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Patient participation, encounter, and methadone-reinforcement in the treatment of heroin addicts

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PATIENT PARTICIPATION, ENCOUNTER, AND METHADONE-REINFORCEMENT IN THE TREATMENT OF HEROIN ADDICTS

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PREFACE

The present thesis represents a summary of research done by the author (and others) that was conducted with heroin addicts and drug abusers undergoing behavioral and pharmacological therapy at Stockton State Hospital, Stockton, California.

From June 1970 to December 1970 the Research Department of Stockton State Hospital, in conjunction with the Drug Abuse Program at Stockton State Hospital, conducted research investigating a number of different facets relating to inpatient programs for heroin addicts undergoing methadone maintenance and drug abusers. These facets included the investigation and evaluation of (a) motivational factors affecting the voluntary participation of inpatient heroin addicts and drug abusers in behavioral and pharmacological therapy, (b) the effectiveness of the synthetic narcotic methadone hydrocloride as a primary reinforcing agent for appropriate behavior, (c) the effectiveness of various therapeutic approaches used in conjunction with behavioral modification techniques, and (d) the effect of methadone on perceptual and motor functioning in the heroin addict undergoing methadone maintenance.

The present thesis is a compilation of these research projects.

The research reported in this thesis was done while the author was a Student Professional Assistant (research assistant) in the Research Department at Stockton State Hospital. The author is indebted to the many people who participated in the completion and presentation of the research reported herein. The author is especially greatful to Robert W. Earl, Ph.D., Chief of Research, and Douglas W. Matheson, Ph.D., Research Specialist, (principle investigators in these projects), who allowed the author to report the research in this thesis. The author also wishes to thank the Student Professional Assistants who conducted the research sessions with him. They include: Meredith A. Davison (Experiments I, II, and V), Janet Hause (Experiment III), and John D. Moffitt (Experiment IV). The author is also greatful to Robert G. Austin, M.D., the ward physician, who acted as medical consultant for the methadone maintenance phase of the program, and the members of Friends, Inc., who served as group leaders in Experiment IV. In addition, the author is appreciative of the comments, criticisms, and advice given to him by the members of his thesis committee, Douglas W. Matheson, Ph.D., (Chm.), and Kenneth L. Beauchamp, Ph.D., Department of Psychology, University of the Pacific, and David Wolter, Ph.D., Mathematics Department, University of the Pacific. Finally, the author wishes to thank Jean Van Dyke and Guenda Nylen for their help in preparing the final copy

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TABLE OF CONTENTS

APPENDIX II

APPENDIX III

APPENDIX III

APPENDIX IV

LIST OF TABLES

Table | Page

Table | Page

LIST OF FIGURES

Chapter 1

BACKGROUND INFORMATION

Historical Overview of Opiate Use, Abuse, and Addiction[1]

The cultivation and use of the opium poppy, Papaver somniferum, has been traced as early as 7000 B.C. Opium, obtained from the juice of the poppy capsules, was used by the Sumerians for its medicinal and euphoric effects and was referred to as the "plant of joy". The poppy, indigenous to Asia Minor, was later known and used in Greece, Egypt, Persia and the Roman Empire.

In the ninth century A.D. Arabian traders introduced opium to China. Here the drug was taken orally and used mainly for the control of various forms of dysentery. It was not until the eighteenth century that the opium habit (eating and smoking opium for nonmedicinal purposes) became widespread throughout China. At this time Portuguese and English traders began to exploit the natives in this regard.

Opium entered the United States in the 1800's when sizeable numbers of Chinese workers began arriving. This event in conjunction with developments in other countries

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[1]Much of this historical review has been taken from N. Hentoff's book A Doctor Among the Addicts (1970).

set the stage for the opiate addiction problem in the United States; in 1805 a German pharmacist in Hanover, F. W. Serturner, isolated an active ingredient of opium, morphine, and in 1853 the hypodermic needle was invented and the injection of morphine and other narcotics became common.

The extent of opiate addiction in the United States increased during the Civil War in the 1860's. During this period morphine was used by wounded soldiers to relieve pain, and many continued to use the drug long after the war had ended. Addiction increased rapidly among the troops and was known as the "army disease".

Opiate use spread from the battlefield to the general populace in the late 1800's by the use of opium and other addictive drugs in patent medicines. Because of the soothing and analgesic properties of the opiates patent medicines containing these drugs were used and prescribed for all types of ailments. Remedies with a narcotic content of 5% to 10% were not uncommon. Such medicines as Mrs. Winslow's Soothing Syrup, Dr. Cole's Catarrh Cure and Perkin's Diarrhea Mixture were notable contributors to the addiction problem in the nineteenth century.

The addiction problem was further increased by the discovery of heroin in 1898. The synthetic alkaloid, made from opium or morphine, was also used in patent

medicines. At first it was considered to be a non-addictive substitute for morphine and for this reason physicians often prescribed it in preference to morphine. It was not until 1910 that heroin's addictive properties were recognized. But, by that time it was too late and many individuals found themselves addicted to the drug.

Thus, by the late nineteenth and early twentieth century the use and abuse of opiates and the addiction problem were firmly established in the United States. Morphine, heroin, and other addictive drugs were frequently prescribed by physicians for pain and other ailments and the drugs could be purchased in most drug stores over the counter. In addition many individuals purchased the drugs regularly to obtain their euphoric and stimulant effects. It has been estimated that at the turn of the century some 200,000 United States citizens were addicted to some form of opiate.

The commonplace use of opiates continued until 1914 when the Federal government, in response to the increasing number of addicts, passed the Harrison Act. The law was a regulatory and revenue act aimed at controlling the production and distribution of narcotics. In effect the law and its subsequent amendments limited the availability of opiates to strictly defined medical and scientific uses.

The outcome of the law was to cut off thousands of addicts from their supply of legal opiates. In

addition addicts were now classified as criminals and many were sent to prison. The illegal narcotics racket also came into being as a result of the continuing need of the addict for his opiate supply.

Although the Harrison Act declared the nonmedical use of opiates illegal the addiction rate continued to rise and the addiction problem remained. Despite numerous pieces of legislation and the establishment of treatment centers aimed at the cure or prevention of addiction opiate use continues to exist and seems to be steadily increasing.

Opiates: Effects and Uses

Opiates are obtained from the juice of unripe seed capsules of the opium poppy, Papaver somniferum, which is indigenous to Asia Minor. "The milky juice is dried in the air and forms a brownish gummy mass. This is further dried, powdered and deodorized to make the official powdered opium" (Goodman & Gilman, 1941, p. 187).

The pharmacologically active constituents of opium are the alkaloids. These number well over a score but only three - morphine (natural), codine (natural) and heroin (semi-synthetic) - will be discussed in this report because they are the opiates commonly used by addicts.

The opiates are generally referred to as "narcotics" because they bring on sleep and analgesia. The drugs act mainly on the central nervous system producing both depressant and stimulant effects.

The physiological and psychological effects of opiates have been summarized by Goodman & Gilman (1941). These authors state that when moderate amounts of morphine (up to 15 mg.) or other opiates are administered to humans the subjects "soon experience an euphoric, exhilarating drowsiness characterized by freedom from anxiety, muscular relaxation, rapid flow of uncontrolled thought and imagination, shortening of the time sense, disappearance of fears, doubts, and inhibitions, and increased ease in discriminating and making decisions. There is an inability to concentrate, difficulty in mentation, apathy, lessened physical activity, dimness of vision, and lethargy. Pain is relieved, hunger abolished, and vomiting (when it occurs due to morphine) is not associated with the usual unpleasant emotional reactions, even when violent and repeated. The respiration is depressed and the pupils are somewhat constricted. If the external situation does not prevent it, sleep soon ensues and dreams may be prominent. The psychological effects outlast the analgesic effects by many hours" (p. 191).

When the dose of the opiate is increased to therapeutic levels (morphine, 15-20 mg.) the stage of euphoria, lessened physical activity and lethargy passes quickly into deep dreamless sleep. As the dose is increased beyond therapeutic amounts all previously mentioned effects become more marked and the subject may experience "opiate poisoning", i.e. overdose.

Poisoning in this case is characterized by deep coma, markedly depressed respiration, and pin-point pupils. Death due to opiate poisoning comes from respiratory failure.

Recovery from opiates is characterized by after-depression, constipation and sometimes nausea and vomiting.

Repeated administration of opiates produces habituation to the drugs. Some of the drug effects disappear and the subject's dose must be increased to obtain the effects experienced initially.

The common medical uses of opiates (morphine and codine) are for the relief of pain and coughing, and the inducement of sleep. The drugs are also used as anti-convulsants, antiperistaltics and for the relief of dyspnea. Heroin, and illegal drug, is not used in medical treatment.

Opiate Addiction

Opiate addiction may be defined as a syndrome characterized by (1) an overpowering need or compulsion to take the drug and obtain it by any means; (2) the tendency to increase the dosage over time; and (3) psychological and physiological dependence upon the effects of the drug.

Presumably the addict initially uses opiates to escape reality and obtain the euphoric and stimulant effects of the drugs. With continued use of the drug the individual soon experiences a hunger for narcotics

and continues to take the drug, not only to experience its euphoric and stimulant effects, but also to avoid the painful stimuli associated with narcotics withdrawal. During this time he must continually increase his dosage and the frequency of opiate administration (due to habituation) or he will experience withdrawal. During this period the addict also becomes psychologically dependent upon the drug and without it he feels he cannot face reality. When the individual has reached the point where the drug must be taken to prevent withdrawal and he depends upon the drug's effects for his psychological well-being he is considered to be an opiate addict.

The actual physiological mechanisms underlying addiction remain unknown, but researchers suggest that the continued use of opiates brings about an acquired metabolic deficiency or dysfunction which results in a narcotics hunger (Nyswander, 1971, Dole, Nyswander & Kreek, 1966, and Dole & Nyswander, 1965). This narcotics hunger in turn motivates the addict to continually seek and use opiate drugs.

The time required for addiction to occur depends upon the individual, and the quality, quantity and frequency of the opiate taken. Clinical studies indicate that generally addiction results after about two weeks of continued opiate use. There have been cases, however, where addiction results after the administration of only a few doses of an opiate.

Of the four opiates which are usually abused - opium, morphine, codine and heroin - heroin is the one used and preferred by the vast majority of addicts in the United States today. Relative to the other opiates mentioned heroin produces the greatest and most intense euphoric and stimulant effects, and only a small amount is need to satisfy the addict. Morphine addiction is also prevalent, but with much less frequency than heroin use. Codine and opium addiction are scarce because of the large quantities of the drugs which must be taken to obtain the euphoric and stimulant effects.

Every conceivable method and route is used to get the opiate into the body. Morphine and heroin, however, are usually taken intravenously. The injection sites are frequently veins in the legs and arms, but some cases have been reported where the drug has been injected into the jugular vein, underneath the fingernails or toenails, under the tongue or between the fingers or toes. The injection method is popular because it gets the opiate into the bloodstream quickly producing a "rush" much akin to sexual orgasm. Codine is taken orally. Opium use is usually confined to smoking opium powder or drinking a mixture of opium powder preparation.

Contrary to popular belief the continued use of opiates has no direct effect upon the health of the addict. Rather, the ill health found in the majority of addicts

is the result of unsanitary living conditions, poor hygenic habits, non-sterile techniques of drug injection and malnutrition (Byrd, 1970, Goodman & Gilman, 1941). Some of the common maladies the addict exhibits are as follows: (1) infections associated with non-sterile techniques of opiate injection including abscesses at the injection site, inflammation of the adjoining body cells, blood clots, inflammation of the blood vessels, infections of the heart and liver (hepatitus), infections in other organs of the body, tetanus, lung damage, and malaria (rare in the United States); (2) infections at injection sites caused by broken needle fragments; (3) collasped veins caused by repeated and frequent injection; and (4) malnutrition caused by neglect of eating.

Opiate addiction is dangerous for both the addict and society as a whole. Addiction is dangerous for the addict because opiate seeking and administration become the salient goals of his life; health needs, personal needs, and social responsibilities are neglected or ignored so that he can procure, administer and experience the opiate effects and prevent withdrawal. In addition the addict frequently exposes himself to death resulting from overdose; often he does not know or care how potent the opiate he secures is, and many times comes close to opiate poisoning.

Addiction is dangerous for society (although most members of society do not realize it) because in most

cases the addict must resort to criminal activities to support his drug habit. Robbery, burglary, theft, forgery, shoplifting, prostitution and the selling of drugs are frequently engaged in by the addict to obtain money to purchase his supply of opiates.

Current surveys and clinical and police records estimate that there are about 250,000 addicts in the United States today (Science News, 1971) and that the majority of addicts are in the age range of 19-30 years. Robins & Murphy (1967) suggest, on the basis of their studies, that heroin usage declines between the age of 30-50 years. It seems few individuals become addicted after the age of 30 years and many addicts discontinue their opiate habit during this period. Presumably those addicts who cease using opiates no longer depend upon the drugs to maintain their well-being.

Psychiatric evaluation and clinical studies suggest that most addicts may be classified as having personality disorders (Goodman & Gilman, 1941). However, it is not uncommon for the addict to be diagnosed as a schizoid, psychotic or psychopathic deviant.

In the past the majority of known addicts came from big city ghettos and were classified culturally as Negroes, Mexicans and Puerto Ricans. Currently, however, the situation is changing and addiction is being recognized in middleclass and upperclass communities as well as in the total spectrum of cultures.

Opiate Withdrawal

When an individual becomes addicted to opiates and subsequently discontinues their use, he experiences withdrawal symptoms. The character and severity of withdrawal depend upon many factors such as the dose and frequency with which the opiate was used and the health of the addict. It is widely recognized by both addicts and those who deal with addicts that withdrawal in most cases is an excruciatingly painful experience.

Withdrawal symptoms start 4-12 hours or longer after the last opiate dose is taken. Within 48 hours the symptoms become severe and reach their peak in 72-96 hours. The symptoms usually decline by the fifth day and usually disappear 8 to 14 days after the last opiate encounter (Goodman & Gilman, 1941).

The first withdrawal symptoms to appear are lacrimation, yawning, sneezing, sweating, loss of appetite and tremor. These symptoms are followed by restlessness, depression, irritability, muscular weakness, mydriasis, violent yawning and marked loss of appetite.

As the severity of withdrawal increases the addict experiences marked chilliness alternating with vascomotor disturbances such as flushing and sweating. The chilliness experienced is manifested by the skin resembling the skin of a plucked turkey (hence the origin of the expression "cold turkey" for withdrawal). Vomiting may occur and

colic and diarrhea are common. During this period the addict also experiences pains in his abdomen, back and extremities.

Throughout this time the addict alternates between waking and sleeping states, and each time he awakes he becomes more miserable and restless than before.

By the eighth to fourteenth day of withdrawal the symptoms begin to disappear and the addict begins to function normally. However, he still craves narcotics and reports a narcotics hunger long after withdrawal ceases (in some cases, several years).

Treatment of Opiate Addiction

There are five basic approaches used in the treatment of opiate addiction. These include (1) combined medical, nursing and psychiatric treatment, (2) non-medically oriented group therapy in a community of addicts, (3) civil commitment programs for treatment and rehabilitation, (4) mutual support programs, and (5) methadone treatment. While each program differs from the others in its methods and areas of emphasis, all have a common goal, namely the rehabilitation of the opiate addict so that he can live a drug-free life.

The combined medical, nursing and psychiatric treatment programs are exemplified by the Federal government programs in Lexington, Kentucky and Forth Worth, Texas. The addict upon entering the special retreat or

hospital is withdrawn from the drug. Withdrawal may be abrupt, rapid, or slow (depending upon the addict's health). The withdrawal procedure consists of withdrawing the addict with either the drug he has used or a substitute drug. In the past such pharmacological agents as morphine, codine, diluadid and belladona alkaloids were used. Presently the synthetic narcotic methadone is being used for this purpose. After withdrawal has been accomplished efforts are made to rehabilitate the patient physically, psychologically and socially. Individual and group psychotherapy, medical treatment, and educational and vocational training are frequently employed for this purpose.

A second approach, non-medically oriented group therapy in a community of addicts, is exemplified by Synanon, Daytop Lodge Villege (Staten Island, New York) and the Family (Napa State Hospital, Napa, California). In this approach the addict lives in a community of addicts run and staffed primarily by ex-addicts. The basic assumption of this approach is that only those individuals who have experienced addiction can truly help the addict stop his addiction. The actual program involves an intensive routine of dicipline, work, group therapy, and community living. Some of the programs, e.g. Synanon, suggest that the addict remain in the community the rest of his life, while others aim at returning the ex-addict to life in the outside world.

Civil commitment programs represent a third type of treatment for opiate addiction. The California rehabilitation Program (Corona, California) and the civil commitment program in New York State are notable examples of this approach. In this type of program the addict, when arrested, is given a choice between standing trial for his narcotics violation or signing up for rehabilitation. If the addict chooses to go to trial and is found guilty he is likely to be put in the rehabilitation program anyway. Prior to entering the program the addict is withdrawn from opiates either in jail or a medical facility. After withdrawal is over the addict is sent to the treatment center to undergo rehabilitation. The emphasis in the program is on psychological, educational and vocational rehabilitation. Community living, group therapy and educational and vocational training are the usual methods employed in the rehabilitation process. After rehabilitation is completed the ex-addict is paroled and continues in a program of compulsory after-care for a prescribed amount of time.

Mutual support programs (Narcotics Anonymous) exemplify a fourth type of treatment for opiate addiction. These programs are modeled after Alcoholics Anonymous. The approach consists of group meetings of ex-addicts and addicts who discuss their drug and drug-related problems and reinforce one another for successful abstinence from drugs.

The newest approach in the treatment of drug addiction is found in methadone maintenance. This approach consists of substituting the synthetic narcotic methadone for the opiate the addict is addicted to. While methadone itself is addictive, it satisfies the narcotics hunger of the addict, allows him to function normally, and provides certain advantages over opiate addiction. This treatment is discussed in greater detail in the next section of this report.

On the whole the prognosis in drug addiction cannot be called favorable, although methadone maintenance (still in its experimental stages) appears to be promising. While some addicts "mature" out of addiction (Robins & Murphy, 1967) many continue to seek and employ opiates and a great many frequently lapse back into addiction after undergoing treatment.

Methadone and Methadone Maintenance

Methadone (i.e., methadone hydrocloride) is a synthetic narcotic whose chemical structure only remotely resembles that of morphine, but whose pharmacological properties are qualitatively similiar to those of the natural alkaloid. The drug is classified as a class A narcotic because it produces physiological dependence after continued use. Other names of the drug found in the literature include adonon, althose, amidone, and dolophine.

The drug was originally synthesized during World War II by German chemists looking for an inexpensive substitute for morphine. After the war the formula for the drug was seized by the United States government and turned over to American drug manufacturers. Since that time the drug has been used by physicians as a narcotics substitute. Currently the drug is being used in experimental studies with opiate addicts - methadone maintenance.

Methadone maintenance represents one of the newest approaches for the management of opiate addiction (particularity heroin addiction). The procedure, developed and outlined by Dole & Nyswander (1965), consists of administering the synthetic methadone to opiate addicts (the majority have been heroin addicts) on a daily basis. The drug satisfies the narcotics hunger of the addict, prevents opiate withdrawal, and allows the addict to function normally with neither sedation nor euphoria (Dole & Nyswander, 1965, Dole, Nyswander, & Kreek, 1966, Nyswander, 1971, and Smith & Bentel, 1970). The satisfying of the narcotics hunger in turn frees the addict from his continual opiate seeking and taking behavior and allows him to concentrate on rehabilitating himself.

The rationale for using methadone is discussed in Dole & Nyswander (1969), Dole, Nyswander, & Kreek (1966), and Nyswander (1971). These authors hypothesize that opiate addiction represents an acquired metabolic alteration (dysfunction or deficiency). This alteration

is consequently manifested in the narcotics hunger addicts report during addiction and long after narcotics withdrawal has ceased; a narcotics hunger which experts consider maintains addiction and causes relapse back into addiction. Considering this metabolic alteration the authors conclude that the only feasible method at present to treat addiction is the administration of methadone as a substitute drug for the opiate in chemotherapy. Although methadone itself is addicting in the same manner as opiates, it satisfies the narcotics hunger of the addict, and allows the addict to function normally (psychologically and physiologically). In addition methadone provides certain advantages over opiates in terms of administration, duration of action, etc. (these issues will be discussed below).

Methadone maintenance then is essentially a form of narcotics substitution chemotherapy. Methadone is substituted for heroin, morphine, or codine as the addict's drug. Thus methadone maintenance is not aimed at curing addiction but rather managing it in a way acceptable to the addict and society.

Although methadone maintenance does not cure, eliminate, or prevent opiate addiction it does provide advantages in comparison to illegal opiate addiction. The arguements for methadone substitution in addiction proceed as follows:

1. Methadone satisfies the narcotics hunger of the addict. Once this hunger is satisfied the addict is free from the overpowering desire to obtain and administer opiates and is conducive to rehabilitation and/or therapy. Dole & Nyswander (1965) report that 22 hard-core criminal addicts ceased to experience narcotics hunger after being maintained on methadone. The addicts reportedly could meet addict friends, watch them inject heroin, and tolerate frustrating episodes without desiring a fix (shot of heroin). In addition the addicts stopped talking and dreaming about drugs. Other studies (Dole, Nyswander, & Kreek, 1966, and Nyswander, 1971) report the same results using larger sample of heroin addicts.

2. Methadone, through a mechanism of cross-tolerance blocks the euphoric effects of opiates, i.e. and addict maintained on methadone who takes an opiate will not experience its effects. Freedman, Zeks, Resnick, & Fink (1971) report that methadone (maintenance dose of 100 mg.) successfully blocked the effects of the intravenous administration of 25, 50, and 75 mg. of recrystallized heroin in saline solution for up to 24 hours. The effects of heroin administered 48 hours after methadone were experienced. No blocking effect was evident when heroin was injected 72 hours after the last methadone dose. Nyswander (1971) also reports the blocking effect of methadone on heroin. Zeks, Bruner, Fink, & Freedman (1969) report that intravenous injections of 25 mg. of heroin

were successfully blocked by maintenance doses of methadone (100-120 mg.) for up to 36 hours. Dole & Nyswander (1965) have found that addicts stabilized on methadone are made refractory to 40-80 mg. doses of heroin. The authors also state that addicts in their program reported that they did not get "high" shooting heroin "on the street" when maintained on methadone.

Those familiar with operant conditioning will clearly recognize the value of methadone. Responses continually made in the absence of reinforcement will eventually be extinguished. Interpreting the methadone blockage in this light one can conclude that the responses of seeking and administering opiates will eventually be extinguished when the euphoric effects of the drugs are no longer present because of methadone blockage.

