Published in final edited form as:

J Subst Abuse Treat. 2015 November ; 58: 67–71. doi:10.1016/j.jsat.2015.06.006.

Patients undergoing substance abuse treatment and receiving financial assistance for a physical disability respond well to contingency management treatment

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Abstract

Physical illness and disability are common in individuals with substance use disorders, but little is known about the impact of physical disability status on substance use treatment outcomes. This study examined the main and interactive effects of physical disability payment status on substance use treatment. Participants (N=1,013) were enrolled in one of six prior randomized clinical trials comparing contingency management (CM) to standard care; 79 (7.8%) participants reported receiving disability payments, CM improved all three primary substance use outcomes: treatment retention, percent negative samples and longest duration of abstinence. There was no significant main effect of physical disability payment status on treatment outcomes; however, a significant treatment condition by physical disability status interaction effect emerged in terms of retention in treatment and duration of abstinence achieved. Patients who were receiving physical disability payments responded particularly well to CM, and their time in treatment and durations of drug and alcohol abstinence increased even more markedly with CM than did that of their counterparts who were not receiving physical disability assistance. These findings suggest an objectively defined cohort of patients receiving substance use treatment who respond particularly well to CM.

Keywords

substance abuse treatment; contingency management; disability

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1. Introduction

More than 6% of US adults between the ages of 21 and 64 receive disability payments in the form of Social Security Disability Insurance or Supplemental Security Income, with nearly 13 million people awarded benefits in 2013 (Social Security Administration, 2013).

Government assistance in the form of disability payments may be granted for mental or physical disability. This study focuses on disabilities for physical reasons, with the most common causes including musculoskeletal problems, cardiovascular disease, and cancer (Mesequer, 2013).

A recent report from the National Survey on Drug Use and Health concluded that substance abuse is higher among individuals with a disability compared to those without (Glazier & Kling, 2013), and some physically disabled populations demonstrate rates of substance abuse up to 50% (Heinemann, Mamott & Schnoll, 1990; West, Graham & Cifu, 2009). These studies indicate a link between physical disability and substance abuse, however, this relationship is complex, and substance use may predate or occur subsequent to disability. Longitudinal studies have found a positive association between substance use and later receipt of disability income. Substance use in late adolescence (Danielsson, Agardh, Hemmingsson, Allebeck & Falkstedt, 2014; Ropponen et al., 2013; Sidorchuk, Hemmingsson, Romelsjö & Allebeck, 2012) and adulthood (Haukenes, Riise, Haug, Farbu & Maeland 2013; Skogen, Øverland, Knudsen & Mykletun, 2011) is predictive of future disability income. Alternatively, having a disability may increase substance use because of pain, accessibility to prescription drugs, feelings of social exclusion, perceived discrimination and low self-esteem (Helwig & Holicky, 1994; Hollar & Moore, 2004; Kachlík & Havelková, 2010; Miller et al., 2013).

Individuals with physical disabilities and substance use disorders are at an increased risk for more severe health and psychosocial problems (Morasco, Corson, Turk & Dobscha, 2011; Pittas et al., 2009; Smedema & Ebener, 2010; Zivadinov et al., 2009). Problems associated with substance abuse may be amplified in individuals with a disability, emphasizing the need to evaluate more intensive treatments for this population. Dobscha and colleagues (2008) conducted a randomized trial in patients reporting physical disability due to chronic pain. A secondary analysis found that when randomized to an enhanced intervention to improve pain-related functioning, which included setting and monitoring the attainment specified goals aimed at improving physical functioning, patients with a history of substance use disorder had chronic pain treatment outcomes that were comparable to patients without a history of substance use disorder. However, patients with a history of substance use disorder who were randomized to usual care were 70% less likely than patients without a history of substance use disorder to demonstrate improvements in pain-related disability (Morasco et al., 2011). These findings suggest that enhanced behavioral interventions may be particularly important for patients with physical disabilities and comorbid substance use disorder as these patients responded poorly to usual care services. Unfortunately, there is little empirical research available assessing intensive substance abuse intervention outcomes among individuals with a physical disability.

Contingency management is a behavioral therapy that can be applied to patients with substance use disorders. It provides monetary reinforcers upon objective evidence of drug abstinence. Of the psychosocial treatments for substance use disorders, this is the intervention with the largest effect size (Dutra et al., 2008). Although highly efficacious in improving substance use outcomes, CM adds direct costs as well as personnel time, and it may not be necessary for all patients initiating substance use treatment (e.g., Petry et al., 2004). For these reasons, identifying subgroups who respond well to this enhanced intervention is important.

