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Substance Abuser Impulsivity Decreases with a Nine-Month Stay in a Therapeutic Community

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Abstract

Background—Substance abuse continues to be a major public health problem. Keeping substance abusers in treatment is a challenge, and researchers continue to investigate ways to increase retention.

Objective—The aim of this study was to investigate the relationship between impulsivity in substance abusers and length of stay in the context of therapeutic community.

Methods—The Barratt Impulsiveness Scale– 11 (BIS-11) was used to assess impulsivity in 138 substance abusers at admission and at nine months in a therapeutic community.

Results—Impulsivity significantly decreased in subjects who completed nine months in the therapeutic community. Legal stipulation increased length of stay, on average, by three months. On admission, female participants were on average more impulsive than their male counterparts.

Conclusion—Impulsivity decreased in subjects who remained in therapeutic community for nine months although self-reported impulsivity at baseline did not seem to be associated with retention.

Scientific significance—Therapeutic community factors contribute to a decrease in self-reported impulsivity and these factors might be enhanced to increase retention in therapeutic community.

Keywords

Barratt Impulsiveness Scale – 11; impulsivity; retention; therapeutic community; substance abuse

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Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

1. BACKGROUND

For over forty years, therapeutic communities (TCs) have been addressing the rehabilitation of substance abusers, and TCs are recognized by clinicians as an effective treatment (1). Numerous studies have documented the correlation between length of time spent in a TC and an increase in positive outcomes but unfortunately, the dropout rate within the first few weeks is substantial (2, 3). The inability to retain clients in treatment has been a persistent problem, with dropout rates remaining confoundingly high.

Impulsive behavior is often associated with substance abuse, and researchers have described impulsivity as a risk factor in the initiation and maintenance of substance abuse. Longitudinal studies identify impulsivity in boys as a risk for later substance abuse and behavioral impulsiveness, as measured by a delay discounting task, is associated with substance use and abuse in a nonclinical population of college students (4–6). Impulsivity has been found to be a reliable predictor of alcohol use in adolescents and adults (7, 8).

In a study comparing individuals with a past history of drug dependence to individuals who reported no history of substance abuse, the subjects with a history of drug dependence exhibited more impulsivity in both behavioral and self-report measures (9). In cocaine dependent individuals, impulsivity was significantly correlated with the intensity of cocaine use and withdrawal symptoms (10, 11). Subjects with higher levels of impulsivity used more cocaine and experienced increased withdrawal.

An increase in impulsive behaviors has also been implicated as a consequence of substance abuse, and there is substantial neurophysiological evidence, in human and animal models, that cognitive function, particularly impulse control, is affected by chronic exposure to drugs of abuse (12–14).

Impulsivity may also be related to length of stay in treatment. For subjects being treated for cocaine dependence, higher impulsivity was significantly correlated with higher attrition (10). Impulsivity, aggression, and sensation seeking in African-American cocaine users were found to predict length of stay in treatment with higher levels being associated with poorer (15).

Attention-deficit hyperactivity disorder has also been associated with earlier dropout. Adults with this disorder, in which impulsivity is a primary feature, had the highest early dropout rates (35%) and were less likely to complete treatment than those with another psychiatric diagnosis or no diagnosis (16). When substance abusers are treated for their impulsivity with bupropion or methylphenidate, they have shown improvement in treatment participation and retention (17).

Despite the evidence suggesting that impulsivity is a primary characteristic of substance abusers and a recommendation that the treatment of substance abuse place more emphasis on the remediation of impulsive behavior, there is a lack of research investigating the effect of impulsivity on retention in therapeutic community (18). The purpose of this study is to explore the relationship of impulsivity to length of stay in a therapeutic community.

2. METHODS

2.1. Participants

The sample consisted of 138 individuals who were the historical controls for an experimental study on a mindfulness-based intervention to decrease stress and improve retention of substance abusers seeking treatment in an 18-month TC. Participants were recruited from newly admitted clients to a TC in a large southwestern city. The subjects included individuals who were remanded to treatment from the judicial system, recruited by public service announcements, referred from the treatment community, or referred by word of mouth. This research was approved by the Committee for the Protection of Human Subjects of the University of Texas–Houston Health Science Center and follows all standards and guidelines established by the Health Insurance Portability and Accountability Act of 1996.

