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An Analysis of Relapse Prevention Factors and Their Ability to Predict Sustained Abstinence Following Treatment Completion

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Abstract

Background & Objectives—This study assessed the role of 14 specific relapse-prevention activities and their underlying factors in maintaining abstinence among subjects (N = 302) completing outpatient treatment for stimulant dependence.

Methods—We examined what broader dimensions might subsume the 14 items constituting the Drug Avoidance Activities checklist (Farabee et al. J Subst Abuse Treat 2002;23:343–350), and how well these derived factors predicted concurrent drug use at baseline and again 3 and 12 months later.

Results—Although four factors were identified consistently for the three time points, only *avoidance strategies* had sufficient internal consistency to be retained for further analysis. Controlling for age, gender, and ethnicity, the avoidance subscale was a significant predictor of UA results at all time periods: a one-point increase in the *avoidance strategies* scale was associated with an 86% increase in odds of a negative UA at baseline (OR = 1.86, 95% CI = 1.37–2.53, $p < .001$), a 77% increase at 3-month follow-up (OR = 1.77, CI = 1.37–2.29, $p < .001$), and a 37% increase at 12-month follow-up (OR = 1.37, CI = 1.04–1.81, $p = .026$).

Conclusions—Although correlations of individual items with UA results showed statistically significant ($p < .05$) results for 8 of 14 items at one or more observation points, avoidance-related behaviors showed the strongest associations with sustained abstinence.

INTRODUCTION

Marlatt and George's[1] model of relapse prevention was originally developed in response to their observation that most substance abuse treatment techniques (at that time) focused on the initial cessation of addictive behavior. Moreover, they contended, "What is often overlooked with this focus on initial cessation during the treatment phase is that the *maintenance* of change, once it has been induced, may be governed by entirely different

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Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

principles than those that are associated with initial cessation" (p. 262). Although the logic of this general approach has been widely embraced, the task of identifying the types of behaviors associated with sustained recovery has been challenging. More than a decade later, Carroll[2] found strong support for relapse prevention interventions based on a review of 24 controlled trials. Notably, Carroll also concluded that there is limited knowledge about the specific relapse prevention components that drive the effects.

Indeed, it has long been known that reinforcing an alternative, competing behavior can lead to reductions in the frequency of a target behavior.[3] The use of procedures to increase the frequency of "competing" alternatives to drug use has been evaluated among cocaine abusers,[4] where vouchers redeemable for a specified set of goods or services were given contingent upon the completion of certain behavioral assignments specified in a mutually agreed treatment plan. These activities included assignments that both the therapist and the patient agreed were achievable, such as incremental behavioral tasks that were incompatible with continued illicit drug use (eg, attending an employment interview, parenting class, or exercise group). Compared to traditional contingency management (CM), the reinforcement of these incompatible activities produced a significant reduction in illicit drug use relative to the no-voucher and drug-contingent-voucher groups. In addition, the treatment-plan condition produced a reduction in illicit drug use that was sustained at two time points following discontinuation of the CM procedure, whereas drug-use-contingent vouchers did not.

However, formalizing the list of "incompatible" activities is an ongoing endeavor. Prendergast et al.[5] compared two CM approaches—one reinforcing abstinence, the other reinforcing engagement in positive behaviors presumed to be incompatible with chronic drug-using behavior (eg, pursuing and maintaining employment, attending school, and joining an exercise group)—and found that subjects in the latter condition tended to have *worse* drug-use outcomes. Perhaps a more appropriate goal at this stage of research is to identify the broader mechanisms underlying the effects of relapse prevention, prior to focusing on specific behaviors or activities that manifest these mechanisms.

