

Drug Court Interventions and the Role of Physical Fitness Programming in Client Treatment Outcomes

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Abstract

Current scientific and clinical research has shown that drug use creates temporary and long-term physiological changes within the brain. Furthermore, by stimulating beta-endorphins, dopamine, and serotonin neurotransmitters, exercise may induce the release of natural anti-addiction medications and alter the physiological effects of long-term drug use. This study examines the psychological and physiological effects of addiction and exercise to determine whether an ancillary exercise program fits into the treatment drug court curriculum. The use of exercise is based on the idea that abstinence from drugs and alcohol begins with improved physical health. Results are presented from a cross-sectional survey of 48 drug court participants on health and exercise. The study details the design and implementation of an exercise program for drug court participants.

The advent of drug courts in the early 1980s marked the beginning of a new treatment oriented approach. By combining the coercive power of the criminal justice system and the knowledge of the treatment community, drug courts became an effective response to an increasing number of drug-involved offenders who flooded the criminal court process. To date, treatment drug courts offer programs that teach participants how to practice abstinence, that is, to live a life free of alcohol and drugs. However, despite the rapid growth in application of the drug court model, research examining which features of the treatment court model most effectively reduce relapse and recidivism is lacking. Although drug courts share a basic design and have underlying principles based on a more informal, judge-oriented treatment-oriented methodology (Belenko, 1998), the proliferation of the drug court model into the criminal justice system is not explained by the "wholesale adoption of a fixed, 'cookie cutter' approach" (Goldkamp, White, & Robinson, 2001, p. 28).

The purpose of this study was to determine whether regular exercise would benefit drug court participants by examining the feasibility of implementing a voluntary exercise program as an ancillary treatment component. It was hypothesized that drug court participants who exercise may experience a more positive affect, reduced degree of anxiety, and an improved level of self-esteem resulting in an improved rate of success in and outside of the boundaries of drug court supervision. This paper discusses the implementation and outcomes of an exercise program specially designed as an enhancement to the Orange County (CA) drug court program; a four-phase, highly structured, out patient treatment program.

The Drug Court Model

Research suggests that treatment-based drug courts are a successful alternative to incarceration for substance-using offenders. Typical terms and conditions for a participant are: to regularly attend recovery fellowship meetings; select a 12-step sponsor already working the recovery program; begin working on the recovery program with the sponsor's guidance; check-in with the drug court coordinator or case manager; submit to random urine tests, and/or the wearing of a sweat-patch; attend counseling sessions; and not miss a report hearing or drug testing. While in drug court, individual progress is closely monitored by the collaborative drug court team of judge, prosecutor, defense attorney, probation officer, and treatment provider. Various sanctions and incentives are used to promote accountability.

A successful treatment strategy coordinates treatment settings, interventions, and services as part of an effort to improve the drug-involved offender's capacity to become productive and functioning within the family, workplace, and society. Unfortunately, there has been little research on what specific program components are effective and what components of drug court produce the desired long-term results for some and not for others (Torres & Deschenes, 1997; Belenko, 1998; GAO, 1997).

Changing Treatment Approaches

Since the inception of the first drug court, an improved scientific understanding of addiction has led to the identification of differences within the chemical composition of an addict and non-addict's brain (Leshner, 1998). Such scientific developments have contributed to an expanded treatment court curriculum that includes both behavioral and cognitive approaches focusing on long-term abstinence. Notwithstanding systematic progress, substance abuse and drug court professionals alike, still recognize addiction as a highly complex problem that varies from person to person. Therefore, treatment court professionals work to

target a range of serious addictions by including treatment therapies that are both scientifically based and clinically tested.

These advances have changed the approach to treatment. According to the National Institute on Drug Addiction (NIDA), “. . . effective treatment must address the individual's drug use and any associated medical, psychological, social, vocational, and legal problems” (1999, p. 3). Thus, the goal of addiction treatment is to improve the patient's quality of life. This philosophy of managing health and wellness is reflected in the changing ideology within the criminal justice system, one that supports recovery through treatment and/or rehabilitation.

NIDA (1999) reports that “effective” rehabilitative efforts rely on treatment that is readily available and can address the individual's drug use including other associated medical, psychological, social, vocational, and legal problems. It is no coincidence that treatment drug courts have many similar components, as does the addiction therapy model. By working together, drug court professionals have brought some “less traditional” yet scientifically based treatment strategies like acupuncture, nutrition, and exercise to the drug-involved offender. Alternative treatment methods add to the adaptability of drug court, making it an attractive and feasible solution for almost every jurisdiction throughout the country.

The Neurobiology of Addiction

Scientific and clinical research indicates that physiological changes occur with prolonged drug use (Leshner, 1998 & 2001; NIDA, 1999 & 2001; Powledge, 1999; Stilkind, 1997). Similarly, research indicates that the same physiological changes occur when involved in regular exercise (Bosscher, 1993; Cramer, Nieman & Lee, 1991; Johnsgård, 1989; Palmer, Vacc & Epstein, 1988; Steptoe, Edwards, Mosses & Mathews, 1989).

Recent work in the scientific and clinical research field of addiction has identified the receptor systems that are affected by every type of substance including: tobacco, alcohol, marijuana, cocaine, heroin, barbiturates, and inhalants. Although each drug affects the brain differently, addiction centers on alterations in a single pathway within the brain. Originally, the addiction pathway was called the “pleasure center”; however, this neurological system is now identified as the “reward region” whose chief centers of action lie in the part of the brain called the limbic system. Scientific research has confirmed the role of “reward circuit” as the addiction pathway (Powledge, 1999).

