Anxiety Among the College Student Population and Exercise as a Treatment for Anxiety

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Abstract

Research has shown that college students experience significant subjective stress (Perez et al. 2023), despite modern life containing much less physical danger than past lifestyles. Separately, exercise has proven to be an effective method for attenuating the symptoms of anxiety (Cheong et al. 2024). This literature review aims to explore the present body of work pertaining to anxiety among the college student population, in addition to current literature exploring the treatment of anxiety with exercise therapy. This paper will then explore present literature studying exercise for anxiety treatment in the college population, such as Aishwarya & Kumar (2024) and Castellote-Caballero et al. (2024). The confluence of these existing bodies of work could then inform future research relevant to mitigating the mental distress of college students. Contrary to the author's initial expectations, aerobic exercise showed the greatest reduction in anxiety, Aishwarya & Kumar (2024), potentially informing future research.

Keywords: Anxiety, Exercise, College Population, Exercise Therapy

College anxiety represents a significant source of stress for modern day young adults living in the developed world (Perez et al. 2023). College is often the first time when these young adults live alone, when they are pried away from the family structure and support system that has surrounded them for their entire lives. For some of them, it might be the first time they have to complete normal adult responsibilities. These newfound stressors also coincide with added pressure and risk of failure. Unlike an American public high school, where the institution has an obligation to educate the student, universities have no such obligation, and under-performing students can simply be discarded. This, in addition to the additional stressors, overwhelms many students. This publication will frequently discuss anxiety and depression together, due to their high incidence of comorbidity (Raskin, 2022). Downing et al. (2020) studied the impact of fear of negative evaluation on the mental health of college students. Downing et al. (2020) concluded that students feared negative evaluation in their coursework, and this was the primary driver of anxiety. A notable limitation of the Downing study is that the subjects of the study were community college students; this may limit generalizability due to socioeconomic factors.

Evolutionary mismatch occurs when an organism lives in an environment unsuited to its evolved characteristics (Manus, 2018). The current evolutionary mismatch of small family sizes may also contribute to college student anxiety. A study by Cheng et al. (2020) noted a difference in comorbid anxiety and depressive symptoms based on only child status. This is of significance in China due to its long running, now defunct one child policy. The United States does not have a history of such brutal family size restrictions; however, only child status is becoming more common (Keenan et al. 2023).

Despite the significant cultural differences between China and the United States, the potential validity of this study to explain some component of rising rates of young adult anxiety in the college setting should not be understated. There is also an

established link between maternal age and anxiety in female young adults. Tearne et al. (2016) researched this link. Tearne concluded, "our results suggest that older maternal age is related to an increased risk of depression, anxiety, and stress symptoms in young adult females" (Tearne et al. 2016, P5) Notably, this link was established between maternal age and self-reported levels of depression, anxiety, and stress, not diagnosed levels. In this case, that may improve the validity of the study, given that female individuals are believed to report their feelings of distress at higher rates than males due to social forces (Raskin, 2022), in contrast to severe cases of various psychopathologies which may be observable without self-reporting due to their higher visibility.

Tearne et al. (2016) also suggest that the link between maternal age and mental distress may be a function of variable parenting behavior based on maternal age, and not biological forces. They suggest this due to the lack of impact of paternal age and suspect that this may be caused by differential levels of parental involvement. Given the two relationships, first between only child status and anxiety, and then between maternal age and anxiety, this seems to create a perfect storm of probable evolutionary mismatch. Logically, one can imagine that being the only child of 40-year-old parents would be a far different experience to being the last of five children, also to 40 year-old parents. The work of Tearne et al. (2016) and their choice to study female young adults is relevant given the preponderance of female students in modern universities. Liberal Arts colleges in particular have a female to male ratio that often nears two to one.