DRUG AVOIDANCE ACTIVITIES

Carroll[6] has argued that, at the very least, extant research on relapse prevention demonstrates that the success of cognitive behavioral therapies such as relapse prevention lies in their emphasis on *active* behavioral change, rather than the mere removal of the targeted behavior (ie, drug use). Evidence for active behavior change—though not for any specific competing behavior—was found in Farabee, Rawson, and McCann's[7] study of patients' adoption of drug avoidance activities (DAAs) during and after treatment, and whether the adoption of these activities was associated with sustained reductions in cocaine use during the follow-up period. Using a DAA checklist, which was derived from the relapse prevention literature, subjects reported their frequency of engagement in 14 DAAs. Results indicated that subjects who had been exposed to cognitive behavioral therapy reported more frequent engagement in DAAs at treatment end and at the 1-year follow-up, compared to subjects assigned to either the CM or control conditions. Although no individual DAA item proved to be a consistent predictor of abstinence across all three time

points, the cumulative number (and frequency of engagement) of DAAs endorsed was significantly related to cocaine abstinence at both post-treatment follow-up contacts. These findings suggested the importance of adopting a range of avoidance activities and engaging in them frequently, rather than relying on any specific one. Further, a series of multivariate regression models revealed that a subject's total DAA score accounted for more variance than did treatment group assignment in predicting reduced cocaine use over the 1-year follow-up period. However, the authors did not examine how these DAAs related to each other, and to what extent empirically identified clusters of these behaviors might offer insight as to the most promising factors underlying relapse prevention.

The present study was based on data collected as part of a five-group randomized trial comparing different styles of a 12- week telephone-based post-treatment support for subjects who had completed the primary phase of an intensive outpatient treatment for stimulant dependence. Results of the main findings can be found in Farabee et al.[8] The aims of this paper are to (i) examine what (if any) broader dimensions might subsume the 14 items constituting the DAAs checklist and (ii) assess how well these derived factors predicted concurrent drug use at baseline and again, 3 and 12 months following study enrollment.

METHODS

Overview

The parent study, which provided the data used in the current study analysis, involved a randomized, factorial design in which subjects were offered telephone-based post-treatment support utilizing counseling protocols that varied in structure and directiveness. The standard aftercare plan for all treatment program graduates consisted of weekly outpatient groups and self-help meetings. All participants were encouraged to participate in these meetings. Interviews assessing background characteristics and drug use were conducted 1 week prior to completion of primary treatment (baseline), and again at 3 and 12 months following study enrollment. Follow-up rates for the 3- and 12-month assessments were 95.3% and 85.9%, respectively.

This project was approved by the University of California, Los Angeles (UCLA), General Campus Institutional Review Board and conformed to the provisions of the Declaration of Helsinki (as revised in Tokyo 2004). All study participants provided signed, informed consent prior to enrollment.

Sample

Subjects (n = 302) were recruited as they neared the completion of their treatment at one of five outpatient programs located in Los Angeles, San Bernardino, and Orange counties, Southern California. As shown in Table 1, nearly three-quarters of the participants were male, with a mean age of 37 (SD = 9.8). With regard to race/ethnicity, two-thirds of the participants categorized themselves as "White," 23% self-identified as non-White Hispanic, and 5% as African American. The remaining 6% were primarily Asian/Pacific Islander. On average, participants had at least a high school degree and over half reported that they had typically maintained full-time employment over the past 3 years. When asked to identify

their primary drug, 56% reported methamphetamine, 30% reported cocaine, and the remaining 14% identified both methamphetamine and cocaine as their primary drugs.

Assessments

Three data sources formed the basis for the present study: the addiction severity index (ASI),[9] DAAs questionnaire,[7] and urine test results. These are summarized below.

Addiction Severity Index (ASI)—The ASI is a standardized 40-minute clinical research instrument widely used in addiction research to quantify problem areas of alcohol/drug user populations.[9] The test has excellent inter-rater and test-retest reliability as well as discriminant and concurrent validity. The following areas of functioning are measured: medical condition, employment, drug use, alcohol use, illegal activities, family functioning, and psychiatric condition. In the present study, our analysis of ASI data focused on demographic/social background variables and self-reported stimulant use during the preceding 30 days.