Changes in several neurotransmitter systems have been causally implicated in behavioral adaptation (Salmon, 2001). Although a thorough review of neurotransmitters is beyond the scope of the present study, nonadrenergic and opioid effects of exercise have particular implications for understanding clinical effects and their role in the treatment therapy model.

Neurotransmitters

Dopamine plays an important role in the regulation of pleasure; however, it is also responsible for promoting activity levels and facilitating movement. Over time, drug abuse and addiction will reduce the amount of dopamine released making it harder for the addict to achieve the same pleasurable sensations. Moreover, the drug-involved will simply not feel well if their dopamine level is lowered. According to Powledge (1999), the drug-involved is no longer using drugs to get high, they are using them to avoid being physically sick. Consequently, effective addiction therapy strategies, e.g., exercise, should “either reverse

or compensate for those . . . changes" (Leshner, 1999, p. 4) by initiating psychological and physiological adjustment within the brain by releasing the body's natural anti-addiction medications stored within the mesolimbic reward pathway.

Additionally, scientific research has indicated that the same receptor system is activated when a person exercises. The common denominator for both addiction and exercise is dopamine. Dopamine, a neurotransmitter, plays a major role in the addiction process. In effect, treatment approaches should evoke a normal response activated by the brain's own opiates rather than relying upon a chemical substance (Bechara & Van Der Kooy, 1985).

Like dopamine, serotonin is a neurotransmitter responsible for regulating behavior. However, unlike dopamine, serotonin plays an important role in sleep and mood changes; dopamine, however, is associated with feelings of pleasure. Feelings of sadness and well-being are potentially affected by changes in serotonin levels caused by using drugs that are chemically similar to the neurotransmitter. Moreover, serotonin neurons that are damaged by long-term drug abuse are also invigorated by exercise.

Endorphins are neurotransmitters that inhibit the sensation of pain. Endorphins are chemicals produced by the brain that have effects resembling those of opiates, decreasing the perception of pain and inducing pleasant feelings (Kalat, 1993). A variety of stimuli can release endorphins; these include exercise, pain, and (of course) drug use. In fact, heroin and morphine stimulate the synapses that normally respond to endorphins.

These documented psychological and physiological benefits support the idea that exercise, as part of the addiction therapy model, has the potential to improve existing treatment court strategies. It is believed that participants who participate in the specially designed Coastal Conditioning exercise program or report using exercise as part of their drug court treatment strategy, outside the supervision of drug court, will experience higher levels of compliance and long-term abstinence than non-exercisers.

Exercise Therapy Model

Exercise has become an essential part of our American culture. Since the "exercise explosion" of the 1970s, millions of Americans have discovered that regular exercise improves self-esteem and their outlook on life. In fact, "we know that exercise helps regulate biorhythms, which improves sleep, and it enhances energy level and vigor" (Krucoff, 1999, p. S1). To date, there are numerous studies showing how regular exercise is used to reduce depression and anxiety effectively while improving an individuals' self-esteem (Salmon, 2001; Moses, Steptoe, Mathews, & Edwards, 1989; Petruzzello, Jones, & Kate, 1997; Morris & Salmon, 1994; Kennedy & Newton, 1997). However, few studies, (if any) have documented the use of exercise as part of substance abuse prevention and/or as part of the addiction therapy model.

Benefits of regular exercise may include lower levels of depression, less anxiety, and an elevated mood. Other positive effects are an increase in the number of positive influences and a decrease in negative pressures (Tate, & Petruzzello, 1995). There has been little research, however, on the role of physical fitness in the rehabilitation of alcoholics and/or drug addicts (Palmer, Nicholas, & Epstein, 1998). However, Hughes (1984) states that the research involving the effects of exercise on various psychological variables is voluminous, well over 1,000 published reports.

Chronic users who abstain from using drugs and alcohol are likely to suffer from depression, anxiety, fatigue, paranoia, aggression, and an intense craving for drugs (NIDA, 1998). Therefore, exercise with its many psychological and physiological benefits may prove valuable to the addiction therapy strategy. If exercise positively affects various medical and personal complications associated with drug use, then it may become a widely accepted part of the treatment strategy for the drug-involved offender.

"When . . . prompted to withdraw from alcohol and other drug use -- what will take its place?" (Hobler, 2001, p. 1). For many, the solution to this question was exercise. Exercise as a treatment method has the potential to change effectively the habits and behaviors of the drug-involved by introducing routines and regimen that may remove the drug-involved from circumstances that were previously associated with their addiction (NIJ, 1998). For example, walking on the beach, running, hiking, cycling, any form of exercise and/or physical activity may introduce new settings and habits found to contribute to the participant's sobriety. Another benefit of using exercise is the potential to change the participant's self-esteem, which has been previously established by long-term drug abuse.

Much of the research on exercise as a method of treatment has focused on how exercise can ameliorate depression, anxiety, and other psychological problems pervasive among substance abusers. The mechanism of action for the therapeutic effect of exercise is considered the increase in endorphins, serotonin, and dopamine, induced during moderate to intense aerobic exercise. In fact, studies have shown that endorphins can reduce depression, anxiety, tension, anger, and confusion (Nash, 1997).