Relating to the Downing study, community college transfer students are shown to have atypically high levels of anxiety, as shown by Cheung et al. (2020). This may be explainable by the specific stressors placed on community college transfer students, ranging from financial, to a changing academic environment. Community college transfer students would also have to endure these stresses at the same time as potentially being separated from their pre-existing friend groups and support systems. All of these factors could add up to produce the result observed by Cheung et al. (2020).

This study, Cheung et al. (2020), also showed atypically high levels of depression for competitive student athletes, which should be clearly distinguished from recreational athletes in research, due to the variable time commitments and different levels of stress when comparing competitive athletics to recreational exercise. Competitive athletes have wildly different work schedules and often exercise enough to induce significant physiological stress and potentially higher levels of injury, including, but not limited to, acute and repetitive motion injuries (Yang et al. 2020). These would likely cause stress in addition to the obvious result of physical pain.

Perez et al. (2023) surveyed mental health symptoms and illicit substance use in the college population; in addition to prevalent mental health issues, they found significant rates of benzodiazepine use "The most worrying issue was the consumption of diazepam, 10.8 % (CI95%: 9.8 to 11.8), and lorazepam, 7.7 % (CI95%: 6.9 to 8.6) without medical prescription." The unprescribed use of these substances is a public health concern given the common presence of adulterants in the supply of illicit drugs. A hypothetical individual intending to buy diazepam might instead accidentally buy diazepam laced with fentanyl, with potential lethal consequences. Although pharmaceutical grade supplies do sometimes circulate on the black market, this is far from guaranteed, making the unprescribed use of these substances even more unsettling (Perez et al., 2023). The surveyed students also frequently used herbal and botanical substances, in addition to over-the-counter calming and sleep promoting supplements. Melatonin was commonly used by the students who were studied. This combined with the alarming rate of benzodiazepine use likely shows an attempt by the students to self-medicate, specifically regarding mental health issues that might hinder normal sleep and relaxation.

This concurs with another result found by Perez et al. which shows that nearly 50% of the population they surveyed displayed symptoms of anxiety or depression, which far exceeds independently observed rates of diagnosed anxiety or depression in this population (Cheung et al. 2020), in addition to exceeding lifetime diagnosis rates for anxiety in the in the general population (Raskin, 2022).

Caution should be taken with "the nearly 50%" statistic. It is almost double the rate found by Cheng et al. (2020). However, this does not necessarily invalidate the number, since the survey attempted to find symptoms of anxiety and or depression, not meet diagnostic thresholds required for formal diagnosis with a mental disorder. Thus, these two disparate statistics are not mutually exclusive.

A study by (Moeller & Seehuus 2019) also noted the high and steadily climbing rates of anxiety and depression in the college population. The focus of their study, however, centered around the relationship between social skills, loneliness, and co-occurring anxiety and depression. Their study observed that higher social competence was associated with lower levels of depression, and a closer alignment between desired and actual levels of social engagement (Moeller and Seehuus 2019). While unsurprising to any scholar with the slightest amount of belief in the humanistic perspective, hard evidence supporting this belief is welcome.

Relating to the study by Perez et al. (2023), the work of Zawadzki et al. (2013) studied the mechanisms of college student anxiety, connecting loneliness, and anxiety to poor sleep quality, other negative health outcomes, and explained that rumination,

loneliness, and various depressive symptoms were strongly associated. Their work lends further credibility to the findings of Perez et al. (2023) relating to substance use in order to achieve sleep, by the college population. Some of the substances studied have significant side effects and potential for dependence formation; thus, their potential negative health outcomes cannot be understated.

Exercise Therapy for Anxiety

Lifetime prevalence of anxiety disorders is approximately 34% in the US. (Szuhany and Simon, 2022). Exercise therapy has shown significant promise in the treatment of anxiety. The study by Cheong et al. (2024), using data from Statistics Canada collected during the recent pandemic, showed that exercise and communication with friends were the two most effective independent methods for reducing anxiety. The latter method, unfortunately, is often not viable for many people, given current levels of social isolation (Cheong et al. 2024). The data they used was Covid data, so levels of anxiety were higher than usual, and yet the promise of exercise showed through.