Drug Avoidance Activities (DAA) Questionnaire—The DAA Questionnaire was adapted from the measure used in Silverman et al.[10] The version employed in the present study consists of the eight original DAAs plus six other items (eg, “I exercised,” “I scheduled my time,” “I went to a counselor”). The additional items are considered related to good treatment outcomes based on previous clinical experience and represented some of the behaviors advised in the treatment orientation groups (see Ref. 7). This questionnaire was administered at treatment end (baseline) and at the 3- and 12-month follow-up sessions. Items were rated on a seven-point Likert-type scale, ranging from one (*not at all*) to seven (*daily*). The DAA Questionnaire consists of 14 items and has a Cronbach’s alpha of .85. Higher DAA scores indicate more frequent participation in DAAs.

Urine Tests—Urine specimens were also collected in conjunction with all three interviews. Urines were tested using DRI EIA reagents for preliminary screening of drug abuse. All positive results, as indicated by preliminary screening were confirmed by a chromatography, radioimmunoassay, or gas chromatography. This process specifies drug groups and rules out “over the counter” medications.

Analytic Approach—DAAs were first considered one at a time with descriptive statistics and with Spearman correlations for assessing the relationship of each item with UA results (with UA result coded 1, positive and 0, negative). Logistic regression was used to examine multivariate prediction of negative UA results from DAA strategies, controlling for gender, age, and ethnicity. The total number of strategies used was also included as a potential predictor in the multivariate models.

Because many of the drug avoidance items were intercorrelated, two data reduction procedures were applied before estimating the multivariate logistic model in order to reduce the number of predictors for parsimony and to reduce predictor redundancy. The first data reduction procedure used principal components factor analysis with varimax rotation to identify clusters of DAA items for creating subscales to consider as possible predictors for the multivariate prediction analysis. The factor analysis was done separately for each time

period. Four factors were identified consistently for the three time periods, with the following items having loadings of .45 or higher: avoidance strategies (items 2, 3, 4, 9; see Table 2), use of treatment or self-help (items 1 and 12), strategies often taught as part of treatment (items 5, 7, and 8), and money-related strategies (items 10 and 11). Three (of the 14) items either had consistently low loadings, had moderate loadings but they migrated across factors at different time periods, or produced a factor that did not meet the eigenvalue criterion across all time periods (items 6, 13, and 14), and were thus not considered in forming subscales. Subscales for each time period were formed from the items identified for the four factors. The avoidance strategies subscale had acceptable reliability (Chronbach's alphas: .71, .83, and .80 for baseline, 3-month, and 12-month follow-ups, respectively) and was retained as a predictor for multivariate analysis. Because reliability was low (<.50) for the other three subscales, these computed subscales were no longer considered as possible predictors in further analysis; but the individual composite items were reconsidered as possible predictors. The second data reduction strategy focused on these individual items that were not a part of the avoidance strategies subscale and omitted from further consideration as predictors any of these individual items if they were not at least modestly related to UA results ($p < .10$) in the bivariate analysis at any time period. The resulting parsimonious set of predictors for multivariate analysis thus included the avoidance strategies subscale, four additional individual items, and the total number (of the possible 14) of strategies employed, as well as age, gender, and ethnicity as control variables.

If subjects interviewed in-person did not provide a urine sample or if a provided sample was uninterpretable due to dilution or improper temperature, then the urinalysis result was assigned a "positive" result. (Adulterated or uninterpretable specimens accounted for 3.3% of urines collected at baseline, 4.3% of those collected at the 3-month contact, and 6.7% of those collected at the 12-month contact.) Other missing urinalysis results were not imputed and were considered missing for statistical analysis.

