Available online at www.sciencedirect.com
SCIENCE DIRECT
Drug and Alcohol Dependence 83 (2006) 269–273
DRUG and ALCOHOL DEPENDENCE
www.elsevier.com/locate/drugalcdep

Short communication

Prize-based contingency management does not increase gambling

Nancy M. Petry [a,*], Ken B. Kolodner [b], Rui Li [b], Jessica M. Peirce [b], John M. Roll [c], Maxine L. Stitzer [b], John A. Hamilton [d]

[a] *Department of Psychiatry, University of Connecticut Health Center, 263 Farmington Avenue, Farmington, CT 06030-3944, United States*
[b] *Johns Hopkins University, 5510 Nathan Shock Drive, Baltimore, MD 21224, United States*
[c] *Washington State University, P.O. Box 1495, Spokane, WA 99210, United States*
[d] *Liberation Programs, 125 Main Street, Stamford, CT 06901, United States*

Received 17 August 2005; received in revised form 25 November 2005; accepted 28 November 2005

Abstract

A contingency management (CM) intervention that provides drug-abstinent patients a chance to win prizes of varying magnitudes is efficacious in retaining patients in treatment and reducing drug use. However, this intervention has been criticized as possibly increasing gambling because it contains an element of chance. Gambling behaviors before, during and 3 months after participation in a multi-site study of CM were compared for stimulant users randomly assigned to 12 weeks of standard care with ($N = 407$) or without ($N = 396$) prize-based CM. Among study participants enrolled in outpatient non-methadone drug abuse treatment ($N = 415$), 26% reported gambling during the observation period, and this rate was 37% among participants ($N = 388$) enrolled in methadone maintenance programs. No differences in gambling over time were noted between those assigned to the prize CM versus standard care conditions, indicating that this prize CM procedure does not adversely impact gambling behavior among stimulant abusers.

Keywords: Contingency management; Gambling; Stimulant use; Cocaine; Methamphetamine; Methadone; Drug abuse treatment

1. Introduction

Contingency management (CM) treatments typically provide vouchers, exchangeable for retail goods and services, whenever drug-negative samples are provided. Voucher-based CM is efficacious in a variety of drug-using populations (Budney et al., 2000; Higgins et al., 2000, 2003; Rawson et al., 2002), but this intervention is rarely implemented in practice in part because of costs. In most 3-month trials (Higgins et al., 2000, 2003; Rawson et al., 2002), participants could earn over US$ 1000 in vouchers.

Recent studies (Petry et al., 2000, 2004, 2005a) applied a CM approach in which patients earn a chance to draw from an urn and win prizes of varying magnitudes, with average maximal earnings of US$ 250–400. The procedure is efficacious in reducing drug use (Petry et al., 2000, 2004, 2005a, in press). However, because pathological gambling and substance use disorders are highly comorbid (Gerstein et al., 1999; Petry, 2005; Welte et al., 2001), and this CM procedure contains an element of chance, it has raised concerns about possibly promoting gambling.

The Clinical Trials Network (CTN) is a collaborative effort between drug abuse treatment researchers and providers, designed to implement evidence-based interventions in community-based clinics. CM treatment using the prize method was selected for inclusion in the first wave of projects. The present study evaluated data from the CTN trial to determine if prize CM increased gambling among stimulant users.

2. Methods

2.1. Participants

Participants were 803 outpatients recruited from eight non-methadone and six methadone clinics. Eligibility criteria (detailed in Petry et al., 2005b; Peirce et al., in press) included recent stimulant use as indicated by self-report or positive urine samples. Participants provided written informed consent and were excluded if they were unable to pass a consent quiz or

* Corresponding author. Tel.: +1 860 679 2593; fax: +1 860 679 1312.
E-mail address: petry@psychiatry.uchc.edu (N.M. Petry).

0376-8716/$ – see front matter © 2005 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.drugalcdep.2005.11.023

were in recovery from a gambling problem. No known participants were excluded for either reason. Inclusion/exclusion criteria were not disclosed to potential participants.

2.2. Study procedures

2.2.1. Intake assessment. Participants completed a 1.5 h interview related to demographics and substance use (Petry et al., 2005b). Two items about recent gambling were also included: "How many days have you gambled in the past month (include days you even bought lottery tickets)?" and "How much money have you spent in total on gambling in the past month?" Similar instruments were administered 1, 3 and 6 months later. Participants were paid US$ 25 for completing follow-ups. Completion rates at respective time-points were 78.1, 70.0 and 58.8% for non-methadone and 91.2, 83.5 and 77.3% for methadone participants.

