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## ORIGINAL ARTICLE

# Voucher-based contingency management and in-treatment behaviors in smoking cessation treatment



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### KEYWORDS

Smoking;  
Contingency management;  
In-treatment behaviors;  
Experimental study

**Abstract** A high percentage of patients relapse within months following an attempt to quit smoking. For this reason, greater understanding of the determinants of successful smoking cessation is needed. The present study assessed the effect of Contingency Management (CM) combined with Cognitive-Behavioral Treatment (CBT) on certain in-treatment behaviors (treatment retention, in-treatment smoking abstinence, and weekly decrease of cotinine levels) and examined the effects of these in-treatment behaviors on smoking status at a 6-month follow-up. A total of 154 treatment-seeking patients in a community setting were randomly assigned to a CBT, CBT plus CM for Abstinence (CMA) or to a CBT plus CM for Shaping cessation (CMS) group. Both CBT + CM procedures improved the in-treatment behaviors compared to CBT alone. These in-treatment behaviors (particularly in-treatment smoking abstinence) were associated with long-term abstinence. The effect of CM on in-treatment behaviors may partially explain the positive long-term outcomes of this procedure. Our findings extend previous knowledge about the effect of CM on smoking behavior.

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### PALABRAS CLAVE

Fumar;  
manejo de contingencias;  
conductas intra-tratamiento;  
estudio experimental

## El manejo de contingencias mediante incentivos y las conductas intra-tratamiento en una intervención para dejar de fumar

**Resumen** Un alto porcentaje de pacientes recae en cuestión de meses después de un intento para dejar de fumar. Por esta razón, es necesaria una mayor comprensión de los determinantes del éxito para dejar de fumar. Este estudio evaluó el efecto del Manejo de Contingencias (MC) combinado con un Tratamiento Cognitivo-Conductual (TCC) sobre ciertas conductas intra-tratamiento (tasas de retención, abstinencia durante el tratamiento y reducción semanal de los niveles de cotinina) y examinó los efectos de estas conductas sobre el consumo de tabaco a

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los 6 meses de seguimiento. Un total de 154 pacientes que buscaban tratamiento en un entorno comunitario fueron asignados aleatoriamente a TCC, TCC más MC para Abstinencia (MCA) o TCC más MC con Moldeamiento (MCM). Ambos procedimientos de TCC + MC mejoraron las conductas intra-tratamiento en comparación con TCC solo. Estas conductas (particularmente abstinencia durante el tratamiento) se asociaron con la abstinencia a largo plazo. El efecto del MC sobre las conductas intra-tratamiento puede explicar parcialmente los resultados positivos a largo plazo de este procedimiento. Nuestros hallazgos amplían el conocimiento previo acerca del efecto del MC sobre la conducta de fumar.

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Tobacco smoking continues to be the health problem that causes more mortality and morbidity in Spain (Díaz-Gete et al., 2013) and appears to be negatively associated with quality of life (Becoña et al., 2013). Despite significant progress being made in the field of smoking cessation treatments, a high percentage of patients relapse within months of a quit attempt (García-Rodríguez et al., 2013), so more effective intervention strategies containing specific long-term relapse prevention components are needed (Alessi, Petry, & Urso, 2008). In addition, identifying the predictors of long-term success is essential for improving treatments for smoking cessation.

Certain individual and environmental factors moderate both long-term abstinence and relapse in patients who have received treatment for smoking cessation. Being male or having received a higher level of education usually increases the likelihood of quitting (Dorner, Troestl, Womastek, & Groman, 2011; Ferguson et al., 2003; Higgins et al., 2009). Later initiation, lower nicotine dependence, a longer duration of prior abstinence and a higher stage of change are also related to better long-term outcomes (Dorner et al., 2011; Ferguson et al., 2003). Conversely, some factors are related to a lower likelihood of quitting, such as illicit substance use (Winhusen et al., 2014), having a social and family smoking context (García-Rodríguez, Suárez-Vázquez, Santonja-Gómez, Secades-Villa, & Sánchez-Hervás, 2011) or some psychopathological factors, such as previous history of depression or schizotypal personality (Burch & Hemsley, 2008; Dorner et al., 2011).

In-treatment variables have also been identified as predictors of long-term abstinence. Previous research has shown that prior smoking abstinence during treatment can directly influence subsequent efforts to abstain from smoking (Heil, Alessi, Lussier, Badger, & Higgins, 2004), suggesting that smoking treatment programs could be optimized by targeting this specific behavior (Romanowich & Lamb, 2010b). Furthermore, consecutive abstinence throughout and at end-of-treatment, and attending more sessions during the treatment are factors commonly related to a higher chance of success in quitting (Dorner et al., 2011; Romanowich & Lamb, 2010b). Other variables such as monitoring participants' behavior (e.g., the proportion of negative samples submitted or attendance during the treatment), or the use of biochemical tests to verify abstinence,

also increase the likelihood of success (McPherson, Packer, Cameron, Howell, & Roll, 2014; Petry, Alessi, & Ledgerwood, 2012).

One of the most efficacious treatment modalities for the treatment of addictive behaviors related to a wide range of drugs, including tobacco, is Contingency Management (CM), an approach that typically involves rewards contingent upon objective verification of self-reported status (Fernández-Artamendi, Fernández-Hermida, Godley, & Secades-Villa, 2014; Higgins, Silverman, & Heil, 2008; Secades-Villa, García-Rodríguez, López-Núñez, Alonso-Pérez, & Fernández-Hermida, 2014; Sigmon & Patrick, 2012). This empirically-supported behavioral treatment is based on the principle of operant conditioning, suggesting that substance-use behavior occurs within the context of environmental contingencies that make it more or less likely to occur (Higgins et al., 2008).

Although long-term smoking abstinence is the intended outcome of CM interventions (Higgins et al., 2006; Lamb, Morral, Kirby, Iguchi, & Galbicka, 2004), some studies have used incentives for improving in-treatment behaviors. These studies have shown that CM procedures improve both smoking reduction and abstinence during the treatment (Alessi, Badger, & Higgins, 2004; Alessi et al., 2008; Chivers, Higgins, Heil, Proskin, & Thomas, 2008; Dunn, Sigmon, Thomas, Heil, & Higgins, 2008; Higgins et al., 2004; Higgins et al., 2012; Lamb et al., 2007; Lussier, Higgins, & Badger, 2005; Romanowich & Lamb, 2010a; Tidey, Rohsenow, Kaplan, Swift, & Reid, 2011). CM has been shown to reduce carbon monoxide levels (Dallery, Raiff, & Grabinski, 2013) and to enhance early abstinence during the treatment (Heil et al., 2004; Higgins et al., 2006; Lamb et al., 2004; Romanowich & Lamb, 2010b; Yoon, Higgins, Bradstreet, Badger, & Thomas, 2009). The CM procedure is also associated with significantly higher rates of treatment completion (Volpp et al., 2006).

Despite previous knowledge, important questions remain about the effect of CM on in-treatment behaviors. Most of this previous work has been carried out in particular samples of smokers, such as residential substance abuse patients (Alessi et al., 2008), smokers with schizophrenia (Tidey et al., 2011), pregnant women (Higgins et al., 2006; Higgins et al., 2004; Higgins et al., 2012), methadone-maintained patients (Dunn et al., 2008) or low-income patients (Volpp et al., 2006). In addition, the generalizability of results is

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