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Psychosocial Functioning Among Inmates in Prison-Based Drug Treatment: Results from Project BRITE

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Abstract

Objective—To assess the impact of a positive behavioral reinforcement intervention on psychosocial functioning of inmates over the course of treatment and on post-treatment self-reported measures of treatment participation, progress, and satisfaction.

Method—Male ($n = 187$) and female ($n = 143$) inmates participating in 12-week prison-based Intensive Outpatient (IOP) drug treatment were randomly assigned to receive standard treatment (ST) or standard treatment plus positive behavioral reinforcement (BR) for engaging in targeted activities and behaviors. Participants were assessed for psychosocial functioning at baseline and at the conclusion of treatment (post-treatment). Self-reported measures of treatment participation, treatment progress, and treatment satisfaction were also captured at post-treatment.

Results—The intervention affected female and male subjects differently and not always in a way that favored BR subjects, as compared to the ST subjects, most notably on measures of depression and criminal thinking.

Conclusions—Possible explanations for the results include differences in the male and female custody environments combined with the procedures that study participants had to follow to earn and/or receive positive reinforcement at the two study sites, as well as baseline differences between the genders and a possible floor effect among females on measures of criminality. Limitations of the study included the inability to make study participants blind to the study conditions and the possible over-branding of the study, which may have influenced the results.

Keywords

Prisoners; Substance Abuse; Treatment; Behavioral Reinforcement; Psychosocial Functioning

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The use of reinforcement for increasing desired behaviors, also known as operant conditioning, has a long tradition of application in the behavioral literature (Bandura, 1969; Ullman & Krasner, 1965). In the form of “contingency management” (CM), reinforcement is applied whenever a targeted behavior is exhibited in order to increase the frequency of that behavior and ultimately effect lasting behavioral change. Contingency management techniques have been widely used within the context of treating drug-dependent individuals largely because the progression from casual drug use to abuse and dependence is viewed as a form of operant conditioning. CM provides reinforcement “that can effectively compete with drug reinforcement to promote drug abstinence and alternative nondrug-related behaviors” (Stitzer & Petry, 2006, p. 412).

Not surprisingly then, more than any other single approach for promoting behavior change in substance users, CM approaches have gained solid empirical support. Meta-analyses and systematic reviews of the experimental literature have consistently concluded that CM techniques are effective at reducing the use of illicit drugs via sustained drug abstinence (Dutra et al., 2008; Griffith, Rowan-Szal, Roark, & Simpson, 2000; Higgins, Heil, & Lussier, 2004; Lussier, Heil, Mondeon, Badger, & Higgins, 2006; Prendergast, Podus, Finney, Greenwell, & Roll, 2006; Stitzer & Petry, 2006), with meta-analyses consistently finding large treatment effects (Griffith et al., 2000; Lussier et al., 2006; Prendergast et al., 2006). Research has also demonstrated the effectiveness of CM at improving treatment attendance and retention (Elk, Mangus, Rhoades, Andres, & Grabowski, 1998; Jones, Haug, Silverman, Stitzer, & Sviki, 2001; Villano, Rosenblum, Magura, & Fong, 2002).

Despite its success at reducing illicit drug use among clients in community-based drug treatment programs, positive behavioral reinforcement has been little used with substance-abusing incarcerated populations. Furthermore, recent studies that have tested CM techniques with non-incarcerated drug-involved offender populations have not shown it to be particularly effective. Prendergast, Hall, Roll, and Warda (2008) tested the effectiveness of CM techniques among offenders participating in a mandated drug court treatment program and found no significant effect on treatment retention, drug use, or psychosocial functioning. Marlowe, Festinger, Dugosh, Arabia, and Kirby (2008) also tested CM in a drug court setting and found no significant differences between participants in a standard drug court control group and those in two experimental groups that received enhanced reinforcements, although some interaction effects were found, which suggested that CM may be efficacious for individuals with more severe criminal histories. Hall, Prendergast, Roll, and Warda (2009) assessed a CM-based intervention among drug-involved offenders diverted into treatment in lieu of incarceration and found no significant effect on treatment retention or drug use. In each of these studies, the investigators posited that the results may have been due to ceiling effects resulting from the influence of the drug court judges, standard drug court reinforcements, and/or standard forms of positive and negative reinforcement inherent in the criminal justice setting within which the study subjects were receiving treatment.

Most CM studies have focused on providing direct reinforcement of a targeted behavior by directly reinforcing the behavior (e.g., increasing drug abstinence by reinforcing clean urines, increasing retention in treatment by reinforcing treatment attendance). However, some research has examined the effectiveness of reinforcing alternative behaviors for reducing drug use. For example, Iguchi, Belding, Morral, Lamb & Husband (1997) assessed the effectiveness of reinforcing behaviors other than abstinence at reducing drug use and found that reinforcing completion of treatment plan tasks was more effective at producing clinically significant improvement over time compared to reinforcing clean urines and standard treatment. Petry et al. (2006) compared standard treatment, reinforcement of goal-related activities, and reinforcement of negative breath and urine specimens and concluded

that although outcomes were better overall for subjects who received reinforcement, reinforcement of goal-related activities was less efficacious than reinforcement of abstinence.

Project BRITE (Behavioral Reinforcement to Increase Treatment Engagement) was designed to increase inmates' engagement in prison-based drug treatment by providing positive behavioral reinforcement contingent upon participating in scheduled group sessions, completing treatment-related assignments, and participating in a range of other behaviors and activities that were consistent with and supported their recovery. Increased engagement in treatment was expected to further facilitate positive change in clients' cognitive processes (i.e., psychosocial functioning; the goal of most treatment programs) and improve post-release outcomes (e.g., by decreasing levels of drug use and reincarceration).

