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THE EFFECTS OF EXERCISE ON MENTAL HEALTH

By Xavier A. Pinex

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ABSTRACT

The Effects of Exercise on Mental Health

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Exercise is an extremely important aspect towards positive mental health. Multiple studies have been done previously that show one benefit or another that exercise has towards mental health, but previously there had been no attempt to summarize the findings of these studies. The benefits that exercise has to an individual's mental health are numerous, but despite this exercise is an underutilized tool in the quest for better mental health. There are many variables that affect the benefits of exercise to an individual's mental health and it is important to understand all these variables to understand how to properly exercise to obtain these benefits. This thesis looks specifically at the connection between exercise and mental health, how to obtain the greatest benefits from exercise, as well as the potential downsides of utilizing this tool to help an individual's mental health. It is important not only to understand these factors to help the public, as well as to help the world altogether.

KEYWORDS: Exercise, Mental Health

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Introduction/Mental Health by the Numbers

Mental illness is a serious issue not only in the United States, but in the world as a whole. With one in every five adults in America experiencing mental illness each year (up to 20.6% in 2019 from 17.7% in 2008 [SAMHSA 2020]) it is a serious problem that has only increased over time. Mental illness refers to any condition that affects cognition, emotion, and/or behavior (Manderscheid et al., 2010) and is typically defined as a serious mental illness once it substantially interferes with or limits one or more major life activities (SAMHSA, 2020). At this point in time there are 157 different testable and diagnosable mental illnesses that affect various people, not just throughout America, but throughout the world (American Psychiatric Association, 2017). In the United States alone an estimated 51.5 million adults experienced mental illness in 2019, with 13.1 million (5.2% of Americans) of these adults experiencing serious mental illness (SAMHSA, 2020). Aside from the 51.5 million adults who experienced mental illness within 2019, there were also another 7.7 million children (ages 6-17) that experienced a mental illness within the same year (National Alliance on Mental Illness, 2020), bringing the total up to 57.2 million people in America who were reported as having experienced mental illness in 2019. These are only the reported numbers though, given the amount of stigma surrounding mental illness all over the world, the real numbers are likely higher. These numbers are all quite disheartening, considering the “ripple effects” of mental illness on an individual. People with mental illnesses experience a wide range of these effects, from having a higher risk of cardiovascular and metabolic diseases, higher rates of dropout from schools, losses of global productivity, not to mention the effects on the

families and communities that these people are a part of (National Alliance on Mental Illness, 2020).

Within the United States the mental illnesses with the highest prevalence among adults are Anxiety Disorders (AD), followed by Major Depressive Disorder (including major depressive episode), with 19.1% and 7.8%, of people respectively (National Alliance on Mental Illness, 2020). Given the nature and prevalence of these specific disorders, it is extremely important that there are resources and ways to attempt to prevent them if possible. Unfortunately, prevention is not possible for some, but it is just as important to try to help remedy the strain that mental illness puts on an individual and assist in maintaining an ideal state of mental wellness once their symptoms have decreased. In roughly the past 70 years there has been an increase in the knowledge of mental illness and treatment, and this has led to a variety of different options for how to seek help with one of these illnesses. Common practices for assisting individuals with mental illnesses are treatments such as psychotherapy (typically in the form of talk therapy), medications, case management, hospitalization, and lifestyle changes (often in the form of self-help plans). One underutilized, understudied, and underemphasized resource for people with mental illnesses is exercise.

Within this paper we define exercise as an umbrella term used to describe any movement that is carried out by the skeletal muscles that requires energy and is in a planned or structured manner, thus effectively eliminating the discrepancy between exercise and physical activity. Anything from gardening, a walk in the park, yoga, or even up to a professional sports event can be counted as exercise for a participant.

Exercise and Mental Health

Exercise is one of the most beneficial things that an individual can do for themselves, with the benefits spanning a wide domain. From the long-term benefits to the immediate, there are numerous reasons why exercise is good for an individual (Table 1).