Data analysis in the same study uncovered a problematic link between meditation and heightened anxiety in isolated individuals (Cheong et al., 2024). Although initially studied during the Covid lockdowns, this is relevant to the college population because many college students are socially isolated, as they have been separated from their pre-existing friend groups and removed, often geographically, from their family members. Given this, meditation should be commenced with caution in socially isolated college students.

A literature review by Stonerock et al. (2023) found evidence to the potential use of exercise to mitigate anxiety symptoms but found the relevant studies to often have flaws in their internal validity. Some of these criticisms may be impossible to avoid in a medical model, since it would be impossible to have a double-blind trial on exercise. A participant could easily discern which group they were randomized into.

The Stonerock review (2023) did find evidence pointing to the efficacy of exercise as an anxiety treatment in individuals with severe psychiatric illness, explaining that 16 weeks of group cycling resulted in lower tested anxiety than a control group receiving occupational therapy. (Stonerock et al., 2023). The use of group exercise, while a possible confound, can also inform future research. If individuals are socially isolated, group exercise could provide the psychological benefits of exercise in addition to the psychological benefits of social contact. This is relevant to the college student population given the findings of Moeller and Seehuus (2019), which identified loneliness as a primary contributor to the anxiety these individuals report. Given this information, it would be logical to structure a potential study comparing the effects of solo exercise to the effects of group exercise in order to discern how much of the observed benefit was due to social forces and how much was due to exercise. The limited validity identified by Stonerock et al. (2023) is thus a call to action for further research, and not simply a flaw.

Despite evidence that exercise is an efficacious treatment method for anxiety, the general first line treatment is often SSRI (Selective Serotonin Reuptake Inhibitor) medication, Szuhany and Simon (2022). Unfortunately, these medications come with a laundry list of side effects and small effect sizes when empirically tested. In many individuals, they do not outperform placebo. SSRIs also commonly cause side effects such as weight gain and sexual dysfunction, Edinoff et al. (2021). SSRIs also do not act immediately, which is logically counterintuitive given that they rapidly raise levels of serotonin. From this, we can infer that the mechanism of action in reducing anxiety is not well understood. Additionally, there is the much publicized increase in suicidality found in children, adolescents, and young adults using SSRIs (Raskin, 2022). This increase in suicidality, is still the subject of debate, whether it is a result of the medication directly, or a product of the increased motivation that a reduction in symptoms can potentiate.

Finally, there is the risk of cardiovascular side effects, which while rare, are potentially fatal (Edinoff et al. 2021). This is not intended to invalidate the use of SSRIs, but merely to show that the gain they can provide in some individuals is far from free. Despite this, favorability of SSRIs seems to be almost hegemonic in the current time. There are even young people making social media posts referencing their use of antidepressants. Without becoming too tangential, it would be hard for a sufferer of mental distress to make an informed decision while these medications are informally advertised with such frequency. The subject of mental health content on social media platforms, and the misconceptions it might spread is a subject warranting formal study. These cultural forces may potentially result in people directly requesting prescriptions from their doctors.

Given the risks involved in current first line treatments, exercise should be further considered and further researched. Studies with improved validity could theoretically parse the actual effect of exercise on various mental health symptoms. Another advantage of exercise is that it side effects are often helpful, not harmful. The physiological effects of exercise offer further benefit to the individual. If more relevant information can be collected, maybe exercise should be considered as a first-line treatment for anxiety.

Exercise Therapy for College Anxiety

For direct analysis of exercise on anxiety in the college student population, one study was particularly notable. Aishwarya & Kumar (2024) compared low intensity aerobic exercise to plyometric exercise as a treatment for college student anxiety. Low intensity, exercise comprised a long duration of walking, rather than a slow run. Anxiety was measured using the Beck Anxiety Inventory (BAI). Results were significant, and low intensity, aerobic exercise significantly outperformed plyometric exercise in reducing anxiety.