The purpose of the current analyses was to assess the effectiveness of the Project BRITE intervention in terms of its ability to effect positive change in dynamic measures of psychosocial functioning over the course of inmates' participation in prison-based drug treatment. Specifically, it was hypothesized that inmates who received contingent positive reinforcement would experience significantly greater improvement on measures of psychosocial functioning over the course of their participation in drug treatment and exposure to the intervention compared to a comparison group of inmates participating in the same drug treatment program who received IOP treatment and non-contingent reinforcement. It was also hypothesized that inmates who received contingent positive reinforcement would report greater treatment participation, treatment progress, and treatment satisfaction compared to the comparison group of inmates who received non-contingent reinforcement. Future analyses will assess the effectiveness of the intervention in terms of post-incarceration outcomes (e.g., re-arrests, returns-to-custody).

Method

Procedures

Study Sites—The Project BRITE intervention was conducted at two 12-week intensive outpatient (IOP) substance abuse treatment programs located at a medium-security male prison and a minimum-security female prison. The male prison housed approximately 1,600 medium-security inmates. The IOP treatment program at this study site had 48 treatment slots. The female prison housed approximately 175 minimum-security inmates. The IOP treatment program at this study site had 24 treatment slots. Thus, there were two separate samples in this study, male prisoners and female prisoners; study procedures were applied to each sample separately.

The 12-week IOP treatment curriculum was developed by the state department of corrections and consisted of 72 hours of cognitive behavioral treatment delivered over a period of 12 weeks (three two-hour group sessions per week). This standardized treatment curriculum was delivered to inmates throughout the prison system by a single external treatment provider organization under contract with the department of corrections. As such, male and female subjects at the two study sites were exposed to the same 12-week, 72-hour IOP cognitive behavioral treatment curriculum delivered by the same provider. Only the staff of the two IOP treatment programs differed. (Some content differed to make certain aspects of the basic standardized treatment curriculum gender-specific.)

Subjects—Subjects were 187 male and 143 female inmates enrolled in the IOP treatment programs at the two study sites. Inmates who received a referral to and were entering the IOP treatment programs at each site were recruited to participate in the study. Those who

agreed to participate were administered informed consent and a baseline interview. (Given the nature of the intervention, the participation refusal rate was less than two percent.)

Behavioral Reinforcement Intervention—Following administration of informed consent and the baseline interview, subjects were randomly assigned to receive IOP treatment as part of a Behavioral Reinforcement (BR) group or a Standard Treatment (ST) group (see Figure 1). This yielded the following breakdown for the male and female samples—187 males: BR = 95 and ST = 92; 143 females: BR = 73, ST = 70.

Inmates in both groups received the same standard 12-week IOP treatment curriculum. Inmates assigned to the BR groups also received positive behavioral reinforcement contingent upon their attending and participating in regularly scheduled group sessions and completing treatment-related tasks (*Treatment*), participating in structured and supervised programs and activities within the institution but separate from the treatment program (*Programs & Activities*), and engaging in behaviors that were consistent with and promoted recovery and a healthy pro-social lifestyle (*Behavior*). Positive reinforcement was delivered in the form of Motivational Incentive (MI) Points. The number of MI points that could be earned for each activity or behavior ranged from 1 to 10 points. MI points earned were computed and awarded weekly to BR subjects.

Using a yoked control procedure, inmates assigned to the ST groups also received MI points, but non-contingently. Each week, each ST subject was given a quantity of MI points that was equivalent to the average number of MI points earned by each BR subject that week. The practice of using yoked control procedures in contingency management research is based on the experimentally confirmed finding that when the delivery of a reinforcer (e.g., MI points) is not perceived to be contingent on the occurrence of a specific behavior, it does not alter the frequency of that behavior (Roll, Higgins, & Badger, 1996; Silverman, et al., 1996). For this study, the use of the yoked control procedure had two purposes. The first was to forestall likely resentment by participants in the ST groups over not having the opportunity to receive and redeem MI points for tangible items and privileges. The second was to isolate the effectiveness of the contingent reinforcement (as opposed to receiving MI points non-contingently).

Study participants in both groups were allowed to accumulate their MI points and then redeem them at any time for tangible items from the prison commissary or for selected privileges. They also had the option of donating them to a “Community Charity” fund. MI points donated to the Community Charity fund were converted into a cash donation to a legitimate charity (chosen by the inmate and approved by the prison management) on behalf of the inmate. Each MI point redeemed for tangible items carried a value of \$.10. MI points redeemed for privileges did not carry a monetary value, but did have an opportunity cost associated with them (i.e., each MI point redeemed for a privilege was a MI point that could not be redeemed for a tangible item). MI points donated to charity were assigned a value of \$.50.

For a more comprehensive description and overview of the development and implementation of Project BRITE at the two study sites, the reader is referred to Burdon, St. De Lore, and Prendergast (2011).

Measures

After recruitment and administration of informed consent, subjects were administered a two-part comprehensive baseline assessment. The main assessment (Part 1), which was administered face-to-face, collected data in 8 domains: (1) Sociodemographic Background, (2) Family Background and Relations, (3) Peer Relations, (4) Criminal History, (5) Health

and Psychological Status, (6) Drug and Treatment History, (7) Gambling, and (8) HIV/AIDS Risk Behaviors. The time frames that questions generally focused on were lifetime and 12 months, 6 months, and 30 days prior to current incarceration. Part 2 of the baseline assessment consisted of self-administered validated measures of dynamic psychosocial functioning. These included the Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983) and the Texas Christian University (TCU) Criminal Thinking Scale (CTS; Knight, Garner, Simpson, Morey, & Flynn, 2006). These measures were administered again at the conclusion of the 12-week IOP program, but before subjects were released from prison (post-treatment). In addition, at post-treatment, self-reported measures of treatment participation, treatment progress, and treatment satisfaction were captured.