One such group may be individuals with physical disabilities. Although few studies have evaluated the extent or correlates of physical disabilities in patients receiving substance abuse treatment, these individuals may be more difficult to treat and require a more intensive intervention such as CM (Morasco et al., 2011). Six primary treatment trials designed to examine CM outcomes were combined in the current data set. The purpose of this secondary data analysis was to evaluate whether patients receiving payments for a physical disability responded differently to substance abuse treatment in general, and to CM treatment in particular. This study also examined the proportion of individuals in substance abuse treatment that were receiving disability payments and whether those individuals differed from their counterparts not receiving disability payments with respect to substance use and psychosocial functioning.

2. Methods

2.1 Participants

Participants were 1,013 patients enrolled in randomized trials of CM (Petry et al., 2006; Petry, Alessi, Marx, Austin & Tardif, 2005; Petry, Barry, Alessi, Rounsaville & Carroll, 2012; Petry et al., 2004; Petry, Weinstock & Alessi, 2011). All trials had similar inclusion criteria: age 18 years or older, beginning intensive outpatient treatment at a community-based substance abuse treatment clinic, and ability to understand study procedures. Exclusion criteria were significant uncontrolled psychiatric conditions (e.g., active suicidal ideation, bipolar disorder, schizophrenia) or being in recovery for gambling disorder (see Petry & Alessi, 2010; Petry et al., 2006). University Institutional Review Board approved study procedures, and patients provided written informed consent.

2.2 Procedures

After obtaining informed consent, participants were queried on demographic questions, including race, ethnicity, gender, age and education. Participants were also administered a checklist for the Structured Clinical Interview for the DSM-IV (First, Gibbon, Spitzer & Williams, 1996) and the Addiction Severity Index (ASI; McLellan et al., 1985). The former assessed substance use diagnoses and the latter medical, drug, alcohol, employment, legal, family/social, and psychiatric problems. The ASI derives composite scores of 0.00–1.00 on each domain, with higher scores indicating greater severity of symptoms. The ASI is reliable and valid in assessing severity of problems related to substance use including medical status (Mäkelä, 2004; McLellan, Cacciola, Alterman, Rikoon & Carise, 2006). One item on the ASI inquires about earned income from the past year; it asks explicitly about legally

obtained income from working and does not include income from other sources such as illegal income, disability payments, alimony, food stamps or unemployment. Another item on the ASI asks, “Do you receive a pension for a physical disability?” For the purposes of this study, groups were formed based on participants’ response to that item.

2.3 Treatments

A computerized procedure randomly assigned patients to treatment conditions in each of the primary studies (Petry et al., 2006; Petry et al., 2005; Petry et al., 2012; Petry et al., 2004; Petry et al., 2011). Each study compared a standard care condition to standard care with one or two CM conditions. Standard care was similar across studies and involved intensive outpatient treatment comprised of group therapy sessions 3–5 days per week for up to four weeks. The frequency of care was gradually tapered to a minimum of one group per week. All patients received standard care, and in addition they were asked to submit up to 24 study breath and urine samples during the first 12 weeks of treatment. Breath samples were tested for alcohol using Alcosensor-IV Alcometers (Intoximeters, St Louis, MO, USA) and urine samples for opioids and cocaine using Ontrak TesTstiks (Roche, Somersville, NJ, USA).

The CM conditions varied across studies, but they all involved reinforcement for submission of substance negative samples or other, objectively determined clinically appropriate behaviors. In the Petry et al. (2004) study, two CM conditions awarded different magnitudes of prizes for submission of negative samples. Another study (Petry et al., 2005) compared prize reinforcement to voucher reinforcement for submission of negative samples. The Petry et al. (2006) study compared a CM condition that reinforced submission of negative samples to one that reinforced completion of goal-related activities. The Petry et al. (2011) study implemented CM in a group context and reinforced both attendance at group and submission of negative samples. The Petry et al. (2012) study was comprised of two related studies, one for patients initiating treatment with a cocaine positive sample (the “positive” study) and the other for patients initiating treatment with a cocaine negative sample (the “negative” study). The positive study reinforced patients for submission of negative samples using two different magnitudes of reinforcers, and in the negative study, patients randomized to a CM condition received reinforcement for either submission of negative samples or for attendance at treatment.

