

Readdiction Liability Testing: A Proposal

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Summary

It is proposed that an objective procedure be developed to gauge an addict's 'readdiction liability'. This instrument could be used to evaluate an addict's susceptibility to his drug environment and probability of readdiction. It could also be used to estimate degree of rehabilitation as a result of a particular treatment, thus providing a framework within which various treatment programs can be compared and contrasted. The proposed 'Readdiction Liability Test' could also serve as a basis for desensitization and deconditioning procedures. This paper also presents recent data in support of a conditioning theory of readdiction, which is the rationale behind this proposal.

Introduction

Health care professionals in facilities treating drug addiction experience difficulty in assessing the severity of a patient's drug habit. Equally a problem is determining the effectiveness of rehabilitation following completion of a treatment programme. Is the patient still at high risk? Does he or she need further help? Did the treatment produce the desired results? Although these aspects of drug treatment are among the most critical, they are largely based upon the subjective history of the patient and equally subjective interpretations by the professional. Currently, clinical outcome research involves follow-up studies that determine the number of patients that have relapsed. Even when one succeeds in locating most of the patients for study (which is not usually the case), feedback on treatment efficacy is not available until months later.

Previous attempts to overcome these problems include a proposal by Dole and Warner [1] to employ an independent panel in comparing data from different programmes, which would yield evaluations using standardized forms. Comparison would be categorized according to treatment site, e.g., jails, hospitals, or sheltered environments. This procedure, however, would be cumbersome and still rely on subjective reporting.

Currently, the most extensively utilized test of drug effects and addiction status is the Addiction Research Center Inventory (ARCI). In numerous studies, these scales have been shown to be successful in discerning various drug effects, including opiate withdrawal [2, 3, 4]. While these tests have proved useful with patients under the effects of a drug or withdrawal from a drug, they are not sensitive enough in discerning an ex-addict's susceptibility to readdiction. Sideroff

and Jarvik [5], for example, found no change in responses on the Weak Opiate Withdrawal (WOW) Scale of the ARCI after addicts were presented with a videotape of heroin related stimuli. Other psychological and physiological measures, on the other hand, clearly demonstrated a significant reaction by the patients.

The most convincing argument against pursuing new avenues of patient assessment is the continued evidence that between 75 and 90 per cent of treated patients relapse, with these figures being consistent across programmes [6, 7, 8]. It also appears that most of the variability in treatment outcome can be accounted for by various demographic factors, such as employment [9], family status [10, 11], and age of onset [11]. There are problems, however, in relying on post hoc reasoning. First, given a group of addicts with similar backgrounds, how can each be distinguished with respect to individual readdiction liability? Also, demographic factors do not measure the effectiveness of the treatment programme or the level of addiction upon entry into the programme. As a result of these deficiencies, it is impossible to obtain immediate feedback on the efficacy of a particular drug programme. This paper outlines a promising approach in dealing with the problems of assessing readdiction liability. This is the development of an objective and systematic instrument that would assess patients' vulnerabilities to their environment.

The Readdiction Liability Test

It would be very convenient if there were a procedure that would yield an objective measure of each individual patient's likelihood of relapse and which would be sensitive to effective treatment methods. The premise for what the author calls a 'Readdiction Liability Test' is the theory that conditioned responses by ex-addicts to drug related stimuli in the environment are a major cause of relapse [12]. According to this thesis, encountering a person or a place previously associated