Cognitive Behavioral Therapy (CBT)

The disease of addiction was believed to be a "continuing desire to use and it has long been recognized that specific people, places, and things can cause an intense craving to return even after years of abstinence" (Weiner, Silberman, Glowacki, & Folks, 1997, p. 3). Therefore, the risks associated with physical activities are much less than the uncertainty related to relapse. In addition to previous studies, (e.g., Weiner et al., 1997) physical fitness as a component of recovery was considered essential. For example, Hobler (2001, p. 1) stated, "any credible goal should be framed as the beginning of a new behavior -- not simply the end of an undesirable one." It can be concluded that in addition to existing treatment options, wellness, self-care, self-concept and/or self-esteem will improve by using "physical activity [which] was our purest human behavior because its disciplined practice was a *gateway* to many other pro-social behaviors" (Hobler, 2001).

Exercise may also act as a diversion from negative thoughts, and the mastery of a new skill. Social contact may be an important mechanism, and physical activity may have psychological effects such as changes in endorphin, serotonin, and monoamine concentrations (Lawlor & Hopker, 2001). Several studies have demonstrated the ability of various forms of exercise to produce changes in mood states such as tension, depression, anger, state anxiety, as well as other measures of psychological well-being such as self-esteem (Doyne, Ossip-Klein, Bowman, Osborn, McDougall-Wilson & Neimeyer, 1987; Kennedy & Newton, 1997). In relatively healthy populations, exercise can reduce tension, stress, and anxiety (Doyne et al., 1987). In fact, a substantial body of scientific research has been accumulating regarding the psychological benefits associated with participation in regular physical activity.

Evidence linking physical activity with psychological well-being comes from a number of sources. At the antidotal level, exercise enthusiasts have proclaimed psychological benefits for many years. For

example, Johnsgård asserts "that he has never met a depressed runner" (as cited in Steptoe A., 1992) suggesting that even low –to moderate- intensity activities can have both short and long term psychological benefits.

Current Study

All South Justice Center Drug Court participants were asked to take part in a specially designed, twelve-week Coastal Conditioning exercise program. A cross-sectional survey was used to evaluate drug court participants' physical and emotional health, current levels of physical activity, substance abuse history, and motivation for change. The pilot program was implemented over a twelve-week period and intake surveys were received from (48) persons. Additional anecdotal information was collected from those who participated in the Coastal Conditioning exercise program.

The impetus for this program was a request from one of the judges to evaluate the role of exercise and nutrition in the recovery of drug court participants. A meeting was held in July of 2000 with one of the drug court judges, the court administrator, and the director of the Orange County Health Care Agency (HCA) to discuss the program design and implementation. Despite the lack of funding for this type of ancillary treatment program, the participating judge wanted to supply the Orange County (CA) South Justice Center drug court participants with the first of its kind exercise program.

The principal researcher requested eight weeks to develop the exercise component, identify resources needed to carryout the program, address any new concerns that developed while planning the program design and schedule, and report back to the court. The two judges and other counselors from HCA would be informed once the researcher had prepared and could present a final version of the program.

Pilot Program Design

Coastal Conditioning was a voluntary twelve-week exercise program specially designed for the Orange County (CA) South Justice Center treatment court. The pilot program planned to evaluate the immediate individual outcomes with a three-month pre/post test design and was used to educate and motivate drug court participants in the area of health and wellness. The exercise component intended to introduce exercise as the medium through which participants could achieve long-term success both physically and mentally.

The voluntary Coastal Conditioning exercise program consisted of one-hour sessions twice per week, focusing on cardio respiratory, muscular strength/endurance, flexibility, and balance training. Sessions included a warm-up (5 minutes), cardio respiratory training (25 minutes), resistance training (20 minutes), and flexibility and balance training (10 minutes). Incorporated into the Coastal Conditioning curriculum was introductory physical fitness information donated by the American Heart Association (AHA). Volunteers were taught how to safely start their own exercise routine, given incentives to participate, and educational materials that underscored the many benefits of physical fitness.

Incorporated into the Coastal Conditioning curriculum was basic fitness education in the form of pamphlets, and newsletters. These handouts outlined how to read food labels, improve diet, identify risk factors associated with exercise, the importance of stretching, and how to begin their own individual exercise program beyond the supervision of drug court. All materials were obtained from the American Heart Association (AHA) at no cost to the researcher staff. Although, educational instruction was not

emphasized, the Coastal Conditioning program design included the use of instructive materials. Additional health related promotional materials were used as part of an effort to improve the participants' understanding of health and wellness by improving their awareness concerning health, wellness, and exercise.

Site Selection

The exercise program was administered at a local state park located just miles from the participating courthouse. This location was chosen because of its wide-open grassy areas, hills, and easy access to the beach. The grass areas were used for warming-up and cooling down; the paved trails were used for walking and running; the stairs were used for stretching, elevating the heart-rate, and testing, and the beach was used for additional fitness walks and/or runs. A nominal parking fee was required, however, the parking fee was paid for any program volunteer. The beach park's landscape was ideal for an outdoor exercise program. The topography accommodated different levels of fitness and provided a variety of exercise choices. When planning an outdoor exercise program, weather should be considered. Of course, there were obvious advantages to implementing an outdoor exercise program in California, which may not apply to other areas of the country. Because of possible weather conditions, the program design suggested alternatives.

Staffing and Budget

Originally, the exercise component was designed as a component of a pilot program. The pilot program was to include three components: nutrition education and counseling, voluntary participation in a smoking cessation program, and a voluntary exercise program. The intent was to have a fitness specialist from California State University, Long Beach (CSULB) was intended to administer the fitness program. The university professor was to supervise 5-10 undergraduate students who were to work one-on-one with the participants. The program was designed to accommodate up to 30 participants.