In all studies reinforcement for abstinence was contingent upon samples testing negative for alcohol, cocaine, and opioids concurrently. Although each CM trial included at least one CM condition that reinforced abstinence, not all CM conditions reinforced abstinence, as noted above. Nevertheless, all studies found some benefits of CM relative to standard care, and studies comparing two CM conditions yielded no or few differences between the CM interventions. Further, all these studies provided comparable treatments (e.g., intensity, duration) and applied identical assessment instruments, allowing for cross-study analyses.

2.4 Data analysis

For the purposes of these analyses, we removed all patients under 21 years of age ($n = 54$), as we presumed, and data confirmed, that no children had been awarded disability payments. Additionally, nine patients with missing disability status data were removed from analyses,

leaving an analyzed sample of 1,013. Patients who reported receiving a pension or disability payments for a physical impairment were compared with those who did not report receiving these payments on demographic and baseline characteristics using chi-squared tests for categorical variables and independent t-tests for continuous variables.

Controlling for differences in demographic characteristics between the groups (age and ASI-medical score), multivariate general linear models (GLM) evaluated relationships between physical disability/pension status, treatment condition (CM or SC), and their interaction on the primary substance use treatment outcomes. Primary drug use treatment outcomes were available from 100% of the sample. They included: retention in treatment, longest duration of abstinence (LDA), and percentage of samples submitted testing negative. Retention was coded as weeks engaged in treatment (range: 0–12 weeks). LDA was defined as the longest period of negative samples for cocaine, opioids, and alcohol submitted during treatment (range 0–12 weeks). Submission of a sample testing positive for cocaine, opioids or alcohol, or a failure to provide a sample with an unexcused absence, reset a period of abstinence (absences cleared in advance and deemed excused by treatment clinic staff did not reset a period of absences). Percentage of samples negative for cocaine, opioids, and alcohol were derived from the number of samples submitted in the denominator; thus, retention in treatment and missing samples did not affect this variable. ASI-employment score and earned income, defined as legal income from work, were not included as covariates due to their lack of association with the outcome measures (ASI-employment, $F(3,998) = 1.94$, $p > .12$; earned income, $F(3,998) = 1.87$, $p > .13$) and their high correlation with disability status. Analyses were conducted on SPSS for Windows (v 21), and 2-tailed alphas of $p < 0.05$ were interpreted as significant.

3. Results

Patients receiving ($n = 79$, 7.8%) and not receiving ($n = 934$, 92.2%) physical disability payments differed significantly on four demographic and baseline variables (Table 1). On average, those with disability payments were older (by about 6 years) and reported less annual earned income (by about \$8,000), $ps < 0.001$. Consistent with disability status, they also had higher scores on the ASI-medical and employment domains, and the two groups differed with respect to items contained within those domains.

In the general linear model, treatment condition, age and ASI-medical score were significantly associated with treatment outcomes. Specifically, treatment condition impacted all outcome measures: retention, $F(1, 1005) = 10.29$, $p = .001$; percent negative samples, $F(1, 1005) = 4.80$, $p = .03$; and LDA, $F(1, 1005) = 30.33$, $p < .001$. Patients randomized to CM had better outcomes than those randomized to standard care, with respective adjusted means and standard errors (SE) of 7.2 (.3) versus 5.6 (.4) for weeks retained, 5.8 (.3) versus 3.0 (.4) weeks for LDA, and 84.9 % (2.2) versus 76.9 % (3.0) for percent negative samples. Age was also positively associated with retention, $F(1,1005) = 7.71$, $p = .01$ and LDA, $F(1,1005) = 6.56$, $p = .01$, but not with percent negative samples, $F(1,1005) = .33$, $p = .56$. ASI-medical scores were inversely associated with percent negative samples, $F(1,1005) = 4.33$, $p = .04$, but not with retention, $F(1,1005) = .11$, $p = .74$ or LDA, $F(1,1005) = 2.92$, $p = .09$.

The multivariate analysis did not reveal a main effect of physical disability status on outcomes ($ps > .55$), but a significant disability status by treatment condition interaction effect emerged for retention and LDA, $F(1, 1005) = 4.68, p = .03$ and $F(1, 1005) = 4.49, p = .03$, respectively. The interaction was not significant for proportion of negative samples submitted, $p > .16$. Figure 1 shows the weighted means (SE) of the primary outcomes based on disability status and treatment condition.