Analyses for the current study included all nine symptom dimensions of the BSI (somatization, obsession-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism) as well as the Global Severity Index, which is derived from the cumulative scores of the nine symptom dimensions. The nine dimensional scales of the BSI have demonstrated good internal consistency and test-retest reliability. Cronbach's coefficient alphas ranged from .71 (psychoticism) to .85 (depression); test-retest reliability coefficients ranged from .68 (somatization) to .91 (phobic anxiety). The test-retest reliability coefficient for the Global Severity Index was .90 (Derogatis & Melisaratos, 1983). The use of the BSI to measure psychological functioning of offender populations also has precedence in the literature (e.g., Sacks, McKendrick, Vazan, Sacks, & Cleland, 2011; Stoops, Tindall, Mateyoke-Scrivner, & Leukefeld, 2005).

Criminal Thinking was a composite measure of six subscales designed to measure the following constructs: *Entitlement*—a sense of ownership and privilege, i.e., a tendency to believe that the world owes one or that one is deserving of special consideration. *Justification*—a thinking pattern characterized by the justification of antisocial acts because of perceived social injustice. *Power Orientation*—a need for power and control manifested by aggression or through the manipulation of others. *Cold Heartedness*—a lack of emotional involvement in relations with others, i.e., callousness. *Criminal Rationalization*—rationalizing criminal behavior by claiming that authority figures frequently engage in equally egregious criminal acts. *Personal Irresponsibility*—an unwillingness to accept responsibility, i.e., casting blame on others (Knight, et al., 2006). These six scales have demonstrated internal consistency and test-retest reliability. Cronbach's coefficient alphas ranged from .68 (Cold heartedness and Personal Irresponsibility) to .81 (Power Orientation); test-retest reliability coefficients ranged from .66 (Cold Heartedness) to .84 (Criminal rationalization) (Knight et al., 2006).

Self-report measures of treatment participation, treatment progress, and treatment satisfaction were derived from the treatment progress domain of the TCU Client Evaluation of Self and Treatment (CEST; Simpson & Knight, 1998). Treatment participation scale items described clients' self-reported level of involvement in treatment (e.g., "You always participate in counseling sessions," "You are willing to talk about your feelings during counseling."). Treatment progress scale items described clients' self-reported level of progress in treatment (e.g., "You have made progress with your drug/alcohol problems," "You have made progress in understanding your feelings and behavior."). Treatment satisfaction scale items described clients' self-reported level of satisfaction with the treatment program (e.g., "You are satisfied with this program," "This program is organized and run well."). Cronbach's coefficient alphas for these scales, computed on the current male and female samples separately, ranged from .76 to .82 for males and from .79 to .85 for females.

Analyses

The hypothesis relating to measures of psychosocial function (i.e., the BSI and Criminal Thinking measures) was tested using the SAS proc mixed model procedure. There are several statistical approaches for analyzing longitudinal data. A mixed model approach was chosen because it does not delete missing data listwise. Instead, the mixed model analyzes all of the data that are present under the assumption that the data are missing at random.

The model was run using a heterogeneous autoregressive covariance structure and maximum likelihood estimation. A fixed-effects analysis was performed such that Group, Time, and Group by Time were included as fixed effects in the model. The variable *Group* represented the extent to which BR and ST subjects differed from each other averaged across the two time points (baseline and post-treatment). The variable *Time* represented the extent to which all subjects (BR and ST) changed over the course of treatment. As such, it served as a measure of general treatment effectiveness of the IOP treatment curriculum at improving psychological functioning and criminal thinking among all subjects. The interaction *Group* $\times$ *Time* represented the differential change between BR and ST subjects over the course of treatment and represented the primary test of the hypothesis.

For longitudinal analyses, there are numerous methods of computing effect size, none of which are considered standard or widely used. One method of computing effect size for the longitudinal model is the estimate of the difference of differences. For this study, this measure was used to compute effect size for the *Group* $\times$ *Time* interaction and is provided by the regression estimate generated by the SAS proc mixed model procedure. Because the SAS proc mixed model does not provide standardized estimates, or any sums of squares, the partial estimates with their confidence interval are reported in the tables. The *Group* $\times$ *Time* interaction is the effect of interest and does not depend on parameterization; therefore, only this effect size for all of the outcomes is reported. This method of computing effect sizes has precedence (Rotheram-Borus, et al., 2004; Putnam & McSweeney, 2008).

The hypotheses relating to measures of treatment participation, treatment progress, and treatment satisfaction were tested using standard GLM regression. For both sets of hypotheses, separate analyses were conducted for the male and female subjects.

Preliminary analyses controlled for covariates on which significant baseline differences were found between BR and ST subjects as well as for covariates on which significant differences were found between participants who completed the post-treatment assessment ($n = 134$ for males, $n = 124$ for females) and those who did not ($n = 53$ for males, $n = 19$ for females). Controlling for these covariates did not affect the results, so they were excluded from the final models. (Results from analyses that included covariates are available from the first author upon request.) The significance level for all analyses was $p < .05$.