RESULTS

Descriptive statistics (means, standard deviations) for individual DAA items appear in Table 2. There is considerable diversity across these strategies in the frequency of their usage. Specifically, avoidance strategies (items 2, 3, 4, and 9) were used most frequently, with averages (on the 1–7 scale, 1, *not at all* to 7, *daily*) above 6.0. Less frequently used strategies with average scores of less than 3.0 (less frequently than "a few times") included "looked for a job," "got rid of paraphernalia," "went to a counselor," and "went to church." Subjects reported at baseline that they used an average of 9.6 (SD = 1.8) of these 14 strategies "a few times" or more, at 3 months they used 9.4 (SD = 1.8), and at 12 months 8.8 (SD = 1.9).

Correlations of individual items with UA results (Table 3) showed statistically significant ($p < .05$) results for 8 of 14 items at one or more observation points. More frequent use of each of three avoidance strategies (reduced use of other drugs, avoided drug-using friends, avoided places where drugs were available) was significantly related to UA results at all three time points, with correlations of −.16 to −.31 (ie, more frequent use of the strategy was

related to negative UA results). Five additional strategies were statistically significant at one or two time points.

Multivariate models were statistically significant at all three observation points (chi-square = 34.33, $p < .001$ for baseline; chi-square = 34.04, $p < .001$ for 3-month follow-up; chisquare = 19.67, $p = .020$ for 12-month follow-up). Controlling for age, gender, and ethnicity, the avoidance subscale was a significant predictor of UA results at all three time periods: a one-point increase in the frequency of use scale was associated with an 86% increase in odds of a negative UA at baseline (OR = 1.86, 95% CI = 1.37–2.53, $p < .001$), a 77% increase at 3-month follow-up (OR = 1.77, CI = 1.37–2.29, $p < .001$), and a 37% increase at 12-month follow-up (OR = 1.37, CI = 1.04–1.81, $p = .026$). Frequency of use of 12-step meetings was significantly related to having a negative drug-test result at baseline (OR = 1.31, CI = 1.06–1.62, $p = .015$) and at the 12-month follow-up (OR = 1.28, CI = 1.04–1.56, $p = .019$).

The total number of strategies used was related at baseline to a negative UA (OR = .76, CI = .60–.97, $p = .030$). Controlling for covariates and for the frequency of specific strategies, a lower total number of strategies was related to the probability of negative UA results. This variable was not associated with UA results at either of the two follow-up points.

Prediction of UA results from these avoidance strategies was strongest at baseline and degraded somewhat by 12 months, as shown by the decreasing pseudo R^2 of .19–.13. Dropping the consistently non-significant items makes little difference in predictive capability (reducing R^2 by only 1–2%) or the magnitude of odds ratios for the remaining included predictors (Table 4).

DISCUSSION

The goal of this study was to build upon the existing research literature concerning strategies for sustaining drug use abstinence following treatment completion. We were particularly interested in identifying any unifying themes underlying competing activities for recovering substance users that could be of practical value for clinicians.

Results of the present analysis differed from earlier findings reported by Farabee et al.[7] in that the total number of DAAs adopted was not associated with abstinence across all three data collection points. In fact, the aggregated number of these various activities in which subjects reported at least some regular participation was negatively related to the probability of being abstinent at baseline. It is difficult to reconcile this finding with prior research, as well as with the overall pattern of results found in the current study. A possible explanation for this unexpected finding relates to the fact that it occurred at baseline—while subjects were still enrolled in treatment. Perhaps those who evinced ongoing drug use while still in treatment were encouraged by treatment staff to increase their levels of participation in traditional relapse prevention activities. In other words, the increased use of relapse prevention activities may have been a result rather than a cause of any drug use detected at this initial time point.

Our attempts to identify underlying factors subsuming these activities produced mixed findings. Although four factors consistently emerged over the three time points (avoidance

strategies, use of treatment or self-help, strategies often taught as part of treatment, and money-related strategies) only the avoidance strategies scale maintained sufficient internal consistency (Cronbach's alpha >.70) at all three follow-up points. That we were only able to examine one factor was disappointing. However, the explanatory value of this single factor proved to be substantial. Each one-point increase in the avoidance strategies scale was associated with an 86% increase in odds of a negative UA at baseline, a 77% increase at the 3-month follow-up, and a 37% increase at 12-month follow-up.