2.2.2. Treatments. Participants were randomized within each site by a computer program to: (a) *Standard care*, consisting primarily of group counseling and twice-weekly toxicology and breath testing or (b) *Prize CM*, consisting of the same standard care and testing, with chances to win prizes whenever testing negative for both stimulants and alcohol. Negative samples resulted in opportunities to draw between 1 and 12 chips from an urn containing 500 chips: 250 chips stated "Good Job," but were not associated with a prize; 209 stated "Small" (e.g. choice of snacks, bus tokens, US$ 1 fast-food certificates); 40 stated "Large" (e.g. choice of telephones, CD players, US$ 20 gift certificates); 1 stated "Jumbo" (e.g. TV, DVD, stereo). Number of draws increased with submission of consecutive negative samples, and additional draws were earned if samples also tested negative for opioids and/or marijuana (Petry et al., 2005b; Peirce et al., in press).

2.2.3. Data analysis. First, we compared baseline characteristics between participants who reported no gambling at all evaluations to those who reported gambling $\geq$1 times. Chi-square analyses evaluated categorical and *t*-tests continuous variables. Because of the number of comparisons, alpha <0.01 was considered significant in the above analyses.

The main analysis evaluated whether gambling over all follow-up periods (1, 3 and 6 months) was more prevalent for those assigned to prize CM relative to those who were not. Because distributions of days and dollars gambled could not be normalized, we treated gambling as a dichotomized variable (presence/absence). General estimating equations (GEE; Zeger et al., 1988) evaluated whether individuals were more likely to gamble over time across conditions. Results are reported as odds ratios (OR) and 95% confidence intervals (CI). Two analyses were conducted—one not including baseline reports of gambling and the second including the baseline results as a covariate. Non-methadone and methadone stimulant users differed on demographics, gambling and main substance use outcomes (Petry et al., 2005b; Peirce et al., in press). Consequently, analyses were conducted independently for each setting.

3. Results

Table 1 shows individuals who gambled one or more times during the study differed from those who never gambled during the study on some baseline characteristics. In non-methadone clinics, those who gambled were significantly more likely to be male ($\chi^2(2) = 14.4$, $p < 0.001$), older ($t(1, 413) = -3.15$, $p < 0.002$), and have an alcohol diagnosis than those who did not gamble ($\chi^2(2) = 6.74$, $p < 0.009$). In methadone clinics, those who gambled were more likely to be African American ($\chi^2(3) = 39.2$, $p < 0.001$).

Among participants who reported gambling at any time during the study period ($n = 250$), no significant differences at baseline were noted between those assigned to prize and standard conditions (data not shown). Frequencies and amounts gambled at baseline were low (Table 1) and remained low throughout the study. Median dollars wagered per month among those who gambled at each assessment point were US$ 8, 5, 12 and 12 for those in the standard condition and US$ 12, 5.5, 12 and 20 for those in the CM condition in non-methadone clinics. In methadone clinics, respective data were US$ 25, 30, 40 and 16 for standard condition participants and US$ 18, 16, 20 and 20 for CM participants.

Fig. 1 shows proportions of participants in the full sample ($n = 803$) who reported gambling in the past month at each assessment. In non-methadone clinics, between 13 and 18% of participants reported gambling at each time period; using GEE, likelihood of gambling did not differ by treatment condition over time, unadjusted OR = 1.3 (95% CI = 0.8, 2.2). Similarly, in methadone clinics, no between-treatment differences were noted in gambling over time, unadjusted OR = 0.9 (95% CI = 0.6, 1.3). When baseline gambling was included as a covariate in the analyses, ORs remained non-significant, with adjusted OR = 1.2 (95% CI = 0.7, 2.0) in non-methadone and 0.8 (95% CI = 0.5, 1.3) in methadone clinics.

4. Discussion

This study of over 800 stimulant users, approximately half of whom received prize-based CM, found no increase in gambling as a result of exposure to prize-based CM. A primary strength of this study is the large sample size, with adequate power to detect modest effect sizes in proportions gambling over time. The randomized nature of the study design allowed for comparisons within the same treatment population of those exposed and not exposed to prize CM. Another strength of the study was that 14 community-based programs throughout the country were included, representing both methadone and non-methadone clinics, thereby enhancing generality. In addition, data were collected 3 months after the incentive program ended, allowing for detection of any post-intervention increase in gambling.

