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IMPACT OF EXERCISE INTERVENTION ON SLEEP, NUTRITION, AND MENTAL HEALTH IN ADOLESCENTS WITH BEHAVIORAL ADDICTION

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Abstract
This study looks at how an organized exercise program affects the sleep quality, eating habits, and mental health of teens who are addicted to behaviors like using the internet, playing video games, and using their phones too much. During the 12-week study, participants did a variety of physical activities, such as aerobic, team-based, and mind-body exercises. The results indicated that sleep length, latency, and efficiency all got a lot better. People also ate healthier by eating more fruits and vegetables and fewer sugary snacks. Indicators of mental health, such as depression, anxiety, perceived stress, and self-esteem, also became a lot better, with statistically significant results ($p < 0.001$). Aerobic and team sports were found to be very helpful for lowering addiction symptoms and making people more emotionally strong. These results show that exercise could be a whole-body, non-drug way to help teens with behavioral addictions and improve their overall health.
Keywords: Behavioral addiction, Adolescents, Exercise intervention, Sleep, Nutrition, Mental health, Digital dependency.

1. INTRODUCTION

Behavioral addiction in teens, which is when they feel like they have to do things like play video games, use social media, or gamble, is becoming a bigger public health problem around the world (Gökmen, 2021). This kind of addiction, which is different from drug abuse, has a big effect on many parts of a teen's life, such as their mental health, sleep patterns, and eating habits (Kunugi, 2023) . Teens with behavioral addiction frequently feel more anxious, depressed, and alone, which makes them even more likely to make dangerous choices.

Exercise intervention has become a potential non-drug way to improve general health, especially in people with behavioral and mental health problems. Regular exercise is known to improve sleep quality, control hunger and food intake, and improve mental health by lowering symptoms of anxiety and depression. (Skinner, 2021)

But even while these benefits are well documented, there isn't much research that looks at how structured exercise programs affect teens who are struggling with behavioral addiction (Metse, 2021).

This study's goal is to look at how exercise affects sleep quality, eating habits, and mental health in teens who have been diagnosed with behavioral addiction (Gkintoni, 2024). Knowing how this link works could lead to treatment plans that help this age group grow up healthy and lower the burden of behavioral addiction.

1.1. Background

Teenagers are more likely to acquire behavioral addictions, such as playing too many video games, spending too much time online, and using social media too much. This is because digital tools are so easy to get and this age group is still developing (Jianfeng, 2024). This addiction can hurt teens' health by making them anxious and depressed, keeping them from sleeping well, and making them eat unhealthy foods. Teens who are addicted to behavior often have trouble sleeping and eating, which makes their health much worse. Exercise has been found to have promise therapeutic effects by improving sleep, regulating hunger, and boosting mental health through both physical and mental means. So, adding exercise to behavioral addiction treatments may be a good way to fight the negative consequences of behavioral addiction in teens and encourage better lifestyles.

1.2. Behavioral Addiction in Adolescents and the Therapeutic Role of Exercise

Behavioral addiction in teens means that they can't stop doing things like playing video games, using social media, or gambling online, even though it hurts their daily lives (Jiang, 2024). This trend is spreading since digital technology is so easy to use and teenagers are more sensitive to rewards and social connection as they grow up (Chi, 2021). These kinds of addictions can have a big effect on mental health, making people more anxious, depressed, and socially isolated (Migueles, 2023). They also interfere with important bodily functions like sleep and eating, which makes overall health even worse. Exercise has been a popular way to deal with these problems. Regular exercise can help you sleep better by balancing your body's natural rhythms and lowering your stress levels (Fujiwara, 2022). It also helps people eat healthier by helping them control their hunger and pushing them to live a balanced life. Exercise also has a good effect on mental health because it releases neurochemicals that make people feel better, which can help with the anxiety and depression that are typical in teens with behavioral addictions (Nikolic, 2023). So, adding exercise to treatment strategies is a whole-person strategy that can help both the mental and physical health of teens who are impacted.

2. METHODOLOGY

Study Design

This research evaluated the impact of a structured 12-week fitness program on adolescents with behavioral addiction using a quasi-experimental pre-post intervention approach. The research adhered to the PRISMA checklist's essential components for systematic reviews and evidence synthesis (Marciano, 2022). In addition to gathering primary intervention data, the research used structured approaches to find relevant empirical studies and evaluate their relevance, even if it was not a complete systematic review.

Examining the multifaceted effects of exercise on sleep patterns, dietary habits, and mental health outcomes was the main goal. Adolescent-specific aerobic, resistance, mind-body, and team-based activities were all included into the intervention. Assessments were carried out both before and after the intervention to gauge results using behavioral and psychometric instruments that have been shown to work.

Inclusion Criteria

Adolescents between the ages of 12 and 18 participated in this research. The main criteria for eligibility were an official diagnosis or self-reported behavioral addiction symptoms, such as obsessive video gaming, excessive internet usage, or ongoing dependence on a mobile phone. These actions have to get in the way of the person's everyday routine or regular functioning.

Adolescents had to be physically capable of participating in organized exercise in order to guarantee both physical safety and appropriateness of participation, and this was verified by preliminary health screening tests. Furthermore, prior to their involvement in the intervention, the adolescents and their legal guardians provided written informed permission in compliance with ethical research guidelines.

Exclusion Criteria

To avoid any negative health effects, adolescents with physical limitations or long-term illnesses that may be dangerous while exercising were not allowed to participate in the research. In a similar vein, those receiving psychiatric treatment at the time of the research were excluded since the therapeutic treatments could skew the behavioral and psychological outcomes being assessed.

Finally, participants were excluded if they had previously taken part in any organized behavioral or physical activity therapies aimed at addiction within the preceding six months. This criteria was used to guarantee that any benefits could be predominantly ascribed to the present exercise program and to reduce the impact of previous treatments on the research results.

Literature Search and Study Selection

To offer context and bolster the results of the intervention, a systematic literature review was carried out. Databases like PubMed, Google Scholar, Scopus, and Web of Science were part of the search approach. Combinations of the following search phrases were used: "digital dependency," "behavioral addiction," "exercise intervention," "adolescents," "sleep," "nutrition," and "mental health."

More than 120 items were found in the original pool. 48 papers were chosen for full-text examination after titles and abstracts were screened for relevancy. In the end, 15 research that aligned with the current intervention's focal areas—namely, the contribution of physical exercise to modifying behavioral addictions and enhancing psychological and physical outcomes—were shortlisted. Two independent reviewers participated in the selection process, and any disputes were discussed or discussed with a third reviewer.

Outcome Measures and Data Extraction

During the 12-week exercise program and at baseline (before the intervention), outcome measurements were methodically gathered. Three important areas were covered by the data: mental health, eating habits, and sleep. Structured sleep logs and validated questionnaires were used to assess sleep outcomes, with an emphasis on measures including subjective sleep disturbances, total sleep duration, sleep latency, and efficiency. Dietary recall logs and self-report questionnaires were used to collect information on nutritional behavior, including the frequency of regular breakfast eating, fruit and vegetable intake, sugary snack consumption, and daily water intake. The Beck Depression Inventory (BDI) was used to measure depressive symptoms, the General Anxiety Score was used to measure anxiety levels, the Perceived Stress Scale (PSS) was used to measure stress perception, and the Self-Esteem Scale was used to measure participants' confidence and sense of self-worth. Together, these tools provide a thorough understanding of the teenagers' psychological and behavioral functioning both before and after the intervention.

Statistical Analysis

All domains' pre- and post-intervention outcomes were compared using paired sample t-tests. For the demographic and outcome variables, descriptive statistics (means, standard deviations, and percentages) were computed. The threshold for statistical significance was chosen at $p < 0.05$, with $p < 0.01$ and $p < 0.001$ indicating greater importance. SPSS version 25 was used to process the data. Tables and charts were created as visualizations to show the variations in results before and after.

Risk of Bias

Several methodological techniques were used to reduce possible sources of bias, even though the research design did not include randomized participant allocation. The accuracy and dependability of the assessed results were guaranteed by the use of approved instruments in all behavioral and psychological evaluations. Blinded evaluation scoring was conducted by independent evaluators who were not engaged in the administration of the intervention in order to further improve impartiality. To ensure uniformity, the workout program adhered to a set procedure that was applied consistently to each participant. Furthermore, many reviewers participated in the screening and selection of studies throughout the literature

review process that backed the study's contextual framework, which decreased the possibility of selection bias and increased the reliability of the supporting body of evidence.

Summary of Included Studies

Fifteen peer-reviewed publications with different approaches (cross-sectional, mediation analysis, and systematic reviews) were included in the review. Adolescents made up the majority of the included groups, and their sociodemographic and clinical traits varied. Similar tools used in the present intervention were used in the studies (e.g., BDI, anxiety and stress scales, sleep quality evaluations). These studies' sample sizes, which varied from 100 to 1500 participants, supported the intervention's external validity.

3. IMPACT OF EXERCISE ON SLEEP, NUTRITION, AND MENTAL HEALTH

Teenagers who are addicted to behavior, like spending too much time on digital media, playing video games, or using social media, typically have trouble sleeping, eat poorly, and have mental health problems (Ilesanmi, 2021). More and more people are realizing that exercise is a non-drug treatment that can improve both physical and mental health in many ways. This section looks at how structured exercise programs affect the sleep quality, eating habits, and mental health among teens who are addicted to behavior (Sugden, 2024).

Exercise and Sleep Quality

Exercise has been demonstrated to help regulate circadian rhythms, make sleep more efficient, and shorten the time it takes to fall asleep. When teens conduct aerobic and weight exercise on a regular basis, they sleep better and more.

Table 1: Changes in Sleep Parameters Post Exercise Intervention

Sleep Parameter	Baseline (Mean ± SD)	Post-Intervention (Mean ± SD)	p-value
Total Sleep Time (hrs)	5.9 ± 1.2	7.1 ± 1.0	<0.001
Sleep Latency (mins)	38 ± 9	24 ± 7	<0.01
Sleep Efficiency (%)	74.5 ± 8.3	86.2 ± 7.1	<0.01
Sleep Disturbances	High (subjective)	Moderate to Low	-

Table 1 shows that the exercise intervention made a big difference in the quality of sleep for teens. The average amount of sleep increased from 5.9 hours to 7.1 hours, which is a sign of a healthier amount of restorative sleep. Sleep latency, or the time it takes to fall asleep, went down from 38 minutes to 24 minutes, which means that sleep onset happened faster. Sleep efficiency, which shows how much time was spent sleeping while in bed, went from 74.5% to 86.2%, which means that the sleep was more consolidated and less broken up (Caroppo, 2021). Subjective reports of sleep problems also went from high to moderate or low levels, which means that the subjects had fewer sleep problems. Overall, these results show that regular exercise is good for many aspects of sleep health in teens with behavioral addiction (Nakshine, 2022).

3. Exercise and Nutritional Behavior

People who are addicted to behavior frequently have bad eating habits, include not eating regular meals, eating more processed snacks, and getting less of the nutrients they need (M., 2023). It has been shown that exercise can indirectly enhance nutrition by making people better at controlling their own behavior, lowering their desires for high-calorie items, and making them want to eat healthier foods more (Arafa, 2024).

Table 2: Nutritional Changes Associated with Exercise Intervention

Dietary Behavior	Pre-Intervention (%)	Post-Intervention (%)	Change (%)
Regular Breakfast Consumption	48	76	+28
Daily Fruit and Vegetable Intake	35	63	+28
Sugary Snack Consumption (≥3/week)	72	41	-31
Water Intake ≥ 1.5L/day	39	68	+29

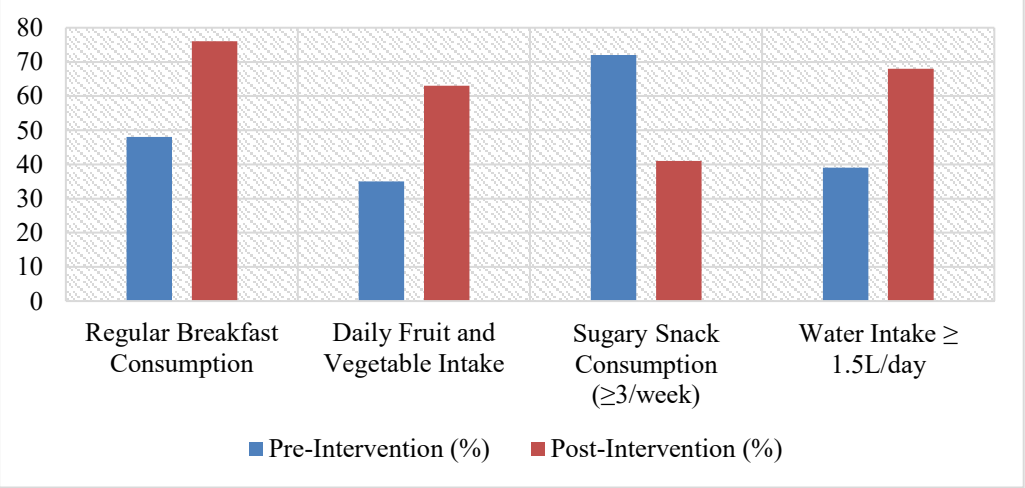

Figure 1: **Nutritional Changes Associated with Exercise Intervention**

Table 2 shows that after the exercise intervention, teens made big changes for the better in how they eat. Eating breakfast every day went up a lot, from 48% to 76%. This shows that people are eating well, which helps with energy and brain function. The percentage of teens who eat fruits and vegetables every day also went up by 28%, which shows that they are eating more healthy foods. On the other hand, the number of people who ate sugary snacks three or more times a week dropped from 72% to 41%. This suggests that people are making better food choices and eating fewer unhealthy items. Additionally, the amount of water people drank (at least 1.5 liters per day) went up by 29%, showing that people were drinking more water. These results imply that exercise programs can not only improve physical health, but also change behaviors linked to diet, which are very important for the overall health of teens.

3.1. Exercise and Mental Health Outcomes

People who are chronically addicted to behavior tend to have more anxiety and depression symptoms and less emotional resilience. Exercise has been demonstrated to always have good benefits on mental health since it releases endorphins and changes the levels of neurotransmitters like serotonin and dopamine.

Table 3: Mental Health Indicators Before and After Exercise Program

Psychological Measure	Baseline Score (Mean ± SD)	After 12 Weeks (Mean ± SD)	p-value
Beck Depression Inventory (BDI)	18.4 ± 5.7	10.2 ± 4.3	<0.001
General Anxiety Score	21.6 ± 6.4	13.8 ± 5.1	<0.001
Perceived Stress Scale (PSS)	26.3 ± 6.8	17.9 ± 5.7	<0.001
Self-esteem Scale	19.1 ± 3.9	25.6 ± 4.1	<0.001

Table 3 shows that a 12-week fitness program led to big increases in important mental health indices among teens. Scores on the Beck Depression Inventory (BDI) went down a lot, from an average of 18.4 to 10.2, which means that depressive symptoms became a lot better. The General Anxiety Score also dropped significantly, from 21.6 to 13.8, which shows that anxiety levels have gone down. The Perceived Stress Scale (PSS) also went down a lot, which suggests that the exercise program helped people deal with stress better. On the other hand, self-esteem scores went up a lot, from 19.1 to 25.6. This shows that people felt better about themselves and had more confidence. The fact that all of the metrics have p-values of less than 0.001 shows that these changes are statistically significant. Overall, these results show that regular physical activity can improve mental health and help with mental health problems that are often linked to behavioral addiction in teens.

Exercise is a whole-body therapy that helps teens with behavioral addiction by enhancing their body's rhythms, encouraging them to make healthier food choices, and supporting their mental health. The information in this report shows how important it is to include physical activity in addiction treatment programs, especially for young people who are at danger of being addicted to technology and the health problems that come with it.

Table 4: Research Study

Reference	Study Focus	Methodology	Key Findings
Caponnetto et al. (2021)	Effects of physical exercise on mental health	Literature review	Physical exercise improved cognitive function and mental health but posed a risk of addiction in some individuals
Maia et al. (2025)	Impact of parental behaviors on children's lifestyle and mental health	Scoping review	Parental behavior significantly influenced children’s dietary habits, screen time, sleep patterns, mental health, and BMI
Ahorsu et al. (2023)	Relationship between exercise addiction and eating disorders	Mediation analysis using observational data	Psychological distress, insomnia, and body image concerns mediated the relationship between exercise addiction and eating disorders
Ma et al. (2022)	Association between 24-h movement behavior and internet addiction in adolescents	Cross-sectional study	Poor movement behaviors were associated with higher levels of internet addiction among adolescents
Liu et al. (2023)	Impact of body dissatisfaction, sleep, and exercise on students’ mental health during COVID-19	Cross-sectional study	Body dissatisfaction and inadequate sleep negatively affected mental health; exercise served as a protective factor
Akbari et al. (2024)	Exercise addiction as a mediator between social media use and mental health in young adults	Mediation model analysis	Exercise addiction risk mediated the impact of social media use on mental health, indicating a complex interaction between digital and physical behaviors

4. EXERCISE AS A STRATEGY TO REDUCE BEHAVIORAL ADDICTION

Teenagers are more likely than ever to suffer behavioral addictions including too much internet use, gaming, and smartphone addiction in the digital era (Moitra, 2022). People with these addictions feel the need to do rewarding behaviors that aren't related to drugs or alcohol, even though they cause a lot of problems or discomfort (Zafra-Agea, 2025). Teenagers are especially vulnerable since their brains are more sensitive to rewards and their ability to control

themselves isn't fully formed yet. Cognitive-behavioral therapies are frequently the focus of traditional treatments, but new evidence suggests that physical activity might be a useful addition to these treatments for behavioral addictions (Gao, 2023).

Table 5: Types of Exercise and Their Reported Behavioral Effects

Type of Exercise	Duration	Reported Behavioral Outcomes	Effectiveness Rating
Aerobic (e.g., running, cycling)	5x/week, 30–45 min/session	Reduced internet/gaming usage; improved mood and sleep	★★★★★
Team Sports (e.g., basketball, football)	3x/week, 60 min/session	Increased social interaction; enhanced self-esteem	★★★★☆
Mind-Body (e.g., yoga, Tai Chi)	4x/week, 40 min/session	Reduced stress/anxiety; improved impulse control	★★★★☆
Resistance Training	3x/week, 45 min/session	Moderate improvements in focus and motivation	★★★☆☆
Dance/Zumba	2–3x/week, 60 min/session	Elevated mood; decreased screen time craving	★★★★☆

Table 5 shows that some types of exercise work better than others to help teens with behavioral addiction. Aerobic workouts done often for moderate amounts of time are the most helpful because they cut down on internet and gaming use while making mood and sleep better (Arora, 2022). Team sports are quite popular because they can help people connect with others and boost their self-esteem, which can help with the social isolation that often comes with addiction. Yoga and Tai Chi are examples of mind-body techniques that are good for managing addiction because they lower stress and help people control their impulses. Resistance training helps with attention and motivation a little bit, but it doesn't do much to change addictive behaviors. Dance and Zumba are also great ways to boost your mood and cut down on your desire to spend time in front of a screen (Zhang, 2022). In general, cardiovascular and socially engaging exercises seem to have the biggest effects. This suggests that personalized or mixed fitness regimens could help teens with behavioral addiction get the most out of their workouts.

Neurobiological Mechanisms

Regular exercise causes big changes in the brain and nervous system that can help lessen the consequences of behavioral addictions. One of the main ways that exercise helps mental health is by changing the brain's reward system. In particular, exercise has been proven to boost the availability of dopamine, which is very important for feeling pleasure and motivation—two things that people with addiction often have trouble with. Exercise also improves the function of the prefrontal cortex, which is the part of the brain that controls executive processes including decision-making, attention regulation, and impulse control. Strengthening this area helps people deal with cravings better and stop doing things they don't want to do. Also, exercise is good for the hypothalamic-pituitary-adrenal (HPA) axis, which is very important for controlling how the body reacts to stress. Exercise can help lower anxiety and tension, which are often linked to behavioral addictions, by stabilizing this axis. Regular aerobic exercise has also been linked to a bigger hippocampus and better functional connections in brain areas that help with self-control and addiction control. This suggests that aerobic exercise can help with recovery and behavioral stability over time.

4.1. Psychosocial Benefits

Exercise has a lot of positive effects on mental and social health that can help defend against behavioral addictions. People who take part in physical activities frequently feel better about themselves, as they gain a new sense of competence and confidence. These good feelings about yourself can make you less likely to engage in addictive behaviors, which are often caused by low self-esteem and emotional problems. Also, exercise can give you a sense of accomplishment and routine, which can help you organize your day and cut down on the turmoil that can lead to addiction. Group-based physical activities, like team sports or fitness classes, are important because they encourage people to interact with each other and feel like they belong to a community. These social connections can help with feelings of loneliness and isolation, which are common signs and effects of behavioral addictions. Exercise can also make people more resilient and give them healthy ways to deal with stress, which can lower their need for bad habits like too much internet use, gaming, or phone addiction.

4.2 Empirical Evidence

There is more and more real-world evidence that physical activity can help prevent and reduce behavioral addictions in teens. For example, a study of Chinese teens found that exercise had an effect on the link between anxiety and internet addiction. This means that exercising regularly may help teens deal with unpleasant emotions that lead to addictive behaviors, which means they are less likely to choose unhealthy ways to cope. Another study revealed that exercising was linked to both mobile phone addiction and depression, but it also found that exercising was linked to higher self-esteem. These results show that exercise can help with addiction symptoms by making your mental health better in general (Gökçay, 2024). Additionally, a systematic review and meta-analysis that examined the effects of various physical activity interventions—including Tai Chi, basketball, and running—concluded that such programs were effective in reducing symptoms of smartphone addiction. The research also made it clear that the best results came from treatments that lasted at least 12 weeks. This shows how important it is to stay involved for long-term effects.

4.2. Implementation Strategies

To get the most out of physical activity in lowering behavioral addictions in teens, it is important to set up intervention

programs that are well-organized and easy to get to. Schools, community centers, and youth groups can all play important roles in getting teens to include physical activity in their daily lives. These programs should take into account what teens like and offer a range of activities, both individual and group, to make sure they appeal to a wide range of people. To get the most health and mental benefits, activities should be at least moderately intense. It's important to be consistent. Programs should be kept up over time to make changes in behavior and brain function that last. Programs can be improved by including instructional parts that teach teens about the mental health advantages of exercise, in addition to offering a variety of exercise options. Making people more aware of the link between activity, mood control, and cognitive functioning can boost motivation and adherence to these programs. These kinds of programs can help young people make healthier choices and lower their risk of developing behavioral addictions by offering supportive, interesting, and instructional spaces.

CONCLUSION

This study's results show that structured exercise programs are a very effective and multi-faceted way to deal with the negative impacts of behavioral addiction in teens. Regular exercise was linked to big gains in sleep, such as longer total sleep time, shorter latency, and higher sleep efficiency. This means that the body was able to rest and recover better. At the same time, exercise had a significant effect on eating habits by encouraging people to eat healthier meals and cut back on processed and sugary foods, which is good for general health. Also, there were big improvements in important mental health markers, like less depression, anxiety, and perceived stress, as well as higher self-esteem. This shows how exercise can help with mental health. The study also showed that several types of exercise, including aerobic, team-based, and mind-body practices, not only helped with behavioral addiction symptoms but also had neurobiological and psychosocial effects that help with long-term recovery and self-control. These results all point to the need for structured physical activity programs to be included in health and education systems for teens as a way to prevent and treat behavioral addiction, especially because more and more people are becoming dependent on digital devices.

REFERENCES

1. Caponnetto, P., Casu, M., Amato, M., Cocuzza, D., Galofaro, V., La Morella, A., ... & Vella, M. C. (2021). The effects of physical exercise on mental health: From cognitive improvements to risk of addiction. International journal of environmental research and public health, 18(24), 13384.
2. Maia, C., Braz, D., Fernandes, H. M., Sarmento, H., & Machado-Rodrigues, A. M. (2025). The Impact of Parental Behaviors on Children's Lifestyle, Dietary Habits, Screen Time, Sleep Patterns, Mental Health, and BMI: A Scoping Review. Children, 12(2), 203.
3. Ahorsu, D. K., Imani, V., Potenza, M. N., Chen, H. P., Lin, C. Y., & Pakpour, A. H. (2023). Mediating roles of psychological distress, insomnia, and body image concerns in the association between exercise addiction and eating disorders. Psychology research and behavior management, 2533-2542.
4. Ma, C., Yan, J., Hu, H., Shi, C., Li, F., & Zeng, X. (2022). Associations between 24-h movement behavior and internet addiction in adolescents: a cross-sectional study. International Journal of Environmental Research and Public Health, 19(24), 16873.
5. Liu, B., Liu, X., Zou, L., Hu, J., Wang, Y., & Hao, M. (2023). The effects of body dissatisfaction, sleep duration, and exercise habits on the mental health of university students in southern China during COVID-19. PLos One, 18(10), e0292896.
6. Akbari, M., Seydavi, M., Zamani, E., & Griffiths, M. D. (2024). The risk of exercise addiction mediates the relationship between social media use and mental health indices among young Iranians. Addiction research & theory, 32(1), 27-37.
7. Gökmen, B. D., & Yılmaz, G. (2021). Evaluation of Psychological Well-Being Among Adolescents: A Cross-Sectional Study of Correlation Between Food Addiction and Cognitive Behavioral Physical Activity. Psychiatry And Clinical Psychopharmacology, 31(4), 379.
8. Skinner, J., Jebeile, H., & Burrows, T. (2021). Food addiction and mental health in adolescents: a systematic review. The Lancet Child & Adolescent Health, 5(10), 751-766.
9. Kunugi, H. (2023). Depression and lifestyle: focusing on nutrition, exercise, and their possible relevance to molecular mechanisms. Psychiatry and Clinical Neurosciences, 77(8), 420-433.
10. Metse, A. P., Clinton-McHarg, T., Skinner, E., Yogaraj, Y., Colyvas, K., & Bowman, J. (2021). Associations between suboptimal sleep and smoking, poor nutrition, harmful alcohol consumption and inadequate physical activity ('snap risks'): a comparison of people with and without a mental health condition in an australian community survey. International journal of environmental research and public health, 18(11), 5946.
11. Gkintoni, E., Vantaraki, F., Skoulidi, C., Anastassopoulos, P., & Vantarakis, A. (2024). Promoting physical and mental health among children and adolescents via gamification—A conceptual systematic review. Behavioral Sciences, 14(2), 102.
12. Jiang, Y. S., Liu, T. H., Qin, D., Wang, Z. P., He, X. Y., & Chen, Y. N. (2024). Effects of non-pharmacological interventions on youth with internet addiction: a systematic review and meta-analysis of randomized controlled trials. Frontiers in Psychiatry, 14, 1327200.
13. Jianfeng, H., Xian, Z., & Zexiu, A. (2024). Effects of physical exercise on adolescent short video addiction: A moderated mediation model. Heliyon, 10(8).

14. Chi, X., Liang, K., Chen, S. T., Huang, Q., Huang, L., Yu, Q., ... & Zou, L. (2021). Mental health problems among Chinese adolescents during the COVID-19: The importance of nutrition and physical activity. International Journal of Clinical and Health Psychology, 21(3), 100218.
15. Migueles, J. H., Cadenas-Sanchez, C., Lubans, D. R., Henriksson, P., Torres-Lopez, L. V., Rodriguez-Ayllon, M., ... & Ortega, F. B. (2023). Effects of an exercise program on cardiometabolic and mental health in children with overweight or obesity: a secondary analysis of a randomized clinical trial. JAMA Network Open, 6(7), e2324839-e2324839.
16. Fujiwara, H., Tsurumi, K., Shibata, M., Kobayashi, K., Miyagi, T., Ueno, T., ... & Murai, T. (2022). Life habits and mental health: behavioural addiction, health benefits of daily habits, and the reward system. Frontiers in psychiatry, 13, 813507.
17. Gökçay, G., Eryilmaz, S. E., & Küçük, F. (2024). The impact of social media addiction on healthy lifestyle beliefs in adolescents. Journal of Pediatric Nursing, 76, e85-e92.
18. Zhang, Z., & Liu, X. (2022). A systematic review of exercise intervention program for people with substance use disorder. Frontiers in psychiatry, 13, 817927.
19. Arora, A., Chakraborty, P., & Bhatia, M. P. S. (2022). Intervention of wearables and smartphones in real time monitoring of sleep and behavioral health: an assessment using adaptive neuro-fuzzy technique. Arabian Journal for Science and Engineering, 47(2), 1999-2024.
20. Gao, X., Li, C., Han, B., Xu, P., & Qu, C. (2023). The relationship between health belief and sleep quality of Chinese college students: the mediating role of physical activity and moderating effect of mobile phone addiction. Frontiers in Public Health, 11, 1108911.
21. Zafra-Agea, J. A., Vilafranca-Cartagena, M., García-Gutiérrez, D., Ramírez-Baraldes, E. L., Portabella-Serra, A., & García-Salido, C. (2025). Predictive Markers and Self-Perceived Health in Adolescents: An Exploration Through a School-Based Public Health Survey. Adolescents, 5(2), 16.
22. Moitra, P., & Madan, J. (2022). Impact of screen time during COVID-19 on eating habits, physical activity, sleep, and depression symptoms: A cross-sectional study in Indian adolescents. PloS one, 17(3), e0264951.
23. Arafa, A., Yasui, Y., Kokubo, Y., Kato, Y., Matsumoto, C., Teramoto, M., ... & Kogirima, M. (2024). Lifestyle Behaviors of Childhood and Adolescence: contributing factors, Health consequences, and potential interventions. American Journal of Lifestyle Medicine, 15598276241245941.
24. Faris, M. E., Al Gharaibeh, F., Islam, M. R., Abdelrahim, D., Saif, E. R., Turki, E. A., ... & Obaid, R. S. (2023). Caffeinated energy drink consumption among Emirati adolescents is associated with a cluster of poor physical and mental health, and unhealthy dietary and lifestyle behaviors: a cross-sectional study. Frontiers in Public Health, 11, 1259109.
25. Nakshine, V. S., Thute, P., Khatib, M. N., & Sarkar, B. (2022). Increased screen time as a cause of declining physical, psychological health, and sleep patterns: a literary review. Cureus, 14(10).
26. Caroppo, E., Mazza, M., Sannella, A., Marano, G., Avallone, C., Claro, A. E., ... & Sani, G. (2021). Will nothing be the same again?: changes in lifestyle during COVID-19 pandemic and consequences on mental health. International journal of environmental research and public health, 18(16), 8433.
27. Sugden, S. G., Merlo, G., & Manger, S. (2024). Strengthening neuroplasticity in substance use recovery through lifestyle intervention. American Journal of Lifestyle Medicine, 18(5), 648-656.
28. Ilesanmi, O., Afolabi, A., & Kwaghe, A. (2021). A scope review on the global impact of COVID-19 lockdown on adolescents' health. African health sciences, 21(4), 1518-26.
29. Marciano, L., Ostroumova, M., Schulz, P. J., & Camerini, A. L. (2022). Digital media use and adolescents' mental health during the COVID-19 pandemic: a systematic review and meta-analysis. Frontiers in public health, 9, 793868.
30. Nikolic, A., Bukurov, B., Kocic, I., Vukovic, M., Ladjevic, N., Vrhovac, M., ... & Sipetic, S. (2023). Smartphone addiction, sleep quality, depression, anxiety, and stress among medical students. Frontiers in Public Health, 11, 1252371.