Table 1: Benefits of Physical Activity (Centers for Disease Control and Prevention, 2020)

Immediate Benefits of Exercise	Long Term Benefits of Exercise
Reduced Feelings of Anxiety	Weight Management
Reduced Blood Pressure	Reduced Risk of Cardiovascular Disease
Improvements in Sleep	Reduced Risk/Management of Type 2 Diabetes
Improved Insulin Sensitivity	Reduced Risk of Cancer Development
Improved Cognitive Functioning	Strengthening of Muscle and Bone
	Improved Ability to Perform Daily Activities
	Decreased Risk of Falls
	Increased Average Longevity of Life
	Decreased Risk for Anxiety and Depression
	Increased Quality of Living

Typically, when people think of exercise they think primarily of the physical benefits, but exercise has numerous benefits to an individual's psychology as well. Research has repeatedly suggested that regular exercise can improve mental health and lessen symptoms of depression, anxiety, and generalized stress significantly. (Mikkelsen et al., 2017). There have even been studies that suggest that physical activity can enhance

mental wellbeing as much as psychotherapy (Raglin, 2012; Mikkelsen et al., 2017). These benefits have been seen not only in adults, but also within the elderly and adolescents (Lane & Lovejoy, 2001). There has not been a precise explanatory reason for these effects of exercise on mental health, Daley (2002) identified some of the mechanisms: 1. The hyperthermic model, which suggests that the primary stimulus for the change is body temperature elevation. 2. The endorphin hypothesis, which suggests the effects are due to the release and binding of endogenous opioids. 3. An increase in self-efficacy (a confidence/belief in an individual's own abilities to perform tasks/behaviors). 4. It serves as a distraction from stressful thoughts and feelings. Regardless of the mechanism that causes the changes in mental health, it has been shown that the results can be life changing.

Despite all the benefits of exercise (physical and psychological), the national average for regular exercise is 51.6% (U.S. Department of Health and Human Services 2017). This means that nearly half of all Americans are not regularly exercising and are missing out on the numerous benefits that they could obtain just by doing so.

Stress and Mental Health

One of the biggest factors in mental health is the ability to handle the stress of everyday life. Stress is “the degree to which you feel overwhelmed or unable to cope as a result of pressures that are unmanageable” (Mental Health Foundation, 2020). The connection between mental health and stress is so intertwined that the definition of mental health often includes wording such as “It...helps determine how we handle stress” (U.S. Department of Health & Human Services, 2020), showing that even in definition stress and mental health cannot be separated.

Stress and mental health have been found to have an inverse relationship with each other (DeLongis et al., 1988). Put plainly, the higher someone’s stress is, the less mentally healthy they are likely to be. This correlation is exemplified by the fact that nearly one in five adults (19%) stated that their mental health was worse than it was the year before (American Psychological Association, 2020). This came as a result of multiple sources of stress throughout the year of 2020: from the coronavirus pandemic (78% of adults reported as a significant source of stress in their life), health care (66%), the uncertainty in the nation (65%), mass shootings (62%), and the issues facing America (60%). Climate change (55%), suicide rates (51%), immigration (47%), sexual harassment/assault reports in the news (47%), and the opioid/heroin epidemic (45%) were also highly reported sources of stress for people throughout 2020. These issues facing Americans and the world as a whole led to 2 in 3 adults (67%) saying that they had experienced increased stress over the course of the pandemic throughout 2020.

One very important point to realize when thinking about stress, especially with regards to the number of stressful items effecting Americans within 2020, is the fact that

exercise also shares a relationship with stress. Exercise has been shown to buffer against the effects of life event stress on health (Brown, 1991), with aerobic exercise having been found to reduce reported stress (Norris et al., 1990). Taken even further, exercise has been suggested to buffer against the negative effects of stressful life events on the neuroendocrine system (Heaney et al., 2014). These positive results were also compounded by the fact that exercise/physical activity was found to have a positive effect on stress relief (Kim et al., 2019; Van der Zwan et al., 2015). Alongside these studies, the American Psychological Association (2014) found that in adults exercise was more effective at managing stress than sedentary activities (Table 2).

Table 2: Stress Management Techniques and their Effectiveness (American Psychological Association, 2014)

<i>Stress Management Technique</i>	<i>Online Activities</i>	<i>TV/Movie Viewing</i>	<i>Exercise</i>
<i>Stress Reduction</i>	29%	33%	62%

Another aspect that stress contributes to is the idea of cell aging, with chronic psychological stress being associated with accelerated cell aging (Puterman et al., 2010). Accelerated aging is typically indexed by the length of telomeres (the protective cap at the ends of a chromosome). Telomere length decreases naturally over time and is inversely correlated with the risk of multiple age-related diseases such as cancer, cardiovascular disease, obesity, diabetes, chronic pain, and overall generalized stress (Arsenis et al., 2017). Fortunately, regular exercise is actually able to reduce telomere shortening activity brought on by stress throughout life (Puterman et al., 2010). These findings were attributed in part to the fact that exercise puts the human mind and body into a ‘eustress’, or positive stress, state, rather than a state of distress. These studies are

consistent with later findings which state that moderate levels of exercise do have a telomere-protective element to them (Ludlow et al., 2013).