4. Discussion

This study found that 7.8% of patients from community-based substance abuse treatment programs, who were also enrolled in clinical trials examining contingency management, received income for a physical disability. This rate is similar to that reported in other studies evaluating physical disabilities in substance using populations, which range from 7% (Tyras & Rush, 1993) to 14% (Ogborne & Smart, 1995). This study also examined the impact of disability status on substance abuse treatment outcomes. Although patients regardless of disability status improved when assigned to CM versus when not, those awarded disability payments had particularly large improvements in treatment retention and LDA when they were assigned to CM. These findings add to the limited research that has examined the extent or impact of disability status on substance abuse treatment patients.

In the present analyses, older age was related to an increased likelihood of receiving disability payments, and scores on the ASI-medical and employment domains were higher in participants receiving disability payments compared to those who were not. Few other differences existed between patients receiving disability and those who were not. Previous research suggests that disability is strongly associated with depression and family discord (Börsbo, Peolsson & Gerdle, 2009; Ervasti et al., 2014; Hahn, McCormick, Silverman, Robinson & Koenen, 2014; Jones et al., 2014), but the lack of differences between groups based on disability payment status in this sample may reflect overall high rates of psychiatric and social problems in these patients and substance abuse treatment patients in general (Chan, Dennis & Funk, 2008; Flynn & Brown, 2008).

Results from this study also suggest that patients with substance use disorders who are receiving disability payments did not differ from their counterparts who were not receiving these payments in terms of severity of substance use problems. Although having a physical disability may increase the likelihood of substance use, findings from the current study suggest that problems related to substance use and treatment outcomes are similar between patients receiving disability payments and those who are not.

Contingency management treatment was also efficacious for both groups of participants, but CM was especially beneficial for patients undergoing substance abuse treatment who were concurrently receiving payments for a physical disability. Patients receiving disability income remained in treatment longer and achieved longer durations of abstinence than patients not receiving disability income when randomized to a CM condition. Although the disability status by treatment condition interaction effect was not significant for proportion of negative samples submitted, a near ceiling effect is noted on this variable as most patients submit negative samples while they remain engaged in outpatient psychosocial treatment

programs. Individuals with a physical disability may be limited in their access to positively reinforcing activities. For example, mobility impairments or chronic pain may prevent them from engaging in rewarding social activities, such as going out to the movies or playing sports. Thus, CM may be particularly compelling for disabled individuals as it adds an additional opportunity for positive reinforcement.

Results from this study suggest that receipt of physical disability payment may be an objective index by which patients could be offered CM. Although highly effective overall, CM adds administrative and direct costs to care (Sindelar, Elbel & Petry, 2007). Identifying subgroups who respond well to this treatment could facilitate its utilization in small and well-defined patient groups. Because patients who receive disability payments are a high-resource utilizing group (Burkhauser, Daly, McVicar & Wilkins, 2014; Livermore, Wittenburg & Neumark, 2014), reducing substance use via CM may result in net healthcare savings. To the extent that reductions in substance use may improve physical functioning, CM may also increase some of these patients' ability to return to work. Due to the retrospective nature of these analyses, however, these results would need to be replicated in a prospective study prior to drawing conclusions about its efficacy in reducing healthcare costs in this population. Further, large scale studies would be needed to examine the effects of CM on physical health and functioning, as well as ability to return to work.

Although this study suggests a subgroup toward whom CM could be directed, it has a number of limitations. First, the number of patients receiving payments for a physical disability in this sample was relatively small, and groups were even smaller when divided by types of treatment received. Future studies are needed to confirm and extend these findings in clinical settings that work perhaps explicitly with patients with physical disabilities or chronic medical conditions. Second, the retrospective nature of the study precluded a comprehensive and detailed assessment of medical status and reasons for disability payments or their durations. Both substance use and physical outcomes may differ based on the reason or type of illness or disability for which persons were receiving disability payments. Third, the available data did not allow us to evaluate long term outcomes comprehensively. Longer term prospective studies are needed to examine enduring effects of CM on substance use outcomes as well as any potential benefits related to improvements in physical functioning if long term abstinence is achieved in this subgroup.