The single item indicating participation in 12-step/self-help meetings also emerged as a significant predictor of abstinence at baseline and at the 12-month follow-up point. Interestingly, although this item did not load on the avoidance strategies factor, it may be argued that a primary function of alcoholics anonymous/narcotics anonymous groups is, in large part, related to avoidance. That is, they provide recovering drug users with a social setting in which drugs are not used—or, at the very least, where such use would be negatively sanctioned.

Although we were unable to examine the comparative roles of multiple factors in predicting abstinence, the strong predictive efficacy of avoidance strategies shown in the present paper is consistent with findings from studies of coping skills. Using longitudinal data from England's National Treatment Outcomes Research Study (NTORS), Gossop et al.[11] found that substance abuse treatment clients who managed to avoid a full relapse were more likely to have employed avoidance and distraction coping strategies than were clients who later relapsed. Similarly, Cleveland and Harris[12] examined the relationship between negative affect and relapse among college students participating in a 12-step program and found that avoidance was the most effective coping strategy for moderating the effects of negative triggers on cravings.

An important, if unavoidable, limitation of this study is its reliance on self-report to measure subjects' post-treatment engagement in prosocial behaviors that compete with substance use. Although the social desirability of providing affirmative responses to these items is quite obvious, it would be impossible to assess these behaviors directly—due to costs as well as the fact that some of the drug avoidance "activities" are, in fact, internal events, such as "thought stopping." We hope that the social desirability bias inherent to these interviews was at least partly mitigated by the assurances of confidentiality. Moreover, our use of an objective measure of drug use/abstinence, rather than self-reports, at least addressed the concern over common methods variance.

Especially in light of the consistency of the present findings with those reported in the coping skills literature, we believe that this study lends further evidence supporting the influential role of avoidance strategies in maintaining abstinence following substance abuse treatment. Emphasizing the importance of avoiding people and places associated with substance use—and making patients aware of the magnitude of such actions—may be a powerful, practical message for persons in recovery.

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TABLE 1

Sample characteristics

	Total sample (*n* = 302)
Sex (%)	
Male	73%
Female	27%
Race/ethnicity (%)	
White	66%
African American	5%
Hispanic	23%
Other	6%
Age at enrollment (*M* ± SD)	37 ± 9.8
Education level—years completed (*M* ± SD)	13.1 ± 2.8
Usually employed full time in past 3 years (%)	56%
Primary substance (%)	
Methamphetamine	56%
Cocaine	30%
Both	14%

TABLE 2

Mean* (standard deviation) of drug avoidance activities (DAAs) items/scales

Item or scale	Baseline (*n* = 302)	3-Month FU (*n* = 283)	12-Month FU (*n* = 229)
1. 12-Step meetings (*M* + SD)	3.53 ± 1.99	3.25 ± 1.96	2.50 ± 1.91
2. Reduced use of other drugs	6.45 ± 1.30	6.14 ± 1.59	5.78 ± 1.91
3. Avoided drug-using friends	6.07 ± 1.63	5.94 ± 1.66	5.94 ± 1.80
4. Avoided places where drugs were available	6.25 ± 1.51	6.03 ± 1.66	6.07 ± 1.59
5. Exercised	3.79 ± 2.04	3.68 ± 1.96	3.64 ± 2.08
6. Spent time with family	5.23 ± 2.09	5.25 ± 1.99	5.24 ± 2.03
7. Scheduled time	4.73 ± 2.03	4.80 ± 1.99	4.80 ± 2.06
8. Used thought stopping	4.69 ± 2.03	4.37 ± 2.05	4.19 ± 2.28
9. Spent time with non-drug users	6.06 ± 1.46	5.92 ± 1.53	5.99 ± 1.52
10. Limited access to money	3.25 ± 2.47	3.22 ± 2.37	2.82 ± 2.21
11. Looked for a job	2.07 ± 1.90	2.10 ± 1.84	1.92 ± 1.70
12. Got rid of paraphernalia	1.60 ± 1.60	1.48 ± 1.44	1.55 ± 1.53
13. Went to a counselor	2.86 ± 1.78	2.17 ± 1.61	1.64 ± 1.23
14. Went to church	2.06 ± 1.51	2.21 ± 1.58	2.11 ± 1.55
Drug avoidance subscale (items 2, 3, 4, and 9)	6.21 ± 1.08	6.01 ± 1.31	5.95 ± 1.35
Total DAA scale (14 items)	4.19 ± .75	4.04 ± .78	3.87 ± .80
Number (of 14) of strategies used (scored 3 or above)	9.59 ± 1.81	9.43 ± 1.80	8.80 ± 1.86