Physical activity creates not only a reduction in generalized stress on the human mind, but also on the human body at the cellular level. These benefits are of great use to society, especially as causes for stress in the everyday lives of people around the world increase. As stress is decidedly a strong factor in mental health, it only makes sense that in the battle to increase general quality of life that exercise be treated as a treatment for problems such as chronic stress, both to help ease the mental and physical burden on the human mind and body. This contrasts the modern way of thinking, with exercise not being considered a “first-choice” in the battle against mental illness.

Exercise Modalities for Greatest Mental Health Benefits

When thinking about exercise there are literally hundreds of different types of exercise, a tally that can make it difficult to know what will give someone the most benefit when it comes to the mental health benefits involved. In a study of roughly 1.2 million it was once again found that the most important thing is that an individual exercises (Chekroud et al., 2018). Just exercise alone was found to lower self-reported mental health burdens (days that most people would call a “bad day”) by 1.39 days per month in people who chose to exercise over people who did not. Among people who already had a previous depression diagnosis this effect was even greater, with a decrease of 3.75 days that they reported a high mental health burden. This demonstrates that exercise can help in the fight against mental illness, especially depression.

Although exercise in general was found to decrease stressed/mentally unwell days, there is a significant difference between different types of exercise (Chekroud et al., 2019). The strongest/most beneficial exercise types were found to be team/popular sports at the top of the list, providing a 22.3% reduction in self-reported mental health burden in a month. This was followed by cycling (21.6% lower), and aerobic/gym exercises (20.1% lower). It appears that participating in recreational or competitive sports (e.g., playing on a rec basketball team, playing flag/tackle football, playing tennis, playing soccer with a group of friends) is associated with the greatest reduction in mental health burdens and could be viewed as one of the top ways to help an individual prevent, heal, or maintain their mental health.

Aside from playing sports in a social manner, it was found that community-based exercise projects in general led to significant improvements in wellbeing scores after

three months, as well as increased exercise participation outside of these projects (Malcolm et al., 2013). These community-based exercise projects consisted of activities ranging from gardening and conservation, to gym classes and walking. The projects were performed both in rural and urban settings across England and were designed to take advantage of local facilities and provide free access to the activities in question. These projects also led to the participants feeling more comfortable talking about their mental health problems with their family and friends. Further than that though, community-based exercise projects were also found to decrease the fear and anxiety of going to a gym in the first place, something that stops many people from exercising (Malcolm et al., 2013). All this points at a common theme within the study: when a group of people participate in an exercise program rather than an individual it leads to greater results.

Humans by nature are social creatures, and as a result it has been found that socializing combats feelings of loneliness, sharpens memory and cognitive skills, increases happiness and well-being, and could even help individuals live longer (Williams, 2019). This supports the idea that the social aspect of the types of exercise boost the positive benefits of exercise. By combining socializing and exercising it can reduce the fear and anxiety of exercise itself, as well as create a positive bonding experience within the community or people that are exercising together (Malcolm et al., 2013).

One thing to note about social exercise, and exercise in general, is that to participate an individual needs to have adequate time to be able to exercise. This is one of the biggest factors that play a part in preventing everyday people from exercising, with 42 percent of people noting that a lack of time is the biggest deterrent in their choice to

exercise (Schmall, 2019). This lack of time is understandable considering 23 percent of people also noted work as something that prevented them from exercising. In general, this lack of time is understandable with the minimum hours to be a full-time worker in America coming at 40 a week. This is also compounded on by the 40 percent of American households have one or more children (17 years old or younger) which also take up a generous amount of a parent's time (Statista Research Department, 2021). Although this lack of time is a severe problem, 45 percent of people also said that home workouts (something that happened to become prevalent in 2020) would get them to exercise more.

Aside from popular sports and community exercise projects, it was found that cycling and aerobic/gym exercises were also found to decrease high mental health burden days (Chekroud et al., 2018). This seems to suggest that even if a person does not necessarily have friends/compatriots to exercise with, even just going on a run by themselves can have an incredible effect on an individual's mental health. Things such as weightlifting, using aerobic training machines (such as treadmills, ellipticals, and stair-climbers to name a few) fall within the jurisdiction of aerobic/gym exercises, showing that even alone people can still find ways to help themselves feel better.

One thing to keep in mind is that not everyone has access or the money to afford going to a gym. With an industry-wide membership fee average of \$58 a month, or \$696 a year (Crockett, 2020), it is a steep price to pay, even if it is to increase physical and mental health. This could be remedied by having community-based exercise projects as an alternative to the potentially costly price of attending a gym. These community-based exercise projects are typically performed in locations that everyone in the community has

free access to (Malcolm et al., 2013). Fortunately, there are several exercise types that do not require a gym or special equipment that can be performed to help mental health without a whole community-based program. Things such as walking or home workouts were found to have a reduction in poor mental health days (Chekroud et al., 2018). Even just going on a walk can aid in the fight for mental health, while not being exceedingly time consuming.