3. Methadone allows the addict to function normally (psychologically and physiologically). Dole & Nyswander (1965), Dole, Nyswander, & Kreek (1966), Dole, Nyswander & Werner (1968), and Smith & Bentel (1970) have found that methadone when given in appropriate amounts produces neither euphoria nor sedation. Dole & Nyswander (1965) report that in their extensive studies of methadone they cannot find a test (medical or psychological) that distinguishes patients on methadone from normal controls. Smith & Bentel (1970) report that methadone maintenance has no effect on vigilance, reaction time, or intellectual function. Nyswander (1971)

reports that addicts studied after at least 5 years in methadone treatment showed no adverse effects in the kidney, liver, bone marrow, or respiratory tract, or in the central nervous system and neuromuscular system. Nyswander further states that methadone was found to be compatible with all types of medications and conditions, including surgery and anesthetics.

4. Methadone is orally effective when administered in pill or liquid form. Oral administration of methadone in contrast to intravenous injection of heroin or morphine is safer and hygienically sound.

5. A stabilization dose of methadone can be found, i.e. there is an upper limit to the dosage level at which an addict can be maintained (Nyswander, 1971). In contrast, opiate users must continually increase their dose to maintain their addiction and prevent withdrawal.

6. The withdrawal onset period (time between last dosage of a drug and the beginnings of withdrawal) is considerably longer for methadone (72 hours) than it is for opiates (3-6 hours). Thus the addict who misses one to two days of methadone medication will not usually experience withdrawal (Dole, Nyswander, & Kreek, 1966).

7. Methadone is long acting. Unlike heroin or morphine which must be taken many times a day, one daily dose of methadone is sufficient to maintain the addict's comfort and prevent withdrawal (Nyswander, 1971).

8. Methadone is free from the moral stigma and bad image of opiates.

9. Methadone is highly acceptable to addicts as a opiate substitute (Isbell, Wikler, Riseman, Dainesfield, & Frank, 1948).

10. Withdrawal due to methadone is less severe than withdrawal due to opiates. In the event an addict is taken off methadone the painful stimuli associated with withdrawal will be milder (although longer in duration) than those stimuli associated with opiate withdrawal (Jaffe, 1970).

11. Methadone is inexpensive, costing 10¢ to 16¢ for a daily stabilization dose of 100 mg. The advantage of methadone over opiates in this case is quite evident.

12. Methadone maintenance offers an economic and logistically feasible opportunity to maintain large populations of addicts under controlled administration of medication.

Thus, it is clearly evident that while methadone maintenance does indeed perpetuate addiction, it does so in a manner which is safer, healthier, and more acceptable to society than the opiate addiction it replaces.

There are three basic types of methadone maintenance programs: inpatient, outpatient, and combination inpatient-outpatient programs. Inpatient programs involve administering methadone to addicts who live on the premises of the methadone treatment center. Typically these centers

are hospitals, government sponsored addiction centers, and the like. In addition to administering methadone the programs usually provide the addict with psychiatric and/or rehabilitation services. Outpatient programs differ from inpatient programs in that the addict resides away from the treatment center and his only real contact with the program is coming to the center for methadone and weekly meetings with other patients and staff members. The third type of methadone maintenance program encompasses both the inpatient and outpatient programs. In this case the addict is first admitted to the inpatient phase of the program and receives psychiatric and/or rehabilitative services. After he has made sufficient progress he is graduated to outpatient status. During outpatient status he continues to come to the center for methadone and supportive measures when needed.

The actual administration and dispensation procedures are usually the same in all of these programs. After careful screening, evaluation, and medical and psychological testing the addict, if accepted into the program, receives small doses of methadone daily which are gradually increased to a stabilization or maintenance level. The stabilization level is determined when the addict reaches a dosage level at which he is comfortable, no longer craves opiates, and is attentive to both external and internal stimuli. The final stabilization level depends upon both the physical condition of the addict

and the type and amount of opiate used. The daily maintenance dosages used thus far in methadone maintenance programs range from 20 mg. to 150 mg. of methadone.

The length of time the addict must stay on methadone has not yet been determined. However, it is generally agreed by researchers in this field that many addicts will have to continue methadone maintenance indefinitely if they are to be prevented from relapsing into opiate addiction.

The actual number of addicts undergoing methadone maintenance is quite small because methadone is still classified by the Federal government as an experimental drug, and consequently only methadone maintenance research programs of a limited scale are being employed; Jaffe (1969) estimates that 2% of the addicts in the United States are undergoing methadone treatment at this time.

Methadone maintenance program evaluation thus far indicates that methadone is a successful agent in the chemotherapy of opiate addicts. Dole & Nyswander (1965) report the successful treatment and rehabilitation of 22 criminal addicts using methadone. Dole & Nyswander (1966) and Dole, Nyswander, & Kreek (1966) using a group of one hundred confirmed "mainline addicts" report that two and one fourth years after the start of the study 89% of the subjects were still using methadone and were rehabilitated. All of the subjects had lost their craving for heroin, crime related to narcotics use was eliminated, and a great

majority of the subjects were holding steady jobs and going to school. Dole et al. (1968) in a study using 750 addicts report a 88% success rate in a four year methadone maintenance program in which arrest rate for criminal activities was used as the behavioral measure for success.

Thus methadone maintenance, although still in its experimental stages, promises to be an effective and efficient means of dealing with the problem of opiate addiction.

The Drug Abuse Program at Stockton State Hospital (SSH)

The drug abuse program at SSH, called Drug Abuse Rehabilitation and Education (Project DARE), was a voluntary commitment inpatient program open to drug abusers from San Joaquin and surrounding counties. The vast majority of the patient population were heroin addicts, while the remainder was made up of abusers of amphetamines, barbituates, hallucinogens, and other drugs. Most of the heroin addicts were referred to SSH by the San Joaquin County Drug Abuse Agency (Stockton, California).

The program consisted of medical treatment, individual and group psychotherapy, work assignments, educational and vocational rehabilitation, participation in research projects (as subjects), and methadone maintenance (for opiate addicts). Members of the Research and Psychology Departments, Rehabilitation Services, and the drug abuse ward staff and physician of SSH provided these services.

Methadone Maintenance Research Protocol

The admission policy for subjects and general methadone maintenance program procedures at SSH followed the "Methadone Maintenance Standard Protocol" as outlined by the Department of Health, Education and Welfare's Conditions for Investigational Use of Methadone for Maintenance Programs for Narcotics Addicts (Federal Register, 1970). This article and other articles relating to official policies and procedures regarding methadone maintenance programs are contained in Appendix I.A.

The following represents an outline of procedures used in the methadone research projects at SSH. Parts of the outline have been taken directly or paraphrased from the above mentioned Federal Register article.

1. Admission criteria for subjects:

A. Documented history of abuse of one or more opiate drugs, the duration of which is to be stated.

B. Confirmed history of one or more failures of withdrawal treatment.

C. Evidence of current abuse of opiates.

2. Criteria for exclusion of subjects from the program:

A. Pregnancy

B. Psychosis

C. Serious physical disease

D. Persons less than 18 years of age

3. Admission evaluation:

A. History of subject: Recorded history is to

include age, sex, verified history of arrests and convictions, educational level, employment history, history of drug abuse of all types.

B. Medical history of significant illnesses.

C. History of prior psychiatric evaluation and/or treatment.

D. Physical examination (to be repeated annually).

E. Formal psychiatric examination in subjects with with a prior history of psychiatric treatment and in those cases in whom there is a question of psychosis and/or competence to give informed consent.

F. Chest X-ray (to be repeated annually).

G. Laboratory examinations to include complete blood count, routine urinalysis, liver function studies (including SGOT, alkaline, phosphatase, total protein, and albuminglobulin ratio), fasting blood sugar, blood urea nitrogen, serologic test for syphilis (to be repeated at 6-month intervals).

The screening of subjects, recording of the various previously mentioned histories, and medical and psychiatric examinations were carried out by professional and staff members of SSH and the drug abuse agencies of San Joaquin County.

4. Intake and determination of maintenance dose level:

The volunteer addict if accepted for study under the procedures mentioned above reported to SSH as an inpatient for behavioral and pharmacological therapy.

Once admitted to the program the addict was placed on methadone administered daily in orange juice. The schedule for methadone dosages from intake to stabilization (maintenance) was as follows:

a. 10 mg., b.i.d. (administered twice daily), for one week.

b. 20 mg., b.i.d., for one week, unless the patient dozed off during the morning therapy session.

c. 40 mg. b.i.d., for one week, unless the patient dozed off in therapy.

d. 50 mg. b.i.d., for one week, unless the patient dozed off in therapy.

e. 60 mg. b.i.d., for one week, unless the patient dozed off in therapy.

While the above procedure was followed in most cases there were exceptions in the establishment of methadone maintenance dosage levels for individual addicts. In these cases the ward physician determined the maintenance schedule as dictated by the subject's condition.

Each experiment in this report followed this procedure, unless otherwise noted in the text.

5. Methadone dispensation procedure:

Methadone was issued in oral form (liquid or tablet dissolved in orange juice), so formulated as to minimize misuse by parenteral injection. The dosage was given under the close supervision of the drug ward staff members licensed to administer narcotics.

6. Urinalysis:

Urine specimens were randomly collected for analysis at intervals not exceeding one week. The urine collection was supervised by members of the drug ward staff. Urine specimens were analyzed for methadone, morphine, quinine, cocaine, barbituates, and amphetamines.

7. Methadone storage:

The methadone was stored by the SSH pharmacy in a locked, steel vault and delivered to the ward just prior to dispensation.

8. Records:

Elaborate records were maintained by the pharmacy and nursing staff according to official Department of Mental Health operating procedures for narcotics reception, maintenance, and disposition. Records were also kept for each subject on each aspect of the treatment program including adverse reactions to methadone and the treatment thereof.

9. Voluntary and involuntary terminations:

A. Attempts were made to obtain followup information on all subjects who elected to leave the program. Whenever possible, the subject was hospitalized for gradual withdrawal from methadone.

B. Subjects were terminated as having failed the program on the basis of continued frequent abuse of narcotics or other drugs, alcoholism, criminal activity, or persistent failure to adhere to the requirements of the program.

Chapter 2

Literature Review For Five Experiments

Experiment I

Experiment I investigated motivational factors affecting the voluntary participation of inpatient heroin addicts and drug abusers in behavioral and pharmacological therapy at SSH. High drop-out rates and frequent readmissions characterize all voluntary treatment systems (Freedman, Fink, Sharoff, & Zaks, 1967). To engage the patients in therapy this study utilized two methods of learning, participation versus passive, and three "therapeutic drugs", methadone, apomorphine, and atropine sulfate. The learning methods were expected to generate two degrees of intrinsic motivation while the drugs were expected to control in different degrees the aversive drives, pain and anxiety associated with heroin withdrawal and psychological drug craving.

Grant and Grant (1967) presented a therapeutic model encompassing participation learning in their report on the New Careers Development Project. In essence New Careers is a model for training change and development teams that can function as enablers to assist professionals in programs designed to aid, rehabilitate and increase

the opportunities of people in need of assistance, i.e. the poor, criminals, drug addicts and abusers, etc.

The training emphasis is on individual and team efforts towards the development of (a) group skills-techniques to work with and within a group, abilities to get groups going and keep them going, and knowledge of observational techniques that may be used with groups, (b) research skills-abilities to use various research techniques, including an understanding of statistics and the concept of research as a tool, (c) organizational dynamics-ability to diagnostically study organizations, their workings and impact, (d) strategies for planned change-abilities for, and the understanding of, methods of bringing about a change, (e) knowledge of social trends and issues-knowing, with understanding, social problems, trends, issues, and programs that are aimed at combating them, (f) interview skills-abilities to conduct proper interviews to gather information that is desired, (g) self-awareness-abilities to be cognizant of oneself, (h) writing skills-abilities to write and express ideas well, (i) speaking skills-abilities to speak clearly and well, and (j) reading skills-abilities to comprehend and study material.

The learning principles upon which the curriculum is based are as follows: (a) learning methods must be tailored to the individual, (b) learning is more rapid, permanent, and usable to the individual when it is perceived by the learner as being important to himself,

(c) learning is more effective when it results from efforts to find answers to self-initiated questions, (d) self-study is more effective when it is part of an achievement rather than self-curing system, and (e) group sharing of self-study in achievement tasks generates powerful forces for enhancing learning as well as providing social content for study.

The training enables the New Careerist (a) to become aware of change as a process in the dynamics of organizations and communities, (b) to be able to work effectively with individuals and groups, both agency staff and people in need of agency service, (c) to become able to use research services in collecting and analyzing data, and relaying information back to the proper people, (d) to become aware of abilities and problem areas, and (e) to become better at basic educational skills.

See Appendix I.B for a list of publications describing the New Careers Project and/or related theoretical issues.

The achievement-oriented New Careers method was used because it offered the addict a powerful source of intrinsic reinforcement derived from developing capabilities and successful achievement. Accordingly, the behavioral therapy for the experimental group employed the New Careers participation model while the sessions for the control group did not. The control group received lectures on the identical subject matter under the traditional schoolroom methods of "passive" learning.

The theoretical and practical considerations behind the selection of drugs and dosage levels for the control of the pain and anxieties associated with heroin withdrawal and drug abstinence may be summarized as follows:
(a) Methadone hydrocloride has recently received qualified experimental support as a narcotic substitute and effective antagonist to narcotic withdrawal symptoms and the euphoric and systemic effects of opiates. Ausubel (1966) and Dole & Nyswander (1965) have recommended initial doses of 10-20 mg., twice daily, to control abstinence symptoms and avoid euphoric effects. The smallest dosage, 10 mg./capsule, 1 b.i.d. (twice daily), was used in the present study to reduce the aversive effects of heroin abstinence.
(b) Apomorphine is an emetic used to induce vomiting in the case of poisoning. Burroughs (1959) reported that apomorphine has been used in combination with minute amounts of morphine as an effective antagonist to withdrawal. The reported "cure", if valid, may represent successful avoidance conditioning mediated by the aversion to the apomorphine, the morphine serving as the conditioned stimulus. In order to investigate the possibility of other sub-emetic therapeutic effects of apomorphine in drug abstinence, this study used 6.5 mg./cap., 1 b.i.d. The expectation, however, was that even a sub-emetic dosage could increase the aversive effects due to drug abstinence. (c) Atropine sulfate was used as a placebo for purposes of experimental

control. Superficial similarities between the experimental drugs in appearance, taste, and certain peripheral physiological effects made atropine the logical choice for the placebo. Any motivational effects due to atropine, however, were expected to mediate between those due to methadone or apomorphine. The dosage was 0.4 mg./cap., 1 b.i.d.

The conceptual hypotheses were that any real differences in performance measures of drug abusers due to learning methods would favor the participation model (New Careers) and drug treatments would favor methadone over atropine and both of these over apomorphine; and that these differences would increase over time.

Experiment II

The second experiment at SSH was designed to evaluate two motivational techniques affecting the voluntary participation of heroin addicts in a program of behavioral therapy using methadone as a reinforcer.

Nichols (1967) and Wikler & Rasor (1953) contend that opiates may be powerful reinforcers for behavior because they function to reduce drives--a common characteristic of reinforcers.[1] This contention is supported by the work of Wikler (1953) who found that sex, hunger, anxiety, and

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[1]Reinforcer in this case and where subsequently mentioned in the text refers to a consequence of behavior which alters the probability of the occurrence of that behavior in the future.

pain drives were reduced by opiates. Davis & Nichols (1962), Nichols (1965), and Weeks (1964) interpret opiate reinforcement in a somewhat different manner and state that opiates may function as reinforcers because they serve to reduce the aversive effects associated with opiate withdrawal. It may also be suggested that opiates function as reinforcers because of their well-known euphoric effects. Ausubel (1966) citing Wikler (1936) speaks of methadone's and morphine's similar euphoric producing properties. Isbell, Wikler, Eisenman, Dainserfield & Frank (1948) report that veteran morphine addicts experienced euphoric effects from morphine, heroin, "dilaudid" (dihydromorphinone hydrochloride) and methadone. The authors further state that methadone's euphoria was rated the highest and most desirable of the four hedonic reactions.

Research with animals supports the contention that opiates function as reinforcement (drive reduction, withdrawal reduction or euphoria) remains unclear. Nichols (1967), (1965), Nichols, Headlee & Coprock (1956) and Wikler & Pescor (1967) have found that rats after having been addicted to morphine experimentally will learn to drink water containing morphine rather than initially preferred morphine-free tap water. Spragg (1939) conditioned morphine addicted chimpanzees to open a box by pressing a pedal for morphine reinforcement. Weeks (1962), (1964) has found that rats can be trained to emit a lever-pressing

or pedal-pressing response to receive intravenously infused morphine on a fixed-ratio schedule of reinforcement. Thompson & Schuster (1964) using intravenous infusion of morphine as reinforcement conditioned a lever-pressing response in monkeys (using a two-member behavior chain). The behavior was maintained on the fixed-interval-fixed-ratio chain for 6 months. Nichols (1965) trained rats to lever-press for an injection of morphine. Schuster & Woods (1967) reported that adult rhesus monkeys bar-pressed for injections of morphine reinforcement. The animals were surgically prepared with chronic indwelling jugular catheters for reinforcement administration. Khazan, Weeks, & Schroeder (1967) have reported that rats will lever-press on a fixed-ratio schedule of reinforcement for 10 mg./kg. morphine reinforcement. Wikler & Pescor (1967) reported morphine functioned as a reinforcer in an escape training paradigm; rats learned a response that enabled them to escape the noxious stimuli associated with morphine abstinence.

Thus, there is considerable evidence that opiates, introduced orally, intravenously, or intraperitoneally, act as reinforcers in the modification of operant behavior.

Taking the above mentioned research into account it was hypothesized that methadone would function as a reinforcer for appropriate behavior in inpatient heroin addicts undergoing behavioral therapy. In as much as methadone's pharmacological properties resemble those

of morphine and methadone prevents narcotics withdrawal, it seemed logical that the drug would function as a reinforcer for behavior.

The experiment was designed as a token economy system (Ayllon & Azrin, 1968, and Schaefer & Martin, 1969) in which methadone was made contingent upon the performance of certain well-defined and specified behaviors. Since it was impossible to administer methadone reinforcement each time the behavior occurred, subjects received tokens (small plastic chips) which could be used for the purchase of methadone at a later date (methadone medication time on the ward). The tokens functioned to bridge the time delay between the response and reinforcement.

The actual variables investigated in the research project were two motivational variables designed to increase positive responding in the behavioral therapy setting (the token economy). The first variable was gambling status. Past research (Collier & Meyers, 1961, Crespi, 1949, Logan, 1960, and Zeaman, 1949) has shown that as the magnitude of reinforcement increases, response strength (amplitude, frequency, speed of response) increases. It was hypothesized that giving the subjects the opportunity to gamble the tokens they had earned for the purpose of possibly winning extra tokens would serve to increase the subjective value of the tokens, hence reinforcement. It was felt that in this case the tokens would not only have a given value for the purchase of methadone but also assume

additional value as a means of obtaining more tokens, i.e. more methadone. Thus the reinforcing value of the tokens would be increased; the reward magnitude for behavior would be subjectively increased.

The second factor under investigation in the research project was peer pressure as a technique to increase motivation in the subjects. It was hypothesized that experimental subjects whose behavior determined the maximum amount of methadone that could be purchased by subjects in the control group would be pressured by this group towards increased responding so as to maximize the amount of methadone that they could purchase.

The conceptual hypotheses were that (a) heroin addicts would earn more tokens used for the purchase of methadone if they were given the opportunity to risk these tokens in games of chance that allowed them the possibility of winning extra tokens; (b) those addicts who could actively determine their maximum amount of methadone would earn more tokens than those individuals who could not; and (c) the differences between groups would increase with time.

Experiment III

The third study at SSH involved running a control group to compare with the methadone-contingency groups of Experiment II. Subjects in Experiment II were reinforced with methadone for (1) attending research group

meetings, (2) completing and handing in assignments, (3) the quality of the assignments, and (4) attending small group therapy sessions on the ward. Experiment III was designed to evaluate the effectiveness of methadone as a reinforcer for appropriate behavior. The research involved conducting group sessions identical to those in Experiment II with the exception that subjects were not reinforced with methadone for the above mentioned behaviors; rather they were given methadone whether they performed the behaviors or not.

The conceptual hypotheses were that inpatient heroin addicts reinforced with methadone for appropriate behavior would exhibit this behavior to a greater extent than those addicts who were not reinforced with the drug, and that this difference would increase with time.

Experiment IV

Experiment IV at SSH involved the investigation of two types of therapy (New Careers and Encounter Group) under conditions of behavioral modification using methadone as a primary reinforcing agent. The study was stimulated by previous research at SSH (Experiments I and III) which suggested that the New Careers method of therapy and methadone-reinforcement were powerful means of motivating engagement and active participation in inpatient drug abuse programs.

The study was also stimulated by the proceedings at the National Institute of Mental Health sponsored

National Drug Abuse Training Center (California State College at Hayward, October 1970). Here members of the research staff of SSH (this author included) and members of drug abuse agencies throughout Northern and Central California discussed types of therapy currently being used with heroin addicts and drug abusers. One of the conclusions from the talks was that while the Encounter group method was widely used in drug abuse programs it had never been truly verified by statistically evaluated research. Therefore, the present study involved the formal evaluation of the Encounter group type therapy.

The Encounter group approach is currently being used widely by various drug abuse programs throughout California. Some of the major programs and their locations include the Berkeley Free Clinic, Berkeley; Pittsburg Drug Therapy Program, Pittsburg; Napa State Hospital Drug Program, Napa; Friends, Inc., Stockton; and the Stockton State Hospital Drug Abuse Program (Project DARE), Stockton.

These programs represent a group therapy type approach whose methods include sensitivity training, marathon therapy sessions lasting for days, and encounter groups which seek to lower a person's own evaluation of himself to rock bottom by initially rejecting him on every possible count and then selectively building him up to become a self-aware and self-confident individual through group acceptance and reinforcement of appropriate behaviors.

Salient goals for the individual in such programs include (1) increased self-awareness and self-confidence, (2) shifts in focus from the past to immediate problems, (3) consideration and creation of alternative solutions to problems, (4) appropriate discharge of emotions, (5) adoption of drug-free values, attitudes, and behavior, (6) the ability to communicate feelings, and (7) the formation of intimate, satisfying relationships with others.

The second method of therapy investigated was the New Careers approach. This method of therapy was essentially the same as that used in the previous studies.

As was previously mentioned the study also evaluated the effectiveness of methadone as a primary reinforcing agent in the modification of behavior. Although the basic methadone reinforcement paradigm from Experiment III was retained in the present study the methadone-reinforcement techniques used were modified for the study of large populations of subjects. The first procedural modification was the use of points instead of tokens. This eliminated the need for creating a large number of individualized tokens for the subjects.

Secondly, the methadone reinforcement payment plan was modified. This was done in consideration of the fact that subjects in the present study were being maintained on various methadone maintenance dosage levels ranging from 40 mg. to 120 mg. per day. It was felt that a single methadone payment plan with a one-to-one correspondence

between points earned and dose of methadone could not be used. Consequently, a sliding scale was developed to equate points earned for behavior with the subjective value of the methadone reinforcement. Through the use of this payment plan all subjects, regardless of their methadone maintenance level, received equal methadone reinforcement for their behavior.