Due to limited resources, the drug court judge wanted to determine if it was even possible to implement an exercise component with little to no funding. It was agreed that through community support and the efforts of a graduate student willing to design and facilitate the program it was possible to propose a program. Some of the largest concerns were staff, facilities, and design. Plans were made to develop the program and report to the court in eight weeks.

The anticipated budget was less than five hundred dollars, most of which was allocated towards printing. The principal researcher and an assistant, who freely volunteered twelve weeks of his time, administered the actual Coastal Conditioning program. The exercise program was partially incentive based, therefore various local business were asked to support the research effort by way of donations that could be distributed to exercise program volunteers throughout the twelve-week period. The university and the South Justice Center that identified the principal researcher and noted that the university and the court supported the research effort.

Scheduling

The frequency of sessions was to be partially determined by the number of participants who volunteered with a minimum of three sessions per week. Anticipating a large number of volunteers, the exercise program was designed to accommodate up to 15 volunteers per session. If the number of participants exceeded 15, the program was designed to accommodate those volunteers by adding additional sessions.

Incentives

Part of the Coastal Conditioning design was to provide incentives. From the beginning, an agreement with the participating Orange County Health Care Agency (HCA) was made. HCA agreed to grant participants who fulfilled a 12-week commitment to the Coastal Conditioning program with credit for a "specialty group," which is a treatment court requirement. To receive credit, participants must have completed a minimum of one hour of exercise under the supervision of the Coastal Conditioning program administrators for twelve weeks. A participant's attendance was recorded on the weekly Log Sheet and verified with the Sign-in sheet that corresponded to that day of participation.

In addition to the possibility of receiving credit for a "specialty-group," all participants who attended at least one session a week were eligible for the weekly incentive drawing. These incentives ranged from twenty-five dollar gift certificates to a grocery store, twenty-five dollars of fresh cut flowers, coupons for two free pizzas, and certificates for a free oil-change and lube.

Methods*Screening and Consent Procedures*

Drug court participants who volunteered for the Coastal Conditioning exercise program were asked to complete an informed consent form and two surveys before they were allowed to participate. The PAR-Q & YOU (a questionnaire for people aged 15 to 69) taken from the Canadian Society of Exercise Physiology (1994), was used to determine a volunteer's "readiness to participate in physical activity." This survey made it possible to identify volunteers who should delay becoming much more active without taking part in a fitness appraisal.

The intake process also included a Screening Questionnaire. This survey contained measures to assess: current health, past and current medical history. Several of these measures were taken from literature provided by the American Heart Association (AHA). The AHA has several informational pamphlets that provide up-to-date information on the effects of exercise on the heart and practical guidelines for starting and staying on an exercise program. Most of the literature from the AHA can be obtained free by contacting the national center in Dallas, Texas. Using these two surveys, the Coastal Conditioning program administrators obtained critical background information for each volunteer.

The Coastal Conditioning exercise program was based on the minimum requirements for intensity, frequency, and duration set by the "Recommended Quantity and Quality of Exercise for Developing and Maintaining Cardio respiratory and Muscular Fitness, and Flexibility in Healthy Adults" set forth in a position stand produced by the American College of Sports Medicine (ACSM, 1998). A review of the literature

relating to the appropriate intensity, frequency, and duration of exercise for a population recovering from an addiction was reviewed.

The ACSM recognizes the potential health benefits of regular exercise performed more frequently and for longer durations. However due to limited resources, it was important to teach participants how to exercise beyond the supervision of drug court. A part of the educational component, the Coastal Condition exercise program provided educational materials received from the American Heart Association (AHA). The exercise program was designed for low-levels of physical activity. The goal was not to overexert the participants under fatigue was considered equally important.

Minimizing the chance of injury and other health concerns were addressed when designing the Coastal Conditioning exercise program. To reduce the chance of having a participant who was not physically ready to participate two different screening tools were used. Anyone identified as not ready to participate, was required to receive clearance from a medical professional.

Recruiting Participants

The target population included all current participants in the South Justice Center Drug Court. In order to determine the approximate number of participants, HCA counselors asked how many would like to participate. Based on this information it was anticipated that 23% of participants would be interested in the program. The decision was made to take all current and incoming and to welcome at any time. However, because of the twelve-week requirement, only those who started at week one would be eligible to receive the "specialty group" credit.

For several weeks, the principal researcher and an assistant attended report hearings (also known as status hearings) at the South Justice Center in Orange County California where there are currently three separate drug courts. Permission was given to the research staff to attend the drug court sessions to administer the Health Surveys and invite the drug court participants to the Coastal Conditioning exercise program. Announcements were made explaining who the program administrators were and briefly describing the current study. All participants from the three individual drug courts were invited to participate in the Coastal Conditioning exercise program.

One judge in particular was the leader of physical fitness in her court. She believed that exercise should be essential to a participant's success in and outside of their drug court experience. Throughout the twelve weeks of program implementation, this judge urged her participants to attend the Coastal Conditioning program sessions and continuously gave positive reinforcement to those who were participating.

Recruitment for participants was on going. During scheduled report hearings, announcements were made. As the scheduled start date got closer, announcements were made more frequently. In addition, maps were provided, and the program administrator's phone numbers were given to answer questions and/or concerns regarding possible participation in the Coastal Conditioning exercise unit. A period of two weeks was allotted by HCA for participant recruitment during their group counseling sessions. Ten minutes at the beginning of each session was used to describe the study and the exercise program.