Another type of exercise that is often overlooked are mindfulness-based training/exercises. These exercises include things such as yoga, tai chi, and qigong, which all integrate an individual's physical, mental, and spiritual health. Mindfulness exercise was found to have a significantly higher reduction in mental health burden than not exercising by 22.9% (Chekroud et al., 2018). It was also found to have a higher reduction than walking (by 17.4%) and general exercise (by 17.8%). They have also been found to have small to medium effect on the symptoms of anxiety and depression (Blanck et al., 2018). This effect is thought to be due to the actual act of mindfulness (being conscious/aware of the present moment while acknowledging and accepting feelings, thoughts, and sensations), meaning that just taking the time to exercise the mind in such a way may have the ability to fight off some symptoms of anxiety and depression.

Aside from home workouts and mindfulness training, even simply doing household chores that involved movement of the body was associated with a 9.7% reduction in poor mental health days (Chekroud et al., 2018). One detail to note is that the benefits of exercise to mental health does not extend to exercise performed in or around the workplace. It was found that exercise in/around the workplace (specifically exercise such as walking to and from the building, standing desks, etc.) was beneficial to physical

health, but not necessarily mental health (White et al., 2017). One of the suggested reasonings behind this was because exercise modalities that can be done or are enforced at the workplace become more of forced chores/tasks than options. This leads to an idea that people “have” to do these things such as walking further after parking further from work, or that they are forced to stand at their desk rather than having a chair to sit at. This deduction of choice creates a feeling of requirement that takes away one of the most important aspects of exercising: the individual’s ability to choose their exercise, when they do it, and how they do it. Aside from the inability to choose, the fact that work itself is a source of stress for many people was suggested to take a part in the reduction of mental health benefits from workplace exercise (White et al., 2017). This study also suggests that as a result of the lack of benefit to work-time exercise, leisure time exercising (when an individual can choose to exercise, rather than it being a chore) is more beneficial than enforced exercise.

The idea of choice is an important aspect of the exercise process. It was found that when individuals have the choice to exercise people are more likely to enjoy the exercise that they are doing, perform at a higher intensity, and have higher positive effects from the exercise (Parfitt et al., 2010; Vazou-Ekkekakis and Ekkekakis, 2009). This highlights the role of motivation, both intrinsic and extrinsic, in exercise. Intrinsic motivation is the act of an individual doing something because they enjoy it and it is interesting (Santos-Longhurst, 2019). This desire to do something has been linked to higher achievement, satisfaction, and general well-being (Benedetti et al., 2015), three things that play important roles in the results found from exercising. Intrinsic motivation is one aspect of motivation, beside extrinsic motivation (the act of doing something because of the

outside incentive or pressure to do it), which has been found to be associated with lower performance, well-being, and satisfaction (Benedetti et al., 2015). This supports the idea that workplace exercise is not the most effective way to exercise, given the fact that it stems from extrinsic motivation more than intrinsic.

Often times the biggest problem of exercise once an individual decides to take the next step comes from the idea of “what should I do?” With so many options and choices of where and how to exercise it can be a daunting task, but ultimately it is a relatively arbitrary choice. Any exercise, even the seemingly mundane tasks that are done around the house, can help reduce mental health burden and increase mental health. While popular sports, cycling, and aerobic/gym exercises have been shown to have the highest rates of mental health increases, that does not mean that they are what everyone needs to do. There are options such as working out at home, mindfulness exercises, or even household chores that can be just as beneficial to an individual’s mental health.

Intensity and Amount of Exercise for Greatest Benefits

It has been established that exercise in general is helpful to ease the mental health burden and decrease stress on an individual. Another aspect that is just as important is how much exercise an individual should be doing to create the greatest benefit.

Roughly half of all adults do not exercise regularly or at all (US Department of Health and Human Services, 2017). This is a statistic found not only in American adults, but in Dutch adults as well (Ten Have et al., 2011). Similar to adults in America, roughly 45% of Dutch adults do not exercise at all throughout the year (Ten Have et al., 2011). One thing to note regarding the amount that people exercise is that usually they are less physically active in the winter than they are during the summer (Ten Have et al., 2011). This factor was mitigated in the study because they performed the survey throughout the year, with participants answering the survey multiple times throughout multiple seasons as to get accurate numbers.