Results

The overall objective of Project BRITE was to increase engagement in prison-based drug treatment by providing positive behavioral reinforcement to inmates for participating in treatment and exhibiting behaviors that were consistent with and supported their recovery. Increased engagement in treatment was expected to further facilitate positive change in clients' cognitive processes (i.e., psychosocial functioning—the goal of most treatment programs) and improve post-release outcomes (e.g., decreased drug use, reincarceration). The focus of these analyses is on the former; that is, assessing whether participation in the Project BRITE intervention by BR subjects resulted in a differential change in dynamic measures of psychosocial functioning over the course of treatment compared to ST subjects. Descriptive data and related discussion on the number of MI points earned and redeemed by

BR and ST subjects over the course of the Project BRITE intervention appears in Burdon, St. De Lore, and Prendergast (2011).

Descriptive

Table 1 contains selected descriptive statistics for male and female subjects. Unless otherwise noted, there were no significant gender differences between BR and ST subjects. Among females, a significantly greater percentage of BR subjects reported having dependent children compared to ST subjects (50.7% vs. 34.3%, respectively). However, female BR subjects had significantly worse family relations compared to female ST subjects ($M = 25.6$ vs. $M = 29.7$, respectively), and scored significantly higher on substance abuse severity compared to ST subjects ($M = 5.8$ vs. $M = 4.8$, respectively). Among males, a significantly greater percentage of BR subjects reported previous participation in substance abuse treatment compared to ST subjects (72.8% vs. 55.8%).

Hypothesis 1: Differential Improvement over the Course of Treatment

Tables 2 and 3 document the results of analyses assessing differential changes over the course of treatment and exposure to the intervention for male and female subjects on the nine BSI domains and the Global Severity Index, and on the six Criminal Thinking subscales and the Criminal Thinking composite measure, treating for a *Group* $\times$ *Time* interaction. Significant results ($p < .05$), as well as results that approached significance (i.e., $p < .10$), are highlighted.

Among females (Table 2), a significant *Group* $\times$ *Time* interaction was found for Depression ($F_{[1,122]} = 4.80$, $p < .05$). Depression among female BR subjects decreased significantly more than it did among female ST subjects over the course of treatment and exposure to the intervention. The *Group* $\times$ *Time* interaction showed a trend toward significance for Sensitivity ($F_{[1,122]} = 3.46$, $p = .07$). Sensitivity among female BR subjects improved over the course of treatment and exposure to the intervention, whereas it remained unchanged for female ST subjects. With respect to the Criminal Thinking Scale, a significant *Group* $\times$ *Time* interaction was found for the component construct Cold Heartedness ($F_{[1,122]} = 4.91$, $p < .05$). Cold Heartedness among female ST subjects decreased over the course of treatment and exposure to the intervention, whereas it increased slightly among female BR subjects.

Among males (Table 3), a significant *Group* $\times$ *Time* effect was found for the Depression measure ($t_{[1,141]} = 4.19$, $p < .05$). Depression among male ST subjects decreased significantly over the course of treatment, whereas it remained unchanged among male BR subjects. With respect to the Criminal Thinking Scale, the *Group* $\times$ *Time* interaction for the composite measure of Criminal Thinking was almost significant ($F_{[1,141]} = 3.75$, $p = .054$). Criminal Thinking among male BR subjects decreased over the course of treatment and exposure to the intervention, whereas it remained essentially unchanged among male ST subjects. This was largely the result of a significant *Group* $\times$ *Time* effect found for the component construct of Justification ($F_{[1,141]} = 5.80$, $p < .02$) and a *Group* $\times$ *Time* effect for Power Orientation that approached significance ($F_{[1,141]} = 2.82$, $p = .095$). The Justification measure decreased over the course of treatment and exposure to the intervention among male BR subjects, whereas it increased among male ST subjects. Similarly, Power Orientation decreased over the course of treatment and exposure to the intervention among male BR subjects, whereas it remained essentially unchanged among male ST subjects. The *Group* $\times$ *Time* effect for Entitlement, although not quite qualifying as a trend toward significance ($F_{[1,141]} = 2.37$, $p = .126$), also favored the BR male subjects; Entitlement decreased among BR subjects, whereas it increased among male ST subjects, and thus also likely contributed to the significant *Group* $\times$ *Time* interaction found for the composite measure of Criminal Thinking.

Clinical Significance—Clinical significance was assessed using Jacobson and Traux's (1991) method that establishes a cutoff point for clinical significance at 2 standard deviations beyond the pre-treatment sample mean (in the direction of improved functionality). Using this criterion, statistically significant improvements in psychosocial functioning among the BR group did not attain clinical significance in this study.

Hypothesis 2: Differential Treatment Participation, Treatment Progress, and Treatment Satisfaction

As seen in Table 4, there were no significant differences between BR and ST subjects by gender on post-treatment self-reported measures of treatment participation, treatment progress, or treatment satisfaction.

Discussion

The primary hypothesis tested was that male and female inmates who received contingent positive reinforcement (i.e., BR subjects) would experience significantly greater improvement on measures of psychosocial functioning over the course of their participation in IOP treatment and exposure to the intervention compared to inmates who received IOP treatment and non-contingent reinforcement (i.e., ST subjects). For this study, psychological functioning consisted of the nine dimensions of the BSI as well as the BSI Global Severity Index and the TCU Criminal Thinking Scales. The results indicate that the intervention affected female and male subjects differently and not always in a way that favored subjects in the BR condition.