2.2. Procedures

The Barratt Impulsiveness Scale – 11 (BIS-11), the measure used in this study, is a well-known instrument in the research literature on impulsivity. Upon entrance into the orientation phase of the TC, several instruments were administered to subjects, including the BIS-11.

The BIS-11 is a self-report instrument designed to measure the attentional, motor (acting without thinking), and nonplanning domains of impulsivity. The questionnaire consists of thirty items using a 4-point Likert scale (from 1 = rarely to 4 = almost always) and is frequently used to assess trait impulsivity in a variety of populations. It was normed in college students, and substance abusers with significantly different between group scores (19). Examples of items used in the BIS-11 include: “I do things without thinking” and “I concentrate easily”.

On admission to the TC, participants were consented for treatment and approached for consent for the primary study. Within 72 hours after admission to the TC, participants were assessed with the BIS-11. Length of stay was measured in days and determined from the day the BIS-11 was administered (within 72 hours of admission) until the subject left the TC either because they dropped out or completed nine months in treatment. The BIS-11 was administered a second time for subjects who remained in treatment for nine months.

2.3. Data Analysis

The *t*-test for paired comparisons was used to examine differences between baseline impulsivity and impulsivity at nine months, while the *t*-test for independent samples was used to compare baseline impulsivity by gender. Time to dropout was examined using Kaplan Meier survival curves. Survival analysis using Cox proportional hazards regression was performed to examine the effect of baseline impulsivity, gender, and legal stipulation on length of stay in treatment.

3. RESULTS

Of the 164 subjects who entered the study, 26 subjects terminated from the historical control group prematurely. Twenty-three subjects dropped out within 72 hours before they were administered the BIS-11, two subjects were excluded from analysis because they did not answer more than 15% of the questions, and one subject was excluded because English was a second language for the participant, and it was unclear if this subject understood the BIS-11 questions. This resulted in a final sample size of 138 subjects, 17 (12%) of whom completed at least nine months in the program.

The majority of the 138 study participants (77%) were male. Just over half (57%) were Caucasian, with the remainder (31%) African-American or other minority groups (12%) including Native American, Mexican, Puerto Rican, Cuban, and other Hispanic.

The substance abusers in this study, on average, scored high in impulsivity at baseline. Their median score of 75 on the BIS-11 is nearly equivalent to the median baseline score reported by Moeller et al. (2001) for cocaine users.

Table 1 illustrates the results of a *t*-test comparing BIS-11 total average scores and gender. On admission to the TC, average scores of females were significantly higher ($p = .008$) than males, although gender was not found to be correlated with length of stay.

A *t*-test comparison of the BIS-11 total scores for the 17 people who completed nine months in the program revealed that the average scores on the BIS-11 were significantly different when the baseline and nine month average scores were compared ($p = .001$). Table 2 illustrates that the BIS-11 total score was lower the second time they took the test, that is, subjects reported lower levels of impulsivity upon completion of nine months of treatment as compared to reported impulsivity at admission. The mean BIS-11 score at baseline was 74.9, and at nine months the mean score was 61.4, a significant difference of 13.5.

After analysis using Cox Proportional hazards regression, retention in treatment was not shown to be related to baseline impulsivity in this sample. Length of stay in treatment was not associated with the total BIS-11 score or any of the three subscales of the BIS-11. However, when trying to predict length of stay in treatment, legal stipulation (i.e., did the subject answer yes to the question “Was this admission prompted or suggested by the criminal justice system?”) was statistically significant ($p < .001$). Those participants who were not legally stipulated were 2.04 times more likely to drop out of treatment.

The fact that the subjects who were legally stipulated stayed, on average, 90 days longer in treatment was not due to less impulsivity in that group, as both groups were almost identical in impulsivity at baseline as measured by the BIS-11 (not stipulated $n = 97$, median 74; stipulated $n = 41$, median 76).

4. CONCLUSIONS

This study examined the relationship between retention in a TC and impulsivity. The study participants entered the TC with high scores in impulsivity, and the results demonstrate that

self-reported impulsivity decreased in subjects who completed nine months of the program. This finding supports the claims by TC proponents that TC treatment is effective in developing coping skills in substance abusers (20). The finding that women are generally more impulsive, on admission and after nine months, than males is consistent with the literature on female substance abusers (21, 22).

In this study impulsivity was not related to retention in treatment. There appeared to be no correlation between levels of baseline impulsivity and length of stay in treatment in this population, which is contrary to results reported in other studies (10, 15). A possible explanation for this finding is that the BIS-11 distinguishes between controls and substance abusers, but it may not be sensitive enough to distinguish levels of impulsivity between two groups of substance abusers.

The threat of legal consequences was found to be a strong predictor of length of stay ($p < .001$). Those participants who were not legally stipulated were twice as likely to drop out of treatment. This is consistent with the literature documenting the positive relationship between legal pressure and length of stay in treatment (23, 24). The threat of legal consequences and/or the highly structured environment of the TC may have acted to control an impulsive decision to leave treatment.

Several study limitations warrant careful interpretation of these results. First, the data were collected from a convenience sample of subjects seeking treatment for substance abuse in a TC. Consequently, the results are only generalizable to those with similar circumstances. Selection bias may have skewed the results, as enrollment in the study included agreeing to start the day at 5:00 a.m., thirty minutes earlier than normal. The early start may have influenced which individuals chose to participate and may also have contributed to early dropout from the study ($n = 23$, 14%). Impulsivity in the original sample of 164 subjects may have increased the probability of a Type II error. The inability to include these possibly very impulsive individuals in the analysis may have resulted in the conclusion that retention was not related to baseline impulsivity when in fact impulsivity did affect retention.

In the case of subjects who answered “yes” to the question assessing legal stipulation, it is not known if the legal stipulation included a court mandated length of treatment. A court ordered term of treatment might have significantly influenced length of stay. The inclusion of these court-mandated individuals was a significant confounder in this study. Finally, some results for example the finding that subjects who completed nine months in the program demonstrated lower levels of impulsivity on the BIS-11 were based upon a very small sample size ($N = 17$).

In conclusion, the role of impulsivity in the treatment of substance abuse is important. This may be the first study to examine the relationship of substance abuse treatment in a therapeutic community to impulsivity. The decrease in impulsivity, as measured by the Barratt Impulsiveness Scale, in the substance abusers in this study suggest that treatment in a TC may act to promote coping skills that attenuate impulsivity and thus the negative consequences of impulsive actions. The substance-abusing subjects in this study scored high in impulsivity on the Barratt Impulsiveness Scale, consistent with earlier studies examining

the difference between substance abusers and controls (9, 19). The finding in this study, that impulsivity was not related to treatment retention, differed from earlier studies supporting the association between impulsivity and treatment retention (10, 15). Legal coercion, a confounder in this study, may have been responsible for the difference. Legal coercion did appear to be associated with a considerable increase in treatment retention, and underscores the idea suggested by Patkar, et al. (2004) and Moeller, et al. (2001) that contingency management of impulsivity may lead to better treatment outcomes.

These findings are tentative due to the small sample size, but represent a preliminary step in determining how impulsivity is impacted by treatment in a TC. A detailed analysis of the items that differed between groups, as well as examining which items changed as a result of treatment in therapeutic community, may be useful in identifying those contingencies most in need of management. Future investigations should include a detailed analysis of the Barratt Impulsiveness Scale items that differed between groups, as well as examining which items changed as a result of treatment in therapeutic community to identify those contingencies most in need of management. Exploring how therapeutic community acts to temper impulsivity and how interventions might be tailored to the therapeutic community environment to reduce impulsivity would also be valuable.

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TABLE 1

T-test comparing baseline scores on the BIS-11

Gender	*N*	Mean	*σ*	95% CI	
M	108	73.7	12.97	71.23	76.18
F	30	80.7	12.01	76.21	85.19

$t = -2.7721$.

$p = .008$.

degrees of freedom = 136.

TABLE 2

Comparison of impulsivity at baseline and nine montlis (9 mo.)

Time	*N*	Mean	*σ*	95% CI	
Baseline	17	74.88	12.62	68.39	81.37
9 mo.	17	61.41	9.41	56.57	66.25

$t = 3.5287$.

$p = .001$.

Degrees of freedom = 32.