Chapter 2
Behavior Economics and Treatment Engagement

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Behavior economics is a field that integrates concepts of psychology and economics to explain individuals' decision making. In the past few years, this field has been increasingly incorporated into health care settings to promote healthier lifestyles. Typically, participants are given monetary incentives when a target behavior or goal is objectively verified. In this chapter, we describe this evidence-based treatment usually referred to as contingency management. This chapter is structured in four parts. Section "Background" reviews the historical background of incentive-based interventions as applied to substance abuse treatment. Section "Application of Incentive-Based Intervention to Medicine Targets" describes the application of these interventions to other medicine targets, such as vaccination, medical screenings, diabetes monitoring, physical activity, and weight loss programs. Section "Fundamental Elements and Concepts Embedded in Incentive-Based Interventions" explains fundamental concepts and elements embedded in effective incentive-based interventions, and the final section discusses issues related to the application and dissemination of incentive programs.

Background

Individuals often make irrational decisions. Drinking, smoking, overeating, and physical inactivity are a few examples of unhealthy patterns of behavior that many individuals engage in despite knowledge of the devastating consequences that may

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result. Poor diet and physical inactivity, for example, is a modifiable unhealthy lifestyle responsible for 17 % of deaths in the United States (Mokdad, Marks, Stroup, & Gerberding, 2004).

A growing number of studies have been published in the past three decades demonstrating the efficacy of incentives to address clinical conditions. These incentive-based interventions, also known as contingency management, are based on principles of behavior economics and behavior analysis. In these interventions, tangible reinforcers or incentives are delivered contingent upon the observation of the target behavior, and withheld when the behavior is not observed.

No other area contains more compelling evidence of the efficacy of incentives to promote clinically relevant behaviors than substance abuse research. It is in this research arena that incentives strategies have been studied most systematically. In incentive-based interventions for substance abuse treatment, patients earn prizes or vouchers exchangeable for goods and services every time the target behavior—e.g., abstinence from drugs—is objectively verified via analysis of biological markers, such as urine and breath samples (Higgins, Silverman, & Heil, 2008; Petry, 2012).

The systematic evaluation of monetary-based incentives in improving substance use treatment outcomes began in the early 1990s with the studies reported by Steve Higgins and colleagues from the University of Vermont (Higgins, Budney, Bickel, & Foerg, 1994; Higgins, Budney, Bickel, & Hughes, 1993; Higgins, Delaney, Budney, & Bickel, 1991). Higgins et al. (1994), for example, conducted a clinical trial aimed at evaluating the effects of incentives in the treatment of 42 cocaine dependent patients. In this trial, half of the sample was randomized to a standard outpatient treatment condition, and half was randomized to the same standard treatment condition combined with vouchers incentives. Vouchers were worth a certain amount of money, and they were exchangeable for monetary-based products, such as clothing, electronics, or gift cards, contingent upon submission of drug negative specimens. Voucher incentives were given in the first 3 months, but the study lasted for 6 months. Results showed that treatment retention and abstinence were substantially higher for the patients receiving incentives relative to those who were not. The rates of treatment completion at 3 and 6 months for patients receiving vouchers were 90 % and 75 %, compared to 65 % and 40 % for those not receiving vouchers during the same periods. Further, 55 % of patients in the incentive group achieved at least 10 weeks of continuous abstinence, whereas only 15 % of the patients in the no-incentive group achieved at least 10 continuous weeks of abstinence. This study was conducted in a research clinic that applied extensive outreach to engage and retain patients in care, regardless of their treatment assignment, and hence relatively high rates of treatment participation occurred, even in patients not receiving incentives.

In community-based substance abuse treatment programs, rates of treatment engagement are much lower. Retention is a long-standing problem in community clinics, and attrition typically exceeds 30 % in the first month (Lefforge, Donohue, & Strada, 2007; Substance Abuse and Mental Health Services Administration, 2008). Studies implementing incentive-based interventions in community-based clinics find that less than 15 % of patients assigned to standard care conditions

remain engaged in care for 12 weeks. In contrast, 30–60 % of patients assigned to incentive conditions, in which they receive the chance to win monetary-based prizes worth $1–100, remain in treatment for 12 weeks (Petry et al., 2004, 2006; Petry, Alessi, & Ledgerwood, 2012; Petry, Alessi, Marx, Austin, & Tardif, 2005; Petry, Martin, & Simcic, 2005; Petry, Weinstock, & Alessi, 2011).