Within the adult population, it was found that any exercise during leisure time was associated with a delayed first onset of mental illnesses, especially mood and anxiety disorders (Ten Have et al., 2011). Aside from the first onset, exercise during leisure time was also associated with a substantially lower incidence of mental illnesses in general, and especially anxiety disorders specifically. The results were supported by a study which found that even one session of aerobic exercise reduces anxiety sensitivity (LeBouthillier & Asmundson, 2015). The effect was a mild reduction after the first exercise session but continued to decline over following weeks of exercise.

With individuals who already experience depression there were similar findings regarding the amount of time needed to benefit from exercising. It was found that even small amounts of exercise as small as an hour a week can provide significant protection against future depression (Harvey et al., 2018). This miniscule amount of exercise was found to have the ability to prevent 12% of the cases of depression that were found at follow-up in the study. This showed a marked similarity to the study that focused on anxiety sensitivity, given the fact that both showed that even just an hour of exercise is shown to help both anxiety and depression (LeBouthillier & Asumundson in 2015).

While these studies reveal a minimum for the amount of exercise that should be performed a week to create benefits to an individual's mental health, it that does not mean that it will provide the greatest benefit to an individual. In Chekroud et al.'s study (2018) they found that exercise durations between 30-60 minutes a session, three to five times a week (120 and 360 minutes a week), were found to be associated with the lowest mental health burden to an individual. These reductions were found to decrease for individuals that exercised longer than 90 minutes in a session, until sessions of 3 hours or more. This was found across all levels of exercise activity, with vigorous exercise showing a more favorable burden than light or moderate exercise.

Drawbacks of Exercise as a Method to Reduce Mental Illness Prevalence

Exercise in general is beneficial, but all beneficial things should be used or performed in moderation. It was found that individuals that exercise for bouts of 3 hours or more were associated with having a worse mental health burden than people who did not exercise at all (Chekroud et al., 2018). One potential reasoning for this could be the amount of stress that it puts on the body (pushing it past the point of eustress into distress). An alternative reasoning for this could be that it is a result of exercise addiction withdrawal. Similar to people who find themselves addicted to any substance, an individual can become addicted to exercise if they put too much stock into exercising (Weinstein et al., 2017).

Withdrawal from exercise in individuals who have exercise addiction symptoms tends to result in higher levels of mental health symptoms (Weinstein et al., 2017). These symptoms included depression, anger, and fatigue. This idea can be particularly problematic for high-level athletes (such as college or professional athletes), compulsive exercisers, or individuals with anorexia that utilize exercise. Beyond people who are addicted to exercise, people who are simply frequent exercisers can also have withdrawals from periods of inactivity, specifically if they are forced into inactivity by hospitalization or experience acute/chronic health issues (Weinstein et al., 2017).

Apart from the symptoms from exercising too much or withdrawing rapidly from exercise, but compulsive exercise can also be a symptom of some mental illnesses. Illnesses such as bulimia nervosa, anorexia nervosa, and people with body dysmorphia often use exercise as a way to try to “better” themselves, even if ultimately it is a symptom of their mental illness (Meyer et al., 2011). These connections happen because

compulsive exercise has been shown to be associated significantly with higher levels of eating disordered symptoms, dietary restraint, weight, and shape concerns, drive for thinness, and body dissatisfaction (Meyer et al., 2011). Aside from this, exercising tends to reinforce these behaviors due to the personal and social benefits that can be accrued from them. These can be problematic factors, as exercise exhaustion, injuries, or a heavy reliance can result from the combination of these mental illnesses and exercise. Among athletes especially this can be troublesome, given the amount of stress that they undergo from themselves, their competitors, as well as their teams to perform well (Kristiansen & Roberts, 2010). This can lead to similar problems similar to workplace exercise, since it is a task for the athletes to perform at this high level regardless of what it costs them. It is this same mentality that leads to 54 percent of athletes playing while they are injured because of “important games” or the desire to “not let the team down” (National Athletic Trainers’ Association, 2020).

While exercise in the right amounts can be a tremendous assistant in preventing, recovering from, and making sure mental illness does not return, it is important to recognize there can be negative consequences to exercising as well. Too much exercise can actually result in increased mental health burdens. An extreme change in exercise from a large amount to very little or none at all, can result in withdrawals. Combined with illnesses like bulimia or anorexia, exercise can lead to worsening symptoms of the mental illness in question. Despite these potential downsides of exercise as it relates to mental health, as long as an individual is careful and/or follows a proper regiment the benefits that can be obtained from exercise are plentiful.