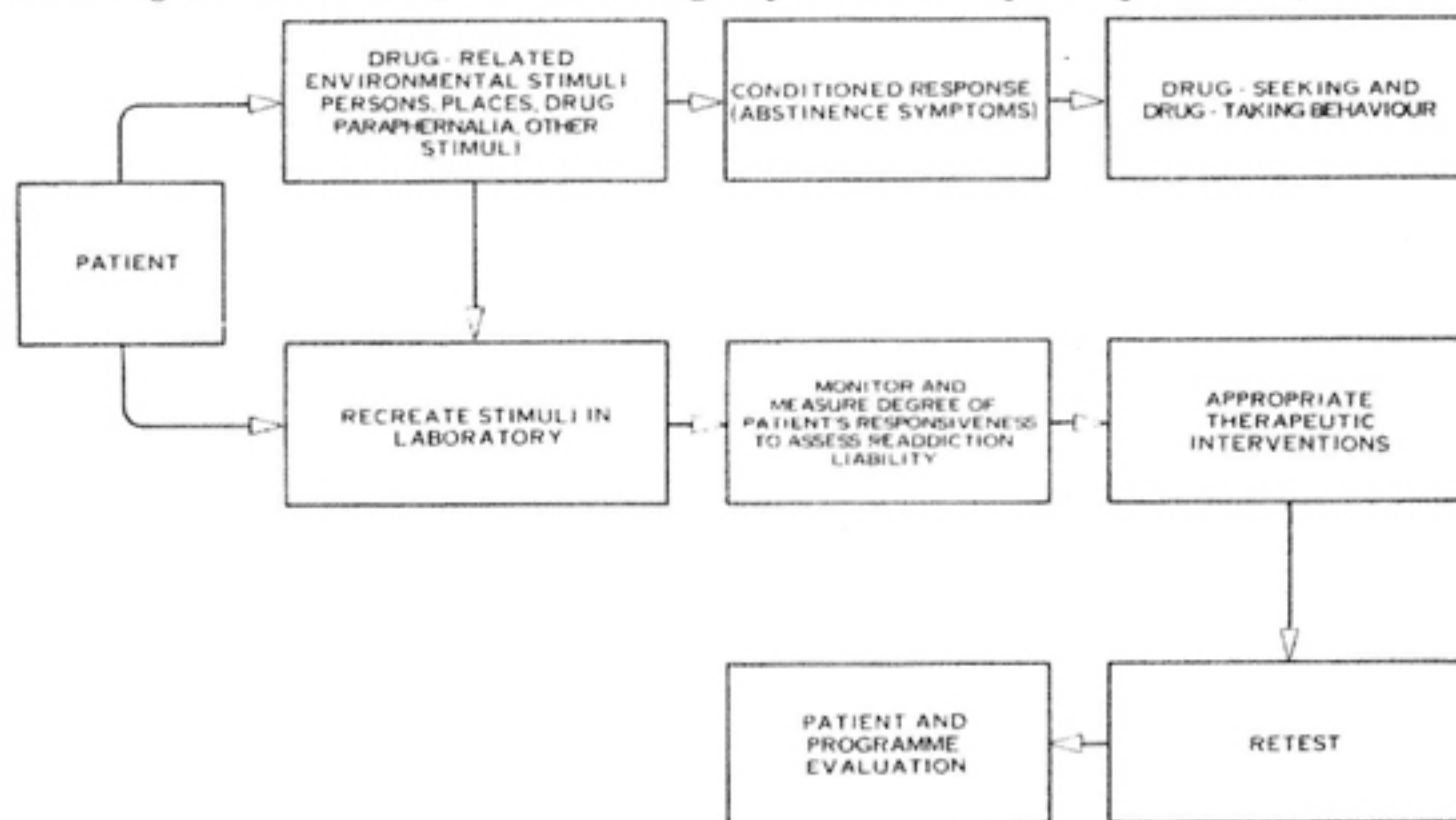


Figure 1 Theoretical model of readdiction as the basis for measuring conditioned responses of addicts as an indication of their drug liability as well as for programme evaluation.

with drug-taking behaviour will produce conditioned responses similar to abstinence signs or craving. These symptoms are likely to lead to drug seeking and taking behaviour. If this premise is correct, one might then expect patients demonstrating the largest conditioned response, or responding most readily to appropriate drug-related stimuli, to have the greatest probability of drug seeking behaviour and consequently readdiction. Finally, if these stimuli can be sufficiently isolated and recreated in the laboratory, where patients' responses (both psychological and physiological) can be monitored and quantified, then an objective measure of their responsiveness can be established. Figure 1 illustrates the premise upon which the Readdiction Liability Test is based.

Table 1 presents suggested characteristics of the proposed Readdiction Liability Test. Note that two basic aspects are the stimulus presentation and the appropriate response measures. In particular, the stimulus presentation should be specific enough to contain elements necessary to elicit some form of conditioned response, but general enough to be relevant to the wide diversity of drug addict experiences. The psychological and physiological response measures should be sensitive enough to detect changes resulting from viewing the stimuli. Suggested psychological measures include pre- and post-testing to determine change in various affect levels as well as personality questionnaires. The latter would be especially important if it were determined that certain personality types are either non-responders or less likely to attend to the stimulus presentation.

Table 1 Characteristics of a readdiction liability test

Stimulus presentation factors

- a. Reality: stimuli should be comparable to that which addicts encounter in their environments.
- b. Generalization: stimuli should be relevant to addicts with wide diversity of drug experience.
- c. Multiple sensory modes: stimuli should combine visual, olfactory, auditory and tactile elements as much as possible.

