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Application of the Transtheoretical Model of Change: Psychometric Properties of Leading Measures in Patients with Co- Occurring Drug Abuse and Severe Mental Illness

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Abstract

People with severe mental illness (SMI) have high rates of substance use disorders. The Transtheoretical Model (TTM) is a framework for understanding behavior change. There are five leading measures associated with the TTM - University of Rhode Island Change Assessment, Processes of Change Scale, Decisional Balance Scale, Abstinence Self-Efficacy Scale, and Temptation to Use Drugs Scale. While these measures have been found to be reliable and valid in primary substance abusers, it is unknown if these measures are relevant in people with co-occurring SMI and substance use disorders (SUD). We evaluated the psychometric properties of these measures in a sample (n=240) of people with co-occurring disorders. Participants met DSM-IV criteria for schizophrenia/schizoaffective disorder or non-psychotic affective disorder, and current cocaine dependence or cocaine dependence in remission. All subscales showed good reliability and validity in the total sample. Analyses within diagnostic groups showed good reliability and validity in most groups, with some falling off in the affective disorders and remitted cocaine dependence groups. Overall, findings support the use of these measures in people with co-occurring disorders.

Keywords

serious mental illness; substance abuse; transtheoretical model; psychometrics

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1.0 Introduction

Substance abuse is a critical and devastating health problem in individuals with severe mental illness (SMI). Nearly 50% of all persons with SMI have met criteria for a lifetime substance use disorder (SUD; Barry, Fleming, & Grenney, 1995; Mueser, Yarnold, & Bellack, 1992). SUDs are especially harmful for people with SMI, who are already severely disadvantaged by impairments that are part of their mental illness. People with co-occurring SMI and SUDs show more medication noncompliance, symptom exacerbations, and re-hospitalizations than do people with SMI only, as well as poor social adjustment and an overall poorer prognosis (Drake, Mueser, Clark, & Wallach, 1996; Cournos, et al., 1991). Although treatment for people with co-occurring SMI and SUDs is complex, interventions for substance abuse that emphasize long-term, integrated treatment that is tailored to the special needs of people with SMI have been shown to be effective in reducing substance abuse and improving rates of abstinence in this population (Bellack et al., 2006; Gonzalez & Rosenheck, 2002; Mueser, Drake, & Miles, 1997). However, the mechanisms that underlie change in SMI remain unknown.

The Transtheoretical Model (TTM) is a framework for understanding intentional behavioral change, and has been used in a large number of studies investigating the treatment and resolution of substance use disorders. There are several dimensions of the TTM, including the stages, processes, and markers of change. The stages of change are the fundamental organizing constructs of the TTM model, with each stage defined by certain tasks to be completed before a person moves onto a succeeding stage. The processes of change represent experiences and activities that allows for movement through the stages. The markers of change are made up of two indicators that signify where a person is regarding change: decisional balance (i.e. the pros and cons of engaging in the behavior) and self-efficacy/temptation regarding the behavior to be changed (DiClemente, 2003). The dimensions of the TTM have been shown to be relevant to change processes among primary substance abusers (Project MATCH Research Group, 1997, 1998; Carey et al., 1999).

It is unclear if the TTM applies to people with co-occurring SMI and SUDs. There are many factors that may impact the ability of people with co-occurring SMI and SUD to access and utilize a process of change similar to that of primary substance abusers. People with SMI have profound cognitive impairments in perception, attention, memory, and reasoning that interfere with their ability to problem solve, make decisions, and assess their own needs. Research has found that, due to these cognitive deficits, some SMI patients show less benefit from rehabilitation programs (Bellack, Gold, & Buchanan, 1999; Silverstein, Schenkel, Valone, & Nuernberger, 1998). Psychotic symptoms that go along with some forms of SMI may also impact how people change. Deficits in social functioning that can impair the ability to establish drug-free social networks and access assistance from others may also impact change. To date, it is unclear if cognitive impairment, psychotic symptoms, or other deficits and impairments associated with SMI impact the way people with SMI go about changing drug use.

Research exploring the mechanisms and process of change in people with co-occurring SMI and SUDs is hampered by the fact that we do not know how well traditional measures of the TTM perform in this population. The most widely used measures of the TTM - the University of Rhode Island Change Assessment (URICA), the Processes of Change Scale, the Decisional Balance Scale, the Abstinence Self-Efficacy, and the Temptation to Use Drugs Scale - have all been shown to tap constructs of the TTM and to be associated with change in samples of smokers, drinkers, and illicit drug users (Carbonari & DiClemente, 2000; Naar-King et al., 2006; Schumann et al., 2005). However, the cognitive and social deficits and severe symptoms found in SMI may affect the ability of people with co-occurring SMI and SUDs to understand and accurately respond to the TTM measures. For example, the ability to self-report intention to change may be impacted by deficits in self-awareness and abstract thinking that often

accompany SMI. Negative symptoms associated with schizophrenia that involve the experience of a lack of energy and/or will to engage in behaviors may make TTM measures inappropriate since they are based on a motivational construct (Carey, Maisto, Carey, & Purnine, 2001).

Several studies have examined psychometric properties of the TTM measures in people with co-occurring SMI and SUDs. Valasquez et al. (1999) assessed constructs related to the TTM in people with SMI (major depressive disorder, schizophrenia, and bipolar disorder) and SUDs (alcohol dependence). They found acceptable alpha coefficients for the Decisional Balance Scale (i.e., pros subscale = .90, cons subscale = .91) and the URICA (readiness to change score = .91). However, test-retest reliability and correlations among subscales for both measures were not considered, and the fact that the sample included only alcohol use disorders makes it difficult to know if these findings would apply to substances other than alcohol. In a sample of 39 substance abusers with schizophrenia, Addington and colleagues (1999) assigned participants to stage of change groups based on both clinician/chart data and a stage of change algorithm, and then compared these assignments with findings from both the Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES; Miller and Tonigan, 1996) and the Readiness to Change Questionnaire (RCQ; Rollnick et al., 1992). There was little correspondence between assigned stage of change and stage as defined by the SOCRATES and the RCQ. However, the small sample size and questionable stage assignments used in this study make the findings difficult to interpret. To further our understanding of the mechanisms of change in people with co-occurring SMI and SUDs, the psychometric properties of the leading TTM measures must be examined in a large sample and relationships among the measures must be analyzed.

The present study examined the applicability of the TTM measures in people with co-occurring SMI and SUDs. Specifically, we examined the psychometric properties of the University of Rhode Island Change Assessment, the Processes of Change Scale, the Decisional Balance Scale (pros and cons of drug use), the Abstinence Self-Efficacy Scale, and the Temptation to Use Drugs Scale in a large sample ($n=240$) of people with SMI and current cocaine dependence or cocaine dependence in remission. Our main questions were: (1) Do the TTM measures show adequate reliability in people with co-occurring SMI and current or remitted SUDs; (2) Do the TTM measures show good validity in this sample; and (3) Is the utility of the TTM measures influenced by diagnosis (schizophrenia spectrum vs. affective disorder) or SUD status (current dependence vs. remission)?

2.0 Methods

2.1 Participants

Participants were part of a larger study examining the process of change in dually diagnosed individuals over one year (The Process of Change in Drug Abuse by Schizophrenics, funded by NIDA, A. Bellack, PI). Participants were two hundred and forty psychiatric outpatients who met DSM-IV criteria for schizophrenia/schizoaffective disorder (SZ) or a non-psychotic affective disorder (e.g., major depression without psychotic features; AD). Participants were also required to