Variables That May Affect Exercise's Effect on Mental Health

Much of this paper has reviewed the effects of exercise on the mental health of adults, but that does not mean that only adults benefit from the effects of exercise on their mental health. In a study performed on adolescents in Korea, it was found that exercise in adolescents also reduced stress (Kim et al. 2019). As previously mentioned, a decrease in stress is also correlated with a decrease in mental illness. These findings were compounded by the study performed by Biddle et al. (2019) in which an association between exercise and positive mental health outcomes (specifically concerning depression, anxiety, positive self-esteem, and better cognitive functioning) was found. The highest effects in this study were found with regards to cognitive functioning and depression, meaning that in adolescents especially, physical exercise is important to increase their cognitive function (how well their brains work) but also in helping to fight/avoid depression.

The benefits of exercise for mental health span greater than just to adults, adolescents, and children though. It was found that exercise's association with mental health was seen across the full age span of humanity (Chekroud et al., 2018). Furthermore, the association was found in both men and women, across all racial groups, and across all levels of income. The association was even greater than a lot of modifiable social and demographic factors such as the difference between education groups, weight, and income on their own. Essentially, exercise was shown to have a positive association with mental health across all people from all walks of life.

Conclusion

Exercise is an extremely important aspect towards positive mental health. Not only can exercise prevent the onset of mental illnesses such as anxiety and depression, but it can help increase mental health amongst individuals with mental illness. Exercise can also help to try to keep an individual's mental health up upon reducing the symptoms of a mental illness for an individual. Exercise has been shown to be a strong stress reducer, and because stress is a fundamental factor in an individual's mental health or lack thereof, it supports the concept that exercise helps mental health. Not only does exercise help reduce mental stress, but it also reduces stress on the telomeres (the protective cap at the ends of a chromosome), which represents a decrease in physical aging and likelihood of various illnesses and problems that are brought on by age.

The smallest activities like gardening or even just taking walks can have an incredibly positive effect on an individual's mental health. The exercises that have the greatest effect happen to be team/popular sports, cycling, and aerobic/gym exercise but regardless, almost any exercise is better than no exercise in the fight for positive mental health. Despite this, exercise can have negative consequences should an individual stop exercising after consistently exercising for a long time, if they exercise more than three hours in a bout frequently, or if they have a few specific mental illnesses such as bulimia or anorexia.

While three hours of exercise in one sitting can have negative effects on mental health, anything as minimal as an hour a week can have the opposite effect: helping prevent mental illnesses such as depression and anxiety in as little as one hour a week.

Only working out once a week, however, does not provide the biggest mental health benefit, as that result comes from roughly 30-60 minutes, three to five times a week.

The benefits of exercise for mental health are not limited solely to adults though, as children, adolescents, and the elderly can all obtain these benefits based on the current research available. With that in mind though, it would be of great use to the scientific and healthcare community, as well as to the world, if more research was performed with these populations in mind to reinforce the benefits of exercise to these populations.

In the fight for mental health and against mental illness, exercise is potentially one of our greatest tools and must be utilized appropriately to increase the wellness, quality of life, and mental health of everyone, regardless of background, race, creed, status, or anything else that can be used to separate humans.

REFERENCES

- American Psychiatric Association. (2017). *Diagnostic and statistical manual of mental disorders: Dsm-5*. American Psychiatric Association.
- American Psychological Association. (2014). *Exercise: A healthy stress reliever*. American Psychological Association.
<https://www.apa.org/news/press/releases/stress/2013/exercise>.
- American Psychological Association. (2020, October). *Stress in America™ 2020: A National Mental Health Crisis*. American Psychological Association.
<https://www.apa.org/news/press/releases/stress/2020/report-october>.
- Arsenis, N., You, T., Ogawa, E., Tinsley, G., & Zuo, L. (2017). Physical activity and telomere length: Impact of aging and potential mechanisms of action. *Oncotarget*, 8(27), 45008-45019.
- Blanck, P., Perleth, S., Heidenreich, T., Kröger, P., Ditzen, B., Bents, H., & Mander, J. (2018). Effects of mindfulness exercises as stand-alone intervention on symptoms of anxiety and depression: Systematic review and meta-analysis. *Behaviour Research and Therapy*, 102, 25–35. <https://doi.org/10.1016/j.brat.2017.12.002>
- Benedetti, A., Diefendorff, J., Gabriel, A., & Chandler, M. (2015). The effects of intrinsic and extrinsic sources of motivation on well-being depend on time of day: The moderating effects of workday accumulation. *Journal of Vocational Behavior*, 88, 38–46. <https://doi.org/10.1016/j.jvb.2015.02.009>
- Biddle, S., Ciaccioni, S., Thomas, G., & Vergeer, I. (2019). Physical activity and mental health in children and adolescents: An updated review of reviews and an analysis of causality. *Psychology of Sport and Exercise*, 42, 146–155.
<https://doi.org/10.1016/j.psychsport.2018.08.011>
- Brown, J.D. (1991). Staying fit and staying well: physical fitness as a moderator of life stress. *Journal of Personality and Social Psychology*, 60(4), 555-561.
<https://doi.org/10.1037/0022-3514.60.4.555>
- Centers for Disease Control and Prevention. (2020, December 2). *Benefits of Physical Activity*. Centers for Disease Control and Prevention.
<https://www.cdc.gov/physicalactivity/basics/pa-health/index.htm>.
- Crockett, Z. (2020, June 30). *Are gym memberships worth the money?* The Hustle.
<https://thehustle.co/gym-membership-cost>.
- Chekroud, S., Gueorguieva, R., Zheutlin, A., Paulus, M., Krumholz, H., Krystal, J., & Chekroud, A. (2018). Association between physical exercise and mental health in