While these data suggest that prize CM does not increase gambling, some differences were noted between participants who gambled and those who did not. African Americans were more likely to gamble in methadone clinics, consistent with epidemiological data indicating that members of minority eth-

Table 1
Demographic and baseline characteristics of individuals who did and did not report gambling at any point during the study period

	Non-methadone patients		Methadone patients	
	No gambling during study	Gambled during study	No gambling during study	Gambled during study
N	307	108	246	142
Treatment assignment (%)				
Standard treatment	52.1	42.6	45.4	45.8
Prize CM	47.9	57.4	49.6	54.2
Gender (%)				
Male	39.1[b]	60.2[b]	56.1	55.6
Female	60.9	39.8	43.9	44.4
Race (%)				
African American	38.8	51.9	38.8[b]	70.4[b]
Caucasian	38.8	27.8	33.5	13.4
Hispanic	13.7	9.3	20.8	9.2
Other	8.8	11.1	6.9	7.0
Age (years)	35.0 (8.4)[b]	38.0 (9.2)[b]	40.8 (8.7)	44.1 (7.9)
Education (years)	11.7 (2.0)	12.0 (1.8)	11.7 (2.1)	11.7 (1.9)
Marital status (%)				
Married or co-habiting	23.8	23.2	13.4	14.1
Separated/divorced/widowed	30.9	37.0	33.3	38.7
Never married	45.3	39.8	53.3	47.2
On probation or parole (%)	36.8	30.6	15.5	16.9
Legal referral to treatment (%)	35.2	27.8	5.7	5.6
Current abuse or dependence[a] (%)				
Stimulant (cocaine or methamphetamine)	84.7	83.3	85.8	76.8
Alcohol	38.4[b]	52.8[b]	16.3	18.3
Cannabis	20.6	22.2	9.4	6.4
Opiates	8.9	11.1	78.4	82.2
Positive sample at intake (%)				
Stimulant (cocaine or methamphetamine)	25.5	27.8	77.1	73.1
Alcohol	0.7	0.9	0.8	1.4
Cannabis	11.4	9.3	13.9	9.9
Opiates	2.0	6.5	44.9	49.7
Gambling days in past month		2.0		5.0
Median (25 and 75% quartiles)		(1.0, 4.0)		(2.0, 14.0)
Money spent gambling in past month		10.0		20.0
Median (25 and 75% quartiles)		(3.0, 20.0)		(5.0, 60.0)

Values represent means and standard deviations (in parentheses) unless otherwise noted.
[a] Based on DSM-IV diagnoses; timeframe for current abuse or dependence was past 90 days.
[b] Designates that groups differ significantly ($p < 0.01$) from one another.

nicities are at increased risk for gambling problems (Gerstein et al., 1999; Petry, 2005; Welte et al., 2001). In non-methadone programs, those who gambled were older than those who did not. Similarly to epidemiology studies (Petry, 2005; Gerstein et al., 1999), gambling was more prevalent among men than women in non-methadone programs. High rates of polydrug use are noted among drug-dependent patients who also gamble problematically (Langenbucher et al., 2001; Steinberg et al., 1992). This study found stimulant users who gambled during the study period were more likely to have an alcohol use diagnosis than stimulant users who did not gamble.

More methadone than non-methadone participants reported gambling. These data are consistent with reports suggesting that opioid-dependent patients have high rates of gambling problems (Feigelman et al., 1995; Hall et al., 2000; Ledgerwood and Downey, 2002; Spunt et al., 1995). However, most published studies evaluated lifetime, not current, gambling participation and problems. Very few studies have assessed on-going gambling behaviors or changes in gambling over time in substance-dependent patients. Data from the present study suggest that gambling occurred at a relatively low frequency among stimulant users enrolled in these substance abuse treatment programs. While these data could be biased by omission of individuals in recovery from a gambling problem, no known individuals were excluded for this reason. A limitation of this study is that self-reports of gambling were not corroborated by other sources. However, self-reports of gambling are generally reliable (Hodgins and Makarchuk, 2003; Petry, 2003), and there was no apparent advantage to misrepresenting one's gambling behavior. The short duration of follow-up and low rates of follow-up com-