Two weeks in advance, flyers were passed out and posted at both the South Justice Center and Health Care agency. In addition, maps, written directions to the Coastal Conditioning exercise program site,

the program administrator's phone numbers and a World Wide Web address with on line directions was provided. The only requirement for participation was current enrollment in drug court and/or familial relationship to a drug court participant. Friends and family members were invited with the hopes of encouraging a larger number of participants.

Program Implementation

The principal investigator conducted the exercise program with assistance from an assistant with a Bachelor of Science degree in Physical Education and extensive sports training experience. The Coastal Conditioning exercise program was designed to get participants "up and moving." The program used an outdoor setting and intended to use low-impact exercise that would involve participants in behaviors not consistent with their previous drug using habits. The Coastal Conditioning program was carried out over a 12-week period and consisted of, up to, three supervised sessions per week. Volunteers were assessed individually via the surveys and during the first week used for an assessment period. The Coastal Conditioning exercise program was an outdoor low-impact exercise program based on the minimum requirements outlined by the American College of Sports Medicine (ACSM) Position Stand: The recommended quantity and quality of exercise for developing and maintaining cardio respiratory and muscular fitness, and flexibility in healthy adults (1998).

After acceptance into the program, each participant during the Intake Phase (week 1) was individually tested. The tests included: sit and reach stretch test, a timed sit up test, and a push-up test. Recorded on Log Sheets given to each participant were individual scores. During the first week, after six weeks, and during the last week of exercise (week 12) testing was done.

All exercise sessions began with a warm-up session to stretch muscles slowly, and thus avoiding injuries. The importance of warming-up was discussed and literature was given to participants who wanted to understand the warm-up process. After warm-ups were completed, slow non-ballistic (stretching without bouncing) stretching was performed. Flexibility is an essential component to the exercise program; therefore, stretching was used before and after every exercise session. Because flexibility training was one of the program goals, flexibility work was performed weekly focusing on: elasticity, extensibility, and stretch reflex. Stretching focused on muscle groups (shoulders, chest, arms, stomach, back, lower back, hip flexors, quadriceps, hamstrings, and calves) and was carried out twice for each muscle for thirty seconds.

Push-ups (bent knee), sit-ups and flexibility testing were completed and recorded on a Log Sheet provided at the beginning of each exercise session. Intensity level was determined by computing a heart-rate range for each subject of between 60 and 80% of their estimated maximum heart rate using a Karvonen formula each participant began the program and every session there after by computing his or her target heart rate. Because participants were not involved in any form of regular exercise before volunteering for the program, fifty percent of their heart rate reserve was considered appropriate. This depended on individual fitness levels. The target heart rate range was found by subtracting 220 from the age and then subtracting that number from the resting heart rate. The program administrators taught each participant how to record their individual scores accurately.

Exercise Program Participants

From the three drug courts at the Orange County South Justice Center (approximately 100-130 participants), 30 participants signed and returned the Informed Consent Form and completed the PAR-Q questionnaire. Only five participants volunteered for the Coastal Conditioning exercise program; all five of the volunteers were women. Four of the five participated regularly, and one participated once in awhile. Only two of the five completed the program; however, data collected from all five was used in the results.

Methods

The current study was originally designed to collect data via intake and follow-up surveys from a sample of drug court participants, some of who would be in the exercise component as part of the "Better Health" program. However, due to a low participation rate the focus of the study changed from an outcome evaluation, to a process evaluation. Therefore, more qualitative information was gleaned from the data sources to conduct a case study in order to describe the importance of using regular exercise as part of the addiction therapy plan. Health Surveys and Log Sheets were used to provide data and anecdotal information that would support the extensive study of exercise, addiction therapy, and drug courts.

Data Sources

The 72 item self-report Health survey was designed to measure, levels of motivation for exercise, overall mental health, overall physical health, and actual exercise habits. The Health Survey was comprised of ten sections that included several core measures found in RAND's Medical Outcome Study (MOS) of Health Related Quality of Life (HRQL) and Physical Activity/Exercise (Stewart, Hays, Wells, & Rogers, 1993). The measures are described in the User's Manual by Hays, Sherbourne and Mazel (1995) and Stewart et al. (1993). The health-related measures evaluated a participant's physical and emotional health; level of physical activity and exercise; levels of anxiety; substance use history; levels of motivation; exercise habits and goals; values, beliefs, and attitudes; and smoking behaviors.

The first section of the Health survey was designed to record background variables that included program start date, current phase, and number of months in drug court. The following section collected data regarding the respondent's personal perception of their overall physical and emotional health. These two general questions were intended to assess the respondent's perception of their individual physical and mental health. These two items helped determined if the respondent thought that their physical or mental health had an affect on their ability to perform "normal social activities with family, friends, neighbors, or groups."

The third section used cores measures related to energy/fatigue and health distress. These core measures were designed for RAND's Medical Outcome Study (MOS) of Health Related Quality of Life (HRQL) and Physical Activity/Exercise (Stewart, Hays, Wells & Rogers, 1993). One-hundred-sixteen health-related quality-of-life (HRQL) items were developed for the MOS study. Some of the HRQL measures were also included in the Screening questionnaire but not the PAR-Q. In the present study, the core measures were used to measure those variables that related to actual exercise habits, overall physical and mental health, and motivation to exercise.