- 1.2 million individuals in the USA between 2011 and 2015: A cross-sectional study. *The Lancet. Psychiatry*, 5(9), 739-746.
- Daley, A.J. (2002). Exercise therapy and mental health in clinical populations: Is exercise therapy a worthwhile intervention? *Advances in Psychiatric Treatment*, 8, 262-270.
- Delongis, A., Folkman, S., & Lazarus, R. (1988). The impact of daily stress on health and mood: Psychological and social resources as mediators. *Journal of Personality and Social Psychology*, 54(3), 486–495. <https://doi.org/10.1037/0022-3514.54.3.486>
- Harvey, S., Øverland, S., Hatch, S., Wessely, S., Mykletun, A., & Hotopf, M. (2018). Exercise and the Prevention of Depression: Results of the HUNT Cohort Study. *American Journal of Psychiatry*, 175(1), 28-36.
- Heaney, J., Carroll, D., & Phillips, A. (2014). Physical activity, life events stress, cortisol, and DHEA: Preliminary findings that physical activity may buffer against the negative effects of stress. *Journal of Aging and Physical Activity*, 22(4), 465-473.
- Kim, H.J., Oh, So Yeon, L., Doo Woong, K., Junhyun, & Park, E. (2019). The Effects of Intense Physical Activity on Stress in Adolescents: Findings from Korea Youth Risk Behavior Web-Based Survey (2015–2017). *International Journal of Environmental Research and Public Health*, 16(10), 1870.
- Kristiansen, E., & Roberts, G. (2010). Young elite athletes and social support: coping with competitive and organizational stress in “Olympic” competition. *Scandinavian Journal of Medicine & Science in Sports*, 20(4), 686–695. <https://doi.org/10.1111/j.1600-0838.2009.00950.x>
- Lane, A., & Lovejoy, D. (2001). The effects of exercise on mood changes: The moderating effect of depressed mood. *Journal of Sports Medicine and Physical Fitness*, 41(4), 539–545.
- Laskowski, E. (2019, April 27). *How much should the average adult exercise every day?* Mayo Clinic. <https://www.mayoclinic.org/healthy-lifestyle/fitness/expert-answers/exercise/faq-20057916>.
- LeBouthillier, D., & Asmundson, G. (2015). A single bout of aerobic exercise reduces anxiety sensitivity but not intolerance of uncertainty or distress tolerance: a randomized controlled trial. *Cognitive Behaviour Therapy*, 44(4), 252-263.
- Ludlow, A., Ludlow, L., & Roth, S.. (2013). Do telomeres adapt to physiological stress? Exploring the effect of exercise on telomere length and telomere-related proteins. *BioMed Research International*, 2013, 1-15.