In addition to the use of the sliding scale for the payment of methadone, the present study utilized methadone dosages in excess of the maintenance level. The purpose of giving the addicts the opportunity to purchase higher dosages was included in the study to determine if increasing the magnitude of reinforcement would result in increased performance of appropriate behavior. It was felt that the increased range of available dosages would function to increase motivation and hence positive responding. In correspondence with the increased magnitude of reinforcement, the contingencies between methadone and behavior were also increased in difficulty.

The conceptual hypotheses were that: (1) Heroin addicts reinforced with methadone for appropriate behavior would exhibit this behavior to a greater extent than heroin addicts not reinforced with methadone, and (2) the frequency of the appropriate behavior would be greater for those addicts who attended a New Careers group than those addicts who attended an encounter group meeting.

Originally Experiment IV was to evaluate the experimental factors for eight weeks. However, on Day 8 of the study the research department at SSH was notified by the California Attorney General's Office and the California Research Advisory Board (agency in charge of methadone maintenance programs) that the research project was to be terminated immediately. The reason given by these agencies was that methadone reinforcement perpetuated the addict's "hustling" for drugs and could not be tolerated. The research department had no alternative but to comply with the directive and the research project was terminated. The consequence of the directive was to terminate the use of methadone on the ward for a brief period of time. Further research on methadone was not engaged in after this directive had taken effect.

Consequently, the results reported in the present study were taken from the first eight days of the research project.

Experiment V

The study evaluated the effect of methadone on perceptual and motor functioning in the heroin addict. The study was done on the recommendation of the Department of Health, Education, and Welfare as outlined in Conditions for the Investigational Use of Methadone for Maintenance Programs for Narcotics Addicts (Federal Register, 1970). Since methadone hydrocloride is still classified as an

"experimental drug" methadone maintenance programs, when and where feasible, are instructed to evaluate methadone's safety and efficacy.

Research in other methadone maintenance programs thus far indicate that methadone has no significant effect upon the normal physiological and psychological functioning of the maintained addict. Dole & Nyswander (1965), Dole, Nyswander, & Werner (1968) and Smith & Bentel (1970) have found that methadone administered in appropriate amounts produces neither euphoria nor sedation. Dole & Nyswander (1965) reported that in their extensive studies on methadone they could not find a test that was able to distinguish addicts maintained on methadone from normal controls. Tests used in the study were both psychological and medical. Smith & Bentel (1970) reported that methadone maintenance had no effect on vigilance, reaction time, or intellectual functioning. Jaffe (1970) has also reported that addicts maintained on methadone function normally (psychologically and physically).

The conceptual hypothesis was that perceptual and motor functioning in the heroin addict would not change before and after methadone maintenance.

Chapter 3

Experiment I[1]

The conceptual hypotheses, as stated on page 33, were that (a) drug abusers engaged in a participation type learning method of therapy would attend more therapy sessions, retain more information covered in these sessions, and show more intrinsic achievement-motivation indices and less anxiety symptoms than drug abusers engaged in a passive type learning method of therapy, (b) the drug abusers receiving methadone in conjunction with these therapy sessions would outperform those subjects receiving atropine, and both these groups would outperform subjects receiving apomorphine, and (c) the differences between the groups would increase with time.

Drug abusers were defined as patients at Stockton State Hospital engaged in therapy for problems related to drug usage of the illegal type. The group included abusers

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[1]Prior to the completion of this thesis the research reported in this chapter was published. The publication, Matheson, D. W., Earl, R. W., Lynch, S. J., Davison, M. & Austin, R. G. "A behavior change participation model for drug users undergoing pharmacological therapy", appeared in Matheson, D. W. & Davison, M. (Eds.) The Behavioral Effects of Drugs. New York: Holt, Rinehart, & Winston, 1972, 257-263. Parts of the present chapter have been quoted or paraphased from this publication.

of opiates, barbituates, and amphetamines. The participation type learning method of therapy referred to the New Careers model for learning in which subjects took an active part in their own learning process. The passive type learning method referred to the traditional schoolroom method of learning by lecture. Therapy sessions were defined as one-hour long daily meetings in which the subjects learned about drugs, types of rehabilitation for drug users, and the philosophy and goals of the New Careers Development Project. These meetings were held in either the active or passive learning method format. Attendance at these meetings was defined as a subject's voluntary attendance at the therapy session. The retention of information covered during these meetings was defined as the amount of learning which took place over the three weeks of behavioral therapy. This was measured through the evaluation of pre- and post-test performance on material which was discussed and lectured on during the therapy sessions. Intrinsic achievement-motivation indices referred to characteristics of each subject noted during the group meetings. Specifically these indices included goal setting, planning ahead, positive contributions in the meetings, and sociability. Anxiety symptoms referred to depression, apathy, hostility, negative contributions during the meetings, and complaints shown during the therapy sessions. Methadone was defined as a narcotic substitute and antagonist to narcotic withdrawal symptoms and the euphoric effects

of opiates. Atropine was defined as a placebo which had superficial similarities to the experimental drugs (methadone and apomorphine) in appearance, taste, and certain peripheral physiological effects (i.e., sweating, nausea). This drug was used for purposes of experimental control. Apomorphine was defined as an emetic which has been used in combination with minute amounts of morphine as an effective agent in the cure of heroin addiction and as an antagonist to abstinence symptoms.

There were three independent variables in the study. The first variable under investigation was the type of therapeutic learning method employed and consisted of two levels: participation learning method and passive learning method. The second independent variable was the type of drug used in conjunction with the learning methods and consisted of three levels: methadone, atropine, and apomorphine. The third independent variable was time and consisted of three levels, each level being defined as one week of the three weeks of behavioral therapy.

There were four dependent variables in the experiment. The first dependent variable was the percentage of one-hour long therapy sessions a subject voluntarily attended on Mondays through Fridays in each week of the three-week periods of the behavioral therapy program. A subject was considered to have attended a session if he came within five minutes after its beginning and stayed until its end. The second dependent variable was the subject's retention

of material covered in the therapy sessions. It was measured by the difference score between the subject's pre- and post-test performance on a test dealing with topics covered in the daily therapy sessions. The third and fourth dependent variables consisted of the frequency of various characteristics of intrasession behaviors of each subject during 9 out of 15 sessions. The third dependent variable dealt with intrinsic achievement-motivation indices such as goal setting, planning ahead, positive contributions, and sociability. The fourth dependent variable consisted of the frequency of anxiety symptoms such as depression, apathy, hostility, negative contributions, and complaints. The daily frequency of a subject's behaviors for each of these variables was noted and an Anxiety Frequency Score and an Intrinsic Achievement-Motivation Score was tabulated for each subject during each day of behavioral observation.

The experimental hypotheses were that (a) voluntary inpatient drug abusers engaged in the New Careers participation learning method of therapy would exhibit a greater frequency of therapy session attendance, have significantly greater retention scores as measured by pre- and post-test performance on a test dealing with material covered in the therapy sessions, and have higher Intrinsic Achievement-Motivation Scores and lower Anxiety Scores than drug abusers engaged in a passive learning method of therapy employing the traditional lecture approach, (b) the drug

abusers receiving methadone in conjunction with these therapy sessions would outperform those subjects receiving atropine, and both these groups would outperform subjects receiving apomorphine, and (c) the differences between these groups would increase over the three weeks of the study.

Method

Seven male and six female voluntary inpatients at Stockton State Hospital served as subjects. The mean age of the subjects was 22 years, with a range from 16-41 years. The average subject had completed 10th grade education, with a range from 5th to 12th grade. Three males and one female were heroin addicts; the remainder were classified under drug abuse.

The patients were exhaustively interviewed and medically examined prior to acceptance in order to determine the extent of their drug involvement and their psychological and physical suitability as subjects. All available candidates qualified and subsequent analysis of psychological test scores showed that the randomization procedures satisfactorily equated subgroups on the variables measured, namely, (a) the Peabody Picture Vocabulary Test, (b) Digit Span, WAIS, (c) Memory for Designs Test, (d) Shipley-Institute of Living Scale, and (e) the Julian Rotter-Internal-External Locus of Control Scale.

The subjects were randomly assigned to the six conditions (two learning methods and three drug treatments)

under the restrictions that (a) only verified (by abstinence symptoms) heroin addicts could receive methadone, and (b) prior to the termination of the experiment, the pharmacist alone should know the exact assignments of subjects to conditions. Table 1 shows the actual subclass n's. Since each behavioral measure summarized a subject's performance from Monday through Friday for each of the three weeks of behavioral therapy, the experimental design conformed to a 2 x 3 x 3 factorial design with repeated measures on the third factor.

The drug therapy program commenced with all subjects receiving atropine sulfate, 0.4 mg./cap., 1 b.i.d., for seven days, followed by 24 days of differential drug therapy. The daily dosage for each group (per subject) during this phase of the study consisted of the following: (a) Methadone group: 10 mg./cap. 1 b.i.d., (b) Atropine group: 0.4 mg./cap. 1 b.i.d., and (c) Apomorphine group: 6.5 mg./cap. 1 b.i.d. The three treatment drugs were dispensed in identical blue capsules. The contents were similar in taste and capable of inducing similiar, although minor, physiological and psychological reactions that served to mask the identity of the drugs from the subjects and nursing staff on the drug ward alike.

The behavioral therapy sessions began on Day 13 of the experiment and ended on Day 31, terminating the study. The sessions were held on Mondays through Fridays in the afternoon in the Professional Building at Stockton State Hospital.

Two Student Professional Assistants alternated as lecturers during the passive learning method therapy sessions. The course content included instruction an (a) established research results on drug effects, therapy, and rehabilitation, (b) psychological research and theory on addiction and related personality disorders, and (c) New Careers goals, sub-goals, and ten skill areas requisite to goal attainment.

During the participation learning method therapy sessions the same two Student Professional Assistants alternated as guides, catalysts, reinforcers, resource individuals, moderators, and change agents operating under quasi-socratic methods. The subjects, working in teams of sizes 2, 2, and 3, were given initial library research assignments in subject areas covered by the lectures under the passive learning condition. Emphasis was on team efforts towards the development of (a) group skills, (b) research skills, (c) organizational dynamics, (d) strategies for planned change, (e) knowledge of social trends and issues, (f) interview skills, (g) self-awareness, (h) writing skills, (i) speaking skills, and (j) reading skills. Obviously, this program was overly ambitious for the 15 one-hour long sessions; but this criticism is irrelevant, since the purpose of this research was to study the effectiveness of the participation process as a motivational technique, regardless of short-term improvement or differential group performance in the

skill areas listed. The actual therapy sessions consisted of a group discussion of the topic which had been researched, with an emphasis on subject participation and leadership.

During each of the sessions the two Student Professional Assistants noted the subjects who were in attendance and the frequency of the anxiety and intrinsic achievement-motivation behaviors under study.

The pre-test of materials covered in the daily therapy sessions was given on Day 14 of the study and the post-test was administered on the last day of the experiment, Day 31.

Results

Table 1 shows the mean weekly attendance of the six treatment groups over the three weeks of behavioral therapy. An analysis of variance revealed no significant differences in attendance performance between the methadone group (A_1) and atropine group (A_3), but both of these groups performed differently from the apomorphine group (A_2), ($p < .05$); the mean attendance rates were 82%, 81%, and 55%, respectively. Furthermore, under the participation learning condition, the methadone (A_1B_1) and atropine (A_3B_1) groups attended the therapy sessions at least 87% of the time, while the apomorphine group's (A_2B_1) attendance dropped to 50%, ($p < .05$) by the third week. Under the passive learning condition, all three groups showed a sharp drop in attendance ($p < .001$), but the apomorphine group (A_2B_2) declined significantly, ($p < .05$) than either the methadone (A_1B_2)

Table 1

Mean Percentage Attendance at Daily Therapy Sessions

Drug	Learning Method	N	Week C_1	C_2	C_3	$\bar{X}$
A_1 (Methadone)	B_1 (Participation)	2	100	90	100	97
	B_2 (Passive)	1	80	20	60	53
A_2 (Apomorphine)	B_1	2	80	40	50	57
	B_2	2	100	60	0	53
A_3 (Atropine)	B_1	3	100	87	93	93
	B_2	3	93	53	60	69

Table 2

Mean Percentage Attendance at Daily Therapy Sessions (Drugs Ignored)

Learning Method	N	Week C_1	C_2	C_3
B_1 (Participation)	7	94	74	83
B_2 (Passive)	6	93	50	40

or atropine (A_3B_2) groups during the three weeks of behavioral therapy. Finally, the apomorphine group showed even a sharper decline in attendance under passive learning (A_2B_2) than they did under participation learning conditions (A_2B_1): that is, the linear trends differed significantly, ($p < .05$).

The learning method by trials interaction (B x C) effect, shown in Table 2, was significant ($p < .05$); but the superiority of the participation method over the passive method depended upon drugs (i.e., the AxBxC interaction was significant, ($p < .05$).

Analysis of variance of the anxiety symptom scores data showed that variation among subjects exceeded the variation between group means, even though the negative correlation found between the means of the six groups and the attendance means listed in the right hand margin of Table 1 was large, Pearson's $r = -.933$, and, significant ($p < .05$). Consistent with the analysis of variance results, individual anxiety scores correlated poorly with individual attendance scores, $r = -.258$ (not significant at .05 level)

The subjects learned more under the participation learning method of therapy, 4.86 points increase, then they did under the passive learning condition, 2.36 points increase in knowledge; but the differences were not statistically significant. Group differences in performance on the remaining measures of behavior were entirely attributable to chance.

Discussion

The results supported the experimental hypothesis that participation learning would motivate the higher rate of attendance between the two learning methods under investigation. The interpretation of the results is that intrinsic motivation dominated anxiety under participation learning conditions, although far less effectively in the case of the apomorphine drug group, while anxiety dominated intrinsic motivation under the passive learning conditions, regardless of drug treatment. The large negative correlation found between the anxiety symptoms scores and attendance supported this interpretation and was furthermore consistent with the results of other research where anxiety was measured during task performance (Atkison, Bastian, Earl, & Litwin, 1960), as in the case of the present study.

The results were also consistent with the experimental hypothesis that any significant differences in attendance attributable to drugs would favor methadone over atropine and both of these over apomorphine. The effects attributable to apomorphine differed significantly from the corresponding effects of either atropine or methadone, and both differences were in the direction predicted. Even the non-significant difference in effects attributable to atropine and methadone was in the predicted direction. Again we interpret drug effects in terms of the hypothetical construct "anxiety". The effect of methadone, as an antagonist to the symptom of withdrawal, was to reduce

anxiety and the attendant task-avoidance responses; while apomorphine, by contrast, induced anxiety in the non-addicted subjects. Apparently, however, the amount of methadone used in this study was insufficient to induce the euphoria that would separate the performances of the methadone and atropine groups.

The present results bear upon the "applicability of the medical model of drug action as a rationale for the use of chemical agents to accomplish psychological (as opposed to physiological) alternations" of behavior (Lennard, Epstein, Bernstein, & Ransom, 1970, p. 439). The results suggest that drugs may serve to increase or reduce anxiety and thereby determine whether or not an individual will avoid a task situation under conditions of free choice. Anxiety may even motivate involuntary task-orientation if the individual is confined in an anxiety provoking situation and must perform the task in order to escape. Voluntary engagement in achievement oriented activity depends, however, upon the arousal of intrinsic motivation in sufficient strength to dominate anxiety (Atkinson, et. al., 1960). Arousal, in turn, depends upon complex, yet specifiable, relationships between cognitive states and environmental cues, (Atkinson, et al., 1960, and Dember & Earl, 1957). The New Careers participation learning method proved to be a powerful realization of the intrinsic motivation model and an adjunct to the drug therapies used in the present study.

Clearly, the specificity of actions that develops when anxiety is controlled or achievement-motivation aroused cannot be due to physiological or psychological effects of drugs alone; for the specificity, variability, and development of behavior sequences depend upon many other conditions of the laws of learning in general and the principles of reinforcement in particular. The behavioral model also suggests the use of an euphoric agent such as methadone as a powerful reinforcing stimulus to shape "desirable" means-end behaviors in narcotics addicts, a consideration originating with this report.

Chapter 4

Expeciment II

The present study was designed to evaluate motivational factors effecting the voluntary participation by heroin addicts in a program of behavioral therapy.

The conceptual hypotheses were that (a) addicts would earn more tokens used for the purchase of methadone if they were given the opportunity to risk these tokens in games of chance that allowed them the possibility of winning extra tokens; (b) those addicts who could actively determine their maximum amount of daily methadone would earn more tokens than those individuals who could not; and (c) the differences between groups would increase with time.

Heroin addicts were defined as those individuals who were admitted as voluntary inpatients to Stockton State Hospital under the classification of "Dependent on Opiates (Heroin)" and were undergoing pharmacological therapy using the synthetic narcotic methadone. Tokens were small plastic chips which functioned as "money" for the purchase of methadone. They were earned by the addicts for attendance at research group meetings, completing and submitting homework assignments at these meetings, the grades they received on these assignments, and attendance at small

group therapy sessions held on the drug abuse ward. The opportunity to risk these tokens in games of chance was defined as the addicts' opportunity to gamble tokens in games such as blackjack, roulette, and craps.

Two independent variables were investigated in the research project. The first was the amount of risk-taking behavior a subject could engage in. The two levels of this independent variable were risk-taking and no risk-taking opportunity. Risk-taking opportunity was defined as a subject's opportunity to engage in games of chance (blackjack, roulette, and craps) with the purpose of possibly winning extra tokens that could be used in the purchase of methadone.

The second independent variable was the purchasing status of the subject. The two levels of this variable were active purchasing status and passive purchasing status. Those subjects who could actively determine their maximum daily amount of methadone referred to those addicts whose purchasing power for methadone was subject only to the basic restrictions that the amount purchased could not exceed the maximum amount established by the ward physician and the cost of the purchase in tokens did not exceed the number of tokens the addict had in his possession. Those subjects who could not actively determine their maximum amount of methadone (Passive Purchasing Status) were subject to the restriction that the maximum amount they could purchase was defined as the mean amount purchased

by the Active Purchasing Status Group. The Passive Purchasing Status Group was also subject to the same two basic restrictions mentioned in the Active Purchasing Status Group.

The dependent variables in the study were: (1) the percentage of daily research group meetings a subject voluntarily attended during each of the five weeks of the study; (2) the percentage of homework assignments completed per week for each of the five weeks of the study; (3) the mean weekly homework grade for each of the five weeks of the study. The daily homework was graded on a two point basis: A = 2 points, B = 1 point, and C, D, and F = 0 points; (4) the percentage of small group therapy sessions held on the ward a subject voluntarily attended for each of the five weeks of the study.

A subject was considered to have attended the research group meeting if he came within five minutes of the start of the session, stayed until its end, and actively participated in the meeting's discussion. A subject was considered to have completed a homework assignment if he submitted the assignment on the day it was due at the beginning of the research group meeting. If the subject completed the assignment but did not attend the meeting it was possible for another subject to hand in the assignment for him. A subject was considered to have attended a small group therapy session if he came to the session on time and stayed until its end.

The experimental hypotheses were that any differences in small group therapy attendance, research group meeting attendance, homework assignments submitted, and mean weekly homework grade corresponding to risk-taking opportunity would favor the Risk-Taking Group, buying status conditions would favor Active Purchasing Status over Passive Purchasing Status, and these differences would increase over the five weeks of the study.

Method

The seven male and two female voluntary heroin addicts were San Joaquin County, Fresno County, and Stanislaus County residents, over 18 years of age, in an acceptable state of health, and with established histories of addiction to opiates, attempted withdrawal, and recidivism. The mean age of the subjects was 29 years with a range of 25-41 years.

Screening, admission, and detoxification of subjects followed the procedure established by the Department of Health, Education, and Welfare as previously outlined on pages 25-27 of this report.

The subjects were randomly assigned to the four treatment conditions.

Since behavioral measures were a summary of a subject's performance for each week of the five weeks of the study the experimental design was a 2 x 2 x 5 factorial design with repeated measures on the last factor.

Prior to the research proper, two Student Professional Assistants and one member of the research staff met with the subjects and ward personnel for one orientation meeting per day for two days to explain the research program and to instruct the subjects on the use of tokens, the various experimental conditions, and the games of chance. Separate meetings were held for those staff members unable to attend these sessions.

On Day 1 of the experiment proper subjects received 10 mg. b.i.d. (twice daily) of methadone. This dosage could be increased 20 mg. per day until the pre-established maximum of 60 mg. b.i.d. was reached, providing the subject was able to purchase the dosage increment with earned tokens and this purchase was in accordance with the conditions of the subject's experimental group.

Behavioral measures were recorded beginning with Day 1 of the experiment.

The small group therapy sessions were conducted in the "encounter group" format on the ward in the morning. The group leaders were members of the ward staff, the Psychology Department and the Rehabilitation Services of Stockton State Hospital. Each group consisted of five to six individuals and one leader. During the sessions the addicts discussed their drug related problems, other problems pertaining to life in general and life on the ward, and their feelings towards individuals in the group. The meetings were made as unstructured as possible and

relied upon active participation rather than group leader guidance for topics of discussion and direction of the meetings.

The research group meetings also began on Day 1 and were held for five weeks (Saturdays and Sundays excepted). The meetings were held in the afternoon in the Professional Building of Stockton State Hospital and lasted for one hour.

The group meetings were conducted by two Student Professional Assistants in the format of the New Careers Approach. Each day the subjects were given assignments to complete for the following day. In each session the subjects filled out a short psychological and physiological questionnaire and then discussed the assignment that was due that day. See Appendix II Table 1 for a copy of the questionnaire.

The emphasis in the research group meetings was on the development of (a) group skills, (b) research skills, (c) organizational skills, (d) strategies for planned chance, (e) knowledge of social trends and issues, (f) interview skills, (g) reading skills, and (h) knowledge of the physiological and psychological effects of drugs.

The homework assignment involved library research on a given topic or a problem solving exercise and writing a short paper on what was read or how the problem was to be solved. The subject matter of the topic or problem was slected for its applicability to one or more of the nine major areas of emphasis in the New Careers Approach.

See Appendix II, Tables 2 and 3 for examples of research group meeting assignments.

The two Student Professional Assistants graded the assignments after each meeting and then went to the drug ward to pay the addicts the tokens they had earned that day. While on the ward these Student Professional Assistants also checked with the staff members about each subject's attendance at the small group therapy sessions. After each subject had been paid the tokens he had earned, he proceeded to purchase his methadone. The amount purchased was noted and this information was given to staff members in charge of drug dispensing. This dosage was given on the day following the purchase. The dosage level purchased Friday was given free on Saturday and Sunday.