Response measures

- a. Psychological
 1. Measures should establish certain personality traits of subjects to screen for 'non-responders'.
 2. Measures should be sensitive to changes in affective states, such as anxiety, confusion and stress.
 3. Measures should monitor changes in level of craving.
- b. Physiological
 1. Measures should be responsive to changes in affective states; e.g. GSR, heart rate, skin temperature, respiration.
 2. They should be non-obtrusive.
 3. Discreetly measured.

Test significance

- a. Validity: inverse correlation between degree of response and 'time to relapse'.
 - b. Reliability: two different but similar stimuli presentations should be made to determine consistency of responding from one testing to the next.
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While elicitation of conditioned responses is beneficial in and of itself, partly as a tool for desensitization, as an indication of readdiction liability it should correlate in some way with relapse probability. Thus one characteristic to be explored would be the correlation between level of responding on the test, and the length of time to relapse, i.e., do those addicts showing the highest level of responding return to drugs the fastest? Finally, it is important to determine the stability or reliability of the addict's responses from one testing to the next.

Rationale for the Readdiction Liability Test: Some Recent Data

There are considerable data from recent studies which indicate that conditioned effects are closely connected to the instigation of readdiction [13–17]. Davis and Smith [17] re-established previously extinguished drug-seeking behaviour in rats with conditioned reinforcers. They paired a buzzer with the infusion of morphine in bar-pressing rats. When saline was substituted for the morphine reinforcement, the bar-pressing behaviour was extinguished. If the buzzer was not operated during the extinction trials, reinstating it during saline injections produced a large recovery of bar-pressing behaviour. The buzzer, as a conditioned stimulus can be viewed as analagous to naturally occurring stimuli in an addict's environment. The experimental situation can be viewed as analagous to detoxification programmes where a drug is withdrawn, but conditioned stimuli are not involved in the process.

Evidence for conditioned effects in humans has been less available. Wikler [18] reported that he found evidence of this phenomenon in the 1950s in work with Isbell and Fraser. In subjects given opiates several times daily, nalorphine was injected on an irregular basis. Upon administration, the nalorphine injections precipitated abstinence symptoms. When saline injections were later substituted for the nalorphine, Wikler notes that patients were observed to exhibit various signs of abstinence, including rhinorrhea, yawning, nausea, and feelings of 'hot and cold all over'.

In an effort to demonstrate experimental support for conditioned effects of addiction, O'Brien et al. [19] conditioned abstinence symptoms in humans in a laboratory setting. Pairing a tone, odor, and saline injection to a naloxone induced abstinence response, they reported conditioned abstinence responses in five of their eight subjects to the conditioned stimuli. The conditioned responses included an increase in both heart rate and respiration, and a decrease in skin temperature.

Teasdale [20] presented addicts with slides of drug-related scenes, such as a syringe, a person injecting, and an 'outfit', in an attempt to monitor responses to the actual stimuli surrounding the acquisition, preparation and administration of heroin. He found some indication that these slides increased anxiety and confusion, as measured on a self-rated mood scale. More objective measures were not available.

In our laboratory, we have further verified the phenomenon of conditioned opiate responses in humans in a manner supporting the feasibility of the proposed Readdiction Liability Test [5]. Subjects were monitored for physiological responses to a brief videotape showing heroin-related stimuli, during which an

assessment was made of their emotional state and level of heroin craving. Drug addicted subjects exhibited a significant increase in heart rate and galvanic skin response compared to control subjects. Level of craving, anxiety, and depression were also elevated after the videotape presentation. This study demonstrated that both psychological and physiological changes occur in response to stimuli closely resembling drug-related stimuli in the addict's environment. It also indicated the possibility of eliciting and quantifying conditioned opiate responses in an experimental setting.

More recently in our laboratory we have replicated the physiological responses to the videotape stimuli. The twelve experimental subjects in our study were volunteers who were completing detoxification from methadone (five were at 0 mg methadone, two were at 2 mg., and two were at 5 mg.) or were on methadone maintenance (one at 30 mg., and two at 60 mg. of methadone) at the time of their participation. The ten control subjects were volunteers from the nursing service of the Veterans Administration Medical Center Brentwood. Figure 2 illustrates heart rate changes from baseline for both groups during either an experimental or control videotape over a five trial period.