- Malcolm, E., Evans-Lacko, S., Little, K., Henderson, C., & Thornicroft, G. (2013). The impact of exercise projects to promote mental wellbeing. *Journal of Mental Health (Abingdon, England)*, 22(6), 519-527.
- Manderscheid, R., Ryff, C., Freeman, E., McKnight-Eily, L., Dhingra, S., & Strine, T. (2010). Evolving definitions of mental illness and wellness. *Preventing Chronic Disease*, 7(1), A19–A19.
- Mental Health Foundation. (2020, November 2). *Stress*. Mental Health Foundation. <https://www.mentalhealth.org.uk/a-to-z/s/stress>.
- Meyer, C., Taranis, L., Goodwin, H., & Haycraft, E.. (2011). Compulsive exercise and eating disorders. *European Eating Disorders Review*, 19(3), 174–189. <https://doi.org/10.1002/erv.1122>
- Mikkelsen, K., Stojanovska, L., Polenakovic, M., Bosevski, M., & Apostolopoulos, V. (2017). Exercise and mental health. *Maturitas*, 106, 48–56. <https://doi.org/10.1016/j.maturitas.2017.09.003>
- National Alliance on Mental Illness. (2020, December). *Mental Health By the Numbers*. Mental Health By The Numbers - Research Information And More. <https://nami.org/mhstats>.
- National Athletic Trainers' Association. (2020). *At Your Own Risk: Information for Student Athletes*. Information for Student Athletes - At Your Own Risk. <https://www.atyourownrisk.org/studentathletes/#:~:text=54%20PERCENT%20of%20student%20athletes%20in%20a%20recent,to%20having%20played%20while%20injured>.
- Norris, R., Carroll, D., & Cochrane, R. (1990). The effects of aerobic and anaerobic training on fitness, blood pressure, and psychological stress and well-being. *Journal of Psychosomatic Research*, 34(4), 367–375. [https://doi.org/10.1016/0022-3999\(90\)90060-H](https://doi.org/10.1016/0022-3999(90)90060-H)
- Parfitt, G., Rose, E., & Burgess, W. (2010). The psychological and physiological responses of sedentary individuals to prescribed and preferred intensity exercise. *British Journal of Health Psychology*, 11(1), 39–53. <https://doi.org/10.1348/135910705x43606>
- Puterman, E., Lin, J., Blackburn, E., O'Donovan, A., Adler, N., & Epel, E.. (2010). The Power of Exercise: Buffering the Effect of Chronic Stress on Telomere Length. *PloS One*, 5(5), E10837.
- Raglin, J. (2012). Exercise and Mental Health. *Sports Medicine*, 9(6), 323–329. <https://doi.org/10.2165/00007256-199009060-00001>

- SAMHSA Key Substance Use and Mental Health Indicators in the United States: Results from the 2019 National Survey on Drug Use and Health (2020). Rockville, MD; Substance Abuse and Mental Health Services Administration.
- Santos-Longhurst, A. (2019, February 11). *Intrinsic Motivation: How to Pick Up Healthy Motivation Techniques*. Healthline. <https://www.healthline.com/health/intrinsic-motivation>.
- Schmall, T. (2019, January 14). *This is why most Americans don't exercise more*. New York Post. <https://nypost.com/2019/01/13/this-is-why-most-americans-dont-exercise-more/>.
- Statista Research Department. (2021, January 20). *Share of U.S. family households with children, by type 1970-2020*. U.S. family households with children, by family type 1970-2020. <https://www.statista.com/statistics/242074/percentages-of-us-family-households-with-children-by-type/#:~:text=In%202020%2C%20about%2040%20percent,18%20living%20in%20the%20household>.
- Ten Have, M., de Graaf, R., & Monshouwer, K. (2011). Physical exercise in adults and mental health status findings from the Netherlands mental health survey and incidence study *(NEMESIS). *Journal of psychosomatic research*, 71(5), 342–348.
- US Department of Health and Human Services. (2017, January 26). *Facts & Statistics*. HHS.gov. <https://www.hhs.gov/fitness/resource-center/facts-and-statistics/index.html>.
- U.S. Department of Health & Human Services. (2020, May 28). *What Is Mental Health?* What Is Mental Health? | MentalHealth.gov. <https://www.mentalhealth.gov/basics/what-is-mental-health>.
- Van der Zwan, J., de Vente, W., Huizink, A., Bögels, S., & de Bruin, E. (2015). Physical Activity, Mindfulness Meditation, or Heart Rate Variability Biofeedback for Stress Reduction: A Randomized Controlled Trial. *Applied Psychophysiology and Biofeedback*, 40(4), 257-268. <http://dx.doi.org.usd.idm.oclc.org/10.1007/s10484-015-9293-x>
- Vazou-Ekkekakis, S., & Ekkekakis, P. (2009). Affective consequences of imposing the intensity of physical activity: Does the loss of perceived autonomy matter? *Hellenic Journal of Psychology*, 6(2), 125–144.
- Weinstein, A., Koehmstedt, C., & Kop, W. J. (2017). Mental health consequences of exercise withdrawal: A systematic review. *General hospital psychiatry*, 49, 11–18. <https://doi.org/10.1016/j.genhosppsy.2017.06.001>

White, R., Babic, M., Parker, P., Lubans, D., Astell-Burt, T., & Lonsdale, C. (2017). Domain-Specific Physical Activity and Mental Health: A Meta-analysis. *American Journal of Preventive Medicine*, 52(5), 653-666.

Williams, V. (2019, April 19). *Mayo Clinic Minute: The benefits of being socially connected*. Mayo Clinic. <https://newsnetwork.mayoclinic.org/discussion/mayo-clinic-minute-the-benefits-of-being-socially-connected/>.