*Items scored on 1–7 scale items (scored on 1–7 scale 1, not at all; 3, a few times; 5, many times; and 7, daily).

TABLE 3

Bivariate correlations: drug avoidance activities (DAAs) items/scales[†] with urinalysis results (from UA and items measured at same time period)

Item or scale	Baseline (*n* = 299)[‡]	3-Month FU (*n* = 268)[‡]	12-Month FU (*n* = 204)[‡]
1. 12-Step meetings	−.10	−.09	−.17**
2. Reduced use of other drugs	−.26**	−.31**	−.20**
3. Avoided drug-using friends	−.16**	−.22**	−.24**
4. Avoided places where drugs were available	−.21**	−.31**	−.23**
5. Exercised	−.04	−.03	−.06
6. Spent time with family	.02	−.10	−.15*
7. Scheduled time	−.07	−.12*	−.09
8. Used thought stopping	.01	−.14*	−.11
9. Spent time with non-drug users	−.11*	−.16**	−.06
10. Limited access to money	.09	.03	.01
11. Looked for a job	.03	.04	.08
12. Got rid of paraphernalia	.08	.05	.06
13. Went to a counselor	−.03	−.06	−.08
14. Went to church	−.06	−.10	−.04
Drug avoidance scale (average across items 2, 3, 4, and 9)	−.21**	−.27**	−.21**

* $p \leq .05$;

** $p \leq .01$;

[†] Items scored on 1–7 scale (1, not at all; 3, a few times; 5, many times; 7, daily);

[‡] Some subjects did not provide (or had unusable) UA results, so could not be included in analysis of relationships (3, 15, and 25 for baseline, 3-month, and 12-month, respectively).

TABLE 4

Logistic regression results: prediction of negative urinalysis from selected drug avoidance activities, controlling for age, gender, and ethnicity

	Baseline (*n* = 299)	3-Month FU (*n* = 268)	12-Month FU (*n* = 204)
Predictor	**OR (95% CI)†**	**OR (95% CI)†**	**OR (95% CI)†**
Drug avoidance scale (average across items 2, 3, 4, and 9)	1.86 (1.37–2.53)**	1.77 (1.37–2.29)**	1.37 (1.04–1.81)*
12-Step meetings	1.31 (1.06–1.62)*	.99 (.82–1.19)	1.28 (1.04–1.56)*
Spent time with family	.96 (.80–1.16)	.94 (.80–1.12)	1.13 (.96–1.34)
Scheduled time	1.14 (.93–1.40)	1.07 (.90–1.27)	1.04 (.88–1.24)
Used thought stopping	.92 (.75–1.12)	1.03 (.86–1.22)	1.01 (.87–1.19)
Total number of strategies used a few times or more	.76 (.60–.97)*	1.03 (.86–1.22)	.90 (.72–1.12)
Chi-square, df = 9	34.33**	34.04**	19.67*
Pseudo R^2	.192	.179	.127

*$p \geq .05$;

**$p \geq .01$;

†Controlling for age, gender, ethnicity, and other avoidance predictors in model.