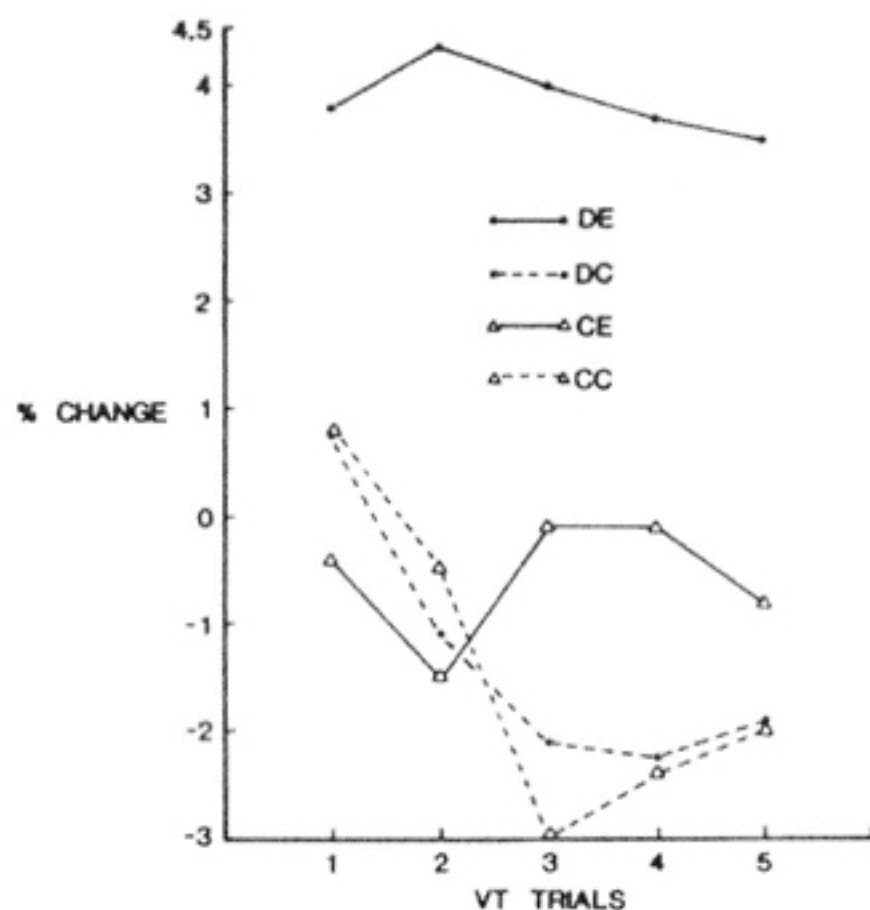


Figure 2 Per cent heart rate changes from baseline for the four experimental conditions: DE - drug group, experimental videotape; DC - Drug group, control videotape; CE - Control group, experimental videotape; CC - Control group, control videotape.

Note the consistent increase in heart rate during the DE condition (drug-related stimuli presented to experimental subjects), with all other groups showing primarily a heart rate decrease. Analysis of variance of scores summed across trials showed significant differences between the DE and DC (neutral stimuli to experimental subjects) conditions ($p < .001$) and between the DE and CE (drug-related stimuli to control subjects) conditions ($p < .05$). All groups began the experimental sessions with similar baseline rates.

The other interesting data were levels of craving. Figure 3 presents mean levels of craving during trial periods and intertrial rest periods (indicated with an 'R') for control and experimental groups. Subjects were given a craving dial they could manipulate on a continuous basis. Note that for experimental subjects viewing the drug related videotape, the craving level increased during each of the trial periods as compared to the immediately preceding intertrial interval; in fact, craving levels were higher during each trial than during any rest period. Mann-Whitney comparisons indicated significant differences between the two video tapes (drug-related: experimental; and neutral: control) for the drug subjects for all but the fourth trial period ($p < .05$).

