlates with a decrease in physical activity and an increase in poor physical health. Farmers, railroad workers, and mountaineers had no need for a treadmill or weight machine to work out because exercise was built into their day. However, now machines have replaced most farmers, and there is no need for explorers to settle new frontiers. Most jobs require specific intellectual knowledge as opposed to physical exertion. As the careers that people choose change from mainly physically taxing to mentally taxing labor, scientists have begun to see the many areas of life that are affected by exercise—or the lack thereof.

Studies conducted over the past 35 years support the consensus that "exercise makes you feel better." (Backhouse, 2007). The importance of exercise in helping people feel better has been strongly indicated, but many still refuse to exercise. This dichotomy is explained by the fact that most people have an unclear knowledge of the most effective type, intensity, and duration for emotional health. Aerobic and anaerobic exercise, for example, do not elicit the same results. Research suggests

that aerobic exercise yields the best results for improving mood (Penninx et al., 2002).

Lack of understanding of personal physical capabilities leads some to inactivity. Some exercisers push themselves too hard while others do not push themselves enough (Reed, 2009). If a person exercises at a higher intensity than his or her body is capable of, it is possible that negative emotions would arise because of pain or fatigue. Conversely, a positive correlation between emotion and intensity may occur because of an exerciser's perceived physical and psychological exertion (Schneider, 2009). Relaxation can be one form of positive emotion, and the more exhausting the work out the more relaxed an exerciser can feel afterward.

A final excuse that many people use to justify not exercising is lack of time. Many inexperienced exercisers believe that they must exercise for extended periods of time every single day, and believe that emotional highs will last in proportion to the length of the work out. However, this may not be true, and professionals, in fact, often prescribe a rest period between sessions of intense exercise (Woo, 2009).

Increased positive emotions might be one of the most important benefits of exercise because attitude determines many factors in quality of life. While the best exercise may vary to some degree for each individual, there are foundational similarities to guide exercise for every body. Type, intensity, and duration of exercise all interact together to affect what emotional outcome is experienced after each work out; and when all are properly accounted for, the best emotional outcomes can be achieved.

### Type

Type of activity—aerobic versus anaerobic—has a direct relationship with emotional outcomes. Aerobic exercise has different benefits from anaerobic exercise. Penninx et al. (2002) compared aerobic and resistance exercises looking for emotional change. They found that older persons with depressive symptomology who participated in aerobic exercise experienced a significant reduction in depressive symptoms, but no significant decrease in the negative emotion—depression—was found with resistance training.

Similar results were found in a study addressing the effects of different types of physical exercise versus leisure activities on the depression scores of obese Brazilian adolescent girls (Stella et al., 2005). During the study, all of the groups experienced a reduction in body mass and anxiety scores regardless of the program. These changes may be explained by

the availability of professional supervision in nutritional eating or other outside factors. Nevertheless, aerobic exercise was the only activity that displayed long-term benefits of decreased depression levels.

Furthermore, one experiment (Buckaloo et al., 2009) found that the type of exercise had no effect on the positive results acquired by inmates in a low-security facility on depression, stress, and anxiety. Researchers found that those who performed aerobic or anaerobic exercise scored significantly lower on the Beck Depression Inventory II and Life Experiences Survey than the inmates who did not participate in any kind of exercise. Participation in some kind of physical activity yielded positive results regardless of the type of exercise chosen. Experimenters found that the more reasons the inmates had for exercising (i.e. improved health, lower depression, lower stress), the more emotional benefits were achieved. However, the fact that inmates were grouped according to previous interest in exercise or a lack thereof may have jeopardized the validity of the experiment. Those who do not choose to exercise on their own may have underlying conditions that would explain a predisposition toward negative effectual symptoms leading to lower scores on emotion testing. Because the inmate study did not account for all variables, this study does not allow us to reach a conclusion about the best type of exercise; however, it does support the conclusion that even some activity is better than no exercise at all.

The importance of exercise on mood has also been demonstrated in animal models. Rats, in confined living-conditions, like inmates in stressful conditions are also prone to depression. A study (Zheng et al., 2006) examining the effects of exercise on coping ability found a significant decrease in eating and open field behavior (otherwise described as play) in rats that did not have access to a form of aerobic exercise, and were subjected to *chronic unpredictable stress* (CNS) for four weeks. Rats were submitted to a variety of stressors in a random order, and rats that did not have the option of aerobic exercise in such an environment showed impaired spatial performance in a Morris water maze test even two weeks after the end of subjection to CNS (Zheng et al., 2006).

In summary animals and humans in stressful environments have both displayed an enhanced ability to function when voluntary exercise was available. Aerobic exercise has been shown to increase positive emotions among individuals with depressive symptoms, as well as in the obese adolescent girls, inmates, and highly stressed rats. These consistent results indicate that aerobic exercise has a significantly beneficial effect on emotions.

## Intensity

Intensity of exercise also affects the emotional reward that an individual receives. Some studies (Reed, 2006; Schneider, 2009) have found that high intensity work outs are the best because a significantly high increase in heart rate results in more brain activity. However, other research (Rose & Parfitt, 2007) supports the position that the intensity does not matter at all or even that the intensity is best when it is low and manageable.

Several independent studies have found similar results regarding the optimal level of intensity. Positive Activated Affect (PAA) is a measurement for emotion based on a scale of levels of both *activation* (either activated or deactivated) and *valence* (positive or negative in response to exercise). When positive-activated affect started out low, a low intensity work out for a short duration yielded the most positive emotions (Reed & Buck, 2009; Backhouse et al., 2007). Low levels of PAA are associated with a depressed mood (Reed & Buck, 2009). So, when a person starts out with a negative response to exercise and a low level of activity, a short, low intensity work out is best for emotional benefits.