Further, randomized clinical trials show that incentives are highly efficacious in retaining patients in treatment and promoting abstinence from a wide range of substances, such as opioid, marijuana, alcohol, methamphetamines, cocaine, and tobacco (see Higgins et al., 2008, for review). A meta-analysis concluded that incentive-based interventions had the largest effect size of all psychosocial therapies in treating substance use disorders (Dutra et al., 2008), and the Veterans Administration in the USA has recently begun implementing this approach nationwide in its substance abuse treatment programs (Petry, DePhilippis, Rash, Drapkin, & McKay, 2014).

Therefore, robust evidence shows that incentive-based interventions are highly efficacious in engaging individuals in the treatment for one of the disorders with the highest attrition rates—substance abuse. More recently, incentive-based interventions have been applied to other behavioral targets relative to medical care, including vaccination and medical screenings, self-monitoring in patients with diabetes, and engagement in diet and exercise. In the following section, we describe some of these studies.

Application of Incentive-Based Intervention to Medicine Targets

Vaccinations, Medical Appointments, and Attendance at Group Meetings

Performance of health prevention programs is often suboptimal and incentives can be incorporated successfully into these programs. An example of how incentives can be used effectively to improve immunization rates was reported by Hoekstra et al. (1998). In that study, food vouchers were used to reinforce immunization rates in inner-city Chicago. Families enrolled in the Women, Infants, and Children programs of Chicago were given 3-month supply of food vouchers if the child was age-appropriately vaccinated; otherwise, families received a 1-month supply of food vouchers until the child was vaccinated appropriately. Data from a total of 16,581 children 24 months old or younger were analyzed, and the results showed that the vouchers had a remarkable effect on immunization rates. During the 15-month period of evaluation, immunization rates increased from 56 % to 89 % at the sites where voucher incentives were made available.

Incentive-based intervention can also be efficacious for promoting compliance with medical appointments. Mayer and Kellogg (1989) used incentives to promote

mammography screening in 96 women 35 years and older. Approximately half of the participants received an information packet explaining mammography procedures and an incentive coupon combined with a prompt, whereas the other half received only the information packet. The coupon was redeemable for a nutritional information kit (worth $2) when presented at the appointment in the clinic. Women randomized to the incentive group were significantly more likely to make appointments (81 %) compared to those randomized to the control group (59 %) ($p < .05$). Remarkably, nearly all appointments made in the incentive condition were kept—97 %. Similarly, Duer (1982) and Friman, Finney, Rapoff, and Christophersen (1985) found that prompts combined with $5 incentives alone or in combination with free transportation to clinics, babysitting, and parking permits increased compliance with papanicolau smears and pediatric visits, respectively.

These studies show that prompts combined with relatively inexpensive incentive strategies can effectively promote greater appointment making and appointment keeping. In Mayer and Kellogg's (1989) study, for instance, the incentives awarded totally only $106 and yielded a 22 % increase in appointments.

In addition to being used in screening prevention programs, incentive-based interventions hold potential to increase attendance rates to groups. Stevens-Simon, Dolgan, Kelly, and Singer (1997) used monetary incentives to promote participation of young mothers (<18 years) at pregnancy prevention peer-support groups. The incentive was comprised of $7 delivered at the weekly meetings. Fifty-eight percent of the girls who were offered incentives participated in the peer-support groups, whereas only 9 % of those who were not offered incentives participated in the group activity.

Diabetes Care Activities

According to the Center for Disease Control and Prevention (2010), one in every ten adults today living in the United States has diabetes, and if the current trends continue, as many as one in three will have this condition by 2050. Controlling diabetes is extremely challenging because it involves lifestyle changes (such as exercise, weight loss, adherence to strict diets), self-monitoring, and frequent clinical visits and laboratory tests.

Recently, a few studies have shown that the use of incentives helps individuals engage in diabetes monitoring (Austin & Wolfe, 2011; Raiff & Dallery, 2010). Austin and Wolfe (2011), for example, used a quasi-experimental design to assess the effectiveness of an intervention designed to encourage clinical visits for glycosylated hemoglobin (A1c) testing among non-compliant patients with Type 2 diabetes. The intervention was comprised of a reminder letter and a gasoline gift card worth $6 for attending the appointment and undergoing blood testing. A total of 464 patients received reminders and incentives, and their performance was compared with 693 controls who did not receive the reminders or incentive. Participants who received the reminders and the gas card came to significantly more visits for

screening test relative to those who did not receive reminder or gift card (3.3 vs. 2.7, respectively). Approximately half of the participants receiving the reminders and incentives had A1c levels in the clinically desired range, whereas only 36 % of participants in the comparison group had A1c levels in this range.