The most notable distinction related to the Depression measure. A significant *Group × Time* interaction was found for both the male and female subjects. However, among females, the interaction effect favored BR subjects, whereas among males the interaction effect favored ST subjects. Post hoc analyses further revealed that this interaction effect was concentrated among study participants who suffered from higher levels of depression. Mixed model analyses were re-run after conducting separate median splits of male and female participants into high-depression and low-depression groups. Among low-depression male and female subjects, depression remained essentially unchanged. There was no significant *Group × Time* interaction. However, among high-depression males and females, there was a significant *Group × Time* interaction. For both high-depression males and high-depression females, depression significantly decreased between baseline and post-treatment. However, depression among female BR participants decreased significantly more than it did among female ST participants, whereas depression among male ST participants decreased significantly more than it did among male BR participants.

Upon first reflection, it seemed anomalous that the intervention (similarly designed and implemented in male and female substance abuse treatment settings) would show opposite effects on experimental and control participants for females versus males. A review of the literature revealed few clues as to possible explanations.

One possible explanation relates to the environments within which the intervention took place combined with the procedures that study participants had to follow to earn and/or receive MI points. In order to receive *Program and Activities* and *Behavior* MI points, BR subjects had to document completion of the program/activity or the behavior by having Activity Sheets stamped by specifically designated custody and non-uniformed institutional staff, and treatment counselors were responsible for determining both eligibility for and number of *Treatment* MI points earned. Although this aspect of the intervention was the same at both study sites, there was a substantial difference between the two sites in terms of the prison and study environment. In the larger medium-security male prison, BR subjects

had to spend substantially more time and effort finding the staff who were designated to stamp their Activity Sheets. In addition, there were anecdotal reports of staff sometimes refusing to stamp the Activity Sheets or of misplacing the stamps, resulting in BR subjects having to find alternative means of proving their eligibility to receive MI points legitimately earned. In addition, the larger male IOP program had three counselors in addition to a counseling supervisor and an administrative assistant. Differences between counselors in terms of the level of subjectivity involved in their determinations of the quantity of *Treatment* MI points earned and rewarded may not have gone unnoticed among BR inmates. In contrast, at the smaller minimum-security female prison, there were far fewer staff designated to stamp BR participants' activity sheets, they were easy to locate and approach, and they seldom resisted stamping activity sheets. In addition, there was only one counselor at the female study site.

This explanation is supported by the increase in hostility among BR male subjects over the course of their participation in the intervention compared to ST male subjects, even though it was non-significant. In short, frustration and resentment associated with the more pronounced differential effort required by male BR inmates to document their eligibility to receive earned MI points while male ST participants were simply given MI points non-contingently may have manifested itself in the differential decline in depression among high-depression study participants that favored the male ST participants over the male BR participants. This result, however, should not be taken as a caution against requiring clients in a positive behavioral reinforcement program to assume responsibility for documenting their activities and behaviors in order to receive an earned reinforcer. Rather, it is believed to reflect a flaw in the design of the study that resulted in the inability to make the study participants, treatment counselors, and institutional staff blind to the study conditions (see below). The differential decline in depression that favored ST participants may have been due solely to the saliency of the differential effort required by BR participants compared with the absence of any effort required by ST participants to receive MI points.

A second notable distinction related to the Criminal Thinking measure. For the composite measure of Criminal Thinking, the *Group* $\times$ *Time* interaction among male participants almost reached significance ($p = .055$). This was largely a result of a significant interaction effect on the component measure of Justification ($p < .05$) and an interaction effect that trended toward significance on the component measure of Power Orientation ($p < .10$). For females, there was no significant *Group* $\times$ *Time* interaction effect for overall Criminal Thinking, but there was a significant *Group* $\times$ *Time* interaction effect for the component measure of Cold Heartedness that favored female ST participants; Cold Heartedness decreased significantly more among female ST participants over the course of the intervention than among female BR participants.

The explanation for these results may lie in baseline differences between the genders on measures of criminality. Males were significantly younger at the time of first arrest, committed significantly more violent crimes in their lifetimes, and had significantly more lifetime years of incarceration than females. Perhaps, more than the constructs of Power Orientation, Cold Heartedness, Criminal Rationalization, and Personal Irresponsibility, the constructs of Entitlement (i.e., a belief that one is deserving of special consideration) and Justification (i.e., perceived social injustice justifies one's criminal behavior) are more amenable to improvement via a positive behavioral reinforcement intervention that requires one to first earn and then receive valuable tangible recognition for positive pro-social behaviors. The failure to note any similar effects of the intervention among females may have been due to low baseline scores on measures of Entitlement and Justification among females, resulting in a floor effect. Males entered treatment with greater deficits on these measures and thus had room for improvement. It may also be worth noting that the lack of a

Time effect among males on all of the dimensions of Criminal Thinking lends support to criticism of corrections-based treatment programs that point to their failure or inability to adequately address the criminogenic needs of offenders (Lowenkamp, Latessa, & Smith, 2006). In the current study, the lack of improvement among male subjects with regard to the Entitlement and Justification constructs was the result of male BR subjects experiencing an improvement on the dimensions, whereas male ST subjects experienced a worsening.

Study Limitations

This study suffered from two limitations that likely impacted our ability to achieve results that may have more clearly highlighted the impact that positive behavioral reinforcement can have on substance abuse treatment in a correctional setting. First, it was not possible to make study participants blind to group assignment. Early efforts to keep BR and ST participants separate within the context of the treatment programs by assigning them separately to morning and afternoon group treatment sessions quickly proved unsustainable due to the treatment provider's need to immediately fill vacant treatment group slots as they became available. As such, both morning and afternoon treatment groups contained BR and ST participants, and most study participants knew the group assignment of other study participants within their group. Furthermore, ST participants quickly discovered that the number of MI points that they received each week under the yoked control procedure was tied to the number of points that BR participants earned. As a result, at both study sites, it became common practice for some ST participants to actively encourage BR participants to engage in activities and behaviors that would earn them points, which in turn would translate into more MI points being received by ST participants.