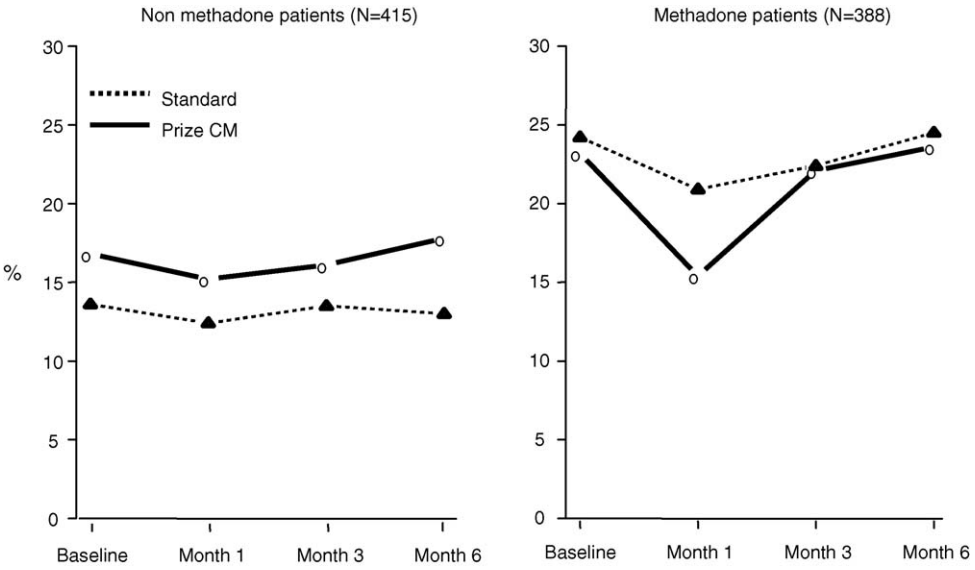

Fig. 1. Proportions of participants reporting any gambling behavior in the past 30 days at baseline, months 1, 3 and 6 assessments. Participants randomly assigned to the standard treatment condition are shown in the hatched lines, and participants assigned to the prize contingency management (CM) treatment condition are show in the solid lines. Data from participants recruited from non-methadone substance abuse treatment programs are shown in the left-hand panel, and data from participants recruited from methadone treatment programs are shown in the right-hand panel.

pletion in non-methadone clinics may also limit interpretation of these findings.

In sum, the present study failed to find any indication of increased gambling among over 400 stimulant abusers assigned to prize-based CM. These data provide support for the safety of prize-based CM.

Acknowledgements

This research was supported by the National Institute on Drug Abuse Clinical Trials Network Grant #U10 DA13034, and preparation of this report was supported by NIH grants R01-MH60417-Suppl, R01-DA13444, RO1-DA016855, RO1-DA14618, R01-DA018883, P50-DA09241 and P50-AA03510. We thank the staff and participants at the treatment centers, and members of the CTN, for their involvement in this project.

References

Budney, A.J., Higgins, S.T., Radonovich, K.J., Novy, P.L., 2000. Adding voucher-based incentives to coping skills and motivational enhancement improves outcomes during treatment for marijuana dependence. J. Consult. Clin. Psychol. 68, 1051–1061.

Feigelman, W., Kleinman, P.H., Lesieur, H.R., Millman, R.B., Lesser, M.L., 1995. Pathological gambling among methadone patients. Drug Alcohol Depend. 39, 75–81.

Gerstein, D.R., Volberg, R.A., Toce, M.T., Harwood, H., Johnson, R.A., Buie, T., Christiansen, E., Chuchro, L., Cummings, W., Engelman, L., Hill, M.A., Hoffmann, J., Larison, C., Murphy, S.A., Palmer, A., Sinclair, S., Tucker, A., 1999. Gambling Impact and Behavior Study: Report to the National Gambling Impact Study Commission. National Opinion Research Center, Chicago, IL.

Hall, G.W., Carriero, N.J., Takushi, R.Y., Montoya, I.D., Preston, K.L., Gorelick, D.A., 2000. Pathological gambling among cocaine-dependent outpatients. Am. J. Psychiatry 157, 1127–1133.

Higgins, S.T., Sigmon, S.C., Wong, C.J., Heil, S.H., Badger, G.J., Donham, R., Dantona, R.L., Anthony, S., 2003. Community reinforcement therapy for cocaine-dependent outpatients. Arch. Gen. Psychiatry 60, 1043–1052.