Raiff and Dallery (2010) used a within-subject reversal design (A-B-A) to evaluate the effects of incentives to promote engagement with frequent blood glucose testing among adolescents with Type 1 diabetes. In this study, participants received voucher incentives for submitting self-monitoring blood glucose testing videos at least four times per day over the study's Web site. More specifically, participants earned $1 dollar per video plus a $3 bonus after the fourth video submitted. The intervention increased substantially the number of times participants tested their glucose levels. During the incentive phase, participants sent an average of 5.7 blood glucose tests per day, compared to 1.7 and 3.1 tests per day during the initial and posttreatment nonincentive conditions, respectively.

Physical Activity and Weight Loss

A risk factor for type 2 diabetes is physical inactivity. One form of exercise that has been targeted in incentive-based interventions because it is largely accessible and easily monitored is walking. Petry, Andrade, Barry, and Byrne (2013) randomized 45 sedentary older adults with moderate to mild high blood pressure to a 12-week intervention consisting of guidelines of walking 10,000 steps per day and pedometers or that same intervention with the opportunity to earn prizes for meeting walking goals. Participants receiving prizes walked, on average, 9395 ± 2220 steps per day and met walking goals on 82.5 % ± 25.8 % of days, whereas participants on the non-incentive treatment walked, on average, 7407 ± 3330 steps per day, and met walking goals on only 55.3 % ± 37.1 % days ($ps < .02$). Significant effects of the incentive intervention were noted in several clinical parameters, such as greater improvement in fitness indices, and reductions of body weight and blood pressure.

Incentive interventions may also be efficacious in making individuals engage in weight loss programs. Volpp, Troxel, Norton, Fassbender, and Loewenstein (2008) used financial incentives to encourage weight loss in overweight adults. Fifty-seven overweight participants were randomized to an intervention comprised of monthly weigh-ins or monthly weigh-ins with chances to win money for meeting monthly weight loss goals. After the 16-week intervention phase, patients receiving incentive lost significantly more weight than the control group. More specifically, patients receiving incentives lost a mean of 6.1 kg (13.6 lb), whereas those in the control condition lost a mean of 1.8 kg (3.9 lb).

These results were replicated by Petry, Barry, Pescatello, and White (2011) in a study in which 56 overweight individuals were randomized to one of two treatment conditions: a structured weight loss intervention with weekly weigh-ins and counseling, or the same weight loss intervention combined with chances of winning prizes of monetary value for each pound lost. At the end of the 12-week treatment

phase, participants receiving prizes lost significantly more weight (6.1 kg) than patients receiving the weight loss intervention alone (2.7 kg). In addition, 64 % of participants in the incentive group achieved clinically significant weight loss of 5 % baseline weight, compared to 25 % of the participants in the no incentive weight loss.

Fundamental Elements and Concepts Embedded in Incentive-Based Interventions

In order to design and implement an incentive-based program, it is important to consider some key variables that are central to behavior analysis and economics. In this section, we describe some of the most important elements and fundamental concepts embedded in efficacious incentive programs.

Delay to Incentives and Delay Discounting

The field of behavioral economics has identified a number of decision-making biases that help explain why individuals often make irrational decisions, such as engaging in self-defeating behaviors or behaviors that are not optimal in the long run (Loewenstein, Brennan, & Volpp, 2007). One decision bias that has been extensively studied and underlies impulsive decisions is delay discounting. The term delay discounting refers to the process by which the decision maker devalues future events. Compelling evidence exists that the value of an incentive decays hyperbolically in relation to the delay to its occurrence—that is, the value decreases quicker in the short run compared to the long run (see Green & Myerson, 2004 for a review of delay discounting). This behavioral process is reflected in individuals' tendency to overvalue events that are closer in time.

This disproportional emphasis on the present leads some individuals to seek immediate gratification even when it produces non-maximizing or self-defeating consequences in the long run. For example, choosing to engage in substance abuse treatment programs and remain sober leads to meaningful consequences—such as better health and improved family relationship—that should outweigh the more immediate and less meaningful consequences of consuming drugs—such as the high from the drug. On the same token, avoiding high-calorie food and engaging in exercise routines lead to important delayed consequences—such as weight loss and improved health—that should outweigh the more immediate and less meaningful consequences of eating high-calorie food and not exercising. Nevertheless, because individuals overvalue proximal events, they often choose to consume drugs and overeat when the opportunities arise to use drugs or eat a highly palatable food.

Many of the ultimately positive consequences of treatment are long delayed in time, making engagement in treatment challenging because its positive effect exerts little immediate impact on the behavior. Incentive-based programs take advantage of the biases individuals have toward immediacy. By applying incentives in close proximity toward treatment seeking, service providers are essentially exploiting a bias toward immediacy to guide persons toward choosing healthier behaviors (Loewenstein et al., 2007).