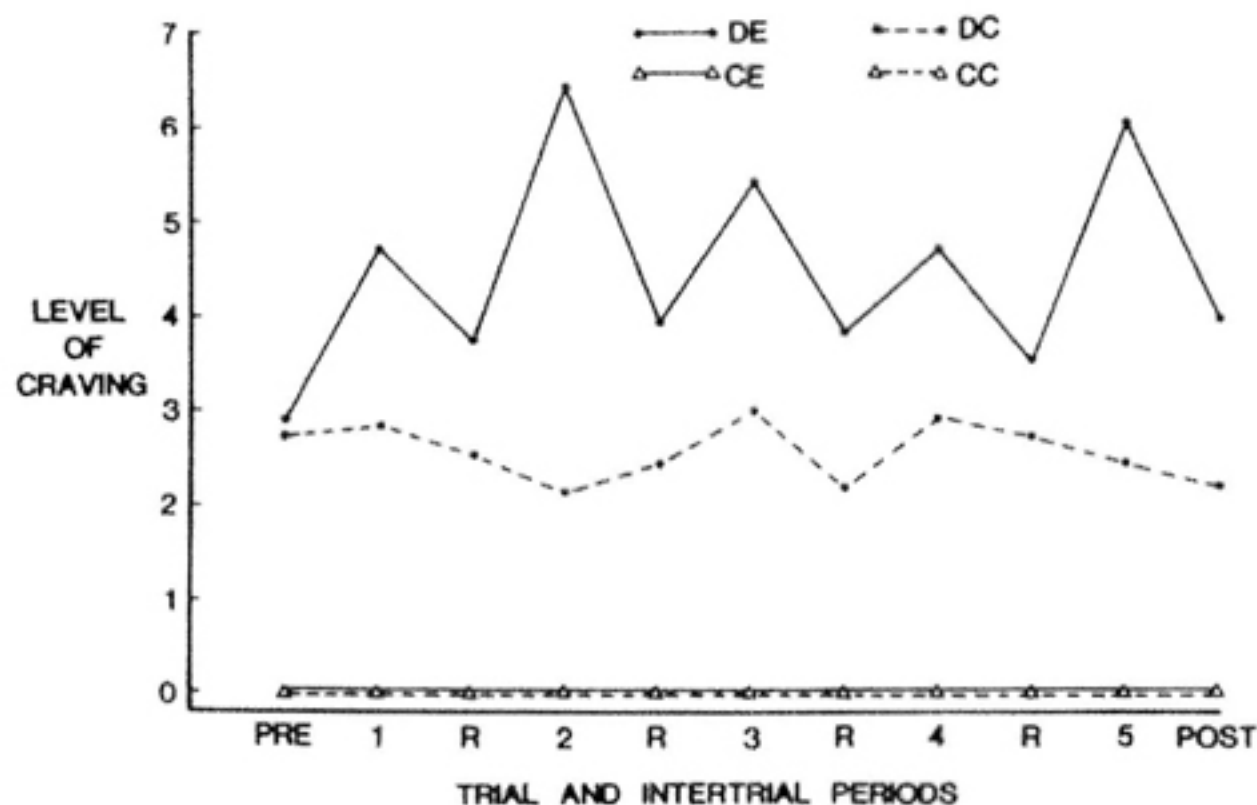


Figure 3 Mean level of craving (scale is from 0 to 10) for each of the four conditions.

Currently, we are also exploring the effects on addicts of presenting them with actual drug paraphernalia.

Conclusion

Table 2 lists the various possible functions of the proposed Readdiction Liability Test. As an initial screening procedure, it might prove to be a valuable adjunct to present methods, which include urine testing, medical and criminal records, history taking and subjective reports. As such, it would focus more attention on the psychological aspects of treatment and perhaps suggest a specific treatment plan. (A naloxone challenge has been proposed and used as a means of rating physical dependence upon entry to a treatment programme. [21])

Used as a final testing procedure, the Readdiction Liability Test may provide a better idea of the addict's level of addiction upon termination and thus objectify the degree of improvement in the patient, based on a reduction in responsiveness to the conditioned stimuli. In addition, the test might be used as part of a final screening process in which patients still demonstrating a high level of responsiveness to experimental stimuli would be continued in treatment for an additional

Table 2 Utility of a readdiction liability test

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1. More accurate assessment of a patient's drug habit in initial screening.
 2. Better specificity in individual treatment.
 3. More precision in determining degree of rehabilitation and progress during and at programme termination.
 4. Better comparison for relative efficacy of widely divergent programmes.
 5. More efficiency in desensitization and deconditioning training.
 6. Better concrete feedback to patients on their proneness to relapse.
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period of time. In this manner the test could serve as a criterion to determine to what degree the patient has shown some rehabilitation. In this same context, an objective measure of improvement, such as the proposed test, can be used to evaluate the treatment programme, as well as to compare the relative effectiveness of different procedures and programmes.

As mentioned previously, most detoxification and other treatment programmes, while attempting to remove heroin and other illegal drugs from the patient's way of life, have been unable to do much in the way of eliminating contingent reinforcers – those stimuli involved in drug taking behaviour that have the capacity to trigger it. Consequently, these stimuli continue to influence the behaviour of ex-addicts following drug treatment. Some programmes have begun to realize the importance of these conditioned factors and are utilizing deconditioning procedures with relatively good results [22, 23]. The procedure described here can be of help in desensitization efforts because of its apparent ability to elicit those conditioned responses that need to be extinguished.

In suggesting the exploration of this new procedure, it is not assumed that relapse can be solely attributed to the conditioned effects of addiction. Clearly, other factors, such as protracted abstinence and motivation, are also of primary significance. The data reviewed, however, indicate that conditioned effects are closely connected to the instigation of readdiction, contributing to some extent to relapse. This discussion offers a promising approach and recommends further investigation of the relevant parameters of this phenomenon.

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