The tokens used for the purchase of methadone were earned in the following manner: (1) one token for arriving on time and staying until the end of the small group therapy session held on the drug ward; (2) one token for arriving within five minutes of the start and staying until the end of the research group meetings, and actively participating in the group discussion of the assignment topic; (3) one to two tokens for completing and submitting the daily homework assignment on the day it was due. The number of tokens earned was determined by the quality of the written assignment. Papers of superior quality with regards to originality, style, neatness, correct spelling, and punctuation were given two tokens. Assignments which

demonstrated an average amount of work were given one token. Those assignments which showed little or no work merited no tokens. Each individual was graded according to his own capabilities; (4) one bonus token was given for each period of two consecutive days of earning four tokens, i.e. two days of perfect research group meeting attendance, small group therapy session attendance, and assignment writing. The following chart indicates the number of tokens needed for a particular dosage of methadone.

Table 3*

Dosage of Methadone (mg.)	20	40	60	80	100	120
Cost in Tokens	0	1	2	3	4	5

Both the Active and Passive Purchasing Status Groups followed this schedule. However, the maximum dosage that could be purchased for any given day in the Passive Purchasing Status Group was defined as the average dosage of the Active Purchasing Group. For example, if the Active Purchasing Status Group's average dosage on a given day was 80 mg., then members of the Passive Purchasing Status Group

*All subjects followed this purchasing plan except for one individual. He declared his maintenance dosage at 80 mg. His plan was as follows: 80 mg. = 5 tokens, 60 mg. = 4-3 tokens, 40 mg. = 2-1 tokens, and 20 mg. = 0 tokens.

could receive only 80 mg. or less, even though they might have had enough tokens to purchase 120 mg.

On the first day of each week of the study those individuals in the Risk-Taking Groups were given the opportunity to engage in games of chance (blackjack, craps, and roulette) to win extra tokens used for the purchase of methadone. The Non-Risk-Taking Group was then given the average number of tokens won or lost. For example, if members of the Risk-Taking Group won an average of three tokens, each member of the Non-Risk-Taking Group would be given three tokens.

The research project was terminated after the five weeks of behavioral therapy. All contingencies between methadone and behavior were dropped and subjects received their daily maintenance dosage of methadone regardless of their behavior. Research group meetings and assignments were also terminated. The small group therapy sessions on the ward continued as part of the drug abuse program.

Results

The first dependent variable, the percentage of research group meetings attended, was analyzed by analysis of variance and a *t* test for independent groups. Both test statistics were used because of the unequal *ns* among the treatment combinations. The *t* test was used to analyze the main effects of Risk-Taking and Purchasing Status variables (using data from all subjects), while the analysis

of variance determined if any interactions were significant. In the case of the analysis of variance one subject was randomly selected and removed from the Active Purchasing Status/Non-Risk-Taking Group to obtain equal cell ns. All effects were tested at the 0.05 level of significance. This procedure was also followed in the analyses of the other dependent variables of the study.

Table 4 presents a summary of the research group meeting attendance for the five weeks of the study.

Table 4

Mean Percentage of Research Group Meeting Attendance for the Five Weeks of Behavioral Therapy

Risk-Taking Group	Purchasing Status Group	N	Week 1	2	3	4	5	$\bar{X}$
Risk-Taking	Active	2	90	100	70	100	90	90
	Passive	2	100	100	90	100	60	90
Non-Risk-Taking	Active	3	93	100	60	100	47	80
	Passive	2	90	100	100	100	90	96

The mean percentage of attendance at research group meetings over the five weeks of the study was analyzed by a *t* test for both the Purchasing Status and Risk-Taking variables. The *t* test for the Purchasing Status conditions revealed no significant difference between the Active Purchasing and Passive Purchasing Groups ($t = -1.66$, $df = 7$). The *t* test for the Risk-Taking conditions revealed no significant difference between the Risk-Taking and Non-Risk-Taking Groups ($t = +0.58$, $df = 7$). See Appendix II, Tables 4 and 5 for the data upon which the *t* tests were based.

An analysis of variance performed on the percentage of research group meetings attended for each of the five weeks of the study indicated that performance varied over trials ($p < .05$). All other main effects and interactions failed to reach statistical significance. See Appendix II, Table 6 for the summary table of the analysis of variance performed on the attendance data.

Appendix II, Table 7 presents a summary of the research group attendance raw data.

The second dependent variable, the percentage of homework assignments completed and submitted during the research group meetings, was analyzed by a *t* test, analysis of variance, and the nonparametric Wilcoxon-Mann-Whitney sum of ranks test. Table 5 presents a summary of the data.

Table 5

Mean Percentage of Assignments Completed and Handed In for the Five Weeks of Behavioral Therapy

Risk-Taking Group	Purchasing Status Group	N	Week 1	2	3	4	5	X
Risk-Taking	Active	2	80	100	100	100	90	94
	Passive	2	100	100	100	100	70	94
Non-Risk-Taking	Active	3	90	90	80	90	80	86
	Passive	2	90	70	80	80	70	78

Hartley's test for homogeneity of population-error variances revealed that the variances of the mean percentage of assignments completed for the Risk-Taking and Non-Risk-Taking Groups (S^2 = 26.66 and S^2 = 347.20 respectively) differed significantly (F_{max} = 13.02, df = 2, 4, p .05). The use of appropriate transformations failed to equalize the variances. Therefore the non-parametric Wilcoxon-Mann-Whitney sum of ranks test was used to analyze the main effect of Risk Taking. Inspection of the test revealed that there was no significant difference

between the mean percentage of assignments completed for the Risk-Taking Groups (T'; 16). See Appendix II, Table 8 for a summary of the Wilcoxon-Mann-Whitney test.

The main effect of Purchasing Status was analyzed by a t test. The analysis indicated that performance of the Purchasing Status Groups did not differ significantly (t = - 0.04, df = 7). See Appendix II, Table 9 for the data upon which the t test was based.

An analysis of variance performed on the percentage of assignments completed and submitted for each week of the five weeks of the study revealed no significant main effects or interactions. See Appendix II, Table 10 for the analysis of variance summary table of the assignment completion data, and Table 11 for the raw data.

The third dependent variable, the mean homework assignment grade, was also analyzed by a t test, analysis of variance, and the Wilcoxon-Mann-Whitney test. Table 6 presents a summary of the homework grade data.

Hartley's test for homogeneity of population-error variances indicated that the mean homework assignment grade data for the Risk-Taking Conditions was not amenable to analysis of variance or a t test, i.e. variances of the groups (Risk-Taking S^2 = 0.01 and Non-Risk-Taking S^2 = 0.17 differed significantly (F_{max} = 14,68, df = 2, 4, $p < .05$). The use of transformations failed to equalize the variances and therefore the Wilcoxon-Mann-Whitney test

was used to analyze the main effect. The test indicated that mean homework assignment grade performance did not differ significantly between the Risk-Taking and Non-Risk-Taking Groups (T' = 14). See Appendix II, Table 12 for a summary of the Wilcoxon-Mann-Whitney test.

Table 6

Mean Homework Grade on Assignments for the Five Weeks of Behavioral Therapy

Risk-Taking Group	Purchasing Status Group	N	Week 1	2	3	4	5	X
Risk-Taking	Active	2	1.6	2.0	1.9	1.8	1.8	1.8
	Passive	2	1.9	2.0	2.0	1.9	1.4	1.8
Non-Risk-Taking	Active	3	1.8	1.2	1.4	1.5	1.2	1.4
	Passive	2	1.8	1.4	1.3	1.6	1.4	1.5

The mean homework grade performance for the Purchasing Status conditions was analyzed by a t test. The test revealed that the performance of the groups did not differ significantly ($t = -0.54$, $df = 7$). Appendix II, Table 13 presents a summary of the data upon which the t test was based.

An analysis of variance performed on the mean weekly homework grade for each week of the five weeks of the study revealed that there were no significant main effects or interactions. See Appendix II, Table 14 for the analysis of variance summary table of the homework grade data.

Appendix II, Table 15 presents a summary of the homework grade raw data.

The fourth dependent variable, the percentage of small group therapy sessions attended on the ward during each week of the five weeks of the study, was not analyzed. Examination of the data indicated that all subjects attended the therapy sessions 100% of the time, with the exception of two individuals who were absent at one session during the second week of the study. See Appendix II, Table 16 for a summary of the therapy attendance raw data.

Discussion

The results of the study did not support the experimental hypotheses. There were no significant performance differences between the Risk-Taking Groups or the Purchasing Status Groups with regards to research group meeting attendance, assignment completion and grades, or attendance at small group therapy sessions held on the ward. The author believes those results indicate that the experimental techniques investigated did not increase motivation in the heroin addict, as measured by the dependent variables.

However, considering the high rate of responding by the subjects on the behavioral measures studied, regardless of the experimental conditions they were in, there is the possibility of another explanation for the equality of performance between groups. The experimental conditions may have generated increased motivation in the risk-taking and active purchasing status groups, but the tasks the subjects were engaged in may not have been of sufficient sensitivity to detect the increased motivation. Subjects in the control groups responded near asymptote (possibly a ceiling effect) on several of the behavioral measures (meeting attendance and small group therapy session attendance). Thus, even without the administration of the independent variables the subjects were responding at nearly 100% performance. In this case one can logically conclude that there was no possible way for the increased motivation, if any, to be detected in the study.

Consideration of the above factor leads one to the conclusion that the motivation techniques investigated may have increased motivation in the inpatient heroin addict, but the conditions and design of the study were such that the motivation was not properly measured. However, unless additional experimental studies indicate to the contrary, the author tentatively concludes that risk-taking opportunity and active purchasing status conditions do not lead to increased motivation in the inpatient heroin addict undergoing methadone-contingency therapy.

Although the findings of the study indicated that the independent variables investigated were of little value in motivation appropriate inpatient program behaviors, they did provide some information regarding both the use of methadone as a reinforcer for appropriate behavior and the token economy system as a feasible means of dispensing this reinforcement.

The study suggested that methadone functioned as a powerful reinforcer for behavior as mediated by the use of tokens. All nine subjects in the experiment demonstrated a high rate of research group and small group therapy meeting attendance as well as assignment completion. These results suggest that the contingency established between methadone and behavior may have been responsible for the high rate of responding among the subjects. Such a hypothesis is consistent with the experimental findings of Davis & Nichols (1962), Khazan, Weeks, & Schroeder (1967), Nichols (1968, 1967, 1965, 1963), Nichols, Headlee, & Coppock (1956), Schuster & Woods (1967), Thompson & Schuster (1964), Weeks (1964, 1962), and Wikler & Pescor (1967) who have demonstrated that opiates function as reinforcers in addicted infrahuman subjects. However, until experimental results involving the comparison of subjects reinforced and not reinforced with methadone on a number of behavioral measures are evaluated, any conclusions regarding the reinforcing qualities of methadone must remain tentative. The possibility does exist that methadone administered without

contingencies upon behavior is sufficient to generate a high frequency of appropriate behavior in the heroin addict, as suggested by Dole & Nyswander (1965). If this is found to be the case the institution of contingencies between behavior and methadone will be obviated for motivating appropriate behavior in the heroin addict undergoing methadone maintenance therapy.

The findings of the study also indicated that the token economy system was a practical and feasible method of dispensing methadone reinforcement in an inpatient drug abuse program. This finding was extremely important because such a system had never been investigated with opiate addicts undergoing methadone maintenance. Prior to the research proper such factors as the amount of ward time spent in the handing out of tokens and purchasing of methadone, the possible termination of engagement in the program by addicts who did not like the contingencies established between methadone and behavior, and the possible thievery of tokens on the ward by the addicts were considered to be potential negative aspects of such a system. Several members of the drug ward staff and members of the Rehabilitation Services of the Hospital expressed doubt as to the practicality and feasibility of the program. However, as the research project progressed such doubts were dispelled. The token economy program ran smoothly throughout the study and after the initial adjustment to the tokens,

contingencies, and methadone payment plans there were no problems regarding the use of tokens for the payment of methadone. Ward time spent in the handing out of tokens and the subsequent purchase of methadone was approximately 20 minutes per day. Problems resulting from the subjects losing their tokens and not being able to find them were solved by keeping records of the number of tokens earned and spent.

With regard to the anticipated walk-out of the addicts who did not approve of the contingencies, the results of the study indicate that no subjects left the program during the five weeks of the experiment. Initially, some negative feelings and hostilities were expressed by the subjects about the contingencies, but soon these reactions subsided and the subjects accepted the contingencies as part of the program.

Theft of tokens on the ward was eliminated through the use of individualized tokens for each subject; each addict had a different color chip.

The only serious problem regarding the token economy occurred when it was discovered that one subject's methadone maintenance level was at 80 mg. per day instead of 120 mg. (the maintenance level of the other subjects). Hence the contingencies between methadone and behavior and the payment plan for this subject did not correspond to those of the other subjects. In effect the subject had to earn fewer tokens (demonstrate less appropriate behavior) for his

maintenance dosage of methadone than the rest of the subjects, i.e. the subject was reinforced with a maintenance dosage of methadone for earning three tokens, while the other subjects had to earn five tokens for the same reinforcement. This problem however was quickly solved by adjusting the methadone payment plan for this subject, as previously mentioned on page 64.

The above finding suggests that in future programs using methadone-reinforcement and the token economy system the methadone payment plan should be individually tailored to the subject's maintenance dosage level. In this manner the methadone reinforcement can be equated for all subjects, regardless of the differences in their maintenence dosage levels.

In conclusion, the findings of the study indicate that risk-taking opportunity and active purchasing status are of no apparent value in motivating appropriate behavior in the inpatient heroin addict undergoing methadone maintenance. The findings do suggest, however, that methadone may function as a powerful reinforcer for behavior and that the token economy system is an feasible method for dispensing the reinforcement.

Chapter 5

Experiment III

The third study with which this thesis is concerned involved running a control group to compare with the methadone-contingency groups of Experiment II. Subjects in Experiment II were reinforced with methadone for attending research group meetings, completing and submitting assignments, and attending small group therapy sessions on the ward.

Experiment III was designed to evaluate the effectiveness of methadone as a reinforcer for appropriate behavior. The research involved conducting group sessions identical to those in Experiment II with the exception that subjects were not reinforced with methadone for attendance at the ward and research group meetings or completing assignments.

Since the control group was not reinforced with methadone there was no Active and Passive Purchasing Status, or Risk-Taking and Non-Risk-Taking Groups.

The conceptual hypotheses were that inpatient heroin addicts reinforced for appropriate behavior with methadone would exhibit this behavior to a greater extent than those heroin addicts who were not reinforced with with the drug, and that this difference would increase with time.

The identifications and coordinating definitions of terms found in the conceptual hypothesis have been described on pages 57-58.

The independent variable was the use of methadone as a reinforcer for appropriate behavior. There were two levels of the independent variable: (1) methadone-contingency; methadone was contingent upon the occurrence of appropriate behavior, and (2) methadone-non-contingency; methadone was not contingent upon the occurrence of appropriate behavior.

The dependent variables were the appropriate behaviors exhibited by the addicts and consisted of the following measures: (1) the percentage of daily research group meetings a subject voluntarily attended for each of the five weeks of the study; (2) the percentage of daily homework assignments completed and submitted per week for each of the five weeks of the study; (3) the mean weekly homework assignment grade for each of the five weeks of the study. The daily homework assignment was graded on a two-point scale: A--two points given for superior assignments; B--one point for average performance, and C, D, and F--zero points for inadequate performance; and (4) the percentage of small group therapy sessions a subject voluntarily attended on the ward for each of the five weeks of the study.

A subject was considered to have attended a research group meeting if he came within five minutes of the start of the session, actively participated in the session's

discussion, and stayed until the end of the session. A subject was considered to have completed the research group homework assignment if he completed and submitted the assignment on the day it was due at the beginning of the research group meeting. A subject was considered to have attended the therapy session on the ward if he came when the session started and stayed until its end.

Method

Three females and seven male inpatient heroin addicts served as subjects in the control group of the experiment. The mean age of the subjects was 27 years with a range of 21-35 years. Admission procedures and characteristics of the subjects were the same as those mentioned in Experiment II.

During the course of the experiment the subjects were maintained on a methadone dose prescribed by the ward physician. The maintenance dosage was determined individually by decreasing the dosage from an initial 120 mg. per day until the addict (a) ceased nodding (sleeping) during group therapy sessions run by the ward personnel, and (b) did not revert to heroin supplementation of the methadone dosage. This method presumably placed each addict in a optimal state of alertness and responsiveness to external and internal stimulation.

The subjects were randomly assigned to the control group from the available population of heroin addicts on

the ward, subject to the restriction that they had not participated in the previous research project (Experiment II).

Since behavioral measures were a summary of a subject's performance during the week for each of the five weeks of behavioral therapy, and the subjects from Experiment II were being used as the experimental group, the experimental design was a 2 x 5 factorial with repeated measures on the last factor.

Prior to the research proper two Student Professional Assistants met with the subjects and ward staff for an Orientation meeting. The subjects and staff were informed of the project and instructed in its procedures. A list of the subjects' names and the meeting time and place was left on the ward bulletin board after the meeting to insure that the subjects were aware of when and where to go for the meetings.

The research group meetings were begun on Monday. They were held for five days per week, Mondays through Fridays, for five consecutive weeks. The daily sessions were held in the early afternoon in a conference room of the Professional Building of Stockton State Hospital, and lasted for one hour.

The group meetings were conducted by two Student Professional Assistants in the format of the New Careers approach. Each day the subjects were given assignments to complete and submit on the following day. In each

session the subjects filled out a short psychological and physiological questionnaire and then discussed the assignment that was due that day.

Sufficient time and space were allotted for the subjects to complete their assignments. Subjects were given access to Stockton State Hospital's professional library and a small study room on the ward for research and writing their assignments.

Results[1]

Research group meeting performance, that is, the percentage of meetings attended, was analyzed by the Wilcoxon-Mann-Whitney sum of ranks test and analysis of variance. Hartley's test for homogeneity of population-error variances revealed a significant difference between the variances of the Methadone-Contingency ($S^2 = 526.9$) and Non-Contingency ($S^2 = 80$) Groups ($F_{max} = 6.22$, $df = 2, 9$, $p < .01$). Because of this significant difference in error variances the nonparametric Wilcoxon-Mann-Whitney test was used to analyze the main effect of contingency, while the trials and trials x contingency interaction effects were analyzeed by analysis of variance.

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[1]Data from the Methadone-Contingency Group has been taken from the nine subjects in Experiment II.

Table 7 presents a summary of research group meeting attendance during the five weeks of the study.

Table 7

Mean Research Group Meeting Attendance for the Five Weeks of Behavioral Therapy

Group	N	Week 1	2	3	4	5	$\bar{X}$
Methadone-Contingency	9	93	100	78	100	69	88
Methadone-Non-Contingency	10	62	40	24	18	04	30

The Wilcoxon-Mann-Whitney test revealed that subjects in the Methadone-Contingency Group attended significantly more research group meetings than subjects in the Non-Contingency Group ($T' = 45$, $p < .005$).

Analysis of variance indicated that meeting attendance performance varied over weeks, i.e. the trials effect was significant ($p < .01$), and the contingency x trials interaction was significant ($p < .01$). See Table 8 for the analysis of variance summary table for research group meeting attendance performance.

Subsequent analysis of the simple main effects (contingency x trials interaction) revealed that the superior performance of the Methadone-Contingency Group was consistent over the five weeks of the study ($p < .01$), and that the performance of both the Methadone-Contingency and

Non-Contingency Groups varied with time ($p < .01$) See Table 9 for the tests of simple main effects.

Table 8

Analysis of Variance Summary Table
Research Group Meeting Attendance

Source	df	MS	F
Between Subjects	18		
A (Contingency)	1	80776.421	51.03*
Sub w. groups	17	1583.050	
Within Subjects	76		
B (Trials)	4	5111.579	12.27*
AB	4	1605.309	3.85*
B x subj w. groups	68	416.653	
Total	94		

*$p < .01$

Table 9

Analysis of Variance Summary Table:
Simple Effects of Meeting Attendance

Source	df	MS	F
Between subjects			
Between A at b_1	1	4650.526	7.16*
Between A at b_2	1	17052.631	26.24*
Between A at b_3	1	13699.181	21.07*
Between A at b_4	1	31850.526	49.01*
Between A at b_5	1	19944.795	30.69*
Within cell	85	649.934	
Within subjects			
Between B at a_1	4	1768.888	4.25*
Between B at a_2	4	4948.000	11.88*
AB	4	1605.309	3.85*
B x subj w. groups	68	416.653	
Total	94		

*$p < .01$

A_1: Methadone-contingency group
A2: Methadone-non-contingency group
B_1. . .B_5: Trials 1. . .Trial 5

Tests for differences in trend indicated that there were significant differences between groups attributable to either linear trends ($p < .05$) or quartic trends ($p < .05$). The trends accounted for 59% (linear) and 23% (quartic) of the variance for the contingency x trials interaction. Meeting attendance performance in the Methadone-Non-Contingency Group declined sharply over trials (62%, 40%, 24%, 18%, and 4%), while performance in the Methadone-Contingency Group remained fairly consistent (93%, 100%, 78%, 100%, and 69%), dropping slightly during the third and fifth weeks of the experiment. The difference in trend is shown in Figure 1. A summary of the trend analysis is provided in Appendix III, Table 1 and a summary of the raw data is provided in Appendix III, Table 2.

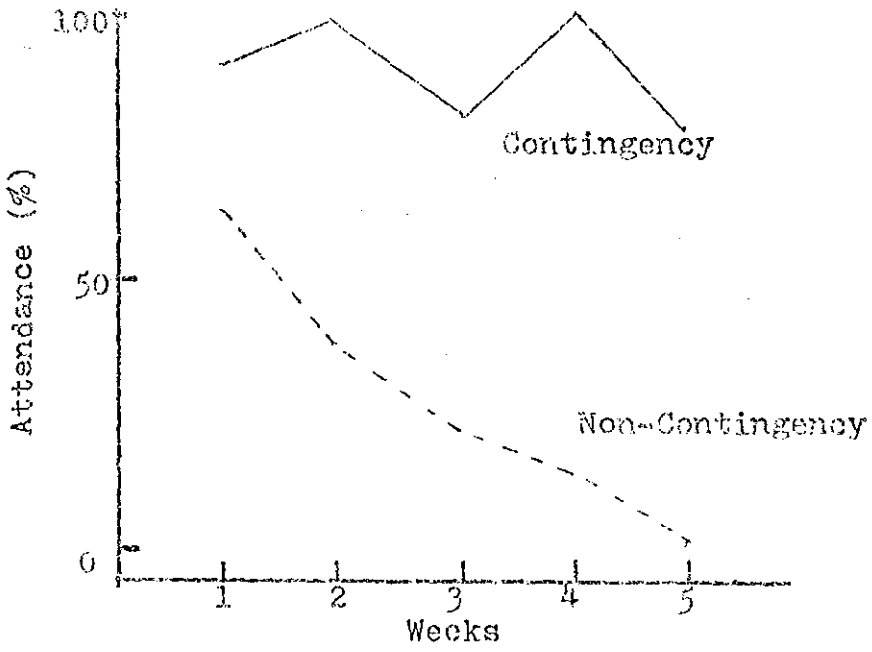

Fig. 1 Mean attendance at research group meetings of Methadone-Contingency and Non-Contingency Groups over the five weeks of the experiment.