Log Sheets

Outcomes of the Coastal Conditioning exercise program were recorded using fitness Log Sheets for week one, week six and week twelve. Evaluating individual fitness levels was used only as an additional incentive to participate. These records were used to monitor individual progress, encouragement, and goal setting. The Daily Log Sheet Personal Evaluation section unexpectedly revealed a large amount of data, which was used as case study information.

Data Collection Procedures

The cross-sectional Health Survey was distributed to drug court participants during their scheduled report hearings. Following the court hearing, interested participants were asked to sign an informed consent form and return the survey by mail in a prepaid envelope. This method of data collection was ineffective because many participants had to leave for work as required by the drug court. Another complication was the varying degree of interest and willingness to support the current study by the three drug court judges. Of the three judges, only one was overtly willing to support the principal researcher. Consequently, of a possible 129 participants, only 48 returned the survey via mail.

Results

Individual Substance Abuse Behavior

According to the DCPO (1998), most drug court participants have been using drugs for at least 15 years and use multiple drugs at the time of program entry, which includes alcohol and prescription drugs. Official records and the participant's self-reports of various substances at the time of their admission to the drug court program were examined. In this study, as shown in Table 1, the majority of drug court participants and survey respondents, more than half, reported methamphetamine as their drug of choice (56.7% and 64.4% respectively). In contrast, only 15.6% of the survey respondents reported using Heroin and even fewer reported using Marijuana (8.9%) and cocaine (4.4%), but the difference was not statistically significant.

When asked to report how often they used their drug of choice, the majority of respondents reported using their drug of choice 73.9% on a daily basis in contrast to the 4.2% who reported using their drug of choice weekly and monthly (see Table 1). Furthermore, 10.4% reported using their drug of choice more than once a week and 6.5% of the respondents reported using their drug of choice more than once a day.

Table 1
Primary Substance Used and Criminal Charge at Intake

	Target Population (<i>n</i> = 126)		Study (<i>n</i> = 48)	
	<i>f</i>	%	<i>f</i>	%
Primary drug of choice				
Alcohol	8	6.7	3	6.7
Cocaine	13	10.8	2	4.4

Heroin	19	15.8	7	15.6
Marijuana	12	10.0	4	8.9
Methamphetamine	68	56.7	29	64.4
Missing	6	4.8	3	6.3
Frequency of use primary drug				
More than once per day	6	4.8	3	6.5
Daily	85	68.5	5	73.9
More than once per week	20	16.1	34	10.4
Weekly	9	7.3	2	4.2
Monthly or less	4	3.2	2	4.2

Reliability and Validity of MOS Measures

The mean scale scores for all of the RAND MOS items used in the Health Survey for both the current study participants and the RAND study population of “normal” persons are displayed in Table 2. In general, the scores for survey participants appear similar to the RAND study population, but there are some exceptions. For example, on average, the study participants report lower levels of fatigue, health distress, and social functioning than the RAND population. However, the mean for health distress is almost the exact opposite. All of the subscales of the mental health index appear similar for the study sample and the RAND population. The mean scale score for the mental health index, which includes all 17 items from RAND’s Mental Health Index II, is 70.0 with a standard deviation of 18.8, suggests that the majority of drug court participants are in good mental health, which is consistent to the RAND population.

Table 2
Comparison of Study Sample to RAND MOS Scale Score

CONCEPTUAL AREA Scale/Index	Study Sample (<i>n</i> = 48)		RAND MOS (<i>n</i> = 2471)	
	Mean	<u>sd</u>	Mean	<u>sd</u>
General Health				
Energy/Fatigue	45.5	17.1	53.8	22.1
Health Distress	17.5	21.8	78.3	23.6
Social Functioning	52.3	12.0	78.8	25.4
Mental Health				
Psychological Distress	72.3	19.3	75.4	20.3
Depression/Behavioral Control	73.7	20.8	77.3	21.0
Psychological Well-Being	64.5	20.1	61.5	23.9
Mental Health Index II	70.0	18.8	71.3	20.6
Motivation For Change	81.4	15.4	na	na

na = Not applicable as this measure is not in the RAND survey

The primary focus of the analysis was to examine possible relationships between levels of exercise and core concepts of health and well-being. Using one-way analysis of variance (ANOVA), differences between low, medium, and high exercisers were tested for each of the dependent variables (i.e., energy/fatigue, health distress, depression/behavioral control, psychological distress, psychological well-being, mental health, social functioning, and motivation for change). Per RAND'S Medical Outcome Study (MOS), the core measures of Health-Related Quality of Life (HRQL) were scale scored, which transforms each item linearly so that the lowest and the highest possible scores are set at 0 and 100.

It was believed that participants who report exercising regularly would have higher levels of health, psychological and social functioning, and well-being. Different tests of significance were used to determine the effect of the independent variable on these dependent variables. These tests included the one-way analysis of variance (ANOVA) and Scheffé, and Tukey post hoc tests. The exercise measure (whether participants had exercised regularly in the past month) was recoded into three levels ranging from low to high. The results of the ANOVA, show that levels of exercise is related to physical and mental health, but the differences are only significant for measures of energy/fatigue, depression, psychological distress and psychological well-being and the overall mental health index.

Unfortunately, due to the small sample size, which contributes to the high standard deviation for each of the dependent variables, these results must be interpreted with caution. In some instances, the significant F tests may be due to the sample variance, rather than actual differences between groups. This may account for the fact that some of the F tests are statistically significant, but the pairwise comparisons between groups are not.