Second, efforts to promote buy-in and ongoing support for the study among correctional staff and inmates resulted in the study becoming heavily branded—perhaps too much so. The “BRITE” acronym was created and the intervention became known and referred to as “Project BRITE.” Research staff were referred to as the “Project BRITE people.” A Project BRITE logo was professionally designed and produced and appeared ubiquitously on banners that hung in the group treatment rooms, counselor and prison administration offices, and other areas of the institutions; on polo shirts and fleece jackets worn by treatment, prison administration, and research staff; on drinking mugs, information booklets, and study folders that were given to inmates who agreed to participate in the study; and on weekly MI point statements and vouchers for MI points redeemed that were distributed weekly to study participants.

Monthly implementation feedback meetings were held to obtain qualitative feedback from prison administration and custody staff and from inmates participating in the intervention on how well it was operating and to identify and resolve problems and issues as they arose. Qualitative feedback received from ST participants during these monthly meetings suggested that, even though they knew they were ST participants (study participants commonly referred to themselves as “STs” or “BRs”), they associated being in the treatment program with receiving MI points as part of Project BRITE. This may have negated the intended effect of the yoked control procedure, which was designed to isolate the effect of the *contingent* delivery of MI points. The successful use of a yoked control procedure depends on study subjects in the yoked control condition not perceiving that the delivery of the reinforcer (e.g., MI points) is contingent on the occurrence of a specific behavior. Due to the overly successful branding of the study, it is possible that ST participants failed to fully perceive the receipt of MI points as separate from and unrelated to their participation in treatment and/or the other activities and behaviors for which BR participants had to engage in to earn MI points.

Gender Differences in Findings

As recently noted by Tuchman (2010), an accumulating body of research is providing evidence that predictors of substance abuse and dependence vary by gender, and Simpson's (2001, 2004) treatment process model posits that these varying predictors influence treatment outcomes differentially among males versus females. Drug-dependent females entering treatment have been shown to have higher levels of depression and anxiety (psychological functioning; Chatham, Hiller, & Rowan-Szal, 1999), and among the participants in this study females did score higher on all baseline BSI measures. With respect to treatment outcomes, Rao, Czuchry, and Dansereau (2009) found that females improved significantly more than males on measures of psychosocial functioning over the course of treatment and suggested that this may be due to females responding more positively to features of treatment curricula that encourage openness and engagement in the treatment experience and their personal recovery. Project BRITE was designed to be just such a treatment enhancement for both males and females, and, notwithstanding the noted limitations, there was some evidence that the use of positive behavioral reinforcement may be efficacious in complementing the treatment process and enhancing treatment effectiveness.

Conclusion

The combination of substance abuse treatment programs and correctional settings presents a very complex real world environment within which this intervention was developed and implemented. Project BRITE was the first effort to test the effectiveness of a large scale behavioral reinforcement intervention in such a setting. It also highlighted some of the challenges to implementing a randomized experimental design in a complex real world setting. Despite the study limitations outlined above and their possible impact on the reported results, it is believed that the results still demonstrate the possible effectiveness and efficacy of using behavioral reinforcement to increase inmate engagement in prison-based drug treatment, which in turn should have a positive impact on treatment outcomes. Additional analyses to be conducted will further assess the effectiveness of Project BRITE by focusing on whether the intervention had any impact on post-prison outcomes (e.g., violations of community supervision, returns to custody). As such, the results of this study should not be taken as either a firm indictment or strong support for the use of behavioral reinforcement in correctional settings, but rather as a foundation upon which future research efforts can improve and build upon.

To that end, future research in this area is encouraged. The most critical aspect of future studies that employ random assignment is that they ensure that participants are either blind to the group assignment or that experimental and control groups are completely segregated from each other. Even then, researchers are cautioned that simple knowledge of the existence and characteristics of the alternative group may impact behavior and results. Furthermore, even though study branding may increase stakeholder buy-in, which is critical in conducting research in correctional settings, it may also impact study results in unintended ways and thus should be undertaken with caution.

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Figure 1.
Project BRITE: Participant Flow Diagram