As observed by Aishwarya & Kumar (2024), exercise caused a significant reduction of anxiety, nearly 50% for the aerobic group, from a mean of 11.35 points on the BAI, to 6.0. The plyometric group showed a less spectacular improvement, although both still achieved statistical significance (Aishwarya & Kumar, 2024 P3-4). Given that the plyometric group results were still significant, this is favorable for a potential weightlifting study to relieve anxiety, showing that even results falling well short of the bar set by group aerobic exercise still reach significance.

Castellote-Caballero et al. (2024) studied the effect of yoga on anxiety in a college student population. Although the effect size was small "the existence of statistically significant differences between the pre and post-measurement in the group that received the treatment/training in yoga was observed." This study validates yoga as an additional potential treatment option for college student anxiety. Yoga also carries the added benefit of built in mindfulness practices, since yoga is not just a type of organized exercise.

The study by Castellote-Caballero (2024) also discussed the ability of exercise to activate GABAergic neurons, a process normally mediated pharmacologically in the conventional treatment of anxiety. Sometimes with the extremely addictive benzodiazepine class of medication. Exercise as an alternative to these substances could represent a favorable first line treatment, since it often has favorable side effects instead of unfavorable ones.

Discussion

Given that social isolation is a commonly reported stressor in the college population (Moeller and Seehuus, 2019), care should be taken when designing hypothetical exercise therapy regimes to promote exercise in a social context. In the research setting, for example, instead of studying the effect of exercise alone, researchers could compare the mental health outcomes produced by a set amount of running, three times a week, alone, to an equivalent amount of exercise in a running group. This would help to parse the differential effects of social engagement from the effects of exercise alone. Given the robust support for the theory that a main driver of college anxiety is social isolation (Moeller and Seehuus, 2019), eventual programs should be structured in order to maximize social opportunities. This aligns with the work of Stonerock et al. (2023), and turns their identified confound into a potential variable to research.

Another potential avenue for exercise-based stress reduction in the college population is a yoga-based fitness program. Given the tenets of mindfulness inherent in yoga, this could have a twofold effect, incorporating mindfulness-based stress reduction into a fitness program, which would further reduce stress by physical activity. If structured accordingly added social engagement could be a tertiary benefit. The incorporation of yoga could also be advantageous for students who are intimidated by other forms of organized exercise.

Finally, a third option would be a weightlifting program. Some students may be more interested in this than yoga or running, and uniquely to weightlifting. The rest in between sets offers significant social opportunity. Also, weightlifters can "work in," referring to the shared use of equipment by multiple weightlifters, where one uses the equipment while another rests. In larger groups, this provides an optimal environment for socialization. Given the work of Moeller and Seehuus (2019), the potential for exercise to drive social engagement may be just as important as the exercise itself, and although aerobic exercise shows the greatest promise in directly reducing the symptoms of anxiety, we should not discount the social opportunities provided by weightlifting.

Conclusion

The body of research shows that anxiety is a pervasive and tenacious problem afflicting a significant percentage of the college age population. Given the promising results shown by Aishwarya & Kumar (2024), and the social factors studied by Moeller and Seehuus (2019), I suggest a randomized trial studying the effect of running on college student anxiety. The study would consist of three randomized groups, first a control, second a solo running group, where the participants would be instructed to run alone for a set amount of time, on a set number of days, and finally, a group run, where the third group would be instructed to work out together in a way contrived to maximize social opportunities. The participants would then be screened for symptoms of anxiety, sleep, disturbances, substance use, and alcohol use related to self-medication (as opposed to hedonism). The results of this hypothetical research could inform mental health and physical fitness initiatives at universities across the nation, and potentially result in university students with stronger bodies and sounder minds.

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