General Health

Variation in levels of exercise appears to be related to perceptions of general health were found. In comparison to those who reported low and medium levels of exercise, those who exercised more frequently had significantly higher levels of general health (62.4 and 68.8 versus 86.7 respectively). Both the F test and the post hoc tests reveal statistically significant differences between these groups. These results support the hypothesis that exercise does make a difference in feelings about health.

Energy/Fatigue

An F test value of 9.2 and significance level of (0.000) confirms that the difference between a respondent's reported level of exercise and energy/fatigue is statistically significant. Further inspection of the post hoc multiple comparison test results were used to determine which pairs of group means were significantly different. The results reveal that those who reported high levels of exercise had significantly lower levels of fatigue (mean of 32) in comparison to those who exercised less, at the low or medium level (with a mean of 52). These results may be attributed to the amount of physical activity exceeding the individual's fitness level resulting in a lower reported mean.

Health Distress

It was believed that those who reported higher levels of exercise would also report lower levels of health distress. The results of the F test measuring health distress at .07 do not reflect a statistically significant relationship between the respondent's level of exercise and health distress when tested at an alpha level of .05. The results, however, do approach significance and may have reached statistical significance with a larger sample. On average, respondents reported low levels of health distress (with a mean of 17.5), but there is a trend towards lower levels of distress with a higher level of exercise. Given the fact that the values of the standard deviation are as high as or sometimes higher than the mean, these results must be viewed cautiously.

Depression/Behavioral Control

The depression/behavioral control measure includes eight items measuring the amount of time in the last month that a respondent felt in low spirits, downhearted, depressed, moody, down in the dumps, had nothing to look forward to, and was not in firm control of behavior or emotionally stable.

As previously stated, it was hypothesized that those who reported higher levels of exercise would also report lower levels of depression. The results of the F test measuring depression/behavioral control reflect a statistically significant relationship between the respondent's level of exercise and this measure. However, further examination of the post hoc multiple comparison test results found a nearly significant relationship between those who reported medium levels of exercise (with a mean of 70) in comparison to those who reported the highest level of exercise (mean 85). No other pairs of group means were found to be significantly different, which may be attributed to the more conservative values produced by the Scheffé post hoc test.

Psychological Distress

It was believed that lower levels of psychological distress would be found in those who reported exercising regularly. Again, the results of the F test measuring psychological distress reflect a statistically significant relationship between the respondent's level of exercise and the psychological distress. The results of the Scheffé multiple comparison test, however, reflect no significant difference between low and medium and high levels of exercise (with means of 66, 69, and 82 respectively) and psychological distress. As previously stated, the sample size may account for the fact that some of the F tests are statistically significant, but the pairwise comparisons between groups are not.

Psychological Well-being

The results of the F test measuring psychological well-being at .003 reflect a statistically significant relationship between the respondent's level of exercise and psychological well-being. In addition, further inspection of the post hoc multiple comparison test results indicated that those who reported high levels of exercise had significantly higher levels of psychological well-being (mean of 78) in comparison to those who exercised less, at the low or medium level (with means of 56 and 59 respectively).

Mental Health Index II

Mental health index II measure includes 17 items including depression/behavioral-emotional control, anxiety, feeling of belonging, and positive affect, which are other measures that consist of several core measures. It was believed that regular exercise in the last month would affect reported positive responses to those core measures for depression, anxiety, and positive affect. Despite the small sample size, the results show an F test value of 4.5 and significance level of (.02), which at an alpha level of .05 is statistically significant. In addition, the multiple comparison results also revealed that those who reported higher levels of exercise had significantly lower levels of depression, anxiety, and higher levels of positive affect (with a mean of 81) in comparison to those who exercised less, at the low or medium level (with a mean of 63 and 66).

Social Functioning

The social functioning measure contained two items, which include the extent of limitations by physical health or emotional health problems in normal social activities with friends, family, and relationships. It was believed that those who reported exercising regularly would report higher levels of social functioning. The F test value of .5 and significance level of (.61) substantiates no statistically significant relationship between social functioning and a respondent's participation in exercise. Thus, the results reveal that those who reported high levels of exercise had no statistically significant change in their level of social functioning (mean 50) in comparison to those who exercised less, at the low or medium level (with means of 55 and 53 respectively).

Motivation for Change

It was hypothesized that exercise would affect the level of motivation for change. Meaning, those respondents who reported low levels of exercise would also report low levels of motivation for change, which is conversely true for those who report high levels of exercise. The results of the analysis of variance indicate no significant differences between groups in motivation for change. Regardless of their current level of exercise, all survey respondents reported generally high levels of motivation to change, as evidenced by the mean scale score of 81.4.

Table 3
Exercise Effect on Physical and Mental Health

	Regular Exercise in Last Month			F test	Sig.
	Low	Medium	High		
	(n = 14)	(n = 19)	(n = 15)		
	Mean (sd)	Mean (sd)	Mean (sd)		
General Health*	62.4 (28.4)	68.8 (20.0)	86.7 (10.2)	5.55	.007
Energy/Fatigue*	51.7 (17.8)	51.6 (17.1)	32.0 (4.8)	9.20	.000
Health Distress	19.5 (23.2)	24.2 (25.6)	7.1 (8.9)	2.85	.068
Depression/Behavioral Control	66.8 (24.2)	70.4 (21.7)	84.5 (11.5)	3.40	.044
Psychological Distress	65.9 (20.8)	68.9 (21.0)	82.2 (11.1)	3.28	.047
Psychological Well-being*	56.3 (22.3)	59.2 (19.3)	78.4 (10.8)	6.62	.003
Mental Health Index II*	63.1 (20.4)	66.1 (19.7)	81.1 (10.3)	4.50	.017
Social Functioning	54.5 (13.5)	52.6 (9.8)	50.0 (13.4)	.50	.610
Motivation to Change	83.8 (8.0)	81.8 (14.5)	78.8 (21.0)	.37	.693

* Significant difference in the scale score means pairwise using Tukey or Scheffé post hoc tests between low and high levels of exercise and medium and high levels of exercise.

The results for the variation of physical and emotional health as it relates to exercise generally support the belief that those who report high levels of exercise within the past month also report better health, less health distress, less depression, and better psychological well-being.

Discussion

The purpose of the study was to examine the potential benefit of exercise on treatment court participant and explain exercise-related affective change. It was predicted that those who participated in the Coastal Conditioning exercise program would improve their overall program compliance because of changes in mood, self-esteem, and overall wellness. The findings of the present study offered little support to this hypothesis, primarily due to the low participation rate. The post-exercise differences between exercisers and non-exercisers were not as strong as would be expected from the scientific data supporting the many documented benefits of regular exercise.

Strengths and Limitations

The findings of this study were inconclusive. Although there is some indication that treatment courts may improve the addiction therapy strategy with exercise, it is difficult to determine this relationship in the course of this study. Drug-involved offenders who participated in the Coastal Conditioning exercise program reported improvements in mood, overall attitude, level of energy, focus, and self-concept. Responses collected from Log Sheets during the program reflected these changes. The present evidence, while not conclusive, suggests that those who participate in an organized exercise program as a component of the treatment court regimen should be able to cope more successfully with life beyond the supervision of drug court.

At this time, modifying treatment programs to include physical exercise appears worthwhile. However, incorporating physical exercise with addiction therapy programs should be done with the recognition that this research study is heuristic and should serve as a base to which other investigations may provide additional data. Although the present study was designed to avoid some of the problems associated with exercise studies, several unexpected limitations surfaced and an awareness of these should be helpful in further research.

First, it would be helpful to include sports training (basketball, soccer, or volleyball) making the program more attractive to the men in treatment court. Future studies should offer a greater number of sessions, which would likely solicit a greater response rate. Additionally, any proposed exercise program should be implemented with the at least two administrators per five participants. Finally, program administrators should be credentialed and specialize in the areas of physical fitness and/or kinesiology. Administrators with an educational background in these areas will have the skills to facilitate various forms of sports training and physical fitness safely, which will accommodate a wider range of fitness levels, thus attracting a larger number of participants. In an effort to improve reliability and strengthen overall empirical results, future studies should also examine post treatment differences between exercisers and controls, particularly concerning abstinence rate.

Outcomes

If participants of the Coastal Conditioning exercise program were interested in receiving credit for a "specialty group" then they were required to attend, at least, one one-hour session per week for twelve weeks. The participating Orange County (CA) health care agency counselors were supportive of the Coastal Conditioning exercise program and encouraged participants to volunteer.

The Log Sheet served as documentation for those participants who wanted to receive "specialty group" credit and as a data collection tool. Although only one hour a week was required, participants were encouraged to attend more than one session per week, with a maximum of three hours per week. However, participants were informed that any additional hours could not be used as credit for a missed day in the following week. The Health Care agency required one hour a week of participation to qualify for the "specialty group" credit. Only two of the four full-time participants fulfilled this condition, one dropped out after nine weeks and one came on an irregular basis disqualifying her for the specialty group credit. Only five volunteered to participate, four participated full-time, and two of the four were eligible for the "specialty group" credit.

To date, alternative forms of treatment not supported by a large body of scientific record are not widely accepted as treatment options (e.g. exercise). The drug court treatment approach, addresses the desirability and feasibility of offering auxiliary treatment options. In fact, individual treatment plans may include ancillary forms of treatment like acupuncture and/or exercise, to improve health and wellness are encouraging options compared to the traditional punitive response.

The potential to record the benefits of exercise on a drug court population is real and necessary, we are certain that other drug court programs in Orange County will benefit from a continued assessment. This study was designed to provide motivation and act as a mechanism for change within other jurisdictions that have not yet realized the full potential of exercise to benefit the drug-involved offender.

To date, variations between drug courts have made it difficult to determine whether drug courts are actually effective (Torres and Deschenes 1997). Nonetheless, drug courts are reported to be a positive and viable response to a growing drug addiction problem here in the United States, benefiting the criminal justice system and ultimately the public. Unquestionably, it is increasingly important to acknowledge that addiction was a multi-faceted problem with implications that run as deep as public health and safety. It was certainly the responsibility of the criminal justice, research, and clinical communities to provide adequate and rational solutions to this immeasurable problem. Additional studies examining which program services, sanctions, courtroom dynamics and client supervision are needed if we are to get inside the "black box" of the drug court model (Belenko, 2001).

Drug use and drug addiction are among the largest and most challenging problems facing society today. Scientific advances have provided a large body of literature that helps criminal justice and treatment professionals understand drug use and addiction, but there will never be a "magic bullet" capable of making these problems disappear. Because drug use and addiction are complex social and public health issues, they require multifaceted approaches. Treatment courts being the medium for many drug-involved offenders will require that they utilize scientific and clinical research to provide ancillary treatment methods that will strengthen the addiction therapy strategy..

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