



## Personal factors and substance abuse treatment program retention among felony probationers: Theoretical relevance of initial vs. shifting scores on impulsivity/low self-control

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### ABSTRACT

**Purpose:** Although past work connects personal factors to substance abuse treatment retention, most studies have been atheoretical. The current work specifically examines impulsivity/low self-control and retention in substance abuse treatment using the General Theory of Crime (Gottfredson & Hirschi, 1990) which anticipates a relationship between intake scores and retention.

**Methods:** Analyses examined 330 probationers in a modified therapeutic community. Four logistic regression models predicting treatment completion examined four aspects of impulsivity/low self-control. Each model included initial scores, while controlling for unexpected changes after 90 days and demographics. Model-fit was analyzed using the Bayesian Information Criterion (BIC).

**Results:** Two best-fitting models emerged: sensation-seeking and volatile tendencies. Higher intake scores for sensation-seeking were related to significantly lower odds of completion. Unexpectedly increasing volatile tendencies was related to a significantly lower odds of completion. Models with impulsivity/low self-control indices provided significantly better fit than models with demographics alone.

**Conclusions:** Both measurement periods of impulsivity/low self-control were found to be associated with substance abuse treatment completion. These findings appear supportive of the General Theory of Crime and are directly applicable to Therapeutic Communities. They also may prove useful in future work examining how personal factors connect with treatment outcomes.

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### Introduction

By the turn of the century, the American society had been preoccupied with the crime problem and how to reduce it for roughly four decades (Garland, 2001). The problem's complex web of causes includes illegal substance use and abuse (Harrison & Backenheimer, 1998). For example, 69% of state prisoners reported regular substance use – “at least once a week for at least a month” – immediately prior to their arrest (Mumola & Karberg, 2006, p. 2). More than half meet the criteria for substance abuse or dependence (Mumola & Karberg, 2006). Additionally, in an epidemiological study of parolees and probationers, Vaughn, DeLisi, Beaver, Perron, and Abdon (2012) reported that probationers and parolees were significantly more likely to use illicit drugs as compared to non-parolees and non-probationers. Consequently, one important component of crime reduction efforts has been substance abuse treatment (Harrison & Backenheimer, 1998).

Such treatment can help lower recidivism (Field, 1989; Inciardi, Martin, & Butzin, 2004; Knight & Hiller, 1997; Knight, Wallace, Joe, & Logan, 2001; Marlowe et al., 2003). Treatment effectiveness is weakened, however, if participants fail to remain in treatment for the entire program period (De Leon, 1996; Field, 1989; Inciardi et al., 2004; Simpson, 1979; Simpson, Joe, & Brown, 1997). Understanding the factors related to program completion is therefore pivotal. This important outcome, treatment completion, is the focus of the current investigation.

Admittedly, there has been considerable research on this outcome. But a case can be made that the segment of work considering impacts of personal factors other than demographics has been insufficiently grounded in theory. The current work mounts such a theoretically-focused investigation. Relying on the General Theory of Crime (GTOC), two questions are addressed. First, as predicted by the GTOC do felony probationers' scores on indicators of impulsivity/low self-control predict treatment program completion? Second, when controlling for change, do initial scores significantly predict treatment completion? The TC perspective emphasizes that program participation affects fundamental changes in participants, and thus focuses on change. The GTOC, by contrast, emphasizes the stability of self-control, implying that initial scores on impulsivity/low self-control

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items would better predict completion because changes are just transient epiphenomena. Through these two questions, the current work examines the role of the GTOC in the therapeutic community by examining the impact of impulsivity/low self-control items on treatment completion, as well as the effect of initial scores while controlling for unexpected changes, on treatment completion using a large sample of felony probationers enrolled in a therapeutic community. The next sections of the introduction will underscore the importance of the outcome investigated here, highlight the range of personal factors related to treatment outcomes, and introduce the theoretical frame used to narrow the range of relevant personal factors.

#### *Treatment completion*

Offenders' participation in substance abuse treatment programs has been associated with positive later outcomes, such as lower arrest rates, reductions in the amount of substance-involved peers, and improvements in the quality of relationships (Field, 1989; Inciardi et al., 2004; Knight & Hiller, 1997; Knight et al., 2001; Marlowe et al., 2003). For example, Marlowe et al. (2003) reported an increasing number of participants in a drug treatment court tested negative for illicit substances as treatment progressed. Hiller, Knight, Saum, and Simpson (2006) also reported increased social functioning during therapeutic community treatment.

More specifically, researchers have investigated how key elements of effective treatment, alternate program structures, and personal factors related to such positive during- and post-treatment outcomes. For example, participants' length of stay in treatment is repeatedly cited as a significant predictor of positive post-treatment outcomes (De Leon, 1996; Field, 1989; Inciardi et al., 2004; Simpson, 1979; Simpson et al., 1997). While length of stay is important, it is also important to complete treatment. For example, graduates of TC treatment programs have been arrested, convicted and incarcerated significantly less often following treatment than those who dropped out (Field, 1989; Inciardi et al., 2004). Similarly, TC program graduates in one study were less likely to be rearrested and more likely to be substance-free during and following treatment as compared to non-participants (Inciardi et al., 2004). It appears, across studies and treatment modalities, that with at least 90-days of program participation some positive effects emerge (Simpson et al., 1997), and treatment completion relates to an even stronger likelihood of positive post-treatment outcomes (Field, 1989; Hiller, Knight, & Simpson, 2006; Knight & Hiller, 1997). For practical purposes alone, the determinants of treatment retention deserve attention.

#### *Previous personal factors investigated*

As the number of studies investigating substance abuse treatment has grown, so has the number of personal factors associated with the treatment experience and impact. Researchers have organized personal factors into two groups: static factors, which include those characteristics that are constant over time or can only increase over time, and dynamic factors which can either increase or decrease over time. Examples of the former include demographics and arrest history, and examples of the latter include attitudes, anxiety, and motivation levels. Empirical evidence shows both classes of factors to be relevant to substance abuse treatment experiences and outcomes (Condelli & De Leon, 1993).

Turning first to static factors, studies examining therapeutic communities have found age, marital status and gender most consistently associated with treatment retention. Older participants were generally more likely to remain in treatment (Hiller, Knight, Saum, et al., 2006; Lopez-Goni, Fernandez-Montalvo, Illescas, Landa, & Lorea, 2008; Sansone, 1980); men were more likely to complete treatment than women (Hiller, Knight, Saum, et al., 2006; Sansone, 1980); and married as compared to single participants were less likely to

complete treatment (Hiller, Knight, Broome, & Simpson, 1998). Neither race nor ethnicity has consistently predicted retention (Collins & Allison, 1983; Cooper, MacMaster, & Rasch, 2010) although it has proven significant in some investigations. (Cooper et al., 2010; De Leon, Melnick, Schoket, & Jainchill, 1993; Hiller et al., 1998). Two additional demographic factors, pre-treatment employment status (Hiller, Knight, Saum, et al., 2006; Hiller, Knight, & Simpson, 1999) and higher education levels (Hiller et al., 1998) also have been associated with retention, albeit not as consistently as age, marital status, and gender.

Turning to dynamic factors, several have proven relevant. Motivation for treatment has predicted retention and participants' engagement in treatment; engagement in turn has predicted post-treatment outcomes (Hiller, Knight, Leukefeld, & Simpson, 2002). Hostility (Hiller, Knight, Saum, et al., 2006) and participants' beliefs that they would complete treatment (Darke, Campbell, & Popple, 2012) also have been related to therapeutic community treatment completion. Studies have also suggested the therapeutic alliance, defined as "the active collaboration between the client and therapist (p. 102)," is associated with treatment retention; however the findings on this factor have been mixed (Brocato & Wagner, 2008). Additionally, readiness to change has been identified as a correlate of retention. Brocato and Wagner (2008), however, did not find support for this proposed relationship in their examination of an "alternative-to-prison (p. 99)" treatment program. Overall findings suggest the strongest dynamic predictors are motivation, engagement in treatment, and hostility, and factors like readiness for treatment and the therapeutic alliance also have some connection to program completion.

#### *Substance abuse treatment and theory*

##### *Personal change and outcomes*

Among the many questions surrounding substance abuse treatment effectiveness, two stand out. The first is: what are the processes that connect treatment participation to post-treatment outcomes? The processes of treatment influence have been metaphorically referred to as the "black box" (Hiller, Knight, Leukefeld, et al., 2002; Hiller, Knight, Saum, et al., 2006; Joe, Simpson, & Broome, 1998; Simpson, 2001, 2004). Researchers have been urged to explore intra-individual changes that are associated with positive post-treatment outcomes (De Leon, 1995). Identifying these relevant processes may help craft more effective programs.

A viable theoretical frame for investigating these processes is the TC perspective which guides TC programs (De Leon, 1994, 1995). Particularly relevant to the current study is the portion of the TC perspective which considers persons with substance abuse problems to have "...low tolerance for all forms of discomfort and delay of gratification, inability to manage feelings, poor impulse control..." (De Leon, 1995, p. 1608). This taps into the TC perspective's broader consideration of the "view of the person" (De Leon, 1995, p. 1606, 1996, p. 52). According to the TC perspective, participation in a TC program should be accompanied by acquiring pro-social behaviors which would, in effect, decrease impulsivity. If the treatment process is proving effective, then participants should be more likely to continue with the program rather than drop out of it.

##### *Therapeutic communities theoretical background*

TCs operate from the perspective that substance-involved individuals have a "disorder of the whole person" (De Leon, 1995, p. 1606, 1996, p. 52; De Leon, Melnick, & Kressel, 1997, p. 186; Melnick, De Leon, Thomas, Kressel, & Wexler, 2001, p. 634), and substance abuse problems are merely a symptom of the individual's overall disorder (De Leon, 1995). Therefore, using the social learning model (Bandura, 1977), treatment goals are focused on restoring or helping participants learn appropriate social functioning. This is achieved through the TC's focus on peer-to-peer interaction between individuals in the program, i.e., the community. The community is intended

to be the “primary method” (p.1611) of socializing its participants (De Leon, 1995), and a number of strategies are used for teaching prosocial behavior (De Leon, 1995; Welsh, 2010), including social skills training, social modeling, peer-to-peer confrontation of antisocial behavior, rewarding of prosocial behavior, parenting classes and group therapy (De Leon, 1995).

In support of the TC perspective, findings show participation in TC programs is associated with a range of intra-individual changes (Bankston et al., 2009; Hiller, Knight, Saum, et al., 2006; Kressel, De Leon, Palij, & Rubin, 2000; Morgen & Kressel, 2010; Newton, 1998; Prendergast, Farabee, Cartier, & Henkin, 2002; Welsh, 2010). The direction and magnitude of the changes varied across studies, and change was not always in the expected direction. Nevertheless, generally it appears that program participation often is associated with intra-individual change.

The role of impulsivity has been examined extensively in the substance abuse treatment literature. The majority of these studies, however, have been in the context of their association with substance abuse. For example, female crack/cocaine users in residential substance abuse treatment evidenced more impulsivity than their male counterparts (Lejuez, Bornoalova, Reynolds, Daughters, & Curtin, 2007). Additionally, in a review of data pertaining to impulsivity and substance use, Moeller and Dougherty (2002) reported that individuals with substance abuse problems have higher levels of impulsivity than those who do not use illicit substances.

Much less studied, however, has been the association between impulsivity and treatment retention and completion. The authors have unearthed only two studies. Bankston et al. (2009) did not find an association between impulsivity and length of stay in treatment. Moeller et al. (2001) found that individuals with higher baseline impulsivity dropped out of treatment significantly sooner. The context, however, was not through a treatment program but rather a short-term examination of medically-assisted treatment for cocaine dependence. As such, retention referred to the participants' length of stay in the study rather than in a treatment program. The work, however, does provide support for the idea of the connection between impulsivity and treatment retention.

#### *Person-by-treatment interaction*

The second key question regarding substance abuse treatment effectiveness is: why is treatment more effective for some than others? For juvenile and correctional treatment programs, empirical work has clearly supported the idea of differential effectiveness (Andrews et al., 1990). Perhaps some substance-involved individuals are less likely to complete treatment, and thus less likely to have positive post-treatment outcomes, simply because of who they are.

#### *Relevance of the General Theory of Crime*

A theoretical frame applicable to this second question, and generally relevant to both substance abuse and criminal involvement, is Gottfredson and Hirschi's (1990) General Theory of Crime (GTOC). This model is relevant because it seeks to explain all crime as well as analogous behaviors such as substance abuse, gambling, and risk-taking generally, and because it explicitly anticipates individual differences. Its key idea is that criminal behavior occurs when individuals with low self-control encounter criminal opportunities. An individual with low self-control is more focused on the present, wants immediate gratification, and is highly impulsive, giving little forethought to the consequences of his/her behavior when confronted with opportunities for criminal or other risk-taking activities (Gottfredson & Hirschi, 1990). This concept comes close to the impulsivity element in the “view of the person” addressed by TC programs (De Leon, 1995).

The GTOC is wide ranging, complex, controversial, and defies easy summation (Akers, 1991; Evans, Cullen, Burton, Dunaway, & Benson, 1997; Forde & Kennedy, 1997; Grasmick, Tittle, Bursik, & Arneklev,

1993; Hirschi & Gottfredson, 1993; Marcus, 2004; Pratt & Cullen, 2000). Those complexities aside, the focus here relies on the GTOC to suggest two points. First, those who are low on self-control will be less likely to complete treatment. The GTOC generally predicts that, when confronted with criminal or risk opportunities, those low on self-control will be more likely to engage in those opportunities. For substance-involved probationers, criminal and risk opportunities may compete with attending and completing treatment programs. Second, because the theory presumes that self-control levels are established early in the life course and are relatively stable thereafter, participants' self-control scores at intake into a program should be negatively associated with program completion.

Two ongoing areas of investigation for the GTOC have specific relevance here. First, the assessment of low self-control (Arneklev, Grasmick, & Bursik, 1999; Tittle, Ward, & Grasmick, 2003) has been at issue. It is not clear what the “best” approach is or which specific items should be used. Second, there has been disagreement regarding the stability of low self-control. According to Gottfredson and Hirschi (1990) low self-control emerges during early childhood as a result of ineffective socialization. They suggested this trait would be manifested by approximately 8 to 10 years of age and remain relatively stable thereafter. Some studies support Gottfredson and Hirschi's contention that levels of self-control remain stable over time (Arneklev, Cochran, & Gainey, 1998; Arneklev et al., 1999) and between varying contexts (Arneklev et al., 1999). But other works suggest self-control can be modified (Burt, Simons, & Simons, 2006; Hay & Forrest, 2006). As such, low self-control may not be as stable as originally thought and may be amenable to change.

Given the stability thesis, and the facts that (a) the current investigation captures changes over just a few months, and (b) focuses on adults, the GTOC leads us to expect that initial scores on self-control would be relevant to treatment retention in this context.

#### *Impulsivity/low self-control in treatment settings*

A limited number of studies have applied the GTOC perspective in a substance abuse treatment setting (Abdel-Salaam, 2011; Longshore, Turner, & Stein, 1996; Packer, Best, Day, & Wood, 2009). Only two of these studies assessed TC participants (Abdel-Salaam, 2011; Packer et al., 2009). Packer et al. (2009) found that adult, substance-involved offenders with lower self-control remained in treatment longer. Neither this counter-theoretical finding, nor post-treatment outcomes, were explored in that paper. The authors did find, however, that self-control correlated with age of first use and, within the 30 days prior to completing the questionnaire, intensity of use and amount spent on drugs per week. There was no correlation between self-control and severity of drug dependence. Abdel-Salaam (2011) examined the impacts of impulsivity/low self-control at treatment intake in a national sample of adolescent participants in TC programs. These indicators are not associated with either treatment completion or criminal or substance abuse outcomes post-treatment.

Longshore et al. (1996) conducted secondary analysis of 623 substance-involved adults and juveniles who participated in the Treatment Alternatives to Street Crime programs. Their results showed a modest association between self-control and crimes of force and fraud.

Additionally, De Leon, Melnick, Cao, and Wexler (2006) examined predictors of reincarceration following participation in a prison-based TC. The factor analyses revealed two items evocative of the GTOC loaded significantly on two factors used to predict reincarceration 3 years post-release. “Changes in concern for others” loaded significantly on the socialization scale, and “Thinking before acting” loaded significantly on the “Individual Growth” scale. Findings showed that an increase on each scale significantly predicted the odds of non-reincarceration. These findings are suggestive of an association between change in indicators of self-control and post-treatment outcome. However, more broadly, the factor, socialization, is directly

associated with the TC model, and demonstrates TC's may be correct in the assertion that pro-socialization is associated with positive post-treatment outcomes.

The few studies considering impulsivity/low self-control in a substance abuse treatment context have either failed to find an association with outcomes like treatment retention or post-treatment outcomes, or observed unexpected connections given expectations based on the TC perspective and the GTOC. A key limitation of all these studies, however, has been their failure to *simultaneously* examine impacts of initial impulsivity/low self-control, as well as changes on that attribute. Ideally, the latter would be operationalized so as to correlate minimally with the former.

#### *The current study*

Using a sample of adult felony probationers assigned to a TC program, the current work examines the role of the GTOC in therapeutic community treatment using indicators of impulsivity/low self-control to predict treatment completion. The GTOC, because it emphasizes low self-control as emerging from ineffective socialization during preteen years, would expect *initial* impulsivity/low self-control to be associated with treatment completion. The TC perspective, because it highlights intra-individual changes occurring while the individual experiences treatment, would expect *changes* occurring during treatment in impulsivity/low self-control scores to be associated with the outcome. The current work explores the association between impulsivity/self-control items and TC treatment completion, and examines the impact of initial scores, while controlling for unexpected changes in impulsivity/low self-control, on treatment completion. These connections will be assessed after controlling for stable personal factors.

## **Methods**

### *Program*

These data were originally collected prospectively from 429 felony probationers with substance problems, admitted to a 6-month modified therapeutic community between January 1998 and December 1998 in Texas. Three-hundred and thirty of them (78 percent) provided information at both intake and 90 days after intake and are the participants analyzed here. The program provided intensive substance abuse treatment in lieu of more lengthy incarcerations in a state correctional facility. The program included the following modifications from the original structure of TCs: "12-Step programming, behavior modification, educational [and] vocational [programs], special therapies, and medical/psychiatric elements (Barthwell et al., 1995, p. 39)." The community included professional staff, encounter groups, morning and evening meetings, process groups and individual counseling. The structure of the program included three phases: Orientation, Main Treatment, and Aftercare. The first phase, Orientation, lasted one month. During this phase, the participants became familiarized with the TC, learned the rules, the expectations, and the peer-to-peer system for holding each other accountable for their behavior in the therapeutic community. The second phase, Main Treatment, lasted for three months and focused on group and individual therapy for substance abuse. The last phase, Aftercare, lasted one month and emphasized relapse prevention and transition back to society. This phase also included finding employment, acquiring "substance-free" stable housing, and the development of relapse prevention plans. For an in-depth discussion of the program structure, see Barthwell et al. (1995).

Previous studies using these data have examined predictors of therapeutic engagement, recidivism following treatment, and drop-out. The findings revealed that motivation, operationalized as desire for help and treatment readiness, was significantly associated with therapeutic engagement (Hiller, Knight, Leukefeld, et al., 2002). A more descriptive

study of the population was provided by Hiller, Knight, Rao, and Simpson (2002), examining factors such as social history, substance involvement, and abuse history. Relating these factors to treatment retention showed women, younger participants, and those with mental health problems were more likely to drop out of the program. Hiller, Knight, Saum, et al. (2006), examined social factors as predictors of drop-out and recidivism. They found those with higher levels of hostility during treatment were more likely to drop out. Additionally, they found modest changes in functioning during the first three months. However, they did not find an association between social functioning and post-treatment recidivism (Hiller, Knight, Saum, et al., 2006). The current study marks the only examination of personal factors using the GTOC to help expand on the TC perspectives. No study to date using these data has looked at the impacts of initial and changing impulsivity/low self-control on retention while controlling for stable personal factors.

### *Participants*

#### *Attrition*

Study participants entered the TC between January and December 1998 (Hiller, Knight, Leukefeld, et al., 2002). Data were collected from 429 participants, however individuals who were discharged due to medical reasons or were transferred to another county ( $n=23$ ) were excluded from the analyses (Hiller, Knight, Saum, et al., 2006). As in past work, dropping out refers to a voluntary exit from the program prior to completion or involuntary discharge due to non-compliance (Hiller, Knight, Rao, et al., 2002). Of the remaining cases, only 387 cases provided valid data for analysis at intake, and of those participants 103 subsequently dropped out of the program (35 drop-outs occurred between intake and the third month) and 284 completed the program. Only 333 individuals provided valid data for analysis at 90-days, of which only 330 provided valid data at both intake and 90-days. The findings from these cases are reported.

#### *Demographics*

Descriptive data are provided for the initial sample of participants who entered the program. They were mostly African-American or White (47.5 percent and 39.6 percent, respectively). Participants were primarily male (70.2 percent), with an average age of 32 at treatment entry. The majority of the participants had obtained either a high school diploma or GED equivalent (40 percent and 23 percent, respectively). Approximately a quarter (27 percent) were married, and a third (36.6 percent) had three to five prior arrests. Descriptive statistics appear in Table 1.

#### *Data collection and instruments*

Staff members administered several assessments to the participants at intake to guide the development of treatment plans. Upon entry into the program, participants received a shortened version of the Texas Christian University (TCU) Client Evaluation of Self and Treatment (CEST) (Simpson & Bartholomew, 2008) form. The short form, the TCU Self-Rating Form (SRF), included 95 questions assessing social and psychological functioning and participants' motivation for treatment (Hiller, Knight, Rao, et al., 2002; Hiller, Knight, Saum, et al., 2006). The SRF provided the baseline measures for the impulsivity/low self-control items used in the current study (Time 1). The CEST is the full assessment form, which includes the SRF along with measures of therapeutic engagement (Hiller, Knight, Rao, et al., 2002; Hiller, Knight, Saum, et al., 2006). Participants received the CEST at the end of the first month (after orientation), at the end of the third month, and at the end of the six months, prior to discharge. Current analyses use the 90-day measurement of the CEST as Time 2. From the CEST, indices for impulsivity/low self-control were developed (see below). Because an additional 52 participants dropped out

**Table 1**  
Descriptive Statistics

Total N: 429				
	Percentage (Intake/90 days)	Mean	Standard Deviation	Minimum/Maximum
<b>Independent Variable</b>				
Sensation-Seeking (Intake)	–	4.14	1.44	1–7
Sensation-Seeking (90-day)	–	4.12	1.46	1–7
Sensation-Seeking (Unexpected Change)	–	0.00	0.67	–2.27–1.73
Volatile Temper (Intake)	–	3.00	1.48	1–7
Volatile Temper (90-day)	–	3.42	1.58	1–7
Volatile Temper (Unexpected Change)	–	0.00	0.63	–2.48–1.93
Forward-Thinking (Intake)	–	4.82	1.14	1–7
Forward-Thinking (90-day)	–	5.26	0.98	2–7
Forward-Thinking (Unexpected Change)	–	0.00	0.64	–1.94–1.47
Risk-Taking (Intake)	–	4.03	1.50	1–7
Risk-Taking (90-day)	–	4.35	1.44	1–7
Risk-Taking (Unexpected Change)	–	0.00	0.70	–2.15–1.93
<b>Dependent Variable</b>				
Treatment Completion				
Completed treatment	73%	–	–	–
Did not complete treatment	27%	–	–	–
Retained at				
90-day	86%	–	–	–
6-month	74%	–	–	–
<b>Demographics</b>				
Age				
		32.1/32.35 years	–	17–62
Race				
African-American	46.9/47.3%	–	–	–
Caucasian	39.8/39.5%	–	–	–
Hispanic	9.8/10.2%	–	–	–
Gender				
Male	69.1/71.8%	–	–	–
Female	30.9/28.2%	–	–	–
Married				
	27%/27%	–	–	–
Educational Status				
High School Diploma	40/40.1%	–	–	–
GED	35/32.7%	–	–	–
Arrest history				
	–	9.23	11.20	1–100

between the 3rd month and 6th month assessment, shifts between intake and the 3rd month on the defined indices were used to operationalize change.

Analyses were conducted two ways: an unweighted analysis used all participants ( $n = 330$ ) who provided information at both the 1st and 3rd month assessments, and is reported here. A separate set of analyses were completed, in which the cases were weighted on gender, educational status, and race so that they matched the complete group of participants analyzed at intake ( $n = 387$ ). Results reported are based on unweighted results. Results with weighted participants provided an identical pattern of significance for key predictors.

### Indicators

#### Treatment completion

Through records obtained from the facility, participants were classified as having graduated from the program ( $= 1$ ) or dropped out ( $= 0$ ) (Hiller, Knight, Rao, et al., 2002). Of the 333 participants remaining at 90 days, 281 completed (84.4 percent) and 52 dropped out (15.6 percent).

#### Impulsivity/low self-control indices

The first and second authors reviewed all items from the CEST and selected just those items consistent either with the GTOC description of low self-control (Gottfredson & Hirschi, 1990) or De Leon's (1995) description of impulsivity. A series of principal components analyses with these selected items for baseline, 1-month and 90-day data ultimately suggested four relatively short, internally consistent indices relevant to impulsivity/low self-control. Because these indices are to some extent experimental, a Cronbach's alpha of  $\geq .60$  was

considered acceptable (DeVellis, 2003; Hiller et al., 2010). Items were subsequently z-scored, and averaged to create indices. Index means and standard deviations at intake and 90 days appear in Table 1. Item means and standard deviations at intake and 90 days appear in Appendix A.

*Sensation-seeking* ( $\alpha = 0.73/0.78$ ). Four items tapped a self-view as a risk taker ("like to take chances") who seeks thrills ("do strange or exciting things") and spends time with impulsive peers ("like wild friends"). A high score indicated high impulsivity/low self-control.

*Volatile temper* ( $\alpha = 0.82/0.85$ ). Five items tapped a self-view as a hot-tempered person ("have a hot temper"), whose temper easily leads to violence ("temper gets you into fights"; "mad at other people easily"), and a general proneness to physical aggression ("have urges to fight others"). A high score indicated high impulsivity/low self-control.

*Risk-taking* ( $\alpha = 0.71/0.73$ ). Persons scoring high on this index are averse to taking risks (e.g., "careful and cautious"; "avoid anything dangerous"). A low score indicates high impulsivity/low self-control.

*Forward-thinking* ( $\alpha = 0.63/0.66$ ). Four items tapped a willingness to look before leaping and to consider before acting (e.g., "look at all choices"; "think about the results of action"). A low score indicates high impulsivity/low self-control.

Correlations between the intake scores on the four different impulsivity/low self-control indices ranged from  $-0.42$  to  $0.43$  (median correlation =  $-0.11$ ).

*Impulsivity/low self-control: operationalizing unexpected change*

There are different ways to operationalize change, and the merits of different approaches continue to be debated. The approach adopted here is the regression-based approach for panel data (Bohrnstedt, 1969; Kessler & Greenberg, 1981; Thomas & Bishop, 1984). For each impulsivity/low self-control index, Time 2 (90 days) scores were regressed on intake scores, and the unstandardized residuals were retained. These were independent of intake scores, and reflect unexpected changes among participants on each index. They also control for overall changes in the entire sample on each index between intake and 90 days.

*Demographic variables*

The statistical control variables used in the analyses were selected based on the previously summarized empirical literature.<sup>1</sup> Previous studies have suggested that men are more likely to complete treatment than women (Hiller et al., 1998; Hiller, Knight, Rao, et al., 2002; Hiller, Knight, Saum, et al., 2006; Sansone, 1980). A dummy for *male* (= 1, 0 = female) was used. Previous studies found married individuals were less likely to complete treatment (Hiller et al., 1998; Sansone, 1980). A dummy for *married* (= 1, 0 = all other marital statuses) was used. Previous work has shown more education is associated with treatment completion (Hiller et al., 1998; Sansone, 1980). A dummy for at least *high school* (= 1, including GED equivalent, 0 = less than high school/GED) was used. Turning to race and ethnicity, previous studies have operationalized race as white or nonwhite (Collins & Allison, 1983), African-American or Caucasian (Cooper et al., 2010), or separated African-Americans, Hispanics, and Whites (Magruder, Ouyang, Miller, & Tilley, 2009). Following Meyers, Gamst, and Guarino (2006) and allowing African-Americans to serve as the reference category given their large representation in the sample, a dummy variable was included for *Hispanic* (Mexican American, Mexican National, Other Hispanic = 1; 0 = all other) and *White* (= 1; 0 = all other). Research consistently suggests that older participants are more likely to graduate from treatment than younger participants

(Hiller, Knight, Saum, et al., 2006; Sansone, 1980). Age was included as a continuous variable. Descriptive statistics for the outcome and all predictors appear in Table 1.

*Analysis*

Logistic models predicted treatment completion. An initial model with just demographics determined the total impact of each. Then models were run in individual impulsivity/low self-control indices. Since the four different indices were correlated, a separate analysis was conducted. In each model, for each index, both baseline and unexpected change were entered since they were independent of one another.

The Bayesian Information Criterion (BIC) was used to compare relative model fit; a lower number indicated better fit (Long, 1997; Long & Freese, 2006; Raftery, 1995). Differences in BIC between two models reflected the degree to which one model was better fitting than another. Long (1997) suggested a BIC difference of 6–10 provided a strong indication that one model was better fitting than another; a BIC difference > 10 provided a very strong indication that one model was better fitting. A BIC difference in the 2–6 range suggests one model was somewhat better fitting. BIC automatically adjusts for model complexity.

**Results**

Results for the logistic regressions<sup>2</sup> appear in Table 2. Indicators for two of the four impulsivity/low self-control indices were significantly related to the program completion outcome.

*Volatile temper*

Controlling for participant attributes and intake scores on volatile temper, results showed unexpected changes in volatile temper was related to treatment completion (OR = 0.44, CI = 0.26–0.74). A one unit increase in volatile temper score lowered the odds of completing

**Table 2**  
Multiple logistic regression predicting treatment completion

Variables	Controls		Volatile Tendencies			Sensation-Seeking			Risk-Taking			Forward-Thinking	
	O.R.	[95% C.I.]	O.R.	[95% C.I.]		O.R.	[95% C.I.]		O.R.	[95% C.I.]	O.R.	[95% C.I.]	
Controls													
Male	1.85*	[1.13, 3.04]	1.73	[0.86, 3.49]		1.38	[0.70, 2.75]		1.28	[0.65, 2.54]	1.36	[0.70, 2.67]	
Married	0.91	[0.54, 1.55]	0.89	[0.43, 1.83]		0.92	[0.45, 1.89]		0.94	[0.46, 1.91]	0.93	[0.46, 1.91]	
Age	1.05**	[1.02, 1.08]	1.04*	[1.00, 1.08]		1.05*	[1.01, 1.09]		1.05*	[1.01, 1.09]	1.06*	[1.02, 1.10]	
High School/GED	0.92	[0.56, 1.50]	0.86	[0.45, 1.66]		1.01	[0.53, 1.93]		1.10	[0.58, 2.12]	1.01	[0.53, 1.91]	
White	1.30	[0.78, 2.16]	1.88	[0.92, 3.82]		2.32*	[1.12, 4.81]		2.49*	[1.15, 5.37]	2.17*	[1.05, 4.49]	
Hispanic	1.01	[0.45, 2.26]	0.83	[0.31, 2.23]		0.91	[0.34, 2.43]		0.98	[0.37, 2.60]	0.90	[0.34, 2.38]	
Independent Variables	-	-	-	-		-	-		-	-	-	-	
Risk-Taking (Intake)	-	-	-	-		-	-		1.21	[0.95, 1.53]	-	-	
Forward-Thinking (Intake)	-	-	-	-		-	-		-	-	1.11	[0.83, 1.47]	
Sensation-Seeking (Intake)	-	-	-	-		0.56*	[0.35, 0.89]		-	-	-	-	
Volatile Tendencies (Intake)	-	-	0.84	[0.65, 1.08]		-	-		-	-	-	-	
Risk-taking (Change)	-	-	-	-		-	-		1.05	[0.76, 1.43]	-	-	
Forward-Thinking (Change)	-	-	-	-		-	-		-	-	1.15	[0.84, 1.57]	
Sensation-Seeking (Change)	-	-	-	-		1.04	[0.75, 1.43]		-	-	-	-	
Volatile Tendencies (Change)	-	-	0.44*	[0.26, 0.74]		-	-		-	-	-	-	
BIC	469.041		316.7075			318.3154			322.4962		323.7525		

Note: The analyses were conducted on a dataset obtained from 330 felony probationers with substance problems who were admitted to a 6-month modified therapeutic community between January 1998 and December 1998. Analyses were conducted using multiple logistic regression to predict treatment completion, and a higher score indicates an increased likelihood of completing the program. The indicators of self-control were scored as follows: A higher score on forward-thinking, sensation-seeking, and volatile tendencies indicated an increase in that particular indicator. However, a higher score on risk-taking indicates a decrease in risk-taking while a lower score indicates an increase in risk-taking. The control variables were coded as follows: Male (= 1, 0 = female), Married (= 1, 0 = all other marital statuses), age (continuous variable), high school (= 1, including GED equivalent was received, 0 = neither the high school diploma nor an equivalent was achieved), White (= 1, and 0 = African-American, Hispanic and Other), Hispanic (= 1 and 0 = African-American, White and Other).

\* = p < 0.05, \*\* = p < 0.001.

treatment by 56 percent. If one assumes these unexpected changes in volatile temper reflected intra-individual processes occurring as a result of TC program participation, the association seen here would seem to support the TC perspective. Those experiencing unexpected declines in volatile temper, between intake and 90 days, were more likely, months later, to complete the program.

#### *Sensation-seeking*

Controlling for personal attributes and unexpected changes in sensation-seeking, intake scores on sensation-seeking was associated with later treatment completion. Those scoring one unit higher on sensation-seeking at intake had 44 percent lower odds (OR = 0.56, CI = 0.35–0.89) of completing the treatment program. If it is assumed that the sensation-seeking index developed here does tap into some elements of low self-control, and that intake scores on sensation-seeking reflect some of the stable, relatively enduring facets of that personal factor, the result seen here would seem to support the GTOC.

#### *Forward-thinking and risk-taking*

After controlling for demographics, neither intake scores nor unexpected change scores for either forward-thinking or risk-taking was related significantly to program completion.

#### *Demographics*

With all models including impulsivity/low self-control indices, being older and being white were both associated with a significantly greater likelihood of treatment completion. Whites as compared to African-Americans were 88 to 149 percent more likely to complete treatment depending on which impulsivity/low self-control index was in the model, and this difference was significant in three of the four models with indices. As previously stated, earlier work has observed varying relationships between race and treatment completion (Collins & Allison, 1983; Cooper et al., 2010).

Each additional year in age at intake increased the odds of completing the program by 4 to 6 percent depending on the model examined. This association was significant in all four models with impulsivity/low self-control indices. The age results are consistent with previous studies suggesting that older participants were more likely to complete treatment than younger participants (Hiller, Knight, Rao, et al., 2002; Hiller, Knight, Saum, et al., 2006; Sansone, 1980).

#### *Comparing models*

The two best-fitting models, according to their BIC levels, were those including either volatile temper (BIC = 313) or sensation-seeking (BIC = 318). The small difference between the fit of these two models suggests each fitted the data comparably well. Using Long's (1997) categories for interpreting BIC differences across models, there is a strong indication that the volatile temper model provided better fit than the risk-taking (BIC = 322) or forward-thinking (BIC = 323) models.

All models including an impulsivity/low self-control were *markedly* better fitting than the demographics alone (BIC = 469). Because BIC scores control for model complexity, this difference suggests that any dimension of impulsivity/low self-control significantly enhanced model fit.

## **Discussion**

### *Focus*

The GTOC guided the selection of personal factors that might relate to substance-involved probationers completing a therapeutic community. Program completion is critical because it is associated with

positive post-treatment outcomes. The GTOC highlights the importance of low self-control, as a key factor leading to a person's involvement in risky behaviors including substance abuse and crime. By extrapolation, an individual with low self-control might be unwilling to remain in treatment when doing so competed with involvement in risky or criminal opportunities. The GTOC expects that those who score low on a relatively enduring personal factor of self-control will be less likely to complete treatment. The TC perspective expects that changes taking place during treatment, reflecting intra-individual processes and changes, should lead to program completion. Using four indices reflecting impulsivity/low self-control, the expectations of the GTOC were tested while controlling for changes (as proposed by the TC perspective) and program participant demographics.

#### *Relevance of impulsivity/low self-control*

The most important feature of the results was the markedly better fit of any model including a dimension of impulsivity/low self-control as compared to the model that included only demographics. Clearly, the broad personal factor of impulsivity/low self-control strengthened models predicting a later program completion outcome. This generally supports both De Leon's (1995) and Gottfredson and Hirschi's (1990) arguments pertaining the relevance of this personal factor.

#### *Support for two theoretical perspectives*

Current results support both the TC perspective and the GTOC. Turning first to the TC perspective, the volatile temper results showed unexpected changes during treatment significantly predicted later treatment completion; specifically, unexpectedly increasing volatile temper was associated with a lower likelihood of completing treatment.

To date, numerous studies have been conducted examining the role of personal factors in TC treatment, and many of these studies have noted changes in personal factors during the course of treatment (Bankston et al., 2009; Hiller, Knight, Saum, et al., 2006; Newton, 1998; Prendergast et al., 2002; Welsh, 2010). But none of those studies have identified a significant relationship between changing impulsivity/low self-control and later treatment completion. This is the first study to do so while controlling for demographics. These changes were not associated with the initial assessment, as the unexpected changes in volatile temper were *uncorrelated* with volatile temper scores at intake (0.00). This operationalization increases the likelihood that these changes arise from intra-individual processes taking place in part because of treatment participation. These changes *may* reflect the re-socialization described by De Leon (1995, 1996) as central to positive outcomes during and after treatment.

Of course, considerable work is needed in the future to better describe the intra-individual changes taking place during treatment, and how those changes connect in specific ways to program participation and program elements. That future work might involve qualitative or quantitative work, connecting participants' behaviors in treatment with changes in self-report of personal factors.

Turning to the GTOC, results supported the idea that low self-control would predict failure to complete the program. Higher intake scores on the sensation-seeking index were associated with significantly lower odds of treatment completion after controlling for demographics.

Of course, it is not clear how stable the intake scores in sensation-seeking were, and, as mentioned earlier, there has been significant debate regarding the stability thesis for low self-control in the GTOC. But the GTOC would *not* expect changes in low self-control, especially when operationalized as they were here, to relate to an outcome. GTOC would consider the latter transient shifts around a stable person-level mean. Even though it is unknown how stable the intake scores on sensation-seeking were, and that remains a topic for future research, the scores *did* relate to program completion which strongly

supports a GTOC-based model of individual differences in treatment completion likelihood. This, by extrapolation, suggests an individual differences model of post-treatment outcomes.

On a practical note, if intake measurements of sensation-seeking are associated with later treatment completion in future studies, these intake scores could be used by staff to identify participants at higher risk for dropout, and to target resources appropriately. Staff could provide a higher level of surveillance for the more at-risk participants, and respond faster if those participants appeared to be disengaging from the program.

The results also suggest practical application in regards to the relevance of treatment length and personal factors. The length of this particular program was six months, and a significant association was found between change in volatile tendencies and treatment completion; however, a significant association was not found for change in sensation-seeking and treatment completion but rather initial scores and treatment completion. This could be due to the varying nature of these two characteristics. Volatile tendencies are more likely to be readily observable and as such can be addressed rather quickly. As previously mentioned TC's are intended to reduce anti-social behavior and even features peer-to-peer confrontation of such behavior. All TC's operate by a set of rules that are clearly described to participants (Field, 1989). Among these rules are cardinal rules, which can result in termination if broken. As it is, one such rule is the proscription of violence, and could account for why increasing volatile tendencies were associated with a lower likelihood of treatment completion.

However, sensation-seeking differs from volatile tendencies as it is a more general characteristic and may not be as easily identified in its manifestations as volatile tendencies. As such, a later assessment period, between 3- and 6-months, could have provided a different picture for unexpected change in sensation-seeking. This could account for why initial scores were significantly associated with treatment completion rather than unexpected change. Three-months, post-intake, may have been an insufficient period for capturing significant change in these characteristics. This would also suggest that a longer treatment period may be in order. If sensation-seeking is not easily identified in a short-period of time, a longer treatment period may be necessary to identify it, and determine if efforts to address it are, in fact, effective. Similarly, risk-taking and forward-thinking may be better addressed in a long-term TC as both may require a longer period of time for these tendencies to manifest and a longer period of time to determine if those characteristics are adequately addressed.

However as the results show, each theory appears relevant, depending on the content sub-domain of impulsivity/low self-control identified. And, as mentioned, there are important on-going questions regarding different aspects of self-control, and how they should be assessed (Tittle et al., 2003; Tittle, Ward, & Grasmick, 2004). To better align work on substance abuse treatment completion and post-treatment outcomes with these ongoing discussions, treatment researchers in future works should employ a wide array of self-control indicators that include cognitive as well as behavioral measures, and that allow the separation of behaviors indicative of self-control from interest in exercising it. If treatment researchers employ a full battery of self-control indicators they will be able to evaluate the theoretical relevance of stable self-control and the GTOC, relative to the TC perspective and its focus on intra-individual change processes during treatment.

#### Limitations and strengths

Of course, the current work has several limitations. Self-report measures of impulsivity/low self-control were used, rather than the recommended behavioral indicators (Hirschi & Gottfredson, 1993). Second, a standardized self-control instrument was not used in this study. Rather, it was necessary to construct impulsivity/low self-control indices from available items. The indices identified, albeit

internally consistent, should therefore be considered experimental. Third, subsequent to the intake assessment, change was only observed at one measurement point. The time elapsed between the intake and 90 day assessments may or may not have been the most theoretically appropriate time frame for gauging change. Future work should gauge changes at multiple points subsequent to intake.

Potentially offsetting study limitations are some study strengths. This work sought to conduct analytic tests closely allied with theoretical perspectives. In addition, analyses controlled for respondent demographics. Further, different levels of model fit were systematically compared using a fit indicator that controlled for differing levels of model complexity. Finally the outcome, program completion, occurred substantially after the assessments periods used in the analysis.

#### Conclusion

Whether substance-involved offenders complete treatment programs is an important clue to whether they will be able to avoid substance abuse and criminal involvement in the future. The current work, seeking to more fully ground work on treatment completion in theory, focused on the personal factor of impulsivity/low self-control and its impact on whether substance-involved felony probationers completed treatment. Two theoretical frames guided the investigation. In support of the TC perspective, participants whose scores on a volatile tendencies index were unexpectedly decreasing after intake were more likely to complete treatment. In support of the GTOC, participants with higher intake scores on sensation-seeking were less likely to complete treatment. Models including an impulsivity/low self-control index in addition to demographics provided significantly better fit. Thus, both of these theoretical perspectives appeared relevant to the treatment completion outcome for this group. Nevertheless, numerous issues have yet to be resolved before the specific relevance of each of these two theories can be gauged for outcomes like completion of substance abuse treatment programs and successful post-treatment outcomes for substance-involved probationers.

#### Appendix A. Factor analysis and scale development

Scale/Item	Intake		90-days	
	M (SD)	Item-Total Correlations	M (SD)	Item-Total Correlations
Sensation-Seeking ( $\alpha = 0.73/0.78$ )	4.12 (1.44)		4.12 (1.46)	
Like to take chances	4.90 (1.79)	0.438	4.41 (1.82)	0.569
Like the fast life	3.89 (2.07)	0.592	3.98 (2.01)	0.620
Like wild friends	3.06 (1.94)	0.576	3.28 (1.91)	0.641
Do strange or exciting things	4.65 (1.92)	0.491	4.79 (1.79)	0.522
Volatile temper ( $\alpha = 0.82/0.85$ )	3.00 (1.48)		3.43 (1.58)	
Urges to fight others	1.95 (1.51)	0.547	2.42 (1.85)	0.606
Have a hot temper	3.01 (2.03)	0.698	3.33 (2.03)	0.717
Arguments/Fights growing up	4.07 (2.14)	0.538	4.47 (2.09)	0.602
Temper gets you into fights	2.92 (2.04)	0.700	3.41 (2.14)	0.743
Mad at other people easily	3.03 (1.89)	0.637	3.49 (1.88)	0.615
Risk-Taking ( $\alpha = 0.71/0.73$ )	4.01 (1.50)		4.35 (1.44)	
Avoid anything dangerous	4.03 (2.00)	0.477	4.30 (1.89)	0.524

## Appendix A (continued)

Scale/Item	Intake		90-days	
	M (SD)	Item-Total Correlations	M (SD)	Item-Total Correlations
Do things that feel safe	3.77 (1.88)	0.578	4.05 (1.85)	0.586
Careful and cautious	4.22 (1.77)	0.516	4.70 (1.63)	0.537
Forward-Thinking ( $\alpha = 0.63/0.66$ )	4.80 (1.14)		5.26 (0.98)	
Plan ahead	4.35 (1.87)	0.391	4.94 (1.55)	0.345
Think about the probable results of actions	4.69 (1.72)	0.414	5.25 (1.43)	0.503
Different way to solve problems	5.18 (1.49)	0.440	5.51 (1.24)	0.473
Analyze problems by looking at all choices	5.00 (1.57)	0.393	5.35 (1.30)	0.494

Response categories for original items was strongly disagree (1) / not sure (4) / agree strongly (7).

## Notes

1. Inter-correlation between demographic factors was examined, and low correlations were found between demographic factors.

2. Models including indicators of motivation at baseline, treatment readiness and desire for help, were also analyzed. The inclusion of these variables did not alter the pattern of findings. As such, in the interest of parsimony, the findings reported pertain to the model analyzed that excluded the indicators of motivation.

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