Although all individuals have the tendency to overvalue proximate events, some individuals do so substantially more than others. For example, most individuals with impulse control problems, such as those presenting with substance abuse, gambling, and/or obesity problems, have a tendency to overvalue proximate events to a greater extent than those individuals without these problems (MacKillop et al., 2011; Reynolds, 2006; Weller, Cook, Avsar, & Cox, 2008). One way to increase the efficacy of incentive programs is to provide incentives more immediately. The shorter the delay between the target behavior and the incentive, the most efficacious the incentive intervention is. Rowan-Szal, Joe, Chatham, and Simpson (1994), for example, reinforced methadone maintained patients for providing negative urine samples with stars exchangeable for retail goods immediately or after the passage of a certain amount of time. The patients who were exposed to the condition in which the stars could be exchanged at a later point in time provided less negative urine samples than the group who could exchange the stars sooner. A meta-analytical review of studies providing incentives revealed that the provision of incentives more immediately was associated with significantly larger effect sizes (Lussier, Heil, Mongeon, Badger, & Higgins, 2006). Thus, in designing incentive programs, one should make the incentives available as soon as possible after the individual exhibits the behavior.

Prospect Theory/Loss Aversion

Daniel Kahneman was awarded the Nobel Prize in 2002 for his work on prospect theory. Prospect theory is a highly influential theory in behavior economics which assumes that value depends on the "frame" or reference point (Kahneman & Tversky, 1979). Research in this area has produced robust evidence that when events are framed as losses, they have a more profound impact on behavior/preference than when the same events are framed as gains (Kahneman, Knetsch, & Thaler, 1990; Tversky & Kahneman, 1991, 1992). In other words, the subjective value attributed to loss is substantially greater than the subjective value attributed to gains. For instance, the prospect of losing $50 dollars has a greater impact on choice than the prospect of gaining the same $50. This tendency to respond more to events framed as losses than gains has been termed loss aversion.

Insights from studies on loss aversion can be incorporated in incentive-based interventions. For example, Volpp, Troxel, et al. (2008) used deposit contracts to promote weight loss. Participants in this condition made monetary deposits that

were refundable contingent on meeting weight-loss goals (16-lbs over 16 weeks). Approximately 47% of participants making monetary deposits attained the 16 pounds weight-loss goal, compared to only 10.5% in the non-incentive control group.

Deposit contracting has been used as an effective strategy in other incentive studies targeting reductions in cigarette smoking and drinking (Bigelow, Strickler, Liebson, & Griffiths, 1976; Dallery, Meredith, & Glenn, 2008; Elliott & Tighe, 1968; Paxton, 1980, 1981; Romanowich & Lamb, 2013). To date, however, few studies in clinical settings have compared the gain-loss asymmetry in clinical settings (Romanowich & Lamb, 2013; Volpp, Troxel, et al., 2008). Romanowich and Lamb (2013) compared the effects of framing incentives as either gains or losses in a smoking treatment program. During the 5-days intervention phase, participants could either earn or lose money ($75) each day nicotine abstinence was verified. Results indicated that the participants in the loss-frame group were more likely to initiate abstinence compared to the gain-frame group. Nevertheless, those in the gain-frame group maintained abstinence more than the alternative group. Therefore, framing events as losses holds potential to improve initial engagement in treatment, but further studies are warranted to understand how to most effectively apply these constructs to improve both short and long-term outcomes.

Incentive Magnitude

In addition to how incentives are framed and the delay between the target behavior and the receipt of the incentive, another variable that greatly impacts behavior and therefore may impact the efficacy of the intervention is the magnitude of the incentives. In general, treatment efficacy increases in direct function of the incentive amount (e.g., Petry et al., 2004; Silverman, Chutuape, Bigelow, & Stitzer, 1999; Stitzer & Bigelow, 1983, 1984). Petry et al. (2004), for example, compared the effect of two different magnitudes of prizes on drug abstinence and found that prizes of higher magnitude engendered greater duration of abstinence. A meta-analytical review found that incentive magnitude impacted effect sizes of incentive-based interventions (Lussier et al., 2006).

Another important feature common to effective incentive-based interventions is the escalating magnitude of the incentives to promote sustained performance. For instance, in Higgins et al.'s (1994) study using vouchers to reinforce abstinence from cocaine, the first negative specimen resulted in $2.50 voucher, and the amounts for each subsequent sample incremented by $1.25. In addition to this increment, a bonus of $10 was given each time participants submitted three negative samples consecutively. If the patient failed to submit a sample or submitted a positive sample, voucher amount was reset to its initial value ($2.50). For example, a patient who provided negative samples for four consecutive tests then provided a positive sample on the fifth test, and a negative sample on the sixth test would earn the following monetary vouchers: $2.50, $3.75, $15 ($5 + a bonus of $10), $6.25, $0, and $2.50.