Table 1

Descriptive Statistics of Project BRITE Subjects

Variables	Males (n = 187)			Females (n=143)		
	ST (n=92) % or M(SD)	BR (n=95) % or M(SD)	Sig.	ST (n=70) % or M(SD)	BR (N=73) % or M(SD)	Sig.
Selected Demographics						
Age	35.5 (11.0)	33.2 (9.8)	n.s.	33.4 (9.0)	33.6 (9.5)	n.s.
Ethnicity			n.s.			p<.10 ¹
White	57.9%	62.0%		75.4%	64.5%	
Black	12.6%	8.7%		8.7%	7.9%	
Latino	10.5%	14.1%		1.5%	13.2%	
Other	19.0%	15.2%		14.5%	14.5%	
Marital Status			n.s.			n.s.
Never Married	48.4%	54.4%		49.3%	48.7%	
Married/live together	16.8%	17.4%		13.0%	11.8%	
Widowed/Sep/Divorced	34.7%	28.3%		37.7%	39.5%	
Employment			n.s.			n.s.
Full/part time	47.4%	44.6%		26.5%	21.1%	
Other	52.6%	55.4%		73.5%	79.0%	
Parent with Dependent Children	50.5%	47.8%	n.s.	34.3%	50.7%	p<.05 ¹
Family Background						
Childhood Problems	31.2 (8.6)	31.5 (7.6)		31.2 (9.6)	31.4 (8.6)	
Dysfunctional Family Relations (0–50)	28.7 (11.3)	30.4 (10.2)	n.s.	29.7 (10.8)	25.6 (12.6)	p<.05 ²
Criminal Background						
Age of First Arrest	16.4 (4.7)	15.4 (3.9)	n.s.	20.2 (6.3)	19.2 (5.1)	n.s.
History of Violent Crime	77.9%	85.9%	n.s.	58.0%	59.2%	n.s.
Lifetime Yrs Incarcerated	7.9 (7.8)	8.4 (12.6)	n.s.	5.2 (13.9)	3.6 (10.0)	n.s.
Physical/Mental Health Status						
Overall Health: Self-Rating (1–5)	3.5 (1.3)	3.8 (1.1)	n.s.	3.4 (0.9)	3.6 (0.9)	n.s.
Any Psychiatric Hospitalizations	21.1%	18.5%	n.s.	17.4%	19.7%	n.s.
Religiosity/Spirituality						

Variables	Males (n = 187)			Females (n=143)		
	ST (n=92) % or M(SD)	BR (n=95) % or M(SD)	Sig.	ST (n=70) % or M(SD)	BR (N=73) % or M(SD)	Sig.
Religious/Spiritual Coping (6–24)	17.6 (3.7)	16.7 (3.8)	n.s.	18.0 (3.4)	18.6 (3.5)	n.s.
Drug Use & Treatment History						
Age of First Drug use	11.0 (3.6)	11.5 (3.5)	n.s.	12.7 (3.2)	12.6 (3.9)	n.s.
Problem Severity (0–9)	4.1 (2.8)	4.2 (3.0)	n.s.	4.8 (2.7)	5.8 (2.6)	p<.05 ³
Previous SA Treatment	55.8%	72.8%	p<.05 ⁴	68.6%	61.6%	n.s.
Desire for Help (10–50)	38.4 (8.9)	38.1 (8.7)	n.s.	42.7 (6.5)	42.4 (6.7)	n.s.
HIV Risk Behaviors						
Unsafe Sex: 6 mos prior to incarceration	53.7%	41.3%	n.s.	24.6%	35.5%	n.s.

¹ A significantly greater percentage of female BR subjects had dependent children compared to ST subjects (50.7% vs. 34.3%).

² The female ST group had a significantly better family relationship score ($M = 29.7$, $SD = 10.8$) than did the BR group ($M = 25.6$, $SD = 12.6$).

³ Female BR subjects had significantly greater substance abuse problem severity compared to ST subjects ($M = 5.8$ for BR vs. 4.8 for ST).

⁴ A significantly greater percentage of male BR subjects reported previous SA treatment compared to male ST subjects (72.8% vs. 55.8%).

Table 2

Results for Females (*Group* × *Time* Interaction)

	ST Baseline (<i>n</i> = 69)	ST Follow Up (<i>n</i> = 57)	BR Baseline (<i>n</i> = 73)	BR Follow Up (<i>n</i> = 67)	F (<i>DF</i> = 1, 122)	Effect Size
	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Estimate (<i>p</i> -value)	Estimate (<i>CI</i>)
Global Severity Index ¹	0.54 (0.50)	0.50 (0.58)	0.50 (0.54)	0.36 (0.43)	1.64 (0.20)	0.09 (−0.05–0.24)
Somatization	0.40 (0.53)	0.46 (0.65)	0.35 (0.54)	0.26 (0.36)	2.25 (0.14)	0.12 (−0.04–0.28)
OCD	0.78 (0.78)	0.71 (0.93)	0.74 (0.79)	0.60 (0.71)	0.45 (0.50)	0.08 (−0.15–0.31)
Sensitivity	0.55 (0.61)	0.55 (0.66)	0.67 (0.75)	0.45 (0.75)	3.46 (0.07)	0.24 (−0.02–0.50)
Depression	0.60 (0.61)	0.56 (0.66)	0.60 (0.61)	0.34 (0.43)	4.80 (0.03)	0.20 (0.02–0.39)
Anxiety	0.48 (0.65)	0.49 (0.78)	0.48 (0.76)	0.39 (0.58)	0.92 (0.34)	0.10 (−0.11–0.31)
Hostility	0.42 (0.56)	0.48 (0.68)	0.28 (0.40)	0.25 (0.43)	1.14 (0.29)	0.09 (−0.08–0.26)
Phobic Anxiety	0.30 (0.65)	0.27 (0.73)	0.25 (0.57)	0.16 (0.44)	0.30 (0.58)	0.05 (−0.13–0.23)
Paranoid Ideation	0.68 (0.68)	0.46 (0.50)	0.62 (0.63)	0.44 (0.62)	0.06 (0.81)	−0.03 (−0.24–0.19)
Psychoticism	0.48 (0.54)	0.39 (0.49)	0.47 (0.61)	0.36 (0.50)	0.01 (0.91)	0.01 (−0.16–0.18)
Criminal Thinking ²	19.46 (4.49)	19.01 (5.25)	19.39 (4.91)	19.01 (4.29)	0.01 (0.94)	0.06 (−1.40–1.51)
Entitlement	15.98 (5.04)	15.87 (5.50)	16.23 (4.94)	15.57 (4.83)	0.43 (0.51)	0.64 (−1.28–2.55)
Justification	16.96 (5.45)	17.28 (6.62)	16.58 (6.33)	15.90 (5.32)	0.90 (0.34)	1.05 (−1.14–3.25)
Power Orientation	20.62 (7.43)	20.13 (7.96)	19.25 (7.46)	19.30 (7.03)	0.04 (0.85)	−0.21 (−2.35–1.93)
Cold Heartedness	22.75 (7.02)	20.81 (5.03)	21.43 (5.27)	21.79 (5.81)	4.91 (0.03)	−2.07 (−3.92–0.22)
Criminal Rationalization	23.43 (6.79)	23.77 (7.54)	25.09 (7.63)	24.89 (7.93)	0.18 (0.67)	0.50 (−1.85–2.85)
Personal Irresponsibility	17.93 (5.43)	16.81 (6.40)	18.68 (5.60)	17.67 (5.18)	0.01 (0.93)	−0.09 (−2.16–1.98)