Higgins, S.T., Wong, C.J., Badger, G.J., Ogden, D.E., Dantona, R.A., 2000. Contingent reinforcement increases cocaine abstinence during outpatient treatment and one year of follow up. J. Consult. Clin. Psychol. 68, 64–72.

Hodgins, D.C., Makarchuk, K., 2003. Trusting problem gamblers: reliability and validity of self-reported gambling behavior. Psychol. Addict. Behav. 17, 244–248.

Langenbucher, J., Bavly, L., Labouvie, E., Sanjuan, P.M., Martin, C.S., 2001. Clinical features of pathological gambling in an addictions treatment cohort. Psychol. Addict. Behav. 15, 77–79.

Ledgerwood, D.M., Downey, K.K., 2002. Relationship between problem gambling and substance use in a methadone maintenance population. Addict. Behav. 27, 483–491.

Petry, N.M., 2003. Validity of the addiction severity index in assessing gambling problems. J. Nerv. Ment. Dis. 191, 399–407.

Petry, N.M., 2005. Pathological Gambling: Etiology, Comorbidity and Treatment. American Psychological Association Press, Washington, DC.

Petry, N.M., Alessi, S.M., Tedford, J., Austin, M., Tardif, M. Vouchers versus prizes: contingency management treatments for substance abusers. J. Consult. Clin. Psychol., in press.

Petry, N.M., Martin, B., Cooney, J.L., Kranzler, H.R., 2000. Give them prizes and they will come: contingency management for the treatment of alcohol dependence. J. Consult. Clin. Psychol. 68, 250–257.

Petry, N.M., Martin, B., Simcic, F., 2005a. Prize reinforcement contingency management forcocaine dependence: integration with group therapy in a methadone clinic. J. Consult. Clin. Psychol. 73, 354–359.

Petry, N.M., Tedford, J., Austin, M., Nich, C., Carroll, K.M., Rounsaville, B.J., 2004. Prize reinforcement contingency management for treating cocaine users: how low can we go, and with whom? Addiction 99, 349–360.

Petry, N.M., Peirce, J.M., Sitizer, M.L., Blaine, J., Roll, J.M., Cohen, A., Obert, J., Killeen, T., Saladin, M.E., Cowell, M., Kirby, K.C., Sterling, K., Royer-Malvestuto, C., Hamilton, J., Booth, R.E., Macdonald, M., Liebert, M., Rader, L., Raynetta, Burns, R., DiMaria, J., Copersino, M., Stabile, P.Q, Kolodner, K., Li, R., 2005b. Prize-based incentives increase retention in outpatient psychosocial treatment programs: results of the National Drug Abuse Treatment Clinical Trials Network Study. Arch. Gen. Psychiatry 62, 1148–1156.

Peirce, J.M., Petry, N.M., Stitzer, M.L., Blaine, J., Kolodner, K., Li, R., Roll, J.M., Kirby, K., Royer-Malvestuto, C., Kellogg, S., Schwartz, M.,

Besteman, K., Cohen, A., Krasnansky, J., Pencer, E., Satterfield, F., Silva-Vazquez, L. Lower-cost incentives increase stimulant abstinence in methadone maintenance community treatment: results of the National Drug Abuse Treatment Clinical Trials Network Multi-site Study. Arch. Gen. Psychiatry, in press.

Rawson, R.A., Huber, A., McCann, M., Shoptaw, S., Farabee, D., Reiber, C., Ling, W., 2002. A comparison of contingency management and cognitive-behavioral approaches during methadone maintenance treatment for cocaine dependence. Arch. Gen. Psychiatry 59, 817–824.

Spunt, B., Lesieur, H., Hunt, D., Cahill, L., 1995. Gambling among methadone patients. Int. J. Addict. Addict. 30, 929–962.

Steinberg, M.A., Kosten, T.A., Rounsaville, B.J., 1992. Cocaine abuse and pathological gambling. Am. J. Addict. 1, 121–132.

Welte, J., Barnes, G., Wieczorek, W., Tidwell, M.C., Parker, J., 2001. Alcohol and gambling pathology among U.S. adults: prevalence, demographic patterns and comorbidity. J. Stud. Alcohol 62, 706–712.

Zeger, S.L., Liang, K.-Y., Albert, P., 1988. Models for longitudinal data, a generalized estimating equation approach. Biometrics 44, 1049–1060.