The second dependent variable, the percentage of assignments completed and submitted for each of the five weeks of the study, was analyzed by analysis of variance. A summary of the data is presented in Table 10. The results of the analysis revealed that the Methadone-Contingency Group's performance was superior to that of the Non-Contingency Group's performance ($p < .01$). Furthermore, analysis of variance indicated that performance varied over weeks ($p < .01$), and that the contingency x trials interaction was significant ($p < .05$). The summary table of the analysis of variance is presented in Table 11.

Table 10

Mean Percentage of Research Assignments Completed and Submitted for the Five Weeks of Behavioral Therapy

Group	N	Week 1	2	3	4	5	$\bar{X}$
Methadone-Contingency	9	89	91	86	89	73	86
Methadone-Non-Contingency	10	2	10	10	0	0	10

Table 11

Analysis of Variance Summary Table:
Research Group Assignments Completed and Submitted

Source	d.f	MS	F
Between subjects	18		
A (Contingency)	1	137440.750	184.12**
Subj w. groups	17	746.460	
Within subjects	76		
B (Trials)	4	1258.950	7.55**
AB	4	506.83	3.04*
B x subj w. groups	68	166.72	
Total	94		

*p < .05
**p < .01

Analysis of the contingency x trials interaction indicated that the Methadone-Contingency Group's superior performance (with regards to assignment completion and submission) was consistent over the five weeks of the study, and that performance varied over trials in both types of contingency groups ($p < .05$). Table 12 presents a summary of the interaction analysis.

Table 12

Analysis of Variance Summary Table: Simple Effects of Assignments Completed and Submitted

Source	df	MS	F
Between subjects			
Between A at b_1	1	17561.640	62.12**
Between A at b_2	1	31163.750	110.29**
Between A at b_3	1	27842.110	98.49**
Between A at b_4	1	37426.900	132.40**
Between A at b_5	1	25473.690	90.11**
Within cell	85	282.666	
Within subjects			
Between B at a_1	4	457.777	2.74*
Between B at a_2	4	1308.000	7.84**
AB	4	506.830	3.04*
B x subj w.groups	68	166.720	
Total	94		

* p .05
** p .01

A_1: Methadone-Contingency Group

A_2: Methadone-Non-Contingency Group

$B_1 \ldots B_5$: Week 1...Week 5

Subsequent analysis of differences in trends between the two contingency groups revealed significant differences in quadratic trends ($p < .05$), and quartic trends ($p < .05$). The differences in quartic trends accounted for 25% of the variance, while the differences in quadratic trends accounted for 50% of the variance, of the contingency x trials interaction. The analysis indicated that differences between groups incrased between Weeks One and Two and Weeks Three and Four while between Weeks Two and Three and Weeks Four and Five the difference remained constant. Figure 2 presents the trends of both groups over the five weeks of the study. Table 3 in Appendix III presents a summary of the trend, tests, and Table 4 in Appendix III presents a summary of the raw data.

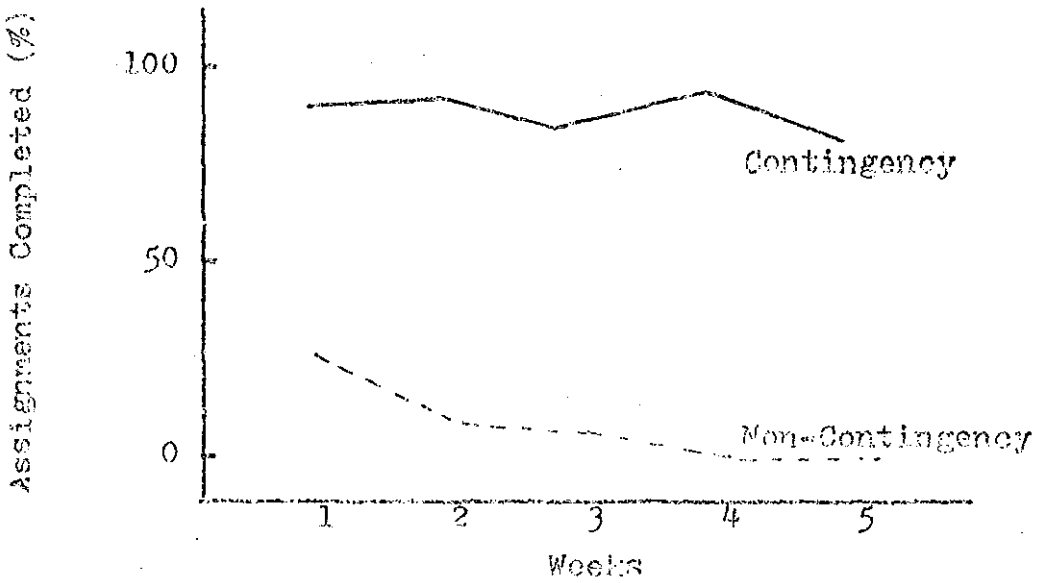

Fig 2 Mean assignments completed and submitted for the Contingency and Non-Contingency Groups during Experiment III.

The third dependent variable, the mean weekly homework grade on assignments (based on a two-point scale), was analyzed by the Wilcoxon-Mann-Whitney test and analysis of variance. Preliminary examination of the data's suitability for analysis of variance by Hartley's test for homogeneity of population-error variances revealed a significant difference between the error variances of the Methadone-Contingency (S^2 = .14) and the Non-Contingency (S^2 = .01) Groups, (F_{max} = 12.27, $\underline{df}$ = 2, 9, $p < .01$). Consequently, the main effect of contingency was analyzed by the Wilcoxon-Mann-Whitney test, while the trials and contingency x trials interaction effects were analyzed by analysis of variance.

The mean weekly homework grade during the five weeks of the study is summarized in Table 13.

Table 13

Mean Weekly Homework Grade for Research Group Assignments for the Five Weeks of Behavior Therapy

Group	N	Week 1	2	3	4	5	X
Methadone-Contingency	9	1.7	1.7	1.6	1.6	1.4	1.60
Methadone-Non-Contingency	10	0.6	0.1	0.1	0	0	0.16

The Wilcoxon-Mann-Whitney test indicated subjects in the Methadone-Contingency Group received significantly higher grades on their homework assignments than subjects in the Non-Contingency Group ($T' = 45$, $p < .005$).

Analysis of variance revealed that there was a significant difference in performance during the five weeks of the study, i.e. the trials effect was significant ($p < .01$). The contingency x trials interaction did not reach statistical significance. Table 14 presents the analysis of variance summary table for the homework assigoment grade data.

Table 14

Analysis of Variance Summary Table: Mean Weekly Homework Grade on Assignments

Source	df	MS	F
Between Subjects	18		
A (Contingency)	1	49.597	136.89*
Subj w. groups	17	0.362	
Within Subjects	76		
B (Trials)	4	0.567	8.64*
AB	4	0.154	2.35
B x subj w. groups	68	0.065	
Total	94		

*$p < .01$

Subsequent a posteriori comparisons among trial means using Tukey's HSD (honestly significant difference) test revealed that performance declined in the second week of the study ($p < .01$) and remained at this level until the end of the study. Table 15 presents a summary of differences between means.

Table 5 in Appendix III provides a summary of the raw data.

Table 15

Tukey's HSD Test: Differences among Trial Means for Weekly Homework Assignment Grades

Trial Means		$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_4$	$\bar{X}_5$
Week 1	$\bar{X}_1 = 1.10$	-	.29*	.34*	.35*	.47*
Week 2	$\bar{X}_2 = 0.83$		-	.05	.06	.18
Week 3	$\bar{X}_3 = 0.78$			-	.01	.13
Week 4	$\bar{X}_4 = 0.77$				-	.12
Week 5	$\bar{X}_5 = 0.65$					-

HSD = 0.28

*$p < .01$

The fourth dependent variable, the percentage of ward small group therapy sessions a subject attended during each week of the study was not analyzed because of faulty techniques employed in collecting the data. (Several group leaders in charge of the therapy sessions neglected to record

meeting attendance for each week of the study. Thus the obtained data was incomplete and was not analyzed.) However, from the results that were obtained it appears that had the complete data been analyzed the results would have been consistent with the previously mentioned dependent variable measures.

In addition to the above mentioned statistical tests, a Pearson correlation coefficient was computed between the mean amount of methadone a subject received during the study and that subject's performance score (percentage meetings attended plus percentage assignments completed and submitted divided by 2). This was done in order to evaluate the effect of differences in mean amount of methadone received by the two groups during the study upon their subsequent performance (Methadone-Contingency received an average 99 mg., while the Methadone-Non-Contingency received an average 80 mg.). As was previously mentioned subjects in the Methadone-Non-Contingency Group were administered maintenance dosages determined by the ward physician. In some cases this dosage level was lower than the levels at which subjects in the Methadone-Contingency Group were maintained. Therefore, the differences between the two group's performance might be attributable to lesser amounts of methadone received in the Methadone-Non-Contingency Group relative to the Methadone-Contingency Group. The correlation (Pearson $r = +.36$ N.S.) revealed that there was not a significant correlation between mean performance and mean amount of methadone received

during the study. A correlation was also calculated between mean performance and mean amount of methadone received for the Methadone-Non-Contingency Group (Pearson r = -.47 N.S.). These results indicate that the lower amount of methadone received by some subjects in the Non-Contingency condition had no significant relationship with their performance during the study, and that any differences between groups were the result of the independent variables under investigation. See Table 6 Appendix III for the data upon which the correlation was based.

Discussion

The results of the study supported the experimental hypothesis that methadone would function as an effective reinforcer for behavior in the heroin addict. Subjects who were reinforced with methadone attended significantly more research group meetings, completed and handed in more assignments, and demonstrated greater proficiency in these assignments than subjects who were not reinforced with the drug, but rather merely received it as medication in pharmacological therapy.

The second experimental hypothesis, that differences in performance between subjects reinforced and not reinforced with methadone would increase in time, was partially supported by the results of the study. Research group meeting attendance performance dropped sharply in the Methadone-Non-Contingency group while it remained relatively consistent in the

Methadone-Contingency Group, dropping slightly in the third and fifth weeks of the study. The Methadone-Non-Contingency Group's rate of completion and submission of assignments also declined during the study while subjects who were reinforced with methadone maintained a high rate of responding, dropping slightly in the third and fifth weeks of the research project. Differences between groups with regards to the quality of assignments completed and submitted, however, did not increase with time; but did remain consistent throughout the study.

The results of the study then indicate that the synthetic narcotic methadone functions as a powerful reinforcer in the acquisition and maintenance of appropriate behavior in the inpatient heroin addict undergoing pharmacological and behavioral therapy. Those addicts reinforced with methadone consistently demonstrated superior performance on several behavioral measures relative to those addicts not reinforced with the drug, but merely given it as an agent in pharmacological therapy. These results are consistent with the experimental findings of Davis & Nichols (1962), Khazan, Weeks, & Schroeder (1967), Nichols (1966, 1967, 1965, 1963), Nichols, Headlee, & Coppock (1956), Schuster & Woods (1967), Thompson & Schuster (1964), Weeks (1964, 1962), and Wikler & Pescor (1967) regarding the use of opiates as reinforcing agents for addicted subjects.

The results of the experiment also suggest that daily maintenance dosages of methadone given without any specific contingency upon behavior do not necessarily generate motivation and performance of appropriate behaviors in the inpatient herion addict. Addicts who were not reinforced with methadone but received maintenance dosages of the drug showed consistently poor performance (by any criterion) throughout the entire course of the program; in fact completion of assignments and quality of assignments dropped to zero by the last week of the study while meeting attendance dropped to 4%. Thus, merely dispensing methadone to heroin addicts at maintenance dosages does not insure that they will begin to function normally and exhibit motivation and behavior appropriate to the circumstances which they find themselves in; namely performance appropriate to an inpatient rehabilitation and or therapeutic setting.

These implications are important for inpatient methadone maintenance programs designed to engender motivation and positive responsible behavior in the heroin addict. Programs whose sole purpose is the dispensing of methadone are of questionable efficacy, since maintenance of the addict on methadone does not by itslef insure that he will avail himself of these activities.

One prerequisite to the success of methadone maintenance programs is a powerful reinforcer; a source of motivation that can be utilized to bring about behavior

change, especially change in the direction of active engagement in the therapeutic or rehabilitation process. The findings of the present study indicate that methadone may provide such a reinforcement.

In conclusion, the findings of the research project indicate that methadone is an effective reinforcer for appropriate behavior in the inpatient heroin addict. If the proper contingencies are established between behavior and methadone reinforcement the probability of the occurrence of this behavior is altered in the direction of greater frequency of response. Thus, methadone, in addition to its properties as an agent in narcotic substitution therapy, may also be used as a reinforcer and source of motivation in programs designed to treat and rehabilitate the heroin addict.

Chapter 6

Experiment IV

The purpose of the study was to investigate two types of group therapy (New Careers and Encounter Group) in conjunction with behavioral modification procedures using the synthetic narcotic, methadone, as a reinforcer for appropriate behavior.

The conceptual hypotheses were that: (1) Heroin addicts reinforced with methadone for appropriate behavior would exhibit this behavior to a greater extent than heroin addicts not reinforced with methadone; and (2) the frequency of the appropriate behavior would be greater for those addicts attending New Careers meetings than those addicts attending the Encounter Group meetings.

Heroin addicts were defined as those individuals classified by Stockton State Hospital as "Dependent on Opiates, (Heroin)" and were undergoing methadone maintenance treatment. Appropriate behavior consisted of punctual meeting attendance, completion and submission of assignments and questionnaires assigned in these meetings, and the grade on the assignments. New Careers was a form of educational therapy in training (a) group skills, (b) research skills, (c) organizational skills, (d) strategies for planned change,

(e) knowledge of social trends and issues, (f) interview skills, (g) writing skills, (h) reading skills, and (i) knowledge of the psychological and physiological effects of drugs. The Encounter Group Method (Group Processes Method) was a form of group therapy in which encounter group techniques were employed to bring about change in the subject's behavior. The term "reinforced with methadone" refers to the contingency of methadone upon the performance of the appropriate behaviors previously mentioned. The term "not reinforced with methadone" is used to indicate that methadone was not contingent upon the performance of appropriate behavior.

Two independent variables were investigated in the research project. The first independent variable was the approach used in the group meetings and consisted of two levels: the New Careers Method and the Group Processes Method. The second independent variable was the type of methadone reinforcement used and consisted of two levels: methadone-contingency and methadone-non-contingency.

There were four dependent variables in the experiment. They were as follows: (1) the percentage of meeting sessions a subject voluntarily attended during the eight days of the study; (2) the percentage of assignments a subject completed and submitted during the eight days of the study; (3) the percentage of totally completed questionnaires a subject submitted during the eight days of the study; and (4) the daily homework grade a subject received during the eight days of the study.

The experimental hypotheses were that (1) heroin addicts whose methadone was contingent upon meeting attendance, assignment and questionnaire completion, and quality of assignment criteria would exhibit these behaviors to a greater extent than those addicts whose methadone was not contingent upon this behavior; and (2) the frequency of the previously mentioned behaviors would be greater for those addicts attending the New Careers sessions than those addicts attending the Group Processes sessions.

Method

Thirty subjects, 25 males and 5 females, participated in the study. The mean age of the subjects was 27 years, with a range of 21-35 years. See pages 25 to 31 of this report for a detailed description of the subjects and the admission policies and procedures.

The subjects were randomly assigned to the four treatment conditions subject to the restrictions that (1) subclass n_{ij} were equal or proportional, and (2) the two sexes were distributed as evenly as possible among conditions. Six subjects entered the research project on Day 6 of the experimental trials and were randomly assigned to one of the two methadone reinforcement conditions under the above mentioned process.

The experimental design was a 2 x 2 x 5 factorial design.

The research program began with five days of orientation. On each day of the orientation phase of the study two Student Professional Assistants and other members of the research staff met with the subjects and ward staff on the ward to explain the various procedures and details of the research project. During this stage separate meetings were held for those staff members and subjects unable to attend the regular meetings.

The research sessions with the subjects began on a Monday and were held for eight weekdays. The meetings were held at Friends, Inc., a Stockton drug abuse agency and crisis center which is adjacent to Stockton State Hospital. Subjects in the Group Processes Method met from 7:00 p.m. to 11:00 p.m. each night (Monday through Thursday). Subjects in the New Careers Group met from 7:00 p.m. to 9:00 p.m. (Monday through Thursday). On Fridays the meetings were held in the afternoons from 2:00 p.m. to 4:00 p.m.

Each group was given daily assignments and a short psychological and physiological questionnaire to complete and return on the following day. A description of the questionnaire is presented in Appendix IV, Table 1. Sufficient time, space, and materials were allotted for the subjects to complete their assignments and questionnaires. Each subject was asked to invest at least five hours per day in the research program. The New Careers Group spent two hours per day in sessions and up to three hours doing their assignments. The subjects involved in the Group Processes

Method spent four hours in sessions per day and up to one hour doing their assignments.

Three members of Friends, Inc. experienced in conducting groups served as group leaders for the Group Processes subjects. There were three different types of groups held during the week. Each group lasted for a maximum of four hours (7:00 p.m. to 11:00 p.m.).

On Monday a group called the "Game" was held. The Game was patterned after the Synanon approach to encounter groups in which the group as a whole verbally responds to an individual group member. On Tuesdays, Wednesdays, and Thursdays an "Encounter Group" was held. The Encounter Group sessions consisted of expressing individual feelings about a number of varied topics (drugs, other individuals in the group, life in general, etc.). On Fridays a "Sensory Awareness Group" was conducted. The Sensory Awareness Group was similiar to the Encounter Group except that feelings were expressed in a non-verbal manner such as by touch.

The homework assignment for the subjects in the Group Processes Method consisted of keeping a daily diary. The contents of the diary were not rigidly defined, but incorporated the feelings of the subject during the group meetings, and these diaries were collected daily before the beginning of the group session. If a subject did not attend a meeting his diary for that day contained the reasons he did not attend. This was submitted as usual

at the beginning of the next meeting. The assignments were graded by two Student Professional Assistants and returned on the following day.

The same two Student Professional Assistants conducted the New Careers sessions at the headquarters of Friends, Inc. The emphasis in the sessions was on the development of the various skill areas of the New Careers program as mentioned in the introduction of this experiment.

Each day the subjects were assigned a project to be completed and submitted on the following day in the meeting. The assignment involved doing research on a given topic and writing a short paper summarizing what had been read. The subject matter of the topic was selected on the basis of its applicability to one or more of the nine major areas of emphasis to Stockton State Hospital's Professional library and a study room on the ward for research and the writing of their assignments.

The New Careers sessions consisted of a discussion by the group of the assignment that was given on the preceding day. During these sessions the two Student Professional Assistants acted as guides and catalysts for the group's discussion.

Both the New Careers and Group Processes Groups were divided into Methadone-Contingency and Non-Contingency Groups. Subjects in the Methadone-Non-Contingency Group received stabilization or maintenance dosages of methadone

by the same procedures described in Experiment III. Subjects in the Methadone-Contingency Group earned points by their behavior to determine their daily dosage of methadone. Points were earned in the following manner:

1. 5 points for arriving on time and staying until the end of the meeting session.

2. 3 points for arriving within five minutes of the beginning and staying until the end of the meeting session.

3. 1 point for coming within 15 minutes of the beginning and staying to the end of the meeting session.

4. No points for arriving 15 minutes or later after the start of the meeting session.

5. 2 points if the questionnaire was totally filled out and returned by the subject at the beginning of the session.

6. 1 point if the questionnaire was completed, but returned by a subject other than the one who had completed it.

7. 1-10 points for submitting the session assignment. The number of points earned was determined by the quality of the assignment, as measured by originality, content, neatness, correct spelling, etc. Each assignment was graded on a 10 point basis as indicated by a letter grade:

Letter Grade:	A+	A	B+	B	C+	C	D+	D	F+	F
no. of Points:	10	9	8	7	6	5	4	3	2	1

8. No points if a diary or assignment was not turned in at the beginning of the session for which it was due.

9. Subjects also had the opportunity to earn "bonus" points. They were earned in the following manner:

Points earned per day:	12	13	14	15	16	17
Bonus points earned per day:	1	2	3	4	5	6

Thus there was a maximum of 23 points a subject could earn on any given day. Table 2 of Appendix IV contains a sample handout sheet distributed to the addicts listing various behaviors and their equivalent points.

As previously stated, subjects in the Methadone-Contingency Groups earned points to determine their dosage of methadone. The number of points needed for a particular dosage of methadone are presented in Table 16.

Table 16

Methadone Payment Plan

Optimal Dosage	Dose of Methadone at which S is Maintained				
	40	60	80	100	120
150					23
140				23	20
130			23	20	17
120		23	20	17	12
100	23	20	17	12	9
80	20	17	12	9	7
60	17	12	9	7	3
30	9	7	3	0	
20	7	3	0		
10	3	0			
5	0				

As can be seen from an inspection of Table 16, the maximum dosage that a subject maintained at a given maintenance level could receive cost 23 points; a maintenance dosage cost 12 points; and a dosage sufficient to prevent withdrawal cost 0 points. The payment plan and contingencies were established so that maximum performance could be reinforced with the maximum dosage of methadone and average performance could be reinforced with a maintenance dosage of methadone.

The rules governing the actual purchase of methadone were as follows:

1. Dosage increase: On a given day a subject could increase his dosage level only one step at a time. For example, a subject maintained on 120 mg. who purchased 120 mg. on Day 5 could only increase his dosage to 130 mg. on Day 6 (although he might have had enough points to purchase 150 mg.). This rule prevented the possibility of subjects overdosing.

2. Dosage decrease: On a given day dosage levels could be decreased to any lower level (including the lowest level). The decrease resulted from the subject's request or from his inability to pay for higher dosages. For example, a subject who was maintained on 120 mg. and earned 0 points on a given day would have his dosage level decreased to 30 mg.

This rule, however, was changed on Day 5 of the research project by the ward physician. Several subjects in the Methadone-Contingency Group who had earned no points during the course of the study reportedly experienced withdrawal symptoms and complained to the doctor. Consequently,

the dosage decrease rule was changed so that subjects could decrease (voluntarily or involuntarily) their methadone dosages only one step at a time.

In effect the contingencies between behavior and methadone reinforcement were considerably weakened by this change. With the new rule in effect subjects could be reinforced with methadone in the absence of appropriate behavior. For example, a subject maintained on 100 mg. (reinforcement), could earn 0 points on Day 5 and receive 80 mg. Thus it was possible for subjects to earn points on one day and receive dosages equal to or above maintenance levels then earn no points the next day and experience only a slight reduction in dosage of methadone.

Although the contingencies were in effect changed the research staff had no alternative but to accept the new rule.

3. Subjects who earned a given number of points were not required to purchase the methadone dosage corresponding to that number of points. They could purchase smaller dosages if they so desired and save the remaining points for use at a later date.

Thus, subjects could procure any methadone dosage within their domain by the points they had earned--subject to the restrictions that the change in dosage did not exceed one step per day in either direction, and that the subject had enough points to procure the dosage.