¹ Possible scores on the Brief Symptom Inventory scales and the Global Severity Index ranged from 0 to 4.² Possible scores on the Criminal Thinking composite and component scales range from 10 to 50.

Table 3

Results for Males (*Group* $\times$ *Time* Interaction)

	ST Baseline (<i>n</i> = 95)		ST Follow Up (<i>n</i> = 69)		BR Baseline (<i>n</i> = 92)		BR Follow Up (<i>n</i> = 65)		F (<i>DF</i> = 1,141)		Effect Size	
	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Mean (<i>SD</i>)	Estimate (<i>p</i> -value)	Estimate	Estimate (<i>CI</i>)	Estimate (<i>CI</i>)
Global Severity Index ¹	0.40 (0.45)	0.38 (0.48)	0.42 (0.40)	0.42 (0.52)	0.02 (0.89)						-0.01 (-0.13-0.11)	
Somatization	0.23 (0.42)	0.24 (0.38)	0.20 (0.31)	0.24 (0.43)	0.18 (0.67)						-0.03 (-0.15-0.10)	
OCD	0.49 (0.58)	0.55 (0.69)	0.58 (0.59)	0.58 (0.70)	0.71 (0.40)						0.08 (-0.10-0.26)	
Sensitivity	0.37 (0.60)	0.34 (0.60)	0.43 (0.60)	0.40 (0.64)	0.00 (0.99)						0.00 (-0.17-0.17)	
Depression	0.51 (0.60)	0.34 (0.56)	0.49 (0.53)	0.50 (0.64)	4.19 (0.04)						-0.16 (-0.31-0.01)	
Anxiety	0.34 (0.52)	0.33 (0.53)	0.40 (0.55)	0.36 (0.56)	0.19 (0.66)						0.03 (-0.11-0.17)	
Hostility	0.38 (0.56)	0.38 (0.57)	0.40 (0.51)	0.49 (0.59)	1.22 (0.27)						-0.09 (-0.24-0.07)	
Phobic Anxiety	0.19 (0.47)	0.24 (0.56)	0.21 (0.34)	0.23 (0.47)	0.66 (0.42)						0.05 (-0.08-0.18)	
Paranoid Ideation	0.62 (0.62)	0.55 (0.71)	0.66 (0.59)	0.53 (0.56)	0.51 (0.48)						0.07 (-0.12-0.25)	
Psychoticism	0.41 (0.52)	0.44 (0.58)	0.43 (0.54)	0.48 (0.63)	0.04 (0.84)						-0.02 (-0.19-0.15)	
Criminal Thinking ²	22.80 (5.13)	23.07 (5.66)	22.80 (4.63)	21.69 (5.19)	3.75 (0.06)						1.16 (-0.02-2.34)	
Entitlement	18.42 (6.59)	19.42 (6.92)	18.25 (5.49)	17.65 (5.45)	2.37 (0.13)						1.35 (-0.38-3.08)	
Justification	19.29 (6.53)	20.32 (7.87)	19.69 (6.20)	18.15 (5.90)	5.80 (0.02)						2.59 (0.46-4.72)	
Power Orientation	23.95 (7.62)	24.02 (8.33)	24.58 (7.46)	22.90 (7.86)	2.82 (0.10)						1.81 (-0.32-3.95)	
Cold Heartedness	25.31 (6.97)	24.22 (6.14)	26.59 (6.61)	25.48 (6.61)	0.02 (0.88)						0.15 (-1.84-2.15)	
Criminal Rationalization	28.73 (8.33)	29.33 (9.18)	27.70 (8.71)	26.87 (9.56)	0.56 (0.45)						0.72 (-1.17-2.60)	
Personal Irresponsibility	22.05 (6.77)	21.85 (6.51)	21.10 (6.94)	20.21 (6.92)	0.02 (0.89)						0.13 (-1.76-2.03)	

¹ Possible scores on the Brief Symptom Inventory scales and the Global Severity Index ranged from 0 to 4.² Possible scores on the Criminal Thinking composite and component scales range from 10 to 50.

Table 4
Post-Treatment Measures of Treatment Participation, Progress, and Satisfaction

	Males			Females		
	BR M (SD)	ST M (SD)	Sig.	BR M (SD)	ST M (SD)	Sig.
Tx Participation	42.3 (6.2)	41.2 (7.2)	n.s.	44.0 (5.2)	43.3 (6.3)	n.s.
Tx Progress	42.5 (4.6)	41.4 (6.2)	n.s.	44.3 (4.8)	43.8 (5.0)	n.s.
Tx Satisfaction	39.7 (5.8)	38.6 (6.9)	n.s.	41.2 (5.1)	40.8 (6.7)	n.s.

Note: Possible scores on each of these scales range from 10 to 50.