Petry, Andrade, et al. (2013) also incorporated an escalating prize system to promote engagement in exercise. In this study, participants had a chance to draw from a prize bowl and earn prizes for each day they walked the target number of steps (10,000 steps or more). In addition, participants received bonus draws every week they met the target number of steps on at least 6 of 7 days. The bonus started at three draws and incremented by 3 each consecutive week participants met target goals on at least 6 days. If participants did not meet the target goals on more than 1 day, they received no bonus and bonus draws were reset to the initial value.

One study (Roll, Higgins, & Badger, 1996) directly compared a fixed versus an escalating rate of incentives in cigarette smokers. Participants assigned to a fixed monetary condition earned $9.80 in vouchers for each daily negative breath test. Participants assigned to an escalating monetary condition earned $3 in vouchers for the first negative test, and each consecutive negative test increased by $0.50. In addition, participants in this group earned a $10 bonus for every three consecutive negative tests in a row. Patients receiving escalating vouchers were less likely to smoke than those in the fixed voucher condition, which provided an overall similar amount of incentives. Therefore, the escalating feature of incentives can impact the effectiveness of the intervention.

In sum, individuals have biases when making decisions, and these biases can be considered in designing incentive-based interventions. In addition to how events are framed, decisions are highly impacted by the magnitude and the delay to incentives. Typically, the most effective interventions are the ones with the shortest delay between the target behavior and the receipt of the incentive, as well as the interventions that provide the highest magnitude and escalating incentives. The provision of immediate and high-value incentives, however, increases the overall costs of the treatment intervention. Most treatment facilities have limited resources, and thus the costs associated with utilizing incentive approaches may be prohibitive. The next section discusses costs and other important implementation issues.

Special Considerations

Cost

Cost-related concerns are one of the greatest challenges in the application of incentive interventions. New approaches are needed to minimize costs while retaining efficacy. One solution is to take advantage of the loss aversion decision bias individuals have and implement a deposit contract paid in full or in part by the participant. As described earlier, deposit contract interventions have been applied for decades (Bigelow et al., 1976; Elliott & Tighe, 1968; Paxton, 1980, 1981), and more recently, Volpp, Troxel, et al. (2008) used this approach in a weight-loss program. While effective, these approaches require that patients are committed, willing, and able to provide deposits, which in essence excludes all but the most motivated

patients. These approaches would likely be ineffective in addressing engagement in treatment among many patients in need of services.

Another solution to decrease cost relates to applying a probability-based system to receiving tangible incentives. In the prize-based incentive system (also known as the fishbowl technique), participants earn chances to pick from an urn and win prizes of different magnitude every time the target behavior is verified (see Petry, 2012). More specifically, participants can earn "small," "medium," and "large" prizes. Small prizes are items that cost about $1, such as food items, bus tokens, and $1 gift cards. Large prizes are prizes worth about $20, such as clothing, sports goods, and store and restaurants gift cards. The jumbo prizes cost up to $100, and consist of items such as e-readers, ipods, gift cards, or a combination of smaller value goods. The probability of receiving each type of prize is inversely related to its magnitude. Usually, the probability of receiving a small, a large, and a jumbo prize is 41.8 %, 8.0 %, and 0.2 %, respectively. The probability of not receiving any prize is 50 %.

Because the target behavior results in a tangible reinforcement only about half the time and higher value prizes are delivered with very probabilities, the overall costs of this system can be substantially lower than other forms of incentive-based interventions in which the behavior is reinforced with set monetary or voucher amounts (Petry, Alessi, Hanson, & Sierra, 2007). In addition to promoting engagement to treatments targeting abstinence from a wide range of drug modalities (e.g., Alessi, Petry, & Urso, 2008; Petry et al., 2007; Petry, Weinstock, et al., 2011), prize-based incentive interventions have also been used successfully in programs targeting attendance to group meetings (Ledgerwood, Alessi, Hanson, Godley, & Petry, 2008; Petry, Martin, et al., 2005; Sigmon & Stitzer, 2005), job-seeking activities (Petry, Andrade, Rash, & Cherniack, 2013), physical activities (Petry, Andrade, et al., 2013), and weight loss (Petry, Barry, et al., 2011). Volpp et al. used a similar approach making different monetary amounts, rather than prizes, available to incentivize weight loss, and medication adherence (Volpp et al., 2008; Volpp, Troxel, et al., 2008).

One of the reasons this prize system works so effectively is because individuals have a decision-making bias toward low probability, high magnitude outcomes. More specifically, individuals have a tendency to overweight small probabilities of large magnitude outcomes (Kahneman & Tversky, 1979; Loewenstein, Weber, Hsee, & Welch, 2001), which might help explain the attractiveness of gambling and lotteries in general. This incentive system, however, is not gambling because the participant risks nothing of value (Petry et al., 2006; Petry & Alessi, 2010).