Lastly, this data set was a combination of studies with variations in CM procedures, including differences in the target behaviors being reinforced. Abstinence was directly reinforced in some CM conditions, while in other studies attendance or adherence to treatment goals were targeted for reinforcement in some conditions. Magnitudes of reinforcement also differed across studies and are known to be associated with CM treatment outcomes (Dallery, Silverman, Chutuape, Bigelow & Stitzer, 2001; Silverman, Chutuape, Bigelow & Stitzer, 1999). Some forms of CM may be more or less efficacious in improving outcome and more or less relevant to patients receiving disability, but this retrospective analysis of a combined dataset of multiple CM interventions was unable to disentangle them. Nevertheless, because different CM interventions were applied across studies and overall effects of CM remained significant despite these variations speaks to the robustness of the intervention in improving outcomes.

Despite limitations of this retrospective analysis, this study also had a number of strengths. It included a large overall sample and was conducted in community-based substance abuse treatment settings, making results generalizable. It used random assignment procedures, and it relied upon objective indices of substance use outcomes. Little research has been directed toward this subgroup of patients, even though they comprise a small but high resource utilizing and easily definable proportion of substance abuse treatment patients. These data suggest that CM may be particularly beneficial for improving substance use treatment outcomes in patients who are receiving payments for a physical disability.

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Highlights

- Contingency management (CM) improved substance abuse treatment outcomes.
- Patients receiving physical disability income responded particularly well to CM.
- Patients receiving physical disability income evidenced increased time in treatment and durations of abstinence with CM.

Figure 1.

Weighted means (SE) of the primary outcomes based on disability status and treatment condition, *Significant interaction of treatment condition by disability status, $p < .05$

Table 1

Demographic and baseline characteristics

Variable	No disability payments	Receiving disability	Statistical test (df), <i>p</i>
N	934	79	
Study, n (%)			$\chi^2(5) = 4.01, 0.55$
Petry et al. (2012) Positive	91 (9.7)	12 (15.2)	
Petry et al. (2012) Negative	292 (31.1)	25 (31.6)	
Petry et al. (2011)	206 (22.1)	12 (15.2)	
Petry et al. (2006)	113 (12.1)	11 (13.9)	
Petry et al. (2005)	127 (13.6)	11 (13.9)	
Petry et al. (2004)	105 (11.2)	8 (10.1)	
Treatment group, n (%)			$\chi^2(1) = 0.02, 0.88$
Contingency management	611 (65.4)	28 (35.4)	
Standard care	323 (34.6)	51 (64.6)	
Race, n (%)			$\chi^2(2) = 1.59, 0.45$
African American	435 (46.6)	42 (53.2)	
Caucasian	369 (39.5)	29 (36.7)	
Other	130 (13.9)	8 (10.1)	
Ethnicity, n (%)			$\chi^2(1) = 0.80, 0.37$
Hispanic	128 (13.7)	8 (10.1)	
Other	806 (86.3)	71 (89.9)	
Male gender, n (%)	459 (49.1)	38 (48.1)	$\chi^2(1) = 0.03, 0.86$
Age *	37.3 (8.1)	43.2 (9.1)	$t(1011) = -6.14, <0.001$
Years of education	11.9 (2.0)	12.0 (1.7)	$t(1010) = -0.07, 0.95$
Earned annual income *	\$9,977 (15,992)	\$1,976 (6,019)	$t(1008) = 4.42, <0.001$
Baseline sample positive n (%)	201 (21.5)	21 (26.6)	$\chi^2(1) = 1.1, 0.30$
Addiction Severity Index			
Medical *	0.24 (0.35)	0.46 (0.41)	$t(1011) = -5.24, <0.001$
Employment *	0.73 (0.28)	0.80 (0.24)	$t(1011) = -2.07, 0.04$
Alcohol	0.23 (0.24)	0.19 (0.24)	$t(1011) = 1.38, 0.17$
Drug use	0.16 (0.10)	0.15 (0.10)	$t(1011) = 0.70, 0.49$
Legal	0.13 (0.20)	0.08 (0.17)	$t(1009) = 1.88, 0.06$
Family/social	0.18 (0.22)	0.16 (0.21)	$t(1009) = 0.52, 0.60$
Psychological	0.28 (0.24)	0.31 (0.25)	$t(1008) = -0.83, 0.41$

Note. Values are means and standard deviations unless otherwise indicated;

* Significant between group difference, $p < .05$