Exercise is related to an increase in PAA partly because the chemical that triggers positive feelings (dopamine) has receptors that are associated with physical activity levels. The most drastic change in dopamine levels provides the best recognition of a change from negative to positive emotions. When exercise is too strenuous, people don't have a positive psychological response to the activity.

An analysis and explanation of differences in affective responses to prescribed and self-selected exercise intensities in sedentary men and women (Rose & Parfitt, 2007) further supported the evidence that a low intensity work out yields the most positive results for emotions. This is because lactic acid (an intramuscular chemical that develops during exercise that can result in pain) builds up during high intensity exercise. Researchers discovered that affect scale responses were more positive below the lactate threshold than above the threshold. When the exercisers did not produce lactic acid, they did not experience the pain that comes with it, and thus they had a more positive emotional response to the exercise.

Self-selection of exercise intensity provided a more positive emotional change than prescribed exercise intensity. However, if the exerciser was unaware of his or her own capabilities and selected too high or too low an intensity, negative emotions could be experienced (Rose & Parfitt, 2007). This is why it is so important to have an adequate understanding

of personal physical ability to achieve a positive emotional experience through exercise.

In contrast, an experiment focusing on male students who regularly exercise found a high intensity was preferable for short duration (1.7 km) aerobic exercise (Kerr & Kuk, 2001; Kerr & Kuk 2006). However, for a long run (5 km), this study found no significant difference in emotions pre- to post-running between high and low intensities. Although more bodily stress is experienced with a long distance high intensity work out, the emotional rewards are not significantly different from a long distance low intensity work out. The longer distance seems to have made up for difference in affect between intensity levels.

The key distinction between the results found by Kerr & Kuk (2001; 2006) and the results found by Rose & Parfitt (2007) is level of experience with exercise. Those who are experienced runners need a higher intensity than those with little experience in order to achieve an emotional change. This is a logical conclusion because there is a negative correlation between intensity and positive affect for those who had a below average baseline affect (Reed & Buck, 2009). If we follow the idea that exercise has positive emotional benefits, then those who exercise often may have higher emotional baselines. Therefore, it makes sense that one with high baseline emotions may require a higher intensity work out than an exerciser with low baseline emotions in order to see a significant difference in emotions.

## Duration

Many people do not work out because they say there is not enough time. However, it is not necessary to spend excessive amounts of time exercising. In fact, working out for too long can have negative effects. In the previously mentioned studies by Reed (2006; 2009), the most positive emotional changes for inexperienced exercisers came from low intensity and low duration.

Woo and colleagues (2009), reported that a relatively short amount of exercise provided enhanced vigor (the only positive emotion defined in this test, also defined as activity). Exercise provided enhanced vigor after 30 minutes of exercise more significantly than after 45 minutes of exercise. No significant difference was found among vigor scores following rest, 15 minutes, and 45 minutes of exercise. A separate study conducted by Buckaloo et al. (2007) examining the effects of exercise duration among inmates also demonstrated that increased duration of exercise did not predict significantly greater improvement in mood. Inmates who exercised

for more than an hour did not enjoy significantly better emotions than those who exercised for 30 minutes.

Positive effects are most significant about 10 to 15 minutes after exercise with lingering effects for up to 24 hours (Hansen, 2001). Twenty-one college students were surveyed and then physically tested to examine the effects of single bouts of moderate exercise. When positive moods—such as vigor and activity, and negative moods—such as depression and anger, were measured, researchers found no significant improvement in any one specific mood's state. Rather, a significant improvement in general affect was found.

However, it is still unclear exactly why exercisers "feel better" after a workout. Researchers have attempted to correlate a relationship between plasma endorphin levels and mood improvement with little success (Schneider, 2009). Although a correlation between plasma levels and emotion has not yet been found, a relationship between frontal brain processes and emotion was discovered. Using electroencephalogram (EEG), researchers examined signals in the brain to discriminate emotions. Female undergraduate students were assessed for EEG and self-reported affective responses as measured by the POMS. Results supported a dose-response relationship between exercise duration and affect, meaning that the best results were found at a moderate intensity and duration of exercise.

Optimum duration of exercise as found with the inmates, in Reed and Buck's (2009) research, Backhouse et al.'s (2007) research, and the EEG testing study (Schneider, 2009) is 30 minutes of aerobic exercise three to five days a week for at least ten to twelve weeks.

### Conclusion

The positive effect of exercise on emotions as demonstrated by the research above has been well established. The best emotional health can be achieved when an exerciser pays attention to the proper type, intensity, and duration of exercise. Research supports the conclusion that aerobic exercise at a moderate self-selected intensity at or below the lactate threshold for about 30 minutes yields the highest positive effect on overall emotion. However, because the positive effects of exercise are short-lived, in order to maintain the positive emotions gained, exercise should be conducted 3–5 times a week.

Some of the common beliefs about exercise are correct but others are false. While some activity is emotionally better than no activity, not all activity is alike. Adequate exercise is not naturally built into the modern

lifestyle. However, when a little time is set aside for exercise, positive emotions can be achieved. It is not necessary to train for a marathon with every work out in order to feel happy. Rather, the right dose of intensity and duration of aerobic exercise should be manageable to improve emotional health.

A review of the literature examining characteristics of exercise which contribute to mood improvement revealed several important predictors. First, research suggests that aerobic exercise is more beneficial for mood than is anaerobic exercise. Second, exercise intensity appears to be important, with research suggesting that more intense exercise produces greater mood benefits. Finally, 30 minutes of exercise is the optimum duration for emotional benefit. Although it is still largely unclear why exercisers feel better, research shows that exercisers who adequately consider the type, intensity, and duration of exercise reap emotional rewards.

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