Incentive Programs Stir Controversy

The incorporation of incentives into health programs often elicits strong reactions (Priebe et al., 2009; Promberger, Brown, Ashcroft, & Marteau, 2011; Promberger, Dolan, & Marteau, 2012). Individuals who oppose these types of interventions often

note that they are paternalistic and that they may have unintended results, such as motivate healthy individuals to start adopting unhealthy lifestyle to receive incentives. The use of incentives may also be interpreted as coercive when applied to disadvantaged and low-income populations.

Promberger et al. (2011) evaluated public attitudes toward financial incentives in the United Kingdom and in the United States, and they found that individuals perceive incentives-based programs as less acceptable than equally effective alternative programs using pills or injections. Furthermore, the authors also reported that the public views the utilization of incentives more favorably when it is used as an intervention to treat individuals who are not responsible for their health condition. For example, the use of incentives in mental health patients is viewed more favorably than its utilization in substance abusers. The public's acceptability of incentives also appears to relate to the type of incentive awarded. The utilization of grocery vouchers, for example, is judged much more acceptable by the public than cash or vouchers exchangeable for luxury items (Promberger et al., 2012).

Importantly, public opinion about incentives is influenced by the effectiveness of the intervention. Promberger et al. (2012) found that even small increases in effectiveness of incentive interventions impact the degree to which individuals accept these interventions. These data suggest that as more research demonstrates effectiveness of these approaches more programs may be willing to implement them, and ultimately, the public may be more willing to endorse them.

In conclusion, the field of behavior economics has been increasingly incorporated into health care settings to promote health-related behavior change. This chapter provides an overview of studies that have provided incentive to promote engagement in treatment and outcomes in a number of different patient populations. This chapter has also described fundamental elements and concepts embedded in incentive-based programs that should be carefully considered when designing and implementing these interventions. Finally, we provided discussion on issues that are critical to the application and dissemination of these interventions.

References

Alessi, S. M., Petry, N. M., & Urso, J. (2008). Contingency management promotes smoking reductions in residential substance abuse patients. *Journal of Applied Behavior Analysis, 41*, 617–622.

Austin, S., & Wolfe, B. L. (2011). The effect of patient reminders and gas station gift cards on patient adherence to testing guidelines for diabetes. *Wisconsin Medical Journal, 110*, 132–137.

Bigelow, G., Strickler, D., Liebson, I., & Griffiths, R. (1976). Maintaining disulfiram ingestion among outpatient alcoholics: A security-deposit contingency contracting procedure. *Behaviour Research and Therapy, 14*, 378–381.

Center for Disease Control and Prevention. (2010). http://www.cdc.gov/media/pressrel/2010/r101022.html.

Dallery, J., Meredith, S., & Glenn, I. (2008). A deposit contract method to deliver abstinence reinforcement for cigarette smoking. *Journal of Applied Behavior Analysis, 41*, 609–615.

Duer, J. D. (1982). Prompting women to seek cervical cytology. *Behavior Therapy, 13*, 248–253.
Dutra, L., Stathopoulou, G., Basden, S. L., Leyro, T. M., Powers, M. B., & Otto, M. W. (2008). A meta-analytic review of psychosocial interventions for substance use disorders. *The American Journal of Psychiatry, 165*, 179–187.
Elliott, R., & Tighe, T. (1968). Breaking the cigarette habit: Effects of a technique involving threatened loss of money. *The Psychological Record, 18*, 503–513.
Friman, P. C., Finney, J. W., Rapoff, M. A., & Christophersen, E. R. (1985). Improving pediatric appointment keeping with reminders and reduced response requirement. *Journal of Applied Behavior Analysis, 18*, 315–321.
Green, L., & Myerson, J. (2004). A discounting framework for choice with delayed and probabilistic rewards. *Psychological Bulletin, 130*, 769–792.
Higgins, S. T., Budney, A. J., Bickel, W. K., & Foerg, F. E. (1994). Incentives improve outcome in outpatient behavioral treatment of cocaine dependence. *Archives of General Psychiatry, 51*, 568–576.
Higgins, S. T., Budney, A. J., Bickel, W. K., & Hughes, J. R. (1993). Achieving cocaine abstinence with a behavioral approach. *The American Journal of Psychiatry, 150*, 763–769.
Higgins, S. T., Delaney, D. D., Budney, A. J., & Bickel, W. K. (1991). A behavioral approach to achieving initial cocaine abstinence. *The American Journal of Psychiatry, 148*, 1218–1224.
Higgins, S. T., Silverman, K., & Heil, S. H. (Eds.). (2008). *Contingency management in substance abuse treatment*. New York, NY: Guilford.
Hoekstra, E. J., LeBaron, C. W., Megaloeconomou, Y., Guerrero, H., Byers, C., Johnson-Partlow, T., … Mize, J. (1998). Impact of a large-scale immunization initiative in the special supplemental nutrition program for women, infants, and children (WIC). *The Journal of the American Medical Association, 280*, 1143–1147.
Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase theorem. *The Journal of Political Economy, 98*, 1325–1348.
Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*, 263–292.
Ledgerwood, D. M., Alessi, S. M., Hanson, T., Godley, M. D., & Petry, N. M. (2008). Contingency management for attendance to group substance abuse treatment administered by clinicians in community clinics. *Journal of Applied Behavior Analysis, 41*, 517–526.
Lefforge, N. L., Donohue, B., & Strada, M. J. (2007). Improving session attendance in mental health and substance abuse settings: A review of controlled studies. *Behavior Therapy, 38*, 1–22.
Loewenstein, G. F., Brennan, T., & Volpp, K. G. (2007). Assymetric paternalism to improve health behaviors. *The Journal of the American Medical Association, 298*, 2415–2417.
Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin, 127*, 267–286.
Lussier, J. P., Heil, S. H., Mongeon, J. A., Badger, G. J., & Higgins, S. T. (2006). A meta-analysis of voucher-based reinforcement therapy for substance use disorders. *Addiction, 101*, 192–203.
MacKillop, J., Amlung, M. T., Few, L. R., Ray, L. A., Sweet, L. H., & Munafò, M. R. (2011). Delayed reward discounting and addictive behavior: A meta-analysis. *Psychopharmacology, 216*, 305–321.
Mayer, J. A., & Kellogg, M. C. (1989). Promoting mammography appointment making. *Journal of Behavioral Medicine, 12*, 605–611.
Mokdad, A. H., Marks, J. S., Stroup, D. F., & Gerberding, J. L. (2004). Actual causes of death in the United States, 2000. *The Journal of American Medical Association, 291*, 1238–1245.
Paxton, R. (1980). The effects of a deposit contract as a component in a behavioural programme for stopping smoking. *Behaviour Research and Therapy, 18*, 45–50.
Paxton, R. (1981). Deposit contracts with smokers: Varying frequency and amount of repayments. *Behaviour Research and Therapy, 19*, 117–123.

Petry, N. M. (2012). *Contingency management for substance abuse treatment: A guide to implementing evidence-based practice*. New York, NY: Routledge/Taylor & Francis Group.

Petry, N. M., & Alessi, S. M. (2010). Prize-based contingency management is efficacious in cocaine-abusing patients with and without recent gambling problems. *Journal of Substance Abuse Treatment, 39*, 282–288.

Petry, N. M., Alessi, S. M., Carroll, K. M., Hanson, T., MacKinnon, S., Rounsaville, B., & Sierra, S. (2006). Contingency management treatments: Reinforcing abstinence versus adherence with goal-related activities. *Journal of Consulting and Clinical Psychology, 74*, 592–601.

Petry, N. M., Alessi, S. M., Hanson, T., & Sierra, S. (2007). Randomized trial of contingent prizes versus vouchers in cocaine-using methadone patients. *Journal of Consulting and Clinical Psychology, 75*, 983–991.

Petry, N. M., Alessi, S. M., Marx, J., Austin, M., & Tardif, M. (2005). Vouchers versus prizes: Contingency management treatment of substance abusers in community settings. *Journal of Consulting and Clinical Psychology, 73*, 1005–1014.

Petry, N. M., Alessi, S. M., & Ledgerwood, D. M. (2012). A randomized trial of contingency management delivered by community therapists. *Journal of Consulting and Clinical Psychology, 80*, 286–298.

Petry, N. M., Andrade, L. F., Barry, D., & Byrne, S. (2013). A randomized study of reinforcing walking in older adults. *Psychology and Aging, 28*, 1164–1173.

Petry, N. M., Andrade, L. F., Rash, C., & Cherniack, M. G. (2013). Reinforcing job-related activities is associated with reductions in employment problems and improvement in quality of life. *Psychology of Addictive Behaviors*. Advance online publication. doi:10.1037/a0032264.

Petry, N. M., Barry, D., Pescatello, L., & White, W. B. (2011). A low-cost reinforcement procedure improves short-term weight loss outcomes. *The American Journal of Medicine, 124*, 1082–1085.

Petry, N. M., DePhilippis, D., Rash, C. J., Drapkin, M., & McKay, R. (2014). Nationwide dissemination of contingency management: The Veterans Administration initiative. *American Journal on Addictions, 23*, 205–210.

Petry, N. M., Kolodner, K. B., Li, R., Pierce, J. M., Roll, J. R., Stitzer, M. L., & Hamilton, J. A. (2006). Prize-based contingency management does not increase gambling. *Drug and Alcohol Dependence, 83*, 269–273.

Petry, N. M., Martin, B., & Simcic, F., Jr. (2005). Prize reinforcement contingency management for cocaine dependence: Integration with group therapy in a methadone clinic. *Journal of Consulting and Clinical Psychology, 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., Weinstock, J., & Alessi, S. M. (2011). A randomized trial of contingency management delivered in the context of group counseling. *Journal of Consulting and Clinical Psychology, 79*, 686–696.

Priebe, S., Burton, A., Ashby, D., Ashcroft, R., Burns, T., David, A., … McCabe, R. (2009). Financial incentives to improve adherence to anti-psychotic maintenance medication in non-adherent patients—A cluster randomised controlled trial (FIAT). *BMC Psychiatry, 9*, 61.

Promberger, M., Brown, R. C., Ashcroft, R. E., & Marteau, T. M. (2011). Acceptability of financial incentives to improve health outcomes in UK and US samples. *Journal of Medical Ethics, 37*, 682–687.

Promberger, M., Dolan, P., & Marteau, T. M. (2012). "Pay them if it works": Discrete choice experiments on the acceptability of financial incentives to change health related behaviour. *Social Science & Medicine, 75*, 509–514.

Raiff, B. R., & Dallery, J. (2010). Internet-based contingency management to improve adherence with blood glucose testing recommendations for teens with Type 1 diabetes. *Journal of Applied Behavior Analysis, 43*, 487–491.

Reynolds, B. (2006). A review of delay-discounting research with humans: Relations to drug use and gambling. *Behavioural Pharmacology, 17*, 651–667.

Roll, J. M., Higgins, S. T., & Badger, G. J. (1996). An experimental comparison of three different schedules of reinforcement of drug abstinence using cigarette smoking as an exemplar. *Journal of Applied Behavior Analysis, 29*, 495–505.

Romanowich, P., & Lamb, R. J. (2013). The effect of framing incentives as either losses or gains with contingency management for smoking cessation. *Addictive Behaviors, 38*, 2084–2088.

Rowan-Szal, G., Joe, G. W., Chatham, L. R., & Simpson, D. D. (1994). A simple reinforcement system for methadone clients in a community-based treatment program. *Journal of Substance Abuse Treatment, 11*, 217–223.

Sigmon, S. C., & Stitzer, M. L. (2005). Use of low-cost incentive intervention to improve counseling attendance among methadone maintained patients. *Journal of Substance Abuse Treatment, 29*, 253–258.

Silverman, K., Chutuape, M. A., Bigelow, G. E., & Stitzer, M. L. (1999). Voucher-based reinforcement of cocaine abstinence in treatment-resistant methadone patients: Effects of reinforcement magnitude. *Psychopharmacology, 146*, 128–138.

Stevens-Simon, C., Dolgan, J. I., Kelly, L., & Singer, D. (1997). The effect of monetary incentives and peer support groups on repeat adolescent pregnancies. A randomized trial of the dollar-a-day program. *The Journal of the American Medical Association, 277*, 977–982.

Stitzer, M. L., & Bigelow, G. E. (1983). Contingent payment for carbon monoxide reduction: Effects of pay amount. *Behavior Therapy, 14*, 647–656.

Stitzer, M. L., & Bigelow, G. E. (1984). Contingent reinforcement for carbon monoxide reduction: Within-subject effects of pay amount. *Journal of Applied Behavior Analysis, 17*, 477–483.

Substance Abuse and Mental Health Services Administration. (2008). *Results from the 2007 National Survey on Drug Use and Health: National Findings* (Office of Applied Studies, NSDUH Series H-34, DHHS Publication No. SMA 08-4343). Rockville, MD.

Tversky, A., & Kahneman, D. (1991). Loss aversion in riskless choice: A reference-dependent model. *Quarterly Journal of Economics, 56*, 1039–1061.

Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty, 5*, 297–323.

Volpp, K. G., Loewenstein, G., Troxel, A. B., Doshi, J., Price, M., Laskin, M., & Kimmel, S. E. (2008). Financial incentives to improve warfarin adherence. *Biomed Central Health Service Research, 8*, 272.

Volpp, K. G., Troxel, L. K., Norton, A. B., Fassbender, L., & Loewenstein, G. (2008). Financial incentive-based approaches for weight loss: A randomized trial. *The Journal of the American Medical Association, 300*, 2631–2637.

Weller, R. E., Cook, E. W., Avsar, K. B., & Cox, J. E. (2008). Obese women show greater delay discounting than healthy-weight women. *Appetite, 51*, 563–569.