Points were totaled for each subject after the meetings by the two Student Professional Assistants. The following morning the Student Professional Assistants met with the subjects on the ward, and the addicts purchased the methadone dosage they desired (within the limitations of the experimental procedures outlined above). This dosage was administered immediately after the purchase. Dosage levels purchased on Fridays were administered on the weekend also.

In the Methadone-Non-Contingency Group methadone procurement was not contingent upon performance; the addicts received maintenance dosages determined by the ward physician under the conditions described in Experiment III, page 79.

The methadone dosages were orally administered once each morning on the ward. The methadone was purchased in tablet form and dissolved in orange juice for consumption. Records were maintained by the pharmacy and nursing staff in compliance with official Department of Mental Health operating procedures for narcotic reception, maintenance, and disposition. Eli Lilly Company furnished the methadone to Stockton State Hospital.

Results

The performance of the subjects during the study is summarized in Tables 17 and 18. Six subjects (Ss 6, 7, 8-Group Processes/Contingency group, and Ss 13, 14, 15, New Careers/Contingency group) entered the experiment on Day 6 of the study. Consequently, only three days of data were

recorded for them. In these cases the subjects' performance score was the percentage of their appropriate behavior (research group meeting attendance, etc.) for the three days of the study.

Preliminary examination of each dependent variable by Hartley's test indicated that the population-error-variances of the Methadone-Contingency and Non-Contingency Groups were unequal ($p < .05$). Results of the tests are summarized in Table 19. Subsequent transformations of the data failed to equalize the variances of the groups. Therefore the data was inappropriate for an analysis of variance, and consequently the nonparametric Wilcoxon-Mann-Whitney test was used to analyze the main effect of contingency for each dependent variable. An analysis of variance was used to analyze the remaining main effect of therapy and the therapy x contingency interaction for meeting attendance, and assignment and questionnaire completion. An analysis of variance was used to analyze the main effects of therapy and trials, and the remaining interactions for the daily homework assignment grade measure.

Research group meeting attendance performance, the percentage of meetings a subject attended during the eight days of the study, was analyzed by the Wilcoxon-Mann-Whitney test and analysis of variance. Insepaction of the Wilcoxon-Mann-Whitney test revealed a significant difference in performance between the methadone-contingency conditions, in favor of the Methadone-Contingency Group ($T = 126$, $p < .005$).

Table 17

Performance of Inpatient Heroin Addicts

Methadone Reinforcement Group	Therapy Group	S	Percentage Daily Papers Completed	Percentage Daily Attendance	Percentage Daily Questionnaires Completed
Contingency	Group Processes	1	100	100	100
		2	100	100	100
		3	88	75	88
		4	100	100	100
		5	0	25	0
		6	100	100	66
		7	33	100	66
		8	33	100	66
		$\bar{X}$	71	88	72
	New Careers	9	88	100	100
		10	63	88	75
		11	0	25	0
		12	0	13	13
		13	100	100	100
		14	66	100	100
		15	100	100	100
		$\bar{X}$	59	75	79
Non-Contingency	Group Processes	16	0	0	0
		17	0	63	0
		18	0	0	0
		19	0	0	0
		20	0	0	0
		21	0	0	0
		22	0	0	0
		23	0	0	0
		$\bar{X}$	0	8	0
	New Careers	24	0	13	0
		25	0	13	0
		26	0	0	0
		27	63	0	0
		28	38	0	63
		29	0	25	0
		30	0	0	0
		$\bar{X}$	14	7	9

Table 18

Performance of Inpatient Heroin Addicts

Methadone Reinforcement Group	Therapy Group	S	Points Earned for Homework Day 1	2	3	4	5	6	7	8	$\bar{X}$
Contingency	Group Processes	1	5	5	7	7	6	7	7	7	6.4
		2	5	7	7	7	8	7	7	8	7.0
		3	0	5	0	5	5	5	4	6	3.8
		4	5	5	5	8	6	8	6	5	6.0
		5	0	0	0	0	0	0	0	0	0.0
		6	5	5	5	5	5	5	5	5	5.0
		7	5	0	0	5	0	5	0	0	1.0
		8	0	5	5	0	0	0	5	0	1.9
	New Careers	9	5	0	5	5	5	5	5	5	4.4
		10	5	0	8	8	5	5	0	0	3.9
		11	0	0	0	0	0	0	0	0	0.0
		12	5	7	7	7	5	5	5	6	5.9
		13	0	0	0	0	0	0	0	0	0.0
		14	5	0	0	5	5	5	5	0	3.1
		15	5	5	5	5	5	5	5	5	5.0
Non-Contingency	Group Processes	16	0	0	0	0	0	0	0	0	0.0
		17	0	0	0	0	0	0	0	0	0.0
		18	0	0	0	0	0	0	0	0	0.0
		19	0	0	0	0	0	0	0	0	0.0
		20	0	0	0	0	0	0	0	0	0.0
		21	0	0	0	0	0	0	0	0	0.0
		22	0	0	0	0	0	0	0	0	0.0
		23	0	0	0	0	0	0	0	0	0.0
	New Careers	24	0	0	0	0	0	0	0	0	0.0
		25	0	0	0	0	0	0	0	0	0.0
		26	0	0	0	0	0	0	0	0	0.0
		27	5	5	0	0	0	8	5	7	3.8
		28	0	0	8	0	0	5	0	5	2.3
		29	0	0	0	0	0	0	0	0	0.0
		30	0	0	0	0	0	0	0	0	0.0

Table 19

Summary of Hartley's Test for Homogeneity of Error Variances

Dependent Variable	Variance of the Methadone-Contingency Group: Contingency	Non-Contingency	F_{max} Test $\underline{df}$ = 2, 9
Assignments Completed	1521.54	331.66	4.59**
Meetings Attended	1041.63	290.40	3.59*
Questionnaires Completed	1356.64	264.60	5.13**
Homework Grade	5.73	1.23	4.66**

*p < .05
**p < .01

Subsequent analysis by analysis of variance of the therapy main effect and the therapy x contingency interaction indicated that there were no significant effects. A summary of the analysis of variance for the research group meeting attendance data is presented in Table 20.

Table 20

Analysis of Variance Summary Table: Research Group Meeting Attendance

Source	df	MS	F
A (Therapy Group)	1	29.07	----
B (Contingency)	1	36680.04	46.38*
AB	1	805.10	1.02
W. cell	26	790.81	
Total	29		

*$p < .01$

The percentage of assignments completed and submitted for the eight days of the study was analyzed by the Wilcoxon-Mann-Whitney test and analysis of variance. Inspection of the Wilcoxon-Mann-Whitney test indicated that subjects in the Methadone-Contingency Group completed and submitted more assignments than subjects in the Methadone-Non-Contingency Group ($T = 149.5$, $p < .005$). Subsequent analysis by analysis

of variance of the interaction indicated that there were no significant effects. The analysis of variance summary table for the assignment completion data is provided in Table 21.

Table 21

Analysis of Variance Summary Table: Assignments Completed

Source	df	MS	F
A (Therapy Group)	1	17.61	----
B (Contingency)	1	25637.64	25.62*
AB	1	1241.15	1.24
W. cell	26	1000.87	
Total	29		

*p < .01

The third dependent variable, the percentage of questionnaires completed and returned during the eight days of the study, was analyzed by the Wilcoxon-Mann-Whitney test and analysis of variance. Inspection of the Wilcoxon-Mann-Whitney test revealed that there was a significant difference in performance between the methadone-contingency conditions, in favor of the Methadone-Contingency Group (T = 138.5, p .005). Subsequent analysis by analysis of

variance of the therapy main effects and the therapy x contingency interaction indicated that there were no significant effects. The analysis of variance summary table of the questionnaire completion data is provided in Table 22.

Table 22

Analysis of Variance Summary Table: Questionnaires Completed

Source	df	MS	F
A (Therapy Group)	1	269.60	----
B (Contingency)	1	34273.21	44.19*
AB	1	175.50	----
W. cell	26	775.81	
Total	29		

*p < .01

The fourth dependent variable, the number of points received on research group assignments (daily homework grade), was analyzed by the Wilcoxon-Mann-Whitney test and analysis of variance. The number of points received by each subject for each day of the eight days of the study constituted the raw data. Because six subjects (Ss 6, 7, 8-Group Processes/Contingency and Ss 13, 14, 15-New Careers/Contingency)

entered the experiment on Day 6 of the study only three days of data were recorded for them. Consequently an estimation of their performance on Days 1-5 of the experiment was obtained. The estimation procedure was as follows: The subject's raw score, the frequency of assignments completed for Days 6-8, was converted into a percentage, multiplied by 5, and an estimate of the frequency of assignment completion was found for Days 1-5 of the study. Once this frequency was found the number of points for each assignment was determined. Because each subject (with the exception of S 13 who earned no points) earned 5 points on each of his assignments, 5 points were given to the estimated assignments for Days 1-5. The estimated scores were then randomly assigned to the cells corresponding to Days 1-5.

The main effect of contingency was analyzed by the Wilcoxon-Mann-Whitney test. The data analyzed was the mean number of points each subject received on his assignments for the eight days of the study. Results of this analysis indicated that there was a significant difference between the methadone-contingency conditions, in favor of the Methadone-Contingency Group ($T = 151$, $p < .005$). Subsequent analysis of the remaining main effects and interactions by analysis of variance (with adjusted degrees of freedom because of the estimated scores) indicated that there were no significant effects. The analysis of variance summary table for homework assignment grades is summarized in Table 23.

Table 23

Analysis of Variance Summary Table:
Homework Assignment Grades

Source	df	MS	F
Between subjects	29		
A (Contingency)	1	673.35	31.38*
C (Therapy Group)	1	1.88	------
AC	1	27.70	1.29
Subj w.groups	26	21.46	
Within subjects	180		
B (Trials)	7	1.93	------
AB	7	2.10	------
BC	7	1.83	------
ABC	7	2.41	------
B x subj w.groups	152	3.59	
Total	209		

* $p < .01$

Discussion

The results of the experiment clearly indicate that methadone was an effective reinforcer for appropriate behavior in the inpatient heroin addict. Meeting attendance, assignment and questionnaire completion and submission, and grades on assignments were notably greater for those addicts reinforced with methadone as compared to those who received it regardless of their performance. The results also indicated that this type of methadone-reinforcement was equally effective in reinforcing appropriate behavior in addicts undergoing Encounter Group therapy and New Careers educational therapy.

The opportunity to purchase dosages of methadone exceeding maintenance dosages did not appear to increase motivation in the subjects. Only two subjects purchased dosages in excess of their maintenance level, and remaining subjects (who had earned the sufficient number of points) purchased maintenance dosages even though some subjects occasionally possessed points sufficient to purchase higher dosages. The author believes these results indicate that offering addicts methadone reinforcement in excess of maintenance dosage levels did not produce an increase in positive responding. Rather, these results indicate subjects were motivated to earn methadone dosages at maintenance levels. However, any conclusion regarding this matter must remain tentative since the study was terminated prematurely.

The non-significant difference between the New Careers and Group Processes Groups is attributed to the fact that the groups met for only eight days. During this period many of the sessions were devoted to adaptation of the subjects, experimenters, and group leaders adapting to each other and to the discussion of the content and purpose of the groups. In reality, neither method of therapy had been truly administered to the subjects when the research project was terminated. However, the results and the experiences encountered during the planning and execution of the project did prove useful for discussion of the effectiveness of methadone-reinforcement and those factors which both enhance and hinder it. First and foremost, the methadone-contingency method was shown to be an effective tool in the rehabilitation process. Through its use the acquisition and/or reinstatement of appropriate behavior was efficiently managed.

Secondly, the use of methadone payment plans and sets of available reinforcing dosages individualized according to the addicts' various maintenance levels proved to be a valuable technique in the methadone-reinforcement process. Through the use of these individualized payment plans and sets of dosages, the methadone reinforcement for behavior was equated across all subjects, regardless of their differing methadone maintenance levels. Such a system seems necessary for those methadone-reinforcement programs involving subjects who differ in their methadone maintenance levels.

A third important aspect of the methadone-reinforcement method revealed by the study was the necessity of having a well informed ward staff. Numerous times during the study the research staff found the controlled experimental conditions being indirectly impeded by members of the drug ward personnel. Ward meetings with required attendance were held during times reserved for research group meetings, some subjects were given dosages of methadone in excess of what they had earned, and one member of the drug ward staff assumed responsibility for determining how many points the addicts' assignments were worth (hence, sometimes subjects were given more methadone than had been ordered for them by the research staff in charge of methadone purchasing). All in all these factors point to the necessity of having a ward staff familiar with the research project they are involved in. In the case of methadone-reinforcement projects effort must be made to insure that members of the ward personnel recognize the nature of the contingencies between methadone and behavior, and their importance for maintaining behavior.

The results of the experiment then indicate that methadone is an effective reinforcer for appropriate behavior in the inpatient heroin addict when contingencies are established between methadone and the behaviors in question. The study has also disclosed certain beneficial and hindering aspects of such a program and these may prove useful in the further experimentation of methadone-reinforcement therapy.

Chapter 7

Experiment V

The present study explored the effect of methadone on perceptual and motor functioning in the heroin addict maintained on it. Such research is required to provide experimental data pertaining to the feasibility of administering methadone as a pharmacological agent in the treatment of opiate addiction.

The conceptual hypothesis was that perceptual and motor functioning in the heroin addict would not be altered by methadone maintenance.

Perceptual and motor functioning were defined as performance scores on perceptual and motor tests. The term maintenance was defined as that period of time when the addict's body had adapted to methadone and the subject no longer exhibited a physical craving for heroin or experienced the euphoric effect of the drug.

The independent variable in the study was the length of time a subject received methadone. The first level of the independent variable was the pre-stabilization stage and the second, the maintained stage. The pre-stabilization stage referred to that period of time when the addict had orally taken 1 dosage of 20 mg. of methadone. The maintained

stage referred to that period of time when the addict had orally taken an average 100 mg./day for five weeks.

The dependent variables in the study were as follows: (1) pre- and post-test performance on the line length matching task of the Müller-Lyer illusion, measured in centimeter deviation scores from the "0" point on the moveable arm of the apparatus; (2) pre- and post-test performance on a pencil maze task, measured in speed of maze completion (sec.); and (3) pre- and post-test performance on the Crawford Small Parts Dexterity Test, measured by the total number of sets of pins, collars, and screws assembled into the test board. Pre-test performance was defined as that performance measured during the pre-stabilization stage of methadone maintenance and post-test performance, was that performance measured during the maintained stage of methadone maintenance.

The experimental hypothesis was that the pre- and post-test performance on the Müller-Lyer illusion task, the pencil maze task, and the Crawford Small Parts Dexterity Test, respectively, would not differ significantly.

Method

The subjects in the experiment were one female and five male heroin addict(s). The mean age of the group was 30 years, with a range of 23-41 years. See the introduction of this report for a complete discription of the subjects.

The experimental design was a one-group, before-after design.

The equipment used in the experiment consisted of the following apparatuses: (1) a Crawford Small Parts Dexterity Test used to measure manual dexterity and fine hand-eye coordination (See Buros, 1959, p. 871 for a complete description of the test); (2) a Müller-Lyer figure (Lafayette Instrument, #14010); and (3) a pencil maze (Lafayette Instrument Company, #20014).

The subjects were individually tested in small conference rooms in the Professional Building at Stockton State Hospital, and the tests were administered during the pre-stabilization and maintenance stages of methadone treatment by two Student Professional Assistants. The order of presentation of the three tests was randomized with an intertest interval of 10-20 minutes.

The Crawford Small Parts Dexterity Test administration consisted of the following procedures: The subject was seated in a small room and shown the various parts of the test. He was then given the following instructions: "Your task is to pick up the screw and put it in the threaded hole of the test board. Then take the screw driver and thread the screw completely into the hole. After you have completed this pick up one of the pins and with the tweezers pick up a collar and place it over the pin. Once you have completed this sequence begin again." The subject was given 5 minutes to practice the test and then given 20 minutes to complete as many sets of screws, collars and pins as possible. After the 20 minutes were up the subject was dismissed from the testing situation to await any further testing.

The pencil maze testing consisted of the following procedures: The subject was seated at a table and shown the pencil maze. He was told that the object of the test was to go through the maze as quickly and as accurately as possible. After clarifying any questions the subject had concerning the test the experimenter gave the following instructions: "Remember, you are to go through the maze as quickly and as accurately as possible. Begin here (start-box) and end here (end-box). . . I am going to time you. . . now when I say 'Start' I want you to run the pencil through the maze. When you are finished say 'Finished'. Now put your pencil in the start-box and begin when I say 'Start'." After the instructions were given the subject was told to "Start". When the subject had finished the task he was dismissed to await any further testing.

All tests were given individually in the afternoon.

Results

The pre- and post-test performance on the line length matching task of the Müller-Lyer illusion was analyzed by a t test for related groups. The raw scores were deviation scores in cms. from the "0" point on the test line's scale. The raw scores were transformed into absolutes to eliminate negative deviation scores. The level of significance was set at 0.10, two-tailed because the null hypothesis was predicted. The analysis indicated that pre- and post-test

performance on the Müller-Lyer illusion task differed significantly, in favor of post-test performance (t = 2.940, df = 5, $p < .10$, two-tailed). The performance scores are summarized in Table 24.

Table 24

Performance on the Müller-Lyer Line Length Matching Task (Original Scores)

Subject	Before Measure	After Measure
1	-4.60	+0.50
2	-2.75	-2.00
3	-6.60	-4.50
4	-0.50	0.00
5	-4.00	-3.50
6	+6.40	-5.00
$\bar{X}$*	4.14	2.58

*$\bar{X}$ is based on the absolute transformation of the original scores.

The second dependent variable, the speed score (sec.) on the pencil maze task, was analyzed by a t test for related groups. The analysis indicated that there was not a significant difference between the pre- and post-test

performance of completing the maze, (t = 1.169, df = 5). The data is summarized in Table 25.

Table 25

Performance on the Pencil Maze Task: Time to Completion (sec.)

Subject	Before Measure	After Measure
1	15.00	14.40
2	16.00	10.20
3	11.00	15.90
4	8.40	8.00
5	16.50	12.50
6	23.00	19.00
$\bar{X}$	15.07	13.33

The performance on the Crawford Small Parts Dexterity Test was analyzed by a t test for related groups. Alpha was set at 0.10, two-tailed. The raw score for the test consisted of the number of completed sets of screws, pins, and collars and fraction thereof assembled into the test board. A score of 1 was assigned to each completed set. In the case of an incomplete set a score of $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{4}$ was given for a screw, pin, and collar respectively. The final raw score was the total number of sets plus any incomplete

set. The analysis indicated that the pre- and post-test performance on the Crawford Small Parts Dexterity Test differed significantly, in favor of post-test performance (t = 2.366, df = 5, $p < .10$, two-tailed). Table 26 provides a summary of the data.

Table 26

Performance on the Crawford Small Parts Dexterity Test: the Number of Sets of Pins, Collars, and Screws Completed

Subject	Before Measure	After Measure
1	20.00	22.50
2	19.00	24.50
3	14.00	14.00
4	18.50	20.50
5	14.50	21.00
6	18.75	19.50
$\bar{X}$	17.46	20.33

Discussion

The results of the experiment indicate that methadone does not cause a decrement in perceptual or motor performance in the heroin addict once he has been stabilized or maintained on the drug. Mean motor performance (pencil maze task) did not decline after maintenance; rather it increased to

a small degree, although not significantly. Mean motor performance (Crawford Small Parts Dexterity Test) and mean perceptual performance (Müller-Lyer line length matching task) did increase significantly during the stabilization stage. However, these results do not necessarily indicate that motor and perceptual functioning, as measured by the tests, are significantly increased by methadone. Rather, a more plausible explanation is that methadone allowed the addicts to live healthy lives with regular meals, sleep, etc. resulting in increased health and decreased anxiety and tension: This in turn may have fostered better performance on the post-tests.

A "practice effect" may also have been responsible for the improved post-test performance, but this is unlikely because of the five week intertest interval.

The results of the study indicate that methadone maintenance did not produce a decline in performance. Average perceptual and motor performance remained statistically the same or better after the addict had been stabilized on methadone.

The results of the present study are in agreement with other studies dealing with addicts maintained on methadone; namely long- or short-term maintenance allows the addict to function normally along a number of different behavioral and physiological dimensions. Dole & Nyswander (1965) report that in their studies they have been unable to find a test (psychological or medical) that is able to distinguish

patients undergoing methadone therapy from normal controls. Smith & Bentel (1970) in their Fourth Annual Report to the Legislature (California) report that . . ."If properly administered, methadone maintenance allows the patient to function with neither sedation or euphoria, and with no impairment of vigilance, reaction time, or intellectual function." (p. 33) Nyswander (1971) also reports that the addict maintained on methadone functions normally during long-term methadone maintenance (5 years).

The findings of this study then indicate that methadone maintenance is a feasible method of pharmacological therapy in the treatment of heroin addiction. However, more research on the effects of methadone maintenance on other types of functioning is required to examine its effectiveness and safety or possible negative effects.

Chapter 8

General Discussion and Conclusions

The research reported in this thesis has been largely concerned with the evaluation of the use of methadone as a reinforcer for appropriate behavior and the New Careers method of therapy for inpatient methadone maintenance programs. Consequently the present discussion and summary will deal with these factors specifically rather than the sum total of the variables investigated in the five experiments.

Methadone-Reinforcement

The results of Experiments II, III, and IV indicate that the synthetic narcotic, methadone, can be used effectively as a reinforcer for appropriate behavior in the heroin addict undergoing methadone maintenance. Addicts who were reinforced with methadone attended significantly more research group therapy sessions (New Careers, Group Processes-Encounter, and on-ward therapy sessions), completed and submitted more and better quality research group assignments, and returned more psychological and physiological questionnaires than addicts whose methadone did not depend upon their performance. In brief, subjects

who were reinforced with methadone took a significantly more active part in their therapy than addicts who were not reinforced with the drug.

Experiments II, III, and IV also indicated that the methadone-reinforcement process was easily adapted to the on-going program of the drug abuse ward at Stockton State Hospital. After the initial adjustment of the ward staff and subjects to the methadone-reinforcement procedures few complications arose with regards to the institution of such a novel use of methadone maintenance on a drug abuse ward.

The author believes that these results indicate that methadone-reinforcement is a potentially valuable approach to the treatment of inpatient heroin addicts and this procedure merits the consideration of drug abuse programs designed to motivate, institute, and maintain appropriate behavior in the heroin addict undergoing methadone maintenance. However, at this point it must be noted that while methadone-reinforcement appears to be a valuable approach for an addict's therapeutic process, it cannot be considered the total answer for engendering motivation and appropriate behavior in the heroin addict. In the final analysis methadone-reinforcement represents external control over the addict's behavior, i.e. it is a source of extrinsic reinforcement. Consequently a basic problem with methadone-reinforcement arises when one justifiably asks, "What happens when the guiding hand of

the behavioral therapist is lifted?", or in other words, "What happens to the appropriate behavior once the contingencies between behavior and methadone are withdrawn?". The answer, according to behavior modification, is that the appropriate behavior will most likely be extinguished. Thus, the utilization of methadone-reinforcement must be qualified if it is to be used in a program designed to create a lasting change in an addict's behavior.

It is this author's belief that such a qualification may be made as follows: Methadone-reinforcement, while providing only an external, hence in most cases temporary, control over behavior, does have potential value if used in conjunction with a therapeutic process or program which has a source of intrinsic reinforcement for appropriate behavior. Ideally methadone-reinforcement can be used to engage an addict in such a program. Once the addict is engaged in the therapeutic process or program he will be exposed to the intrinsic reinforcement and a lasting change in his behavior will be effected.

In summary, it is this author's belief that methadone-reinforcement can be used to its greatest advantage when it is used to engage an addict in a program or therapeutic process which offers intrinsic reinforcement for appropriate behavior. In this way methadone-reinforcement can make a valuable contribution to the total therapeutic goal of positive behavior change.

New Careers

Conclusions regarding the value of the New Careers patient participation approach for inpatient heroin addicts must remain speculative. While Experiments I - IV utilized the New Careers approach, only Experiment I provided meaningful experimental data. Experiments II and III did not use appropriate control groups to evaluate New Careers and Experiment IV was terminated before subjects had been adequately introduced to the New Careers concept. Consequently this discussion of New Careers is based upon the experimental results of Experiment I and speculations from the performance of subjects in Experiments II and III.

The results of Experiment I showed that the New Careers method was successful in generating research group meeting attendance; performance of subjects participating in the New Careers sessions was superior to that of subjects in a control group. These results supported the hypothesis that New Careers offered the addict a source of intrinsic motivation for attendance at therapeutic sessions.

Experiments II and III also utilized the New Careers method. However, the approach was not used as an experimental condition and consequently no control groups were conducted to evaluate its relative effectiveness. Examination of the performance of subjects in these experiments does, however, merit consideration in this discussion. Contrasting the performance of subjects in Experiment II with that of subjects in Experiment III

indicates that New Careers had little effect upon motivating the performance of subjects; only subjects who were reinforced with methadone for performance in the New Careers meetings demonstrated significant performance. Subjects who were not reinforced with the drug demonstrated a very low level of performance. Thus, considering the performance of subjects in Experiments II and III, it seems that the New Careers method had little effect in motivating the performance of inpatient heroin addicts.

The results of Experiment I and those of Experiments II and III thus are inconsistent. New Careers was shown to motivate subjects in Experiment I but seemed to have no effect on motivation in Experiments II and III.

A possible explanation for the above mentioned inconsistency is that the population of subjects in Experiment I was different from those in Experiments II and III; Experiment I used both drug abusers and heroin addicts, while Experiments II and III used only heroin addicts. The possibility exists that a population of drug abusers or a combination of drug abusers and heroin addicts are more amenable to the New Careers approach than a population of only heroin addicts. This explanation, however, remains untested and therefore speculative until more research is done on the performance of various types of drug users in New Careers programs.

Thus, conclusions from the research presented in this thesis concerning the effectiveness of the New Careers

approach for heroin addicts are nebulous. However, considering the positive findings of past research on New Careers projects (Grant & Grant, 1967), it seems that New Careers may be a potentially valuable tool in the rehabilitation of the heroin addict. It is this author's belief that more research is needed to evaluate the efficacy of the New Careers approach for heroin addicts. Only when this is done can any meaningful conclusions be made regarding New Careers as a method of treating heroin addicts.

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DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Food and Drug Administration

[21 CFR Part 130]

NEW DRUGS

Conditions for Investigational Use of Methadone for Maintenance Programs for Narcotic Addicts

In order to assist the profession, municipalities, organizations, and other groups who are interested in sponsoring programs for the investigation of methadone in the treatment of narcotic addicts, the Food and Drug Administration and the Bureau of Narcotics and Dangerous Drugs agree that it is in the public interest that acceptable guidelines for these programs be established. The guidelines of the Bureau of Narcotics and Dangerous Drugs, Department of Justice, are also proposed in this issue of the FEDERAL REGISTER.

Accordingly, pursuant to provisions of the Federal Food, Drug, and Cosmetic Act (secs. 505, 701(a), 52 Stat. 1052-53, as amended, 1055; 21 U.S.C. 355, 371(a)) and under authority delegated to the Commissioner of Food and Drugs (21 CFR 2.120), it is proposed that a new section be added to Part 130 as follows:

§ 130.44 Conditions for investigational use of methadone for maintenance programs for narcotic addicts.

(a) There is widespread interest in the use of methadone in the maintenance treatment of narcotic addicts. Though methadone is a marketed drug approved through the new-drug procedures for specific indications, its use in maintenance treatment of narcotic addicts is an investigational use for which substantial evidence of safety and effectiveness is not available. In addition, methadone is a controlled narcotic subject to the provisions of the Harrison Narcotic Act and has been shown to have significant potential for abuse. In order to assure that the public interest is adequately protected, and in view of the uniqueness of this method of treatment, it is necessary that a methadone maintenance program be closely monitored to prevent diversion of the drug into illicit channels and to assure the development of scientifically useful data. Accordingly, the Food and Drug Administration and the Bureau of Narcotics and Dangerous Drugs conclude that prior to the use of methadone in the maintenance treatment of narcotic addicts, advance approval of both agencies is required. The approval will be based on a review of a Notice of Claimed Investigational Exemption for a New Drug submitted to the Food and Drug Administration and reviewed concurrently by the Food and Drug Administration for scientific merit and by the Bureau of Narcotics and Dangerous Drugs for drug control requirements.

(b) No person may sell, deliver, or otherwise dispose of methadone for use in the maintenance treatment of narcotic addicts until a study providing for such use has had the advance approval by the Commissioner of Food and Drugs on the basis of a Notice of Claimed Investigational Exemption for a New Drug justifying such studies.

(c) An abbreviated Notice of Claimed Investigational Exemption for a New Drug shall be submitted to the U.S. Food and Drug Administration (four copies), 5600 Fishers Lane, Rockville, Md. 20852. Forms entitled "Notice of Claimed Investigational Exemption for Methadone for Use in the Maintenance Treatment of Narcotic Addicts," suitable for such a submission may be obtained from the above address. The submission should be signed by the physician in charge of the maintenance program who will be regarded as the responsible party and sponsor for the exemption. (If the sponsor is a manufacturer or distributor of the drug, the regulations as outlined in § 130.3 should be followed, except where the guidelines set forth below are appropriate.) The notice shall contain the following:

(1) Name of sponsor, address, date, and the name of investigational drug—methadone.

(2) A description of the form in which the drug is purchased (e.g., bulk powder or tablet or other oral dosage form), the name and address of the manufacturer or supplier, and assurance that the drug meets the requirements of the United States Pharmacopeia if recognized therein. If it is in an oral form designed to minimize its potential for abuse, and not recognized in the U.S.P., assurance that the drug meets adequate specifications for such use should be provided.

(3) The name, address, and a summary of the scientific training and experience of each investigator, the physician-sponsor, and the individual charged with monitoring the progress of the investigation and evaluating the safety and effectiveness of the drug if the monitor is other than the physician-sponsor. Investigators, other than physician-sponsor, are required to sign a form FD 1573, obtainable from the Food and Drug Administration.

(4) A description of the facilities available to the sponsor to perform the required tests including the name of any hospital, institution, or clinical laboratory facility to be employed in connection with the investigation.

(5) A statement of the protocol. The following is an acceptable protocol. Modifications of this protocol or other protocols will be judged on their merits.

METHADONE MAINTENANCE STANDARD PROTOCOL

Objectives:

A. To evaluate the safety of long term methadone administration at high doses.

B. To evaluate the efficacy of oral methadone per se at high dosage in decreasing the craving for other narcotic drugs and in minimizing their euphoriant effect.

C. To evaluate the efficacy of methadone as the pharmacological moiety in a regimen for the rehabilitation of narcotics addicts including their return to a drug free state.

Admission criteria:

A. Documented history of abuse of one or more opiate drugs, the duration of which is to be stated.

B. Confirmed history of one or more failures of withdrawal treatment.

C. Evidence of current abuse of opiates.

An exception to the third criterion (i.e., current abuse of opiates) is allowable in exceptional circumstances for certain subjects for whom methadone maintenance may be initiated a short time prior to or upon release from an institution. This procedure should be justified on the basis of a history of previous relapses. In these circumstances, appropriate descriptions of the facilities, procedures, and qualifications of the personnel of the institution are to be included in the application filed by the physician-investigator.

Subjects who wish to do so may be transferred from one approved program to another.

Criteria for exclusion from the program:

A. Pregnancy.

B. Psychosis.

C. Serious physical disease.

D. Persons less than 18 years of age.

Addicts who are pregnant or who are suffering from psychosis or serious physical disease should be hospitalized and withdrawn from narcotics.

Admission evaluation:

A. History: Recorded history to include age, sex, verified history of arrests and convictions, educational level, employment history, history of drug abuse of all types.

B. Medical history of significant illnesses.

C. History of prior psychiatric evaluation and/or treatment.

D. Physical examination.

E. Formal psychiatric examination in subjects with a prior history of psychiatric treatment and in those in whom there is a question of psychosis and/or competence to give informed consent.

F. Chest X-ray.

G. Laboratory examinations to include complete blood count, routine urinalysis, liver function studies (including SGOT, alkaline phosphatase, total protein, and albumin-globulin ratio), fasting blood sugar, blood urea nitrogen, serologic test for syphilis.

Procedure:

A. Methadone to be administered in an oral form, so formulated as to minimize misuse by parenteral injection. The dosage to be adjusted individually and not to exceed 100 mg. per day. The methadone is to be administered under the close supervision of the investigator or responsible persons designated by him. Initially, the subject is to receive the medication under observation each day. After demonstrating adherence to the program, the subject may be permitted twice weekly observed medication intake with no more than a 3-day supply allowed in his possession. (Longer intervals may be approved in exceptional cases when the investigator

(Reprinted from Federal Register of June 11, 1970; 35 F.R. 9014, 9015)

has stated appropriate justification in his protocol.)

B. Urinalysis: Urine collection to be supervised; urine specimens to be analyzed for methadone, morphine, quinine, cocaine, barbiturates, and amphetamines. urine specimens to be pooled or selected randomly for analysis at intervals not exceeding 1 week.

C. Rehabilitative measures as indicated; these may include individual and/or group psychotherapy, counseling, vocational guidance, and educational placement.

D. Adequate investigation and appropriate management of any abnormalities detected on the basis of history, physical examination, or laboratory examination at the time of admission to the program or subsequently, including evaluation and treatment of intercurrent physical illness with observation for complications which might result from methadone.

E. Physical examination and chest X-ray to be repeated annually and laboratory examinations conducted at the time of admission to be repeated at 6-month intervals.

F. Consideration to be given to discontinuing the drug for participants who have maintained a satisfactory adjustment over an extended period of time; in such cases, followup evaluation to be obtained periodically.

G. Adequate records to be kept for each participant on each aspect of the treatment program including adverse reactions and the treatment thereof.

Other special procedures:

Within the limitations of personnel, facilities, and funding available and in the interests of increasing the knowledge of the safety and efficacy of the drug itself, the following procedures are suggested as worthwhile, to be carried out at baseline and periodically in randomly selected subjects: EKG, EEG, measures of respiratory, cardiovascular, and renal function, psychological test battery, simulated driving performance.

Voluntary and involuntary terminations:

A. Attempts are to be made to obtain followup on all participants who elect to leave the program. Whenever possible, the patient is to be hospitalized for gradual withdrawal from methadone, and appropriate facilities should be available for this purpose.

B. Subjects are to be terminated as having failed in the program on the basis of continued frequent abuse of narcotics or other drugs, alcoholism, criminal activity, or persistent failure to adhere to the requirements of the program.

Results:

Evaluation of the safety of the drug administered at high dosages over prolonged periods of time is to be based on results of physical examination, laboratory examinations, adverse reactions, and results of special procedures when these have been carried out.

Evaluation of rehabilitation is to be based on, among other things, the following:

A. Arrest records.

B. Extent of alcohol abuse.

C. Extent of drug abuse.

D. Occupational adjustment verified by employers or records of earnings.

E. Social adjustment verified whenever possible by family members or other reliable persons.

Evaluations are to be recorded at predetermined intervals, e.g., monthly for the first 3 months, at 3 months, and at 6-month intervals thereafter.

Evaluation group:

Whenever possible, an independent evaluation committee of professionally trained and qualified persons not directly involved in the project will inspect facilities, interview personnel and selected patients, and review individuals' records and the periodic analysis of the data.

(d) The sponsor shall assure that adequate and accurate records are kept of all observations and other data pertinent to the investigation on each individual treated; the sponsor shall make the records available for inspection.

(e) The sponsor is required to maintain adequate records showing the dates, quantity and batch or code marks of the drug used. These records must be retained for the duration of the investigation.

(f) The sponsor shall monitor the progress of the investigations and evaluate the evidence relating to the safety and effectiveness of the drug. Accurate progress reports of the investigation and significant findings shall be submitted to the Food and Drug Administration at intervals not exceeding periods of 1 year. All reports of the investigation shall be retained for the duration of the investigation.

(g) The sponsor shall promptly notify the Food and Drug Administration of any findings associated with the use of the drug that may suggest significant hazards, contraindications, side effects, and precautions pertinent to the safety of the drug.

(h) The sponsor in admitting addicts to the investigational treatment program is required to give to the addict an accurate description of the limitations as well as the possible benefits which the addict may derive from the program.

(i) The sponsor of this program shall certify that the drug will be used and administered only to subjects under his personal supervision or under the supervision of personnel directly responsible to him; a statement to this effect shall be included in the notice.

(j) The sponsor shall certify that all participants will be informed that drugs are being used for investigational purposes, and will obtain the informed consent of the subjects and shall include a statement to this effect in the notice.

(k) If the study is undertaken on institutionalized human subjects, the notice shall include a description of the peer committee responsible for initial and continuing review. Names of the individual committee members need not be submitted if the institution has been granted an "Assurance" by the Department of Health, Education, and Welfare. Assurance should be given that the review committee does not allow participation in its review and conclusions by any individual involved in the conduct of the research activity under review (except to provide information to the committee), and that the investigator will report any emergent problems to the committee for review. A statement to this effect shall be included in the notice.

(l) Failure to conform to the standard protocol or an approved modified protocol will be a basis for termination of the claimed investigational exemption.

(m) Provisions under the Harrison Narcotic Act enforced by the Department of Justice are also applicable to this use of methadone.

Any interested person may, within 30 days from the date of publication of this notice in the FEDERAL REGISTER, file with the Hearing Clerk, Department of Health, Education, and Welfare, Room 6-62, 5600 Fishers Lane, Rockville, Md. 20852, written comments (preferably in quintuplicate) regarding this proposal. Comments may be accompanied by a memorandum or brief in support thereof.

Dated: June 4, 1970.

CHARLES C. EDWARDS,
Commissioner of Food and Drugs.

DEPARTMENT OF JUSTICE

Bureau of Narcotics and Dangerous Drugs

[26 CFR Part 151]

REGULATORY TAXES ON NARCOTIC DRUGS

Administering and Dispensing Requirements

Notice is hereby given pursuant to the authority granted by section 7805 of the Internal Revenue Code of 1954 (26 U.S.C. 7805) and under the authority vested in the Attorney General by Reorganization Plan No. 1 of 1968 (33 F.R. 5611) and redelegated to the Director, Bureau of Narcotics and Dangerous Drugs, by § 0.100 of Title 28 of the Code of Federal Regulations, and the requirements concerning proposed rulemaking contained in 5 U.S.C. 553(b) that the Director, Bureau of Narcotics and Dangerous Drugs, proposes to amend § 151.411 of Part 151 of Title 26 of the Code of Federal Regulations in order to make clear the conditions upon which practitioners may administer or dispense narcotic drugs for the purpose of prolonged narcotic drug dependence in the course of conducting clinical investigations in the development of narcotic addict rehabilitation programs.

It is recognized that the investigational use of methadone, a class "A" narcotic drug, requiring the prolonged maintenance of narcotic dependence as part of a total rehabilitative effort has shown promise in the management and rehabilitation of selected narcotic addicts. Although methadone is a marketed drug approved through new drug procedures for specific indications, its use in the maintenance treatment of narcotic addicts is an investigational use for which substantial evidence of safety and effectiveness are not available. In addition, it is a drug controlled under Federal narcotic laws which has been shown to have a significant potential for abuse. Accordingly, the Food and Drug Administration and the Bureau of Narcotics and Dangerous Drugs are agreed that advance approval of such investigations must be obtained through review of a Notice of Claimed Investigational Exemption for a New Drug submitted to the Food and Drug Administration for such purposes. The amendment which follows applies only to the administering and dispensing of narcotic drugs and

does not authorize the prescribing of narcotic drugs for any such purposes; see 26 CFR 151.392.

Accordingly, it is proposed to delete the word "Dispensing" preceding § 151.411 of Part 151 of Title 26 of the Code of Federal Regulations and that § 151.411 be amended to read as follows:

§ 151.411 Administering and dispensing.

(a) Practitioners may administer or dispense narcotic drugs to bona fide patients pursuant to the legitimate practice of their profession without prescriptions or order forms.

(b) The administering or dispensing of narcotic drugs to narcotic drug dependent persons for the purpose of continuing their dependence upon such drugs in the course of conducting an authorized clinical investigation in the development of a narcotic addict rehabilitation program shall be deemed to fall within the meaning of the term "in the course of professional practice" in sections 4704(b)(2) and 4705(c)(1) of title 26 of the United States Code: *Provided*, That approval is obtained prior to the initiation of such a program by submission of a Notice of Claimed Investigational Exemption for a New Drug to the Food and Drug Administration which will be reviewed concurrently by the Food and Drug Administration for scientific merit and by the Bureau of Narcotics and Dangerous Drugs for drug control requirements; and provided further that the clinical investigation thereafter accords with such approval; see 21 CFR 130.44, 35 F.R. 9014.

Pursuant to the requirements of 5 U.S.C. 553(c) all interested persons are hereby afforded the opportunity to participate in the rulemaking through the submission of written data, views, or arguments. Such written comments should be submitted, preferably in quintuplicate, to the Director, Bureau of Narcotics and Dangerous Drugs, 1405 Eye Street NW., Washington, D.C. 20537, within 30 days from the date of publication of this notice in the FEDERAL REGISTER.

Dated: June 4, 1970.

JOHN E. INGERSOLL,
Director, Bureau of Narcotics and Dangerous Drugs.

APPENDIX I

URINE ANALYSIS FOR METHADONE MAINTENANCE PROJECTS

The following suggestions regarding urine analysis supervision are provided:

1. The knowledge that a certified urine specimen will be collected from 1 - 3 times weekly may be, in itself, a deterrent to experimentation with drugs. A certified urine is one which is voided in the presence of a staff member who is aware of the contrivances that the addict might use to "con" the system.

2. A variety of sampling techniques is possible, and the installation will settle upon the one which provides the best results for its special problems and for its special patients. The urine might be requested during randomly chosen visits to the clinic, or at regular intervals. Some clinics collect and test urines at every visit, others discard all except one or two a week.

3. A patient may use a repertoire of devices ("stalls") to avoid supplying a specimen if he has taken opioids, barbiturates or amphetamines. These maneuvers should be looked on with suspicion. The excuse of not being able to void, for example, can be dealt with by requesting patients not to void for two hours before coming to the clinic. Keeping the patient at the clinic and urging him to drink fluids should result in a specimen.

4. The urine test also gives information as to whether the patient is taking his methadone. For patients who appear at the clinic daily and whose drink of methadone in fruit juice equivalent

is directly observed, this information is superfluous. When the patient has graduated to being trusted with a few days' supply, this fact is important. Methadone can be differentiated from heroin in the urine analysis.

5. The frequency of analyses can be reduced to one or two a month in patients who have been in the program a long time, and who have clearly demonstrated drug abstinence.

6. A positive urine for heroin usually, but not invariably, signifies heroin usage during the past day or two. The test must be repeated as soon as possible. Additional positives from a capable laboratory mean that heroin is being used. A single positive for quinine and heroin is proof of heroin usage in those parts of the country where quinine is used to cut the heroin. A positive for quinine and not heroin means either that the patient has taken poor heroin, or that he has taken cold tablets, quinine water or other quinine containing compounds.

7. A negative test for heroin means that the patient is either "clean," or has taken very cut heroin, or has taken it more than two days previous to the test.

8. Hopefully, the report from the laboratory will be promptly delivered. It would be worthwhile to arrange for the lab to phone in definite positives for heroin. "Doubtful positives" require repeat analyses.

9. Confrontation of the patient with the test results in a non-punitive manner is probably the best way to deal with the "chipper," the regular user, or the barbiturate or amphetamine abuser.

10. The results of the urine analysis should be recorded in the record on a form similar to the one enclosed.

11. Actually, the use of urine analysis for all patients whether or not they are on methadone is considered a standard practice in many narcotic programs.

12. We shall be glad to discuss further details with you.

Methadone Maintenance Guidelines

Some projects which will be supported with PL 90-574 funds beginning FY 1970 intend to initiate a methadone maintenance (MM) program as one of their therapy modalities. Some general guidelines are presented here, especially for those who lack prior experience with this treatment procedure. A methadone treatment conference, co-sponsored by NIMH, will be held at Rockefeller University, New York City, on October 26-27, 1969. At that time those workers with reportable experience will present their techniques and findings. There will be opportunities for private discussions. A meeting of all project directors will be held from 5:00 - 6:00 p.m., October 26, 1969. You will be sent an invitation to attend.

1. General. Any program which makes the assumption that merely supplying a patient with methadone is sufficient, will probably fail. Its failure will also reflect adversely on other MM programs. It must be emphasized that MM is an investigative procedure at this time. It represents a new use for an approved drug. The NIMH has submitted an Investigational New Drug (IND) application to sponsor the MM programs which are already supported by its grants (Drs. Wieland, Jaffe, Rollingsworth, Kleber, and Knowles). This sponsorship can be extended to your program if you wish. Form FD 1573 (Statement of Investigator), attached, must be filled out and returned to this office. Alternatively, an IND must be submitted by you to comply with FDA regulations. Furthermore, you will be in a better legal position in case of a possible lawsuit by a patient on MM.

Careful supervision by periodic interviews and urine analyses (see appendix) are a basic requirement. If MM is planned, the patient should be given his daily dose under the direct observation of a nurse, pharmacist, or their assistants. Methadone tablets or capsules should be avoided. A fruit juice vehicle is used in constant amounts so that changes in dosage are not detected by the patient. If, eventually, the patient is permitted to take a few days' supply with him, the possibility that he will consume the entire amount at one time, or that he will sell his supply must be considered. Small amounts of methadone from MM programs and from doctors who write prescriptions for methadone have been picked up by enforcement officials.

2. Rationale. The rationale for MM is that it produces cross tolerance to other narcotics. It has the advantage of prolonged action and oral effectiveness. If the dose is slowly increased, euphoria is rarely experienced. During maintenance the patient is alert and capable of operating a vehicle and other complex activities and does not tend to hustle for narcotics. If MM must be terminated, it should be on a 1 - 2 week, slowly decreasing schedule. Reasons for termination include: persistent refusal to cooperate, the patient's movement to another city, the patient's or physician's desire to discontinue MM.

3. Safeguards. Adequate and uniform record keeping, order forms, etc. for MM do not differ from those of any other narcotic. It is recommended that large amounts of methadone not be kept in

storefront operations, and that bulk supplies be given the best possible protection to avoid theft. Medical supervision of the program is obviously required. It may not be possible for the staff to always know each person by sight. Plastic identification cards with picture and signature are needed for every patient. Now that more than one methadone program exists in some cities, MM programs should periodically check rosters and pictures to avoid multiple membership. For any given program the need for such safeguards or concern will vary with the particular program structure and size.

4. Types of MM. Inpatient initiation of MM is the ordinary means. However, some success with outpatient methods is reported. Whether lifelong MM is required remains unanswered now and is an important research question.

Two levels of MM dosage are practiced. The Dole method employs high dosages, 50 - 180 mg. daily. This produces a high level of cross tolerance, and if street heroin is injected, it is not likely to induce euphoria.

Other investigators have found that smaller doses (20 - 40 mg. daily) produce satisfactory results. It may be that the poor quality of black market heroin makes these small amounts sufficient to reduce the craving and hustling activity. A lesser degree of cross tolerance occurs.

5. Selection of patients. A patient without sufficient motivation to come off heroin and to attend a followup MM clinic is obviously a poor candidate for treatment. Sufficient numbers of motivated individuals are looking for help so that established clinics have waiting lists. Chronic alcoholism or addiction to barbiturates is a contraindication. Chronic psychosis and long-standing, severe, painful physical illness usually make the candidate unsuitable. MM should not be lightly initiated. The applicant should be an addict of many years standing, and should have failed under other satisfactory treatment programs. Youngsters under 21 can be treated only with parental permission. They should be particularly carefully selected. Recidivist addict felons who have been involved with narcotics for decades need not be barred from MM. These individuals with an apparently poor prognosis may do well in MM. A signed consent form should be in the patient's file.

6. Aftercare. An optimal MM program will include the capability for environmental and interpersonal assistance to the patient. Group therapy, individual counseling and crisis intervention capabilities ought to be available. Vocational guidance, job placement opportunities, educational advice and physical corrective procedures are often necessary. Legal assistance is periodically required. The goal of a restructured existence for the former addict can be achieved by providing the necessary supports during the years of transition to a self-sustaining, socially acceptable, new way of life.

One undesirable occasional complication encountered in MM patients is their abuse of stimulants, sedatives or alcohol. A well run MM program will use all possible measures to avoid swapping one addiction for another.

7. FDA Requirements. In order to comply with IND regulations, certain procedures are necessary. They do not increase the ordinary workload of a well run program.

a. A progress report to the sponsor is to be submitted once a year. If the MM program is discontinued, the sponsor should be informed immediately. If a major change in the proposed program is made, he ought to be informed of it.

b. A severe adverse effect attributable to MM is to be reported to the sponsor immediately.

c. Your case records are to be retained by you for a period of two years after FDA approval of MM as an accepted therapy, when and if such approval is given.

d. A visit by me or my staff will occur occasionally. Although this is required for IND purposes, it will actually be a visit to discuss your problems in general and try to be helpful.

Sincerely,

Sidney Cohen, M.D.
Director
Division of Narcotic Addiction and Drug Abuse

Enclosures:
Form FD 1573
Appendix I
Record of Urine Testing

Appendix I.B

Publications Describing the New Careers Project and/or Related Theoretical Issues

Cressey, D. R. Changing criminals: The application of the theory of differential association. American Journal of Sociology, 1955, 61, 116-120.

Grant, J. D. Changing times and our institutions: or participants, not recipients. In: Readings in correctional change. Southwest Center for Law and the Behavioral Sciences, University of Texas School of Law.

Grant, J. D. New careers development in the change agent field. Journal of the California Probation, Parole, and Correctional Association, 1966, 3, 18-22.

Grant, J. D. The psychologist as an agent for scientific approaches to social change. In: L. Abt & T. Riess (Eds.), Progress in clinical psychology. New York: Grune and Stratton, 1966.

Grant, J. D. The changing professional role in manpower utilization. Paper presented at the Seventh Annual Institute for Social Workers, Los Angeles, May, 1967.

Grant, J. D. The offender as a correctional manpower resource. Paper presented at the First National Symposium in Law Enforcement Science and Technology, Illinois Institute of Technology, Chicago, March, 1967.

Grant, J. D. The offender as participant, not recipient, in the correctional process. Canadian Journal of Corrections, 1967, 9, 234-242.

Grant, J. D. & Grant, Joan Staff and client participation: a new approach to correctional research. Nebraska Law Review, 1966, 45, 702-716.

Grant, J. D. & Grant, Joan Contagion as a principle in behavior change. In: H. C. Rickard (Ed.), Unique Programs in Behavioral Readjustment. New York: Pergamon, in press.

Pearl, A. & Riessman, F. New careers for the poor. Glencoi: Free Press, 1965.

Appendix II

Table 1

Psychological and Physiological Questionnaire (Experiment II)

Dosage you are on today:_____ Name:_____ Date:_____

Answer Yes or No to the following symptoms:

Sleepy

Nervous

Heroin craving

Constipated

Good appetite

Good mental health

Nausea

Blurred vision

Perspiration

Easier expression of yourself

Insomnia

Urination problems

Fuzzy thinking

Elevated mood

Ambition

Do you feel the present dosage level is maintaining you? ___

Appendix II

Table 2

Example of Research Group Assignment
(Experiment II)

Topic: Current drugs being used in the treatment of heroin addicts.

Source of information: Zaks, A. M. et al., Intravenous Diacetylmorphine (Heroin) in Studies of Opiate Dependence. Diseases of the Nervous System, 1969, 30, 89-92.

Assignment: Read and summarize the article, give your opinion of how good the drugs are, and discuss the revelance of the article for you.

Table 3

Example of Research Group Assignment:
Problem Solving Exercise
(Experiment II)

Problem: Hustling, stealing, leaving the ward without permission, etc. that is causing problems on the ward and for the program.

Assignment: Meet together and discuss what can be done about ending the trouble on the ward. Try to work as a group and reach some kind of solution. Then write up a short summary of what you have discussed and the plans you have made.

Appendix II

Table 4

Mean Percentage of Research Group Meeting Attendance for Purchasing Status Conditions (Experiment II)

Active Purchasing Status Group (N = 5)	Passive Purchasing Status Group (N = 4)
92	80
88	100
88	96
76	96
76	
$\bar{X}$= 84	93

Table 5

Mean Percentage of Research Group Meeting Attendance for Risk-Taking Conditions (Experiment II)

Risk-Taking Group (N = 4)	Non-Risk-Taking Group (N = 5)
92	88
88	76
80	76
100	96
	96
$\bar{X}$= 90.0	86.4

Appendix JI

Table 6

Analysis of Variance Summary Table: Research Group Meeting Attendance (Experiment II)

Source	df	MS	F
Between subjects	7		
A (Risk-Taking)	1	10	-----
C (Purchasing Status)	1	490	1.40
AC	1	400	1.14
Subj w.groups	4	350	
Within subjects	32		
B (Trials)	4	1060	3.53*
AB	4	10	-----
BC	4	340	1.13
ABC	4	390	1.30
B x subj w.groups	16	300	
Total	39		

* $p < .05$

Appendix II

Table 7

Raw Data: Percentage of Research Group Meeting Attendance for the Five Weeks of Behavioral Therapy (Experiment II)

Risk-Taking Group	Purchasing Status Group	S	Week 1	2	3	4	5	$\bar{X}$
Risk-Taking	Active	1	100	100	80	100	80	92
		2	80	100	60	100	100	88
	Passive	3	100	100	80	100	20	80
		4	100	100	100	100	100	100
Non-Risk-Taking	Active	5	80	100	80	100	80	88
		6	100	100	40	100	40	76
		7*	100	100	60	100	20	76
	Passive	8	80	100	100	100	100	96
		9	100	100	100	100	80	96

* Subject 7 in the Non-Risk-Taking/Active Purchasing Group was randomly selected out for the analysis of variance of this dependent variable.

Appendix II

Table 8

Wilcoxon-Mann-Whitney Test: Mean Percentage of Research Group Assignments Completed for Risk-Taking Conditions (Experiment II)

Risk-Taking Group (N = 4)	Rank	Non-Risk-Taking Group (N = 5)	Rank
92	5.0	96	6.5
88	4.0	68	2.0
96	6.5	76	3.0
100	8.5	100	8.5
		56	1.0
$\bar{X}$= 94.0		79.2	

T = 24
T' = 16

Table 9

Mean Percentage of Research Group Assignments Completed for Purchasing Status Conditions (Experiment II)

Active Purchasing Status Group (N = 5)	Passive Purchasing Status Group (N = 4)
92	88
96	100
96	100
76	56
68	
$\bar{X}$= 85.6	86.0

Appendix II

Table 10

Analysis of Variance Summary Table: Research Group Homework Assignment Data (Experiment II)

Source	df	MS	F
Between subjects	7		
A (Risk-Taking)	1	1440	----
C (Purchasing Status)	1	160	----
AC	1	160	----
Subj w.groups	4	1560	
Within subjects	32		
B (Trials)	4	285	1.36
AB	4	165	----
BC	4	185	----
ABC	4	85	----
B x subj w.groups	16	210	
Total	39		

$p < .05$

Appendix II

Table 11

Raw Data: Percentage of Research Group Assignments Completed for the Five Weeks of Behavioral Therapy (Experiment II)

Risk-Taking Group	Purchasing Status Group	S	Week 1	2	3	4	5	$\bar{X}$
Risk-Taking	Active	1	80	100	100	100	80	92
		2	80	100	100	100	100	96
	Passive	3	100	100	100	100	40	88
		4	100	100	100	100	100	100
Non-Risk-Taking	Active	5	80	100	100	100	100	96
		6	100	80	60	80	60	76
		7*	80	100	60	60	40	68
	Passive	8	100	100	100	100	100	100
		9	80	40	60	60	40	56

* Subject 7 in the Non-Risk-Taking/Active Purchasing Group was randomly selected out for the analysis of variance of this dependent variable.

Appendix II

Table 12

Wilcoxon-Mann-Whitney Test: Mean Homework Assignment Grade for Risk-Taking Conditions (Experiment II)

Risk-Taking Group (N = 4)	Rank	Non-Risk-Taking Group (N = 5)	Rank
1.76	6.0	1.72	4.5
1.88	7.0	1.12	2.0
1.72	4.5	1.16	3.0
1.96	8.5	1.96	8.5
		1.04	1.0
$\bar{X}$= 1.83		1.40	

T = 26
T' = 14

Table 13

Mean Homework Assignment Grade for the Purchasing Status Conditions (Experiment II)

Active Purchasing Status Group (N = 5)	Passive Purchasing Status Group (N = 4)
1.76	1.72
1.88	1.96
1.72	1.96
1.12	1.04
1.16	
$\bar{X}$= 1.53	1.67

Appendix II

Table 14

Analysis of Variance Summary Table: Homework Assignment Grade Data (Experiment II)

Source	df	MS	F
Between subjects	7		
A (Risk-Taking)	1	1.369	1.71
C (Purchasing Status)	1	0.025	----
AC	1	0.009	----
Subj w.groups	4	0.799	
Within subjects	32		
B (Trials)	4	0.116	1.08
AB	4	0.174	1.63
BC	4	0.020	----
ABC	4	0.064	----
B x subj w.groups	16	0.107	
Total	39		

* $p < .05$

Appendix II

Table 15

Raw Data: Research Group Homework Assignment Grade for the Five Weeks of Behavioral Therapy (Experiment II)

Risk-Taking Group	Purchasing Status Group	S	Week 1	2	3	4	5	$\bar{X}$
Risk-Taking	Active	1	1.6	2.0	2.0	1.6	1.6	1.76
		2	1.6	2.0	1.8	2.0	2.0	1.88
	Passive	3	1.8	2.0	2.0	2.0	0.8	1.72
		4	2.0	2.0	2.0	1.8	1.0	1.96
Non-Risk-Taking	Active	5	1.6	1.6	1.8	1.8	1.8	1.72
		6	2.0	0.8	1.0	1.2	0.6	1.12
		7*	1.4	1.8	0.8	1.0	0.8	1.16
	Passive	8	2.0	2.0	1.8	2.0	2.0	1.96
		9	1.6	0.8	0.8	1.2	0.8	1.04

* Subject 7 in the Non-Risk-Taking/Active Purchasing Group was randomly selected out for the analysis of variance of this dependent variable.

Appendix II

Table 16

Raw Data: Percentage of Small Group Therapy Session Attendance for the Five Weeks of Behavioral Therapy (Experiment II)

Risk-Taking Group	Purchasing Status Group	S	Week 1	2	3	4	5	$\bar{X}$
Risk-Taking	Active	1	100	100	100	100	100	100
		2	100	80	100	100	100	96
	Passive	3	100	100	100	100	100	100
		4	100	100	100	100	100	100
Non-Risk-Taking	Active	5	100	100	100	100	100	100
		6	100	80	100	100	100	96
		7	100	100	100	100	100	100
	Passive	8	100	100	100	100	100	100
		9	100	100	100	100	100	100

Appendix III

Table 1

Summary of Trend Analysis for Attendance Data (Experiment III)

Source	df	MS	F
Between subjects	18		
A (Contingency)	1	80776.421	51.03**
Subjects within groups	17	1583.050	
Within subjects	76		
B (Trials)	4	5111.579	12.27**
Linear trend	1	17433.684	22.92**
Quadratic trend	1	1.503	------
Cubic trend	1	682.105	2.02
Quartic trend	1	2329.022	8.26*
AB	4	1605.309	3.85**
Diff in lin trend	1	3761.426	4.95*
Diff in quad trend	1	1103.575	3.85
Diff in cubic trend	1	51.675	------
Diff in quartic trend	1	1504.564	5.33*
B x subjects within groups	68	416.653	
B x subj w.groups (lin)	17	760.287	
B x subj w.groups (quad)	17	286.255	
B x subj w.groups (cubic)	17	338.013	
B x subj w.groups (quartic)	17	282.057	
Total	94		

* $p < .05$
** $p < .01$

Appendix III

Table 2

Raw Data: Percentage of Research Group Meeting Attendance for the Five Weeks of Behavioral Therapy (Experiment III)

Group	S	Week 1	2	3	4	5	$\bar{X}$
Methadone-Contingency	1	100	100	80	100	80	92
	2	80	100	60	100	100	88
	3	80	100	80	100	80	88
	4	100	100	40	100	40	76
	5	100	100	60	100	20	76
	6	100	100	80	100	20	80
	7	100	100	100	100	100	100
	8	80	100	100	100	100	96
	9	100	100	100	100	80	96
Methadone-Non-Contingency	10	100	60	60	60	0	56
	11	100	40	0	0	0	28
	12	100	40	0	0	0	28
	13	100	40	40	20	0	44
	14	80	40	60	20	0	40
	15	100	60	80	60	40	68
	16	40	80	0	0	0	24
	17	0	40	0	0	0	08
	18	0	0	0	0	0	0
	19	0	0	0	0	0	0

Appendix III

Table 3

Summary of Trend Analysis for Assignment Data
(Experiment III)

Source	df	MS	F
Between subjects	18		
A (Contingency)	1	137440.750	184.12**
Subjects within groups	17	746.460	
Within subjects	76		
B (Trials)	4	1258.950	7.55**
Linear trend	1	4850.526	15.87**
Quadratic trend	1	0.000	------
Cubic trend	1	170.526	1.55
Quartic trend	1	14.736	------
AB	4	506.830	3.04*
Diff in lin trend	1	505.473	1.65
Diff in quad trend	1	1019.365	6.86**
Diff in cubic trend	1	4.584	------
Diff in quartic trend	1	497.898	4.85*
B x subjects within groups	68	166.720	
B x subj w.groups (lin)	17	306.117	
B x subj w.groups (quad)	17	148.440	
B x subj w.groups (cubic)	17	109.699	
B x subj w.groups (quartic)	17	102.618	
Total	94		

* $p < .05$
** $p < .01$

Appendix III

Table 4

Raw Data: Percentage of Research Group Assignments Completed for the Five Weeks of Behavioral Therapy (Experiment III)

Group	S	Week 1	2	3	4	5	$\bar{X}$
Methadone-Contingency	1	80	100	100	100	80	92
	2	80	100	100	100	100	96
	3	80	100	100	100	100	96
	4	100	80	60	80	60	76
	5	80	100	60	60	40	68
	6	100	100	100	100	40	88
	7	100	100	100	100	100	100
	8	100	100	100	100	100	100
	9	80	40	60	60	40	56
Methadone-Non-Contingency	10	40	40	0	0	0	16
	11	40	0	0	0	0	08
	12	40	0	0	0	0	08
	13	40	20	20	0	0	16
	14	40	20	40	0	0	20
	15	40	20	40	0	0	20
	16	40	0	0	0	0	08
	17	0	0	0	0	0	0
	18	0	0	0	0	0	0
	19	0	0	0	0	0	0

Appendix III

Table 5

Raw Data: Mean Weekly Assignment Grade Based on Two-Point Scale (Experiment III)

Group	S	Week 1	2	3	4	5	$\bar{X}$
Methadone-Contingency	1	1.6	2.0	2.0	1.6	1.6	1.8
	2	1.6	2.0	1.8	2.0	2.0	1.9
	3	1.6	1.6	1.8	1.8	1.8	1.7
	4	2.0	0.8	1.0	1.2	0.6	1.1
	5	1.4	1.8	0.8	1.0	0.8	1.2
	6	1.8	2.0	2.0	2.0	0.8	1.7
	7	2.0	2.0	2.0	1.8	2.0	1.9
	8	2.0	2.0	1.8	2.0	2.0	1.9
	9	1.6	0.8	0.8	1.2	0.8	1.0
Methadone-Non-Contingency	10	0.8	0.4	0	0	0	.24
	11	0.8	0	0	0	0	.16
	12	0.8	0	0	0	0	.16
	13	0.8	0	0.2	0	0	.20
	14	0.8	0.2	0.2	0	0	.24
	15	0.8	0.2	0.4	0	0	.28
	16	0.8	0	0	0	0	.16
	17	0	0	0	0	0	0
	18	0	0	0	0	0	0
	19	0	0	0	0	0	0

Appendix III

Table 6

Pearson r Correlation between Mean Methadone Dosage (mg.) and Mean Performance (%) (Experiment III)

Group	Subject	Methadone Dosage	Performance
Methadone-Contingency	1	109	92
	2	107	92
	3	105	92
	4	99	76
	5	66	72
	6	101	84
	7	110	100
	8	112	98
	9	81	76
Methadone-Non-Contingency	10	22	36
	11	100	18
	12	100	18
	13	90	32
	14	60	30
	15	80	44
	16	55	16
	17	100	04
	18	85	0
	19	100	0

Pearson r for groups combined: +.36 (N.S.)
Pearson r for Methadone-Non-Contingency Group: -.47 (N.S.)

Appendix IV

Table 1

Psychological and Physiological Questionnaire
(Experiment IV)

Name:_____ Date:_____

	MINIMUM	1	2	3	4	5	MAXIMUM
SLEEPY							
NODDING							
NERVOUS							
HEROIN CRAVING							
CONSTIPATED							
GOOD MENTAL HEALTH							
NAUSEA							
BLURRED VISION							
PERSPIRATION							
INSOMNIA							
URINATION PROBLEMS							
ELEVATED MOOD							
AMBITION							

DO YOU FEEL THE PRESENT DOSE IS MAINTAINING YOU? YES___ NO__

TIME ALLOTMENTS:

TELL HOW MANY HOURS YOU SPEND AT THE ACTIVITY EACH DAY.

SLEEPING_____
EATING_____
DOING CHORES AT HOME_____
WORKING AT A JOB_____
OTHER THINGS FOR MONEY_____
GOING TO AND FROM WORK_____
OTHER MOVING AROUND_____
LEISURE BY YOURSELF_____
LEISURE WITH OTHERS_____
TOTAL HOURS_____

Appendix IV

Table 1 (cont.)

SELF-RATINGS:

FOR EACH OF THE FOLLOWING TELL WHETHER YOU WOULD DESCRIBE IT NOW AS EXCELLENT (5), GOOD (4), FAIR (3), POOR (2), OR VERY POOR (1).

IN GENERAL YOUR ABILITY TO GET ALONG IN LIFE	1	2	3	4	5
YOUR ENJOYMENT OF YOUR SPARE TIME	1	2	3	4	5
YOUR RELATIONS WITH FRIENDS AND ACQUAINTANCES	1	2	3	4	5
YOUR RELATIONS WITH FAMILY MEMBERS	1	2	3	4	5
THE PLACE WHERE YOU LIVE, AS A HOME FOR YOU	1	2	3	4	5
YOUR WORK LIFE (ON THE JOB, IN THE HOME, AT SCHOOL)	1	2	3	4	5
YOUR ABILITY TO HANDLE THE HABITS THAT CAN HARM YOU	1	2	3	4	5
YOUR ABILITY TO STAY OUT OF TROUBLE	1	2	3	4	5
YOUR ABILITY TO GET SERVICES FROM AGENCIES AND PROFESSIONALS	1	2	3	4	5

WELL-BEING RATINGS:

YOUR MENTAL HEALTH	1	2	3	4	5
YOUR PHYSICAL HEALTH	1	2	3	4	5
YOUR SEX LIFE	1	2	3	4	5
YOUR HAPPINESS	1	2	3	4	5
YOUR HOPE FOR THE FUTURE	1	2	3	4	5

Appendix IV

Table 2

Methadone-Contingency Point System
(Handout Sheets for Subjects)
(Experiment IV)

Points may be earned in the following ways:*

Attendance at the Research meetings:

1. 5 points for arriving on time and staying until the end of the group.

2. 3 points for arriving within 5 minutes of the beginning of the meeting and staying until the end.

3. 1 point for coming within 15 minutes after the start of the meeting and staying until its end.

4. 0 points for arriving 15 minutes after the start of the meeting.

Questionaires:

1. 2 points if your questionaire is totally completed and handed in by the beginning of the meeting by yourself. The questionaires will be placed ON the ward.

2. 1 point if your questionaire is completed but handed in by someone else.

Assignments:

1. 0-10 points for handing in a diary or assignment. The number of points paid will be determined by the grade on the assignment:

Letter grade:	A+	A	B+	B	C+	C	D+	D	F+	F
No. of points:	10	9	8	7	6	5	4	3	2	1

2. 0 points will be paid if the assignment or diary is not submitted at the beginning of the meeting at which it is due.

* Bonus points may be earned in the following manner:

Points earned per day:	12	13	14	15	16	17
Bonus points per day:	1	2	3	4	5	6