

# An overview of studies on exercise for Substance Use Disorders treatment connected to the misuse of illegal drugs





## Editorial Advisor Group

**Hassandra Mary**

*Assistant professor of Department of Physical Education and Sport Science, University of Thessaly, Greece.*

**Theodorakis Yiannis**

*Professor of Department of Physical Education and Sport Science, University of Thessaly, Greece*

**Goudas Marios**

*Professor of Department of Physical Education and Sport Science, University of Thessaly, Greece*

**Papaioannou Athanasios**

*Professor of Department of Physical Education and Sport Science, University of Thessaly, Greece*

**Panagiotounis Fotis**

*Department of Education, Therapy Centre for Depended Individuals (KETHEA), Greece*

## Acknowledgements

This document would not have been possible without the contribution of the post-graduate students of the University of Thessaly, Chouleva Thomai and Aarthi Nadagopal.



# Contents

Abstract .....	5
<b>Chapter 1   Introduction</b> .....	6
Why do people take drugs? .....	6
Risk and Protective Factors for Drug Use .....	7
Substance use disorders (SUDs) .....	7
Addiction .....	7
Addiction and Health .....	8
Addiction and personality .....	8
Substance use disorders treatment .....	8
Physical exercise and SUDs treatment .....	9
Aim of the review .....	9
<b>Chapter 2   Method</b> .....	10
Inclusion and Exclusion Criteria .....	10
Information sources .....	10
Search Strategy .....	10
Study selection .....	10
Data extraction process .....	10
Data items .....	11
<b>Chapter 3   Results</b> .....	12
Descriptives of Cross-sectional studies .....	12
Descriptives of Intervention studies .....	12
Behavior Change techniques .....	13
Descriptives of Literature reviews .....	14
Synthesized Outcome Findings .....	14
Outcomes of physical exercise interventions and reviews .....	15
<b>Chapter 4   Discussion</b> .....	16
Available research regarding physical exercise for individuals under SUDs treatment .....	16
Outcomes of physical exercise .....	16
Designing physical exercise interventions for SUDs treatment connected to the misuse of illegal drugs .....	17
Behavior change and motivational techniques used at the intervention groups of effective studies .....	17
Physical exercise characteristics .....	17
Limitations .....	18
Conclusion .....	18

## Abstract

Several types of Substance Use Disorders (SUDs) treatment include physical exercise as an add-on recovery. This review summarizes research on sports and physical exercise as an adjunct to SUDs treatment with the misuse of illegal drugs. Twenty peer-reviewed papers that met the inclusion criteria for representing cross-sectional, intervention and, review studies were considered. Descriptives for each category are presented as well as synthesized findings regarding outcomes and preferences of patients with SUDs, regarding physical exercise programs. Further, the studies are discussed in terms of quality, quantity, and positive outcomes of physical activity for patients with SUDs. Finally, information regarding the design of sports and physical exercise programs is critically presented and discussed.

*Keywords:* physical exercise, SUDs, intervention development.

## Glossary

Abbreviation	Description
RTS+	Reintegration Through Sport Plus
SUDs	Substance Use Disorders
PE	Physical Exercise
BCTs	Behavior Change Techniques



# Chapter 1 | Introduction

Drug use is one of the most serious problems in modern-day public health and society as a whole, with a significant proportion of young adults in developed countries, have used an illicit drug at some point in their lives. Drug use affects the brain's «reward circuit,» causing euphoria as well as flooding the brain with the chemical messenger “dopamine”. Surges of dopamine in the reward circuit cause the reinforcement of pleasurable but unhealthy behaviors leading people to repeat the behavior again and again. These brain adaptations often lead to the person becoming less and less able to derive pleasure from other things they once enjoyed (NIDA, 2018). Consequently, drug use is bound to impact individuals' health and well-being. The health consequences of drug use may include a range of negative outcomes such as substance use disorders, mental health disorders, HIV infection, hepatitis-related liver cancer and cirrhosis, overdose, and premature death (World Drug Report, 2020). Drug use, particularly when it develops into substance use disorders, can also have an impact on the social development of the users. Besides, long-term use also causes changes in other brain chemical systems and circuits, affecting functions that include learning, judgment, decision-making, memory, and behavior (NIDA, 2018).

## ► Why do people take drugs?

According to NIDA (2020), people begin taking drugs for a variety of reasons, amongst which:

- *To feel good.* Most abused drugs produce intense feelings of pleasure. This initial sensation of euphoria is followed by other effects, which differ depending on the type of drug used. For example, when it comes to stimulants such as cocaine, the state of feeling “high” is assorted with feelings of power, self-confidence, and increased energy. In contrast, the euphoria caused by opiates such as heroin is bound to induce feelings of relaxation and satisfaction.

- *To feel better.* Certain people suffering from social anxiety, stress-related disorders, and depression begin abusing drugs in an attempt to alleviate feelings of distress. Stress can play a major role in starting the use of drugs, continuing drug abuse, or relapsing when it comes to patients recovering from addiction.

- *To do better.* Some people feel pressure towards chemically enhancing or improving their cognitive or athletic performance, which can play a role in initial experimentation and continued abuse of drugs such as prescription stimulants or anabolic/androgenic steroids.

- *Curiosity and “because others are doing it.”* In this respect, adolescents are particularly vulnerable because of the strong influence of peer pressure. Teens are more likely than adults to engage in risky or daring behaviors, to impress their friends, and express their independence from parental and social rules.

In 2018, an estimated 269 million people worldwide had used drugs at least once in the previous year. This corresponds to 5.4% of the global population aged 15–64, representing nearly 1 in every 19 people. Over the period 2009–2018, the estimated number of past-year users of any drug globally increased from 210 million to 269 million. Consequently, the prevalence of drug use increased from 4.8% of the adult population in 2009 to 5.4 % in 2018 (World Drug Report, 2020).

### ► Risk and Protective Factors for Drug Use

The likelihood of developing an addiction differs from person to person whereas no single factor determines whether a person will become addicted to drugs. In general, the more risk factors present in a person, the greater the chance that taking drugs will lead such person to drug use and addiction. Protective factors, on the other hand, reduce a person's risk. Risk and protective factors may be either environmental or biological (NIDA, 2020).

RISK FACTORS	PROTECTIVE FACTORS
Aggressive behavior in childhood	Self-efficacy (belief in self-control)
Lack of parental supervision	Parental monitoring and support
Low peer refusal skills	Positive relationships
Drug experimentation	Extracurricular Activities
Availability of drugs at school	School anti-drug policies
Community poverty	Neighborhood resources

Source: NIDA (2020)

### ► Substance use disorders (SUDs)

According to the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* of the American Psychiatric Association (2018), substance use disorders (SUDs) are defined as the persistence of drug use (including alcohol) despite substantial harm and adverse consequences. SUDs are characterized by an array of mental/emotional, physical, and behavioral problems such as chronic guilt, an inability to reduce or stop consuming the substance(s) despite repeated attempts; driving while intoxicated; and physiological withdrawal symptoms. The diagnoses of substance abuse and substance dependence were merged into the category of SUDs (Guha, 2014; Hasin et al., 2013). The syndrome of dependence may be present for a specific psychoactive substance (e.g. tobacco, alcohol, or diazepam), or a class of substances (e.g. opioid drugs), or a wider range of pharmacologically different psychoactive substances (WHO, 2008).

Substance use disorders usually coexist with other mental illnesses; however, it is not clear whether one is the cause of the other or whether common underlying risk factors have contributed to both disorders. The relevance of comorbidity to substance use and mental health disorders is associated with lower treatment success rates (EMCDDA, 2015).

### ► Addiction

One severe substance use disorder is addiction. Addiction is a chronic disease characterized by drug seeking and use that is compulsive, or difficult to control, despite harmful consequences. The initial decision to take drugs is voluntary for most people, but repeated drug use can lead to brain changes that challenge an addicted person's self-control and interfere with their ability to resist intense urges to take drugs. These brain changes can be persistent, which is why drug addiction is considered a «relapsing» disease—people in recovery from drug use disorders are at increased risk for returning to drug use even after years of not taking the drug (NIDA, 2018).





### ► **Addiction and Health**

People who suffer from addiction often have one or more accompanying medical issues, which may include lung or cardiovascular disease, stroke, cancer, HIV/AIDS, Hepatitis B and C, and mental disorders. Imaging scans, chest X-rays, and blood tests show the damaging effects of long-term drug abuse throughout the body. For example, research has shown that tobacco smoke causes cancer of the mouth, throat, larynx, blood, lungs, stomach, pancreas, kidney, bladder, and cervix. Besides, some drugs of abuse, such as inhalants, are toxic to nerve cells and may damage or destroy them either in the brain or the peripheral nervous system (NIDA, 2020).

### ► **Addiction and personality**

According to EMCDDA (2004), drug users suffer from mental and personality disorders. Between 50% and 90% of drug users are reported to suffer from personality disorders and around one-fifth (15–20%) from more serious psychotic complaints. Depression and anxiety exist in addicts at greater levels than in other groups (Craig, 1979; McIntosh & Ritson, 2001) as well as higher neuroticism (Kotov, et al., 2010; Zilberman et al., 2018). Addicts are often hostile individuals tending to have less control over their angry feelings (De Mojá & Spielberger, 1997). Addicts pursue more sensation-seeking experiences and are characterized by impulsivity (Zuckerman, 1979). Moreover, most addicts feature such traits as pursuing immediate gratification, a lack of impulse control, demanding attention, low frustration tolerance, impatience, poor socialization, difficulty in profiting from experience, being disrespectful of authority, having difficulty in forming relationships, irritability, and irresponsibility, and having underlying feelings of insecurity and inadequacy (Craig, 1979).

### ► **Substance use disorders treatment**

In recent years, our understanding of addiction and the wider range of substance use disorders has improved significantly, enabling us to respond effectively. Numerous mechanisms underlying addiction have been discovered, having, in turn, spawned a multitude of models, each of which addresses a part of the problem. A large number of addiction models have been proposed that describe such mechanisms, on which recovery interventions and strategies are based (EMCDDA, 2013). SUDs can be treated effectively in most cases, provided people have access to a wide range of services, based on behavioral and medicinal approaches (NIDA, 2018).

However, it is a generally accepted assumption that SUDs treatment is a process of behavioral change through which addicted persons are supported in their efforts to regain their physical and psychological health and wellbeing whilst aspiring to the reinstatement of their social functioning (NIDA, 2017). In this frame, the application of psychosocial interventions is used in treatment to address motivational, behavioral, psychological, and other psychosocial factors related to SUDs. These interventions have proved effective in reducing drug use, promoting abstinence, and preventing relapse (WHO & UNODC, 2020). Psychosocial interventions are structured to address SUDs by helping patients to recognize the triggers for substance use and learn alternative strategies to handle those triggers (Jhanjee, 2014; EMCDDA, 2016; Murthy, 2018).

In this context, interventions based on physical exercise-PE (i.e. exercise and sports) can help SUDs patients, discover and develop strategies, which can support recovery and social reintegration (WHO & UNODC, 2020). The contribution of physical exercise and sports seems to be crucial in a wide range of long-term benefits for the mental and physical health of SUDs patients. However, there is no extensive literature on the effects of physical exercise as an effective intervention strategy in the treatment of SUDs connected to the misuse of illegal drugs, with the majority of studies suffering shortcomings and limitations.



## ► Physical exercise and SUDs treatment

Physical exercise is characterized as a planned, organized, and repeated body movement that aims to promote or maintain physical fitness (Caspersen et al., 1985). Different types of SUDs treatment approaches include physical exercise as an add-on therapy. Studies have reported benefits when individuals in SUDs treatment programs exercise regularly. Positive outcomes reported in studies include:

- Reduced drug intake
- Increased abstinence rate
- Reduced cravings during treatment
- Enhanced healing effects on SUDs
- Higher completion rate of the rehabilitation program,
- Relapse prevention
- Alleviation of a number of the factors that contribute to SUDs development and which act as barriers to healthy recovery (e.g., a lack of social support, poor mental health, high stress, and boredom)
- Achievement of 'holistic' goals within treatment programs (e.g., improving interpersonal relationships, and physical and mental health)
- Repair of the damage caused to the muscles and the cardiovascular system and helping the body to recover from drug use complications faster
- Reduced anxiety depressive symptoms and enhanced mood states
- Improved self-confidence, self-esteem, and body image
- Improved general well-being and quality of life
- Adoption of a healthy lifestyle that is incompatible with substance abuse
- Awareness of one's health condition
- Reported increased personal satisfaction through physical and mental improvement, hence the completion of one's transformation.

Nevertheless, some studies did not detect targeted benefits from exercise programs (McDaniel, 2016). Since this review aims to inform the development of exercise training programs to be implemented by professionals of drug treatment organizations, we consider it of importance to summarize the existing knowledge with a broader focus on the existing literature in terms of outcomes and process on how physical exercise has been applied and understood to relate to SUDs treatment. This review will focus on questions: Who can deliver the physical exercise programs? What activities are best (if any)? How to design physical exercise programs for SUDs? What factors should be taken into account?

## ► Aim of the review

The purpose of this review is to explore previous research regarding sports and physical exercise for SUDs treatment connected to the misuse of illegal drugs (interventions, cross-sectional studies, and literature reviews). The guiding research questions are as follows:

- What research is currently available regarding sports, physical activity, or physical exercise programs related to people who are under SUDs treatment?
- What are the preferences and/or attitudes of those with SUDs regarding sports, physical activity, or exercise?
- What are the outcomes of sport and physical exercise interventions on individuals under SUDs treatment?
- Which behavior change-inducing and motivational techniques were employed in respective studies that showed positive outcomes

# Chapter 2 | Method

## ► Inclusion and Exclusion Criteria

Studies were included if they met the following criteria: a. The participants should be aged between 15 and 60 years and in illicit drug addiction therapy, b. any type of physical activity, exercise, or sport, c. language should be English. d. Prevention programs employing sport or exercise were excluded.

## ► Information sources

The database search was performed in two main databases: EBSCO and SCOPUS. The databases were searched until May 2020. Included were only published studies from peer-reviewed journals. Journals from various disciplines were considered. Publications in the English language were considered for the review. Relevant references were also searched for possible handpicked suitable studies.

Overall, the authors of 8 articles were contacted to receive various clarifications or to provide us with the full papers, required for the review. Five authors replied to the initial request. The rest of the authors did not reply to emails and reminders.

## ► Search Strategy

The database search was performed using selected keywords. Four groups of keywords were used, incorporating such categories as “illicit drug”, “physical activity (exercise, sports)”, “intervention”, “review” and “addiction therapy”.

## ► Study selection

The studies were selected based on the above-mentioned exclusion criteria. The search results were reviewed by two independent reviewers. Both reviewers were trained well acquainted with the criteria. In case of disagreement, a third reviewer was consulted until an agreement was reached. During the first stage, studies were excluded based on title and abstract whereas the rest of the studies were reviewed in full text.

## ► Data extraction process

After piloting a data extraction sheet (with 3 random studies) and refining it, the most important qualitative and quantitative data from the studies were extracted. Descriptions of the interventions were coded according to behavior change techniques (BCT) taxonomy as developed by Michie et al., (2013).

In order to be able to retrieve all the necessary information about the intervention contents or any other information, we had to consult articles related to the chosen studies, such as, for example, protocols or qualitative analyses. Five additional articles were consulted for this purpose (Dolezal, 2013; Nygard, 2018; Zhu, 2016, 2018; Wang, 2017).

### ► Data items

Information was extracted from each study depending on the type of study. From cross-sectional studies we extracted the following information:

- a. Aim
- b. No of participants
- c. Type of Illicit drug
- d. Type of Exercise/Sport/Physical Activity
- e. Relevant Measures/assessments
- f. Results/Outcomes

*Appendix 1 presents all data extracted for cross-sectional studies.*

From intervention studies we extracted the following information:

- a. Aim
- b. No of participants per group
- c. Type of Illicit drug
- d. Exercise (type/intensity/duration)
- e. Measures/assessments (relevant variables that have been assessed)
- f. BCT coding based on intervention description
- g. Results / Outcomes
- h. Type of delivery of exercise/sport/physical activity
- i. Who delivered the exercise
- j. Individual or Group exercise sessions
- k. Setting

Descriptions of the interventions were coded according to the Behavior Change Techniques taxonomy (Michie et al., 2013). BCT is a “systematic procedure included as an active component of an intervention designed to change behavior”. These techniques, being an active component in behavior change interventions, have distinct characteristics such as being observable, replicable, and irreducible. Michie and colleagues (2013) developed a BCT taxonomy that allows identifying and coding various BCTs according to strict categories in different interventions.

*Appendix 2 includes all data extracted for intervention studies.*

From review studies we extracted the following information:

- a. Type of review
- b. Aim
- c. Number of included studies
- d. Geographic areas
- e. Inclusion criteria
- f. Type of Illicit drug
- g. Types of exercise/sport/physical activity
- h. Results/Outcomes

*Appendix 3 includes all data extracted for review studies.*



# Chapter 3 | Results

The title and abstract of 393 papers (187/EBSCO and 206 Scopus) were initially reviewed after removing duplicates. After reviewing the title and the abstracts, 320 papers were excluded (reasons: acute exercise only effects, animal studies, prevention studies, etc). Finally, after reviewing 73 full papers, 20 papers fulfilled the inclusion criteria and data extraction started. These represented cross-sectional, intervention, and review papers.

## ► Descriptives of Cross-sectional studies

The cross-sectional studies gathered information from 959 participants in total. As of all studies, data were collected from participants using mixed substances (illicit drugs, nicotine, and alcohol) whereas an investigation was carried out with respect to regular physical exercise involvement of any type and intensity, checking whether such practices were in accordance with the official guidelines. Four of the studies (Caviness 2013; Linke, 2015; Nani, 2017; Wang, 2019) assessed physical exercise behavior among other measures whilst one assessed only their motives to participate in exercise (Abrantes, 2011).

## ► Descriptives of Intervention studies

Two intervention studies (Brown, 2010; Muller, 2015) had a pre-post design whereas the rest (Cutter, 2014; Dolezal, 2013; Gimnez, 2015; McDaniel, 2016; Rawson, 2015; Wang, 2017; Zhu, 2016, 2018) featured a control or comparator group, with six (Cutter, 2014; Dolezal, 2013; Rawson, 2015; Wang, 2017; Zhu, 2016, 2018) of them being of a randomized control concept and two a non-randomized one. The number of participants per study varied between 16 and 200 participants with half of the studies (Brown, 2010; Cutter, 2014; Dolezal, 2013; Gimnez, 2015; Muller, 2015; Rawson, 2015; Wang, 2017) having less than 50 participants. Four (Brown, 2010; Gimnez, 2015; McDaniel, 2016; Muller, 2015) had a sample of mixed dependence (illicit drugs, alcohol, nicotine) participants and six (Cutter, 2014; Dolezal, 2013; Rawson, 2015; Wang, 2017; Zhu, 2016, 2018) featured participants with only illicit drug dependence (amphetamines, methamphetamine, methadone).

Exercise intensity varied between light to vigorous, with the majority of the studies using moderate-intensity exercises. All exercise interventions were supervised, mostly by an exercise professional and all were delivered in groups, except two (Cutter, 2014; Dolezal, 2013) which delivered individually and one (Muller, 2015) mixed. All exercise training sessions were delivered face to face, except one (Cutter, 2014) who used a computer game platform.

Eight studies (Brown, 2010; Cutter, 2014; Dolezal, 2013; Gimnez, 2015; Muller, 2015; Rawson, 2015; Zhu, 2016, 2018) used measurements for physical exercise (e.g., fitness tests, attendance), whereas one assessed exercise self-efficacy (McDaniel, 2016), and one craving measures, and Electroencephalographic (EEG) activity (Wang, 2017).

Six studies (Brown, 2010; Cutter, 2014; Gimnez, 2015; Rawson, 2015; Zhu, 2016, 2018) reported a decrease in substance use (or relapses or cravings) and simultaneously an increase in exercise-related variables (fitness or attendance). One study (Dolezal, 2013) reported an improvement in fitness measures only, one study (Wang, 2017) reported a decrease in substance use only whereas one study (McDaniel, 2016) reported no differences at all between the 2 groups (exercisers vs. non-exercisers). Finally, one study (Muller, 2015) reported improvements in physical and psychological health.

### ► Behavior Change techniques

All but one (McDaniel, 2016) study, provided a description of how the intervention content was delivered by the exercise specialists. We coded the interventions' contents description based on the Behavior Change Techniques taxonomy (Michie et al., 2013) and the Self-determination motivational behavior change techniques (Teixeira et al., 2020); the results (list of techniques and frequency of appearance) are set forth on Table 1. The detailed BCTs per study are displayed in Table 1.

**Table 1.** List of BCTs and motivational BCTs - frequency of appearance

	BCTs	Definitions	Frequency
1	Graded tasks	Set easy-to-perform tasks, making them increasingly difficult, but achievable, until behavior is performed	7
2	Self- monitoring of outcome(s) of behavior	Establish a method for the person to monitor and record the outcome(s) of their behavior as part of a behavior change strategy	7
3	Credible source	Present verbal or visual communication from a credible source in favour of or against the behavior	3
4	Instruction on how to perform the behavior	Advise or agree on how to perform the behavior (includes 'Skills training')	3
5	Biofeedback	Provide feedback about the body (e.g. physiological or biochemical state) using an external monitoring device as part of a behavior change strategy	3
6	Provide choice	Provide opportunities to make choices from a collaboratively-devised menu of behavioral options and autonomous goals. It includes the decision not to change, delay change, select focus/intensity of change, personally endorsed intrinsic goals and standards for success, including the timing or pace for certain outcomes.	2
7	Social support (unspecified)	Advise on, arrange or provide social support (e.g. from friends, relatives, colleagues, 'buddies' or staff) or noncontingent praise Or reward for performance of the behavior. It includes encouragement and counselling, but only when it is directed at the behavior	2
8	Material incentive (behavior)	Inform that money, vouchers or other valued objects will be delivered if and only if there has been effort and/or progress in performing the behavior (includes 'Positive reinforcement')	2
9	Material reward (behavior)	Arrange for the delivery of money, vouchers or other valued objects if and only if there has been effort and/or progress in performing the behavior (includes 'Positive reinforcement')	2



10	Behavioral practice/ rehearsal	Prompt practice or rehearsal of the performance of the behavior one or more times in a context or at a time when the performance may not be necessary, in order to increase habit and skill	2
11	Goal setting (outcome)	Set or agree on a goal defined in terms of a positive <b>outcome</b> of wanted behavior	1
12	Reward (outcome)	Arrange for the delivery of a reward if and only if there has been effort and/or progress in achieving the behavioral outcome (includes 'Positive reinforcement')	1
13	Feedback on behavior	Monitor and provide informative or evaluative feedback on performance of the behavior (e.g. form, frequency, duration, intensity)	1
14	Prompts/cues	Introduce or define environmental or social stimulus with the purpose of prompting or cueing the behavior. The prompt or cue would normally occur at the time or place of performance	1
15	Information about health consequences	Provide information (e.g. written, verbal, visual) about health consequences of performing the behavior	1

### ► Descriptives of Literature reviews

There were carried out three systematic reviews (College, 2018; Simonton, 2018; Wang, 2014), one with a meta-analysis (Wang, 2014), and two (More, 2017; Zschucke, 2012) literature reviews the selection criteria. Through all reviews, 85 studies have been summarized, all of them targeting illicit drugs either integrally or in combination with other substances. The three systematic reviews summarized the existing literature regarding the impact of anaerobic exercise (College, 2018), the effects of long-term physical exercise (Wang, 2014) on SUDs therapy, and exercise preferences and attitudes of people with SUDs in therapy programs (Simonton, 2018). All types of physical exercise and intensity levels were used in the reviewed interventions.

### ► Synthesized Outcome Findings

#### *Preferences and attitudes towards the physical exercise of people with SUDs*

Overall, the results of the reviewed cross-sectional studies indicate that, in a variety of SUDs instances, individuals are not as physically active as the typical population; still, they express an interest in physical exercise and sport involvement especially if programs are tailored to their needs.

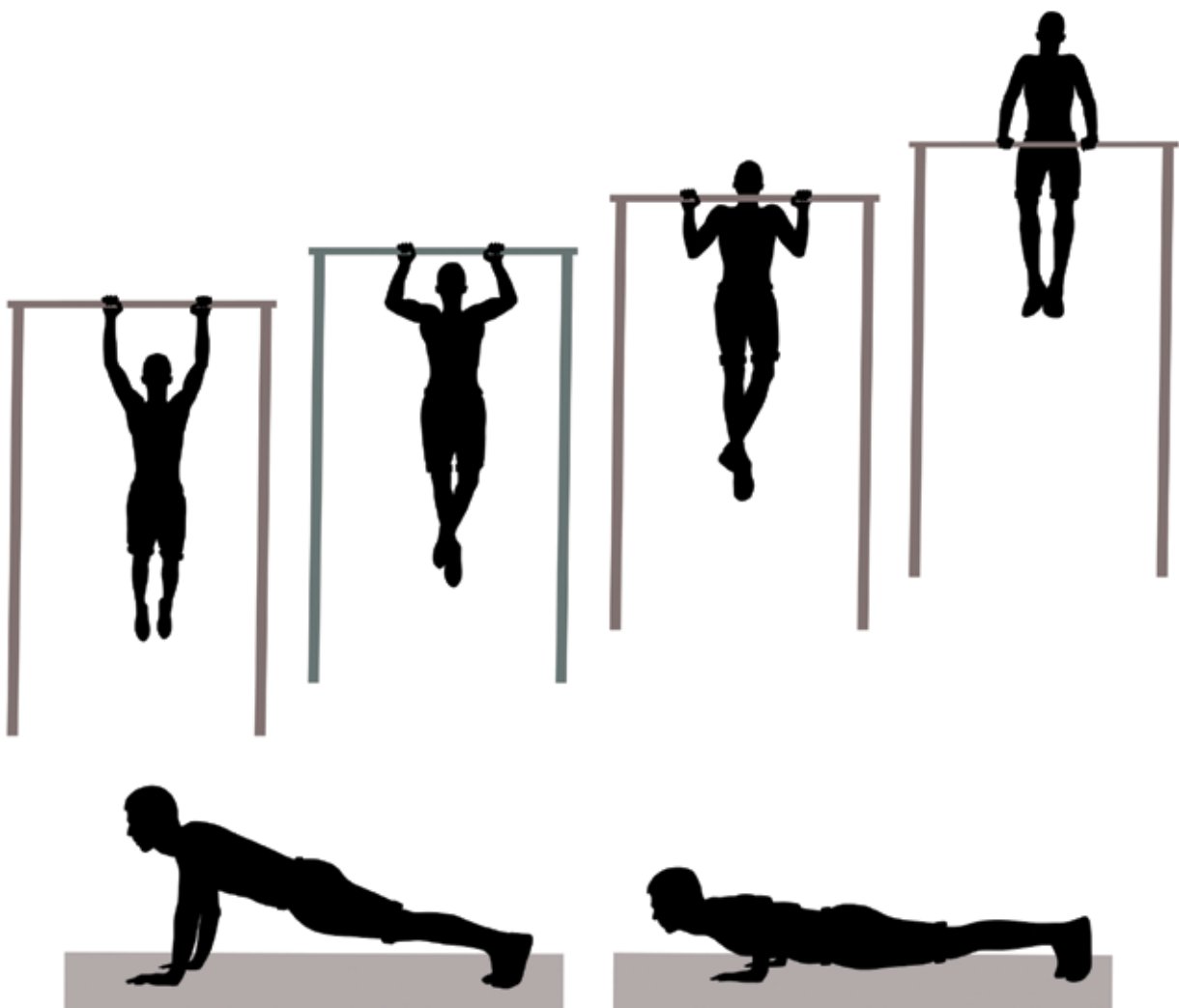
Identifying barriers and facilitators is also a topic of interest in the reviewed studies. Addicts face issues of poor physical condition; they might be inexperienced in sports and exercise and often feel intimidated in physical exercise environments. An additional finding is that there are significant differences in their preferences due to individual factors (e.g., gender or stage of therapy) regarding exercise-related characteristics, like type, frequency, and intensity.

Finally, one review (Simonton, 2018) summarized the preferences and attitudes of SUDs people under therapy in five respective studies. They reported the most frequently preferred types of exercise to be walking, strength training, and cycling, activities in which they would like to engage either alone or with small groups, and would prefer their exercise options to be available on the premises of their treatment clinics.

### ► Outcomes of physical exercise interventions and reviews

Overall, according to the reviewed studies, people with illicit SUDs under therapy who managed to increase exercise-related variables (fitness or attendance) reported that exercise contributed to a reduced desire to use substances, a reduction in cravings, and increased abstinence. Physical exercise interventions also had positive psychological outcomes for participants. The reduction of stress, tension, anxiety, and depression symptoms (Gimnez, 2015; Zhu, 2018), for example, is a common outcome for all exercisers. Individuals in therapy for illicit drug addiction face intense and prolonged stress, in comparison with other addictions. Therefore, they experience more positive effects than people with addictions to nicotine or alcohol (Wang, 2014). Additional positive psychological outcomes reported were optimism in life, life satisfaction, (Cutter, 2014), quality of life, such as physical function, mental health, vitality, social function, and general health perception (Gimnez, 2015), forgetting about everyday problems and improved mood as well as improved self-concept and locus of control (Zschucke, 2012).

Physical exercise and/or sport involvement had also positive outcomes on employment, and dwelling (Gimnez, 2015), as well as physical benefits, like decreased injuries and muscle pain, decreased weight, and increased vitality with improvement in activities of daily living and sleep quality (Zhu, 2018).





# Chapter 4 | Discussion

To overview the available literature regarding sports and physical exercise in relation to illicit drug addiction treatment, we summarized results of interventions, cross-sectional, and literature review studies to inform the aim of the *Reintegration Through Sport Plus (RTS+)* project ([www.rtsport.eu](http://www.rtsport.eu)).

## ► Available research regarding physical exercise for individuals under SUDs treatment

Overall, the published research in the area of physical exercise for people under treatment for SUDs with the misuse of illegal drugs is small in quantity and low to moderate in quality. Nevertheless, in the latest years, there is a trend showing interest in this area of research, and some studies in the last decade comply with higher standards in research design and methodology. This is also reflected in the number of recently published reviews, which summarize the growing number of research publications. Nevertheless, because of the still small number of existing studies and with the heterogeneity thereof, reviews may not feed in meta-analyses. Finally, very few intervention studies used criteria for a BCT, some were of a quasi-experimental design, whereas other studies suffered several methodological limitations.

There are reasonable justifications to explain such a lack of research in this area. There are several difficulties: for example, in any longitudinal study design, like behavioral interventions, having recruiting volunteers to participate is a challenge, since most illicit drug users may just as well not cross paths with the healthcare system for their addiction. Therefore, recruitment for trials is done via advertisements placed at treatment centers where patients of illicit drugs receive therapy. Another issue amongst people with illicit substance use disorders is that they are stigmatized, and consequently afraid of further social or legal consequences of their addiction, which discourages potential volunteers from signing up to participate in research. Moreover, people with addiction often do not wish to engage in treatment or believe they need no treatment at all. Finally, as many people with addictions are unemployed, poor, or homeless (possibly because of their addiction), they may lack the resources needed for attending exercise programs. As a result, the attrition rate (discontinuation of participation) in studies is more than 50%, which ultimately undermines the representability of the results.

## ► Outcomes of physical exercise

Physical exercise in combination with other types of therapy may effectively attenuate withdrawal and abstinence symptoms for illicit drug addictions. Further, the multitude of benefits of exercise on individuals under SUDs treatment helps them stay motivated towards recovery. As the changes in their body and psychosocial condition set in, progress helps them to form a new healthier identity whilst the increased confidence may transfer to their effort to stay off their addiction (Cutter, 2014).

Most of the studies that identified psychological positive benefits reported positive changes in mood regulation (stress, depression) and aspects relevant to the quality of life. One of the mechanisms likely to underlay the

stress-relieving effects of exercise could be the stimulation, through exercise, of the production of the brain's feel-good neurotransmitters, called endorphins (Goldfarb, 1997).

A number of quality-of-life relevant aspects have also been identified in the reviewed studies to have been positively affected as a result of engaging in physical exercise (e.g., increased vitality and function). Similar effects on life quality have been found with respect to Yoga programs for women undergoing detoxification for heroin dependence (Zhuang, 2013). The latest review from Giménez-Meseguer (2020) also postulates that physical exercise - both body-mind and physical fitness programs - can be effective in improving the quality of life in SUDs patients.

### ► **Designing physical exercise interventions for SUDs treatment connected to the misuse of illegal drugs**

According to cross-sectional studies' results, tailoring physical exercise interventions to the unique needs and preferences of the SUDs people under treatment is a crucial element (Abrantes, 2011; Linke, 2015). Tailoring interventions to the needs of the target group is a key strategy for a successful exercise intervention (Michie et al., 2014). Exploration of the SUDs population's preferences and attitudes regarding exercise may lead to more efficacious exercise interventions with improved adherence and attrition rates and therefore lead to improved recovery outcomes. Moreover, identification of barriers and facilitators of the specific group helps exercise program designers to better tailor physical exercise programs and enhance motivation and adherence. The provision of PE opportunities needs to be flexible and regular enough to allow the continued engagement of participants (Horrell et al., 2020). There is also some evidence that the person-centered approach might be effective, because of participants' varying fitness levels and underlying medical conditions (Horrell et al., 2020). Finally, the type of drug, as well as the type of therapy (e.g., with or without replacement) may play a significant role in the physical exercise program design.

### ► **Behavior change and motivational techniques used at the intervention groups of effective studies**

The most frequent behavior change techniques used in the reviewed intervention studies were the "graded tasks" and "self-monitoring" by the participants, of their physical exercise behavior. This indicates that for drug addicts to progress slowly with exercise duration and intensity is a very important technique. In so doing, they are bound to build their confidence up step-by-step, especially if they are inexperienced and express concerns regarding their ability to exercise. Similarly, by "self-monitoring their physical exercise behavior", they may actually become conscious of their progress, which in turn boosts their self-esteem towards continuing the effort. The BCT's of "credible source" and "instruction on how to perform the exercise behavior" heralds the need to have as an instructor a specialist who is not only knowledgeable of the specific physical exercise or sport but also a person they value and trust. Finally, "providing choices" and "social support" to participants implies that they need to feel autonomous and supported by their group members while participating in physical activities (Horrell et al., 2020). Access to physical exercise programs and affordability may also play an important role in SUDs patients in therapy, especially when they face stigma or poverty. For that reason, using techniques as "material rewards" and "incentives" may also help them to be able to attend physical exercise programs.

### ► **Physical exercise characteristics**

Most of the reviewed studies provided information regarding the type, intensity, frequency, duration, structure, and delivery modes. Regarding the type of exercise, studies delved into a wide array thereof, ranging from aerobic exercise to body and mind types of exercise, with various outcomes. Preferences of participants play a significant role in deciding what types of physical exercise we should include in programs for drug-addicts. Therefore, an assessment of needs with respect to preferences, as well as to barriers and facilitators is a

sine-qua-non process for physical exercise program designers. Moreover, an exercise program should be preceded by a medical check due to the varying health conditions of participants.

Physical exercise intensity varied along a continuum from light to moderate to vigorous. According to some researchers, vigorous exercise is not recommended for substance use populations, therefore, moderate-intensity exercise is preferred for reasons such as the risk of injury or other adverse effects (Simonton, 2018). Moreover, moderate-intensity exercise has greater adherence rates in comparison to vigorous-intensity exercise (Heinrich et al., 2014). According to (Nani et al., 2017) exercise intensity did not predict happiness with life for attendants of rehabilitation centers in Greece, but frequency did. However, intensity should also be matched to participants' perceptions of what is achievable.

The majority of the studies considered used group-based delivery of exercise sessions. It seems that addicts under therapy prefer to engage in physical activities in small groups or a "buddy" system suggesting that they need social interaction and support when they exercise. Nevertheless, individual preferences should be taken into account, because exercising alone might also be a preference or a necessity for some.

Regarding the type of delivery, the majority of studies were based on delivery through the physical presence of an exercise trainer or counselor, except for one study based on virtual delivery. The importance and need for the presence of a trained physical exercise instructor has been discussed earlier. In addition to the previously mentioned reasons, a trained exercise specialist is in a position to make decisions regarding how much supervision the participants need, and based on that to provide feedback and encouragement in order to support retention and adherence to physical exercise programs. The support, encouragement, and guidance provided by staff are generally highly valued across a number of study findings (Linke et al., 2019). Finally, technology-supported exercise needs further intervention studies to give evidence about the adequacy on this population.

### ► Limitations

Studies currently reviewed in the field of SUDs treatment with the misuse of illegal drugs provide some useful initial information allowing us to develop physical exercise training programs that can be used by professionals of drug treatment organizations and sports organizations. Moreover, they provide some evidence as to positive treatment effects likely to be achieved using PE interventions as an add-in, under SUDs treatment schemes. Regarding the identified most effective behavior change techniques, results should be treated with caution, as in several cases the description of the intervention has not been sufficiently detailed. Therefore, there is a possibility that exercise programs used more techniques than they described. This is a common problem when intervention studies do not use the BCT taxonomy to report their intervention contents. Moreover, as a result of the application of our inclusion criteria, certain studies may have been left out that could have provided us with additional information. Systematic reviews and meta-analyses have already started to become available in the literature, although featuring questions of a more limited scope than the ones we needed and which we ultimately decided to use. Therefore, readers need to further explore literature if they need more specific answers to questions regarding the effects of exercise as an adjunct to therapies for SUDs. Nevertheless, during our study, it became obvious that evidence concerning physical exercise for illicit drug users under therapy is rather scarce.

### ► Conclusion

Following a review of the literature regarding sports and physical exercise programs as an adjunct to therapy of illicit drug addiction treatment, we presented initial useful information about designing physical activity programs for the needs of the *Reintegration Through Sport Plus /RTS+ project*. However, several gaps in our knowledge remain and we need more specific and valid information regarding exercise as an adjunct intervention for SUDs. What is definitely and most specifically required are future studies investigating and testing the potential of mechanisms of interaction between exercise and positive outcomes for SUDs population.

## References

1. Abrantes, A.M., Battle, C.L., Strong, D.R., Ing, E., Dubreuil, M.E., Gordon, A. & Brown, R.A. (2011). Exercise preferences of patients in substance abuse treatment. *Ment Health Phys Act. 2011* 4(2):79-87.
2. American Psychiatric Association (2018). Diagnostic and statistical manual of mental disorders (5th ed.). ISBN 978-0-89042-554-1. OCLC 830807378
3. Brown, R. A., Abrantes, A. M., Read, J. P., Marcus, B. H., Jakicic, J., Strong, D. R., Oakley, J. R., Ramsey, S. E., Kahler, C. W., Stuart, G. G., Dubreuil, M. E., & Gordon, A. A. (2010). A Pilot Study of Aerobic Exercise as an Adjunctive Treatment for Drug Dependence. *Mental health and physical activity*, 3(1), 27–34.
4. Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public health reports (Washington, D.C.: 1974)*, 100(2), 126–131.
5. Caviness, C.M., Bird, J.L., Anderson, B.J., Abrantes, A.M. & Stein, M.D. (2013). Minimum recommended physical activity, and perceived barriers and benefits of exercise in methadone maintained persons. *J Subst Abuse Treat.* 44(4):457-62.
6. Colledge, F., Gerber, M., Pühse, U., & Ludyga, S. (2018). Anaerobic Exercise Training in the Therapy of Substance Use Disorders: A Systematic Review. *Front Psychiatry*; 9:644.
7. Craig, J. Robert, (1979). Personality Characteristics of Heroin Addicts: A Review of the Empirical Literature with Critique-Part II, *International Journal of the Addictions*, 14:5, 607-626, DOI: 10.3109/10826087909041894
8. Cutter, C. J., Schottenfeld, R. S., Moore, B. A., Ball, S. A., Beitel, M., Savant, J. D., Stults-Kolehmainen, M. A., Doucette, C., & Barry, D. T. (2014). A pilot trial of a videogame-based exercise program for methadone maintained patients. *Journal of substance abuse treatment*, 47(4), 299–305.
9. De Mojá, C., A., & Spielberger, C., D. (1997). Anger and Drug Addiction. *Psychological Reports.*;81(1):152-154. doi:10.2466/pr0.1997.81.1.152
10. Dolezal, B. A., Chudzynski, J., Storer, T. W., Abrazado, M., Penate, J., Mooney, L., Dickerson, D., Rawson, R. A., & Cooper, C. B. (2013). Eight weeks of exercise training improves fitness measures in methamphetamine-dependent individuals in residential treatment. *J Addict Med*; 7(2):122-8.
11. EMCDDA (2004). Drugs in focus No 14 “Co-morbidity – drug use and mental disorders”, [https://www.emcdda.europa.eu/system/files/publications/357/Dif14EN\\_84982.pdf](https://www.emcdda.europa.eu/system/files/publications/357/Dif14EN_84982.pdf)
12. EMCDDA / Robert West (2013). *Models of addiction*
13. EMCDDA, (2019). [www.emcdda.europa.eu/system/files/publications/11364/20191724\\_TDAT19001ENN\\_PDF.pdf](http://www.emcdda.europa.eu/system/files/publications/11364/20191724_TDAT19001ENN_PDF.pdf)
14. EMCDDA (2015). *Comorbidity of Substance Use and Mental Health Disorders in Europe, EMCDDA Insights Series, No. 19* (Luxembourg, Publications Office of the European Union).
15. Giménez-Meseguer, J., Tortosa-Martínez, J., & Cortell-Tormo, J. M. (2020). The Benefits of Physical Exercise on Mental Disorders and Quality of Life in Substance Use Disorders Patients. Systematic Review and Meta-Analysis. *Int J Environ Res Public Health*. May 23; 17(10):3680. doi: 10.3390/ijerph17103680. Erratum in: *Int J Environ Res Public Health*. 2020 Jul 17; 17(14).
16. Giménez-Meseguer, J., Tortosa-Martínez, J., & De los Remedios Fernández-Valenciano, M. (2015). Benefits of Exercise for the Quality of Life of Drug-Dependent Patients. *J Psychoactive Drugs*. Nov-Dec; 47(5):409-16.
17. Goldfarb, A. H., & Jamurtas, A. Z. (1997). *β-Endorphin Response to Exercise, an Update*.
18. Guha., M., (2014). Diagnostic and Statistical Manual of Mental Disorders: DSM-5 (5th edition). *Reference Reviews*. 28 (3). doi:10.1108/RR-10-2013-0256. ISSN 0950-4125.

References

19. Hasin, D., S., O'Brien, C., P., Auriacombe, M., Borges, G., Bucholz, K., Budney, A., et al., (2013). DSM-5 criteria for substance use disorders: recommendations and rationale. *The American Journal of Psychiatry*, 170 (8): 834–51.
20. Heinrich, K. M., Patel, P. M., O'Neal, J. L. et al. (2014). High-intensity compared to moderate-intensity training for exercise initiation, enjoyment, adherence, and intentions: an intervention study. *BMC Public Health* 14, 789 <https://doi.org/10.1186/1471-2458-14-789>
21. Horrell, J., Thompson, T. P., Taylor, A. H., Neale, J., Husk, K., Wanner, A., Creanor, S., Wei, Y., Kandiyali, R., Sinclair, J., Nasser, M., & Wallace, G. (2020). Qualitative systematic review of the acceptability, feasibility, barriers, facilitators and perceived utility of using physical activity in the reduction of and abstinence from alcohol and other drug use. *Mental Health and Physical Activity*, Volume 19.
22. Kotov, R., Gamez, W., Schmidt, F., & Watson, D. (2010). Linking “big” personality traits to anxiety, depressive, and substance use disorders: A meta-analysis. *Psychological Bulletin*, 136(5), 768–821
23. Linke, S. E., Noble, M., Hurst, S., Strong, D. R., Redwine, L., Norman, S. B., Lindamer, L. A. (2015). An Exercise-Based Program for Veterans with Substance Use Disorders: Formative Research. *J Psychoactive Drugs*; 47(3):248-57.
24. Linke, S. E., Hovsepian, R., Schnebly, B., Godfrey, K., Noble, M., Strong, D. R., et al. (2019). The Go-VAR (Veterans Active Recovery): An adjunctive, exercise-based intervention for veterans recovering from substance use disorders. *Journal of Psychoactive Drugs*, 51(1), 68–77.
25. McDaniel J. A. (2016). Assessing the Impact of Yoga as a Moderator on Substance Abuse Treatment Effectiveness. Walden Dissertations and Doctoral Studies Collection. <https://scholarworks.waldenu.edu/dissertations/2993/>
26. McIntosh, C. & Ritson, B., (2001). Treating depression complicated by substance misuse. *Advances in Psychiatric Treatment*, Vol. 7, pp. 357–364.
27. Michie S, Atkins L, West R. (2014). *The Behaviour Change Wheel: A Guide to Designing Interventions*. London: Silverback Publishing. [www.behaviourchangewheel.com](http://www.behaviourchangewheel.com).
28. Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., Eccles, M. P., Cane, J. & Wood, C. E. (2013). The Behavior Change Technique Taxonomy (v1) of 93 Hierarchically Clustered Techniques: Building an International Consensus for the Reporting of Behavior Change Interventions. *Annals of Behavioral Medicine*, 46(1), pp. 81-95.
29. More, A., Jackson, B., Dimmock, J. A., Thornton, A. L., Colthart, A., Furzer, B. J. (2017). Exercise in the Treatment of Youth Substance Use Disorders: Review and Recommendations. *Front Psychol*. 2017 Oct 17;8:1839.
30. Muller, A. E., & Clausen, T. (2015). Group exercise to improve quality of life among substance use disorder patients. *Scand J Public Health*. Mar;43(2):146-52.
31. Nani, S., Matsouka, O., Tsitskari, E., et al. (2017). The role of physical activity in life happiness of Greek drug abusers participating in a treatment program. *Sport Sci Health* 13, 25–32 <https://doi.org/10.1007/s11332-016-0345-2>.
32. NIDA, (2017). Recovery. Retrieved from <https://www.drugabuse.gov/related-topics/recovery>
33. NIDA, (2020). *Addiction and Health*. Retrieved from <https://www.drugabuse.gov/publications/drugs-brains-behavior-science-addiction/addiction-health>
34. NIDA, (2018). *Understanding Drug Use and Addiction*. *DrugFacts*. Retrieved from <https://www.drugabuse.gov/publications/drugfacts/understanding-drug-use-addiction>
35. NIDA. (2018). (Third Edition). Retrieved from <https://www.drugabuse.gov>.

36. Rawson, R. A., Chudzynski, J., Mooney, L., Gonzales, R., Ang, A., Dickerson, D., Penate, J., Salem, B. A., Dolezal, B., & Cooper, C. B. (2015). Impact of an exercise intervention on methamphetamine use outcomes post-residential treatment care. *Drug Alcohol Depend*;156:21-28.
37. Simonton, A. J., Young, C. C., & Brown, R. A. (2018). Physical Activity Preferences and Attitudes of Individuals With Substance Use Disorders: A Review of the Literature. *Issues Ment Health Nurs*;39(8):657-666. *Sports Medicine*, 24, 8-16.
38. Teixeira, P. J., Marques, M. M., Silva, M. N., Brunet, J., Duda, J., Haerens, L., La Guardia, J., Lindwall, M., Lonsdale, C., Markland, D., Michie, S., Moller, A. C., Ntoumanis, N., Patrick, H., Reeve, J., Ryan, R. M., Sebire, S., Standage, M., Vansteenkiste, M., . . . Hagger, M. S. (2020). Classification of techniques used in self-determination theory- based interventions in health contexts: An expert consensus study. *Motivation Science*. <https://doi.org/10.1037/mot0000172>
39. Wang, D., Wang, Y., Wang, Y., Li, R., & Zhou, C. (2014). Impact of physical exercise on substance use disorders: a meta-analysis. *PLoS One*. Oct 16;9(10):e110728.
40. Wang Dongshi, Zhu Ting, Zhou Chenglin, & Chang Yu-Kai. (2017). Aerobic exercise training ameliorates craving and inhibitory control in methamphetamine dependencies: A randomized controlled trial and event-related potential study. *Psychology of Sport and Exercise*, Volume 30, Pages 82-90.
41. Wang, K., Luo, J., Zhang, T., Ouyang, Y., Zhou, C., & Lu, Y. (2019). Effect of Physical Activity on Drug Craving of Women With Substance Use Disorder in Compulsory Isolation: Mediating Effect of Internal Inhibition. *Front Psychol*;10:1928.
42. WHO: *Dependence syndrome*. [www.who.int/substance\\_abuse/terminology/definition1/en/](http://www.who.int/substance_abuse/terminology/definition1/en/)
43. World Drug Report, (2020). United Nations publication, Sales No. E.20.XI.6.
44. World drug report, (2018). [www.unodc.org/wdr2018/](http://www.unodc.org/wdr2018/)
45. World Health Organization and United Nations Office on Drugs and Crime, (2020). *International standards for the treatment of drug use disorders: revised edition incorporating results of field-testing*. Geneva: License: CC BY-NC-SA 3.0 IGO.
46. World Health Organization, (2008). *The ICD-10 Classification of Mental and Behavioral Disorders: Clinical descriptions and diagnostic guidelines*
47. Zhu, D., Xu, D., Dai, G., Wang, F., Xu, X., & Zhou, D. (2016). Beneficial effects of Tai Chi for amphetamine-type stimulant dependence: a pilot study. *Am J Drug Alcohol Abuse* ;42(4):469-78.
48. Zhu, D., Dai, G., Xu, D., Xu, X., Geng, J., Zhu, W., Jiang, X., & Theeboom, M. (2018). Long-Term Effects of Tai Chi Intervention on Sleep and Mental Health of Female Individuals With Dependence on Amphetamine-Type Stimulants. *Frontiers in psychology*, 9, 1476.
49. Zhuang, S. M., An, S. H., Zhao, Y. (2013). Yoga effects on mood and quality of life in Chinese women undergoing heroin detoxification: a randomized controlled trial. *Nurs Res*; 62(4):260-8.
50. Zilberman, N., Yadid, G., Efrati, Y., Neumark, Y. & Rassovsky, Y., (2018). Personality profiles of substance and behavioral addictions. *Addict Behav*. 82:174-181. doi: 10.1016/j.addbeh.2018.03.007. Epub 2018 Mar 6. PMID: 29547799.
51. Zschucke, E., Heinz, A., & Ströhle, A. (2012). Exercise and physical activity in the therapy of substance use disorders. *Scientific World Journal*: 901741.





**Appendix 1.** Data extracted from cross-sectional studies

No of study	1st author/ year	Aim	N of participants	Type of Drug(s)	Type of Exercise(s)	Relevant Measures/Assessments	Results/Outcomes
1	Abrantes/ 2011	1. to investigate the extent to which substance dependent patients are interested in engaging in an exercise intervention as an adjunct to their substance abuse treatment. 2. to examine patients' preferences regarding the type, intensity, and timing of exercise interventions in relation to their ongoing substance abuse treatment. 3. to determine if there exist differences in exercise preferences across substance abuse treatment type (i.e., alcohol dependence only or drug dependence with or without alcohol dependence) and by gender.	N=97	47.4% alcohol dependence only, 52.6% primary drug dependence only or with concomitant alcohol problems	Participants were queried on whether they regularly engage in an exercise program of moderate intensity activity for at least 20 uninterrupted minutes.	Motives for Physical Activity Measure, Barriers to physical activity.	The vast majority (95%) expressed an interest in engaging in an exercise program specifically designed for persons in substance use recovery and 89% reported wanting to initiate an exercise program within the first 3 months of sobriety. Specific exercise preferences regarding type of physical activity, exercise intervention components, and perceived benefits and barriers to exercise differed between males and females. These findings suggest low rates of regular exercise, high level of interest in engaging in exercise during early recovery, and point toward the need to tailor interventions to the unique preferences of individuals.
2	Caviness/ 2013	To provide a comprehensive examination of exercise attitudes and physical activity in a sample of MMT smokers (benefits and barriers to exercise).	N=305	Methadone-maintained smokers	Physical activity guidelines - Any type	International Physical Activity Questionnaire, Perceived barriers to exercise, Benefits to exercise (Motives for Physical Activity Measure), Body-mass index (BMI).	Nearly 45% endorsed fair or poor physical health. Although participants perceived many benefits of exercise and few barriers, only 38% of participants met weekly recommendations for physical activity, and nearly 25% reported no physical activity. Those who met recommended guidelines were significantly more likely to endorse relapse prevention as a benefit of exercise. Motivating MMT patients to increase physical activity could have important physical, mental health, and drug treatment benefits.
3	Linke/ 2015	Formative research: To evaluate the following information among veterans in treatment for SUDs: (1) interest in an adjunctive exercise program to supplement their current SUD treatment; and (2) exercise program design considerations.	N= 19	Alcohol (50%), Cocaine (18%).	Physical activity guidelines - Any type	"Health Behavior Survey" (past and current exercise habits and exercise preferences), Small group interviews (exercise preferences of veterans in recovery, with the goal of designing an exercise program that would maximize adherence).	A survey and small group interviews were conducted to obtain both quantitative and qualitative data. Results suggested that veterans with SUDs are interested in exercise, and participants provided perceptive suggestions for modifying an existing evidence-based program. These findings used to design an exercise-based treatment program tailored specifically for veterans with SUDs.
4	Nani/2017	To explore the influence of physical activity on the degree of happiness among drug abusers	N=73	69% opioids, 21% cannabis, 5% cocaine	Any type	Godin Leisure-Time Exercise Questionnaire, Happiness with life (Oxford Happiness Questionnaire)	For the dimension of the happiness with life, the results showed that the respondents were only moderately happy. They also moderately exercise in terms of intensity and frequency. Regression analysis indicated that the exercise intensity did not predict the respondents' happiness with life. On the contrary, frequency of exercise predicted the respondents' happiness. Results suggest that attendants of rehabilitation centers in Greece should be motivated to participate more frequently in exercise and recreation programs to somehow improve their happiness with their life.
5	Wang 2019	To determine the critical role of internal inhibition in the path of physical exertion affecting the drug cravings of women drug users	N=465	Mixed drugs	Any type	Physical Activity Rating Scale (PARS-3), Internal Inhibition Scale, Drug Craving Scale.	Women with traditional drug users had the strongest internal inhibition and new drug use disorder had the highest drug craving. The longer the duration of drug abuse, the lower the internal inhibition and the higher the drug craving. Women with moderate-intensity activity had the strongest internal inhibition and the lowest drug craving. The physical activity intensity was negatively correlated with drug craving, positively correlated with intrinsic inhibition, and negatively correlated with drug craving. Internal inhibition played a partial mediating effect between physical activity intensity and drug craving.

## Appendix 2. Data extracted from intervention studies

No of study	1st author/ year	Design	Aim	N of participants	Type of Drug(s)	Type of Exercise(s)	Measures/Assessments	BCT coding	Results/Outcomes	Type of delivery exercise	Who delivered the Exercise/ Sport	Individual or Group sessions	Setting
1	Brown/ 2010	Pre-post	To examine the feasibility of aerobic exercise as an adjunct to substance abuse treatment among drug dependent patients.	N=16	(81.3%) Alcohol, (31.3%) cocaine, (31.3%) marijuana, (12.5%) opiates, (6.3%) reported sedative use	12-week, moderate-intensity aerobic exercise intervention	1. Physical activity screen. 2. Structured clinical interview for DSM-IV (SCID-P; First, Spitzer, Gibbon, & Williams, 1995). 3. The TLFBI interview (Sobell et al., 1980) was utilized to assess alcohol and drug use at baseline and during the follow-up intervals. 4. Cardiopulmonary fitness was assessed using a submaximal graded exercise protocol on a motorized treadmill at baseline and follow-up evaluations. 5. ACSM's Guidelines for Exercise Testing. 6. 20-Item Intervention feedback questionnaire.	8.1 Behavioral practice/rehearsal, 8.7 Graded tasks, 2.6 Biofeedback, 2.4 Self-monitoring of outcome(s) of behavior, 9.1 Credible source, 10.1 Material incentive (behavior), 10.2 Material Reward (behavior).	Participants demonstrated a significant increase in percent days abstinent for both alcohol and drugs at the end of treatment, and those who attended at least 75% of the exercise sessions had significantly better substance use outcomes than those who did not. In addition, participants showed a significant increase in their cardiorespiratory fitness by the end of treatment.	Face to face	Exercise specialist	Group	Rehabilitation
2	Cutter/ 2014	Randomized control trial	To investigate the feasibility and acceptability of an exercise intervention comprising the Wii Fit Plus™ and of a time-and-attention sedentary control comprising Wii™ videogames. We also explored their impact on physical activity levels, substance use, and psychological wellness.	N=29: Active Game play (N=15) or Sedentary Game Play (N=14)	Methadone-maintained patients	Active Game Play (Wii Fit Plus™ videogames involving physical exertion) or Sedentary Game Play (Wii™ videogames played while sitting)	1. Acceptability: Satisfaction with the intervention, perceptions of enjoyment, usefulness, accomplishment, and motivation to continue. 2. Physical Activity In-session activity: Kilocalories (kcal), standardized units of energy expenditure. Exercise intensity was expressed as "METs, kcals for intermittent time spent standing between exercises in Active Game Play as well as for sitting and gaming in Sedentary Game Play sessions. Height and Weight. Extra-session activity: Levels of overall moderate-to-vigorous physical activity (MVPA) outside of the Wii sessions were measured weekly with the International Physical Activity Questionnaire-Long Version (IPAQ-L) in five domains: work, transportation, house work, recreation, and time spent sitting. 3. Substance Use: The Weekly Substance Use Inventory; Time Line Follow Back, detailed day-by-day self-report of drug use. 4. Psychological Wellness Outcomes: Perceived stress Perceived Stress Scale (PSS), Optimism - Life Orientation Test-Revised (LOT-R), Psychiatric Symptomology Brief Symptom Inventory-18 (BSI-18), Life satisfaction, Brief Life Satisfaction Scale (BLSS).	MBCT 6. Provide choice.	Participants had high satisfaction and study completion rates. Active Game Play participants reported greater physical activity outside the intervention than Sedentary Game Play participants despite no such differences at baseline. Substance use decreased and stress and optimism improved in both conditions.	Mediated	Exercise specialist	Individual	Rehabilitation

No of study	1st author/ year	Design	Aim	N of participants	Type of Drug(s)	Type of Exercise(s)	Measures/Assessments	BCT coding	Results/Outcomes	Type of delivery exercise	Who delivered the Exercise/ Sport	Individual or Group sessions	Setting
3	Dolezal 2013	Randomized control trial	To assess the feasibility and efficacy of an 8-week endurance and resistance training program on fitness measures in individuals undergoing residential treatment for methamphetamine (MA) dependence.	N=29, Exercise training (ET, N=15) or Health Education without training (EA, N=14)	Methamphetamine-Dependence	Endurance and resistance exercise routines	VO2max, LP strength, and CP strength, body weight, body fat, fat weight, Physical activity 7 -day recall	10.10 Reward (outcome), 2.3 Self-monitoring of behaviour, 8.7. Graded tasks, 4.1. Instruction on how to perform the behavior, 2.2. Feedback on behaviour,	Individuals recovering from methamphetamine dependence showed substantial improvements in aerobic exercise performance, muscle strength and endurance, and body composition with exercise training. The ET group significantly improved V O2max, LP strength, and CP strength and showed significant reductions in body weight, % body fat and fat weight. All changes were significant (P<0.001) for ET, and no changes were seen for the EA group. These findings demonstrate the feasibility of an exercise training intervention in these participants and also show excellent responsiveness to the exercise stimulus resulting in physiological changes that might enhance recovery from drug dependency.	Face to face	Exercise specialist	Individual	Rehabilitation
4	Gimnez/ 2015	Non-Randomized control trial	To evaluate quality-of-life changes in drug-dependent patients after participation in a group-based exercise program.	N=37; Group exercise program (n = 18) - Routine care (n = 19)	DSM-IV criteria for drug dependence	3 days/week for 60-90 minutes per session/ over 12 weeks/ aerobic capacity and muscular endurance/ moderate to vigorous intensity	The Six-Minute Walk Test (6MWT) - submaximal test measuring aerobic fitness, TGUG - agility and dynamic balance, Chair Stand Test (CST) - lower limb strength, Short Form Health Survey (SF-36) - quality-of-life. Qualitative Assessment: Interviews took place in the rehabilitation center, lasted up to 45 minutes, and were conducted by the same researcher the week after the end of the exercise program.	9.1 Credible source, 3.1 Social support (unspecified), 8.7 Graded tasks, 2.4 Self-monitoring of outcome(s) of behavior	Quantitative results showed improvements in fitness and different aspects of quality of life, such as physical function, mental health, vitality, social function, and general health perception. Qualitative results showed specific physical benefits (decreased injuries and muscle pain, decreased weight, and increased vitality with improvement in activities of daily living), psychological benefits (forgetting about everyday problems, improved mood, decreased stress and anxiety), social benefits, and a reduction in craving. The results of this study provide insight into the importance of exercise for the quality of life and recovery process of drug-dependent patients.	Face to face	Exercise specialist	Group	Rehabilitation
5	Mc Daniel/ 2016	Non-Randomized control trial	To assess yoga as a moderator of substance abuse treatment effectiveness, as indicated by the Exercise Self-Efficacy survey and Treatment Effectiveness Assessment scores.	N=200; Yoga group (N=100) or Non Yoga group (N=100).	SUD disorder	Yoga / moderate intensity	Exercise Self-Efficacy (ESE) survey, Treatment Effectiveness Assessment, and adjunct yoga exercise was both an independent and moderating variable.	No description	The results demonstrated no significant difference with respect to treatment effectiveness for either the yoga or non yoga treatment groups. This study contributes to positive social change by showing that yoga exercise is not, contrary to earlier suggestions, effective at reducing substance addiction severity.	Face to face	Exercise specialist	Group	Rehabilitation

No of study	1st author/ year	Design	Aim	N of participants	Type of Drug(s)	Type of Exercise(s)	Measures/Assessments	BCT coding	Results/Outcomes	Type of delivery exercise	Who delivered the Exercise/ Sport	Individual or Group sessions	Setting
6	Muller/ 2015	Pre-post	To measure changes in Quality of Life after group exercise among residential substance use disorder patients and to explore the feasibility of the program within a treatment setting.	N=35 (24 completers)	Benzodiazepines (41%), alcohol (38%), cannabis (28%), heroin/opiates (25%), amphetamines (25%)	Not a specific type / 30 minutes / low intensity / 10-week group exercise program	Quality of Life Brief (WHOOQL-BREF), Hopkins Symptoms Checklist (HSCL-25) - emotional distress (anxiety and depression), European Addiction Severity Index, Somatic health burden - amount of somatic conditions, Program feasibility was explored through the attendance data, spontaneous participant feedback during the program, and participants' answers to open-ended questions at the end about program acceptability.	MBC1 6. Provide choice. 5.1. Information about health consequences; 7.1 Prompts/ cues; 3.1 Social support (unspecified); 10.1 Material incentive (behavior); 10.2 Material reward (behavior)	The program was feasible for participants and the completion rate was 69%. Completers' physical health domain and psychological health domain of QoL improved significantly. The program engaged the most physically and mentally vulnerable participants, and flexibility and motivational factors were important elements. This study provided promising evidence that low doses of group exercise can yield appreciable benefits, even to patients with more severe health problems.	Face to face	Exercise specialist	Both	Rehabilitation
7	Rawson/ 2015	Randomized control trial	The primary aim of this study was to characterize the effects of an 8-week exercise intervention on Methamphetamine use outcomes at 1-, 3-, and 6-months post-discharge from residential treatment, compared to a health education control group.	N=135; Exercise Group (N=69) or Health education control (N=66)	Methamphetamine dependence per DSM-IV	Aerobic / moderate / 3 times a week for 8 weeks. Exercise sessions consisted of a 5-min warmup, 30 min of aerobic activity on a treadmill, followed by 15 min of weight training and a 5-min cool-down/ stretching period.	Primary outcome measures included MA use as measured by both urine drug screens (UDS) and self-report using the Substance Use Inventory and maximal exercise performance test	8.1 Behavioral practice/ rehearsal, 8.7 Graded tasks, 2.6 Biofeedback, 2.4 Self-monitoring of outcome(s) of behavior; 9.1 Credible source, 1.3 Goal setting (outcome)	While fewer exercise participants returned to methamphetamine (MA) use compared to education participants at 1-, 3- and 6-months post-discharge, differences were not statistically significant. A significant interaction for self-reported MA use and MA urine drug test results by condition and MA severity was found: lower severity users in the exercise group reported using MA significantly fewer days at the three post-discharge timepoints than lower severity users in the education group. Lower severity users in the exercise group also had a lower percentage of positive urine results at the three timepoints than lower severity users in the education group. These relationships were not present in the comparison of the higher severity conditions. Participants who were MA abstinent at the 1-month post-discharge follow-up reported significantly more minutes of exercise (i.e., 118.97 minutes per week) via the IPAQ than those who were not MA abstinent (i.e., 90.8 minutes per week) using UDS results (p = .03; response rate for the 1-month interview was N = 102 [exercise n = 54 and health education n = 48]). Results support the value of exercise as a treatment component for individuals using MA 18 or fewer days/month.	Face to face	Exercise specialist	Group	Post-residential treatment care

No of study	1st author/year	Design	Aim	N of participants	Type of Drug(s)	Type of Exercise(s)	Measures/Assessments	BCT coding	Results/Outcomes	Type of delivery exercise	Who delivered the Exercise/Sport	Individual or Group sessions	Setting
8	Wang 2017	Randomized control trial	To determine the effects of aerobic exercise training on craving and inhibition control among people with MA dependencies.	N=50: Aerobic group (N=25) or Attention Control group (N=25)	Methamphetamine dependence	Three 30-min sessions per week of moderate intensity aerobic exercise (i.e., cycling, jogging, or jump rope) for 12 weeks.	Craving measures, Inhibitory control measures, neutral and MA-related inhibitory control, elicited neuroelectric activation (Electroencephalographic (EEG) activity).	8.7 Graded tasks, 2.6 Biofeedback, 2.4 Self-monitoring of outcome(s) of behavior.	The current study provides the first evidence that aerobic exercise training may be efficacious for MA-associated cravings and inhibitory control from behavioral and neuroelectric perspectives among MA-dependent individuals.	Face to face	Exercise specialist	Group	Drug Rehabilitation Bureau
9	Zhu 2018	Randomized control trial	To investigate if Tai-Chi practice can improve sleep quality and mood of females who are dependent on amphetamine-type stimulant (ATS).	N=80: Tai Chi group (N=42) or Standard Care (N=38).	Amphetamine-type stimulant (ATS)	Tai Chi (medium intensity, five times a week during the first 3 months and three times a week during the second 3 months).	Self-rated Pittsburg Sleep Quality Index (PSQI), Self-Rating Depression Scale (SDS), fitness after 3 and 6 months.	8.7 Graded tasks, 4.1. Instruction on how to perform the behavior.	Result suggested that TaiChi (TC) had positive effects on sleep quality, depression and fitness. Long-term study demonstrated that TC may be a cheap and potential supplementary treatment for ATS-dependent individuals. TC may also be considered as an alternative exercise to escalate abstinence for ATS-dependent females.	Face to face	Exercise specialist	Group	Rehabilitation center
10	Zhu 2016	Randomized control trial	To assess the quality of life and physical effects of a Tai Chi intervention on individuals with amphetamine-type stimulant dependence.	N=59: Tai Chi group (N=30) or Standard Care (N=29).	Amphetamine-type stimulant (ATS)	Tai Chi (medium intensity, five times a week for 12 weeks).	Quality of life scale for drug addiction (QoL-DAV20), Fitness test	8.7 Graded tasks, 4.1. Instruction on how to behavior.	Test scores of the QoL-DA in the Tai Chi group significantly increased after 12 weeks in the following areas: physiology, symptoms, society, and QoL total score. A post hoc test further revealed that quality of life improved in the Tai Chi group but not in the standard care group. Physical results showed a significant interaction with balance and participants in the Tai Chi group improved by 10 s while there was no change in the standard care group. Although there were no significant interactions in the fitness outcomes (i.e., hand-grip and sit-and-reach tests), the within-group factor displayed significant changes in body fat ( $F(1,56) = 27.79, p < 0.001$ ) in both groups.	Face to face	Exercise specialist	Group	Rehabilitation center

**Appendix 3.** Data extracted from review studies

No of study	1st author/ year	Review type	Aim	Number of included studies	Geographic areas	Inclusion criteria	Type of Drug(s)	Type of Exercise(s)	Results/Outcomes
1	Colledge/ 2018	Systematic Review	To document the implementation of anaerobic exercise in the treatment of SUDs.	26	University of Connecticut Health Center, Farmington, CT	Included in the review are all studies which, as a form of treatment for SUDs, involved acute or chronic exercise of the following type: (1) reported by authors as being at or above the specifically determined IAT; (2) at or above a heart rate which corresponds to 75% of maximum, (3) at or above 70% of heart rate reserve, (4) at a score of 14 or above on the Borg scale, (5) described by the authors as vigorous, intense, or anaerobic, or (6) involving activities which may incorporate bouts above the IAT, where the authors do not explicitly state that this was not the case, by reporting physiological data (for example, heart rate below 75% of maximum). These activities are defined as any type of sport, exercise or structured physical activity excluding yoga, Pilates, stretching, walking, medical rehabilitation, Qi Gong, or Tai Chi.	Cigarettes (12 studies), alcohol (1 study), and all illicit and prescription drugs (13 studies)	Anaerobic exercise training	The findings of this review suggest that anaerobic or vigorous exercise may have a positive effect on a number of outcomes in populations with a SUD. The most positive effects being found for abstinence in nicotine dependence. The effects of anaerobic exercise cannot be determined, and therefore not evaluated or compared with other forms of exercise. "Further studies are required to establish the optimum intensity of exercise intervention required.
2	More/ 2017	Literature Review	1. To identify factors associated with the development and persistence of substance use disorders among youth. 2. To identify current treatment modalities and present evidence to support the efficacy of incorporating exercise participation during rehabilitation. 3. To provide a series of recommendations for future research that explores the feasibility and effectiveness of exercise participation as a complement to substance use disorder treatment among youth.	Unspecified	Young person as 'at-risk' within Western societies	Not applicable	SUD disorders according to DSM	Exercise participation in general - Any type	1. 'At-Risk' Populations: Parents and family, School, Peers, Stress, Boredom, Mental health. 2. No consistent and universally accepted therapy approach exists, the primary goal of many SUD rehabilitation programs is abstinence, attained through the treatment of the physiological, psychological, and sociological problems presented by the individual. More holistic goals, including harm minimization, facilitating access to education, reducing substance use, improving interpersonal relationships, and improving physical and mental health, may also be targeted. 3. Very little research exists in the area of exercise on SUD, and as a result, the feasibility and/or outcomes of exercise participation within youth SUD populations are relatively unknown. <b>RECOMMENDATIONS FOR FUTURE RESEARCH:</b> 1. : Examine Exercise Perceptions and Attitudes among Youth with SUDs; 2. Examine Recovery-Related Outcomes Associated with Exercise Participation; 3. : Identify Community Transition Pathways and Long-Term Outcomes.



No of study	1st author/year	Review type	Aim	Number of included studies	Geographic areas	Inclusion criteria	Type of Drug(s)	Type of Exercise(s)	Results/Outcomes
3	Simonton/2018	Systematic Review	To explore previous research regarding PA/exercise preferences for those with SUDs. Research questions: 1. What research is currently available regarding PA/exercise preferences in those with a SUD? 2. What were the designs (location, SUD population, data collection methods, etc.) of these studies? 3. What were the preferences and/or attitudes of those with SUDs regarding PA/exercise?	5	United States	1. Written in English, 2. peer reviewed, 3. pertaining to a population with a SUD, 4. preferences or attitudes as a primary outcome.	SUD	Any type	The findings of this review, though limited, nonetheless suggest that <b>people with SUDs are interested in increasing their PA. Facilitators/Benefits:</b> PA would provide a sense of accomplishment and confidence, would improve physical health, and could increase one's confidence to stay sober. <b>Barriers:</b> lack of motivation, financial restrictions, disability or injury and lack of energy. Social environment: Preferred engaging in PA alone or with a small group or a buddy system, indicating that foster support and encouragement for PA should be a part of an intervention. <b>Types of preferred exercise:</b> interested in discussing exercise (women more than men), incorporating strength/resistance training, activity tracks (pedometer), Walking, Gym, bicycling, Sports, Yoga, Recreational activities, Competitive without friction, Exercise counseling during treatment. <b>Structure:</b> Face-to-face from an exercise counselor, Scheduled, Combined supervised / unsupervised or supervised, with a Mentor, Unsupervised, self-paced, or Do it yourself with professional guidance. <b>Intensity:</b> Moderate, Light, Multiple, ranging from easy to difficult. Emphasized it can't be too strenuous or intense
4	Wang/2014	Systematic Review with Meta-analysis	To examine whether long-term physical exercise could be a potential effective treatment for substance use disorders (SUDs).	22	Raju, Georgia Regents University, United States of America	1. The selected papers were studying physical exercise intervention's effect on drug abuse, excluding preventive studies. 2. All research use RCT. 3. Objects of the study were adults over 18 years old who were assessed as alcohol, nicotine, and illicit drug abusers through the DSM-III(R)/IV.	Alcohol (3 studies), nicotine (11 studies), illicit drug abusers (5 papers), and polydrug abusers of alcohol, nicotine, and illicit drugs (4 studies) / DSM-III(R)/IV	Any type	The results indicated that <b>physical exercise can effectively increase the abstinence rate, ease withdrawal symptoms, and reduce anxiety and depression.</b> The physical exercise can more ease the depression symptoms on alcohol and illicit drug abusers than nicotine abusers, and more improve the abstinence rate on illicit drug abusers than the others. Similar treatment effects were found in three categories: exercise intensity, types of exercise, and follow-up periods. Although physical exercise has been proven effective in facilitating drug abstinence, its effects on alcohol, nicotine and illicit drug abusers are different. From the results of the meta-analysis, the effects of physical exercise on illicit drugs abusers are significantly greater compared to others. Given the limitation of materials, these issues require further investigation.
5	Zschucke/2012	Literature Review	This paper aims at summarizing empirical evidence for therapeutic effects of PA and EX in SUD and arriving at conclusions concerning further research and clinical practice.	Alcohol (9 RCTs), nicotine (17 RCTs), and illicit drug (8 studies)	Not specific	For nicotine abuse and dependence, only randomized-controlled trials (RCTs) were included into this paper. Since the literature was very limited concerning RCTs on alcohol abuse/dependence and illicit drug abuse/dependence, studies with inadequate control strategies and small samples were also included into this paper. Studies in English or German published between 1970 and 2011 which had investigated any form of EX as therapeutic intervention strategy. Search terms included "exercise", "physical activity", "substance use disorder", "dependence", "abuse", "illicit drugs", "alcohol", "nicotine", "cannabis", "opiate", "stimulant", and "cocaine", in the respective languages.	Illicit drugs	Any type	<b>Illicit drugs:</b> Positive outcomes for craving, percentage of abstinent subjects, continuous days of abstinence. Secondary psychological and social outcomes like depression, anxiety, tension, self-concept, locus of control, employment, and dwelling were increased at least in one of the exercise conditions. Fitness increased in 3 studies. / <b>Alcohol:</b> Significant improvements on drinking episodes, craving, or days of abstinence as substance-related outcomes. Secondary psychological outcomes like depression, anxiety, stress, self-concept, locus of control, and sleep quality, which increased at least in one of the EX conditions. / <b>Nicotine:</b> Evidence is mixed, but some preliminary conclusions can be drawn concerning favorable effects of EX intervention in smoking cessation. Acute effects of exercise are favorable for a number of variables: EX adherence rather than the admission to an EX intervention per se predicted smoking abstinence, suggesting an important role of motivation, individual resources, and self-efficacy. Exercise interventions showed the clearest effects when compared to standard treatment, which becomes more unequivocal, when EX is compared to control groups which offer a similar amount of social support, therapeutic contact, and preoccupation with health-related topics. The majority of studies have shown that EX interventions are as effective as other standard interventions for smoking cessation, such as CBT or NRT/medication.



## WE WORK TOGETHER

### Project Coordinator

KE@EA

Greece/www.kethea.gr

### Partners



UNIVERSITY OF THESSALY  
Greece/www.pe.uth.gr



EQUAL SOCIETY/Greece  
www.equalociety.gr



A-LARM/Norway  
www.a-larm.no



ASOCIACIÓN EXPERIENTIA  
Spain/  
www.asociacionexperiencia.org



COOLMINE THERAPEUTIC  
COMMUNITY/Ireland  
www.coolmine.ie



STOWARZYSZENIE  
MONAR/Poland  
www.monar.org



Centro di Solidarietà di  
Reggio Emilia Onlus  
CENTRO DI SOLIDARIETÀ DI  
REGGIO EMILIA ONLUS/Italy  
www.solidarieta.re.it



ASOCIACION SPORT  
TO LIVE/Spain  
www.sport2live.org



CZEKOBANDA  
Czech Republic/  
www.czekobanda.eu

We invite you to join and learn more about the RTS+ project activities and to establish strong links between all those involved in the Addiction Prevention, Care, and Recovery through sport.

Register free to our Learning Community and stay informed about project activities at:

**Website:** [www.rtsport.eu](http://www.rtsport.eu)

**Facebook:** [www.facebook.com/ketheasport/](https://www.facebook.com/ketheasport/)

**Email:** [rtsport@gmail.com](mailto:rtsport@gmail.com)

Co-funded by the Erasmus+Sport program of the European Commission, the Reintegration Through Sport PLUS project is of a duration of three years (2020 – 2022).

The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



Co-funded by the  
Erasmus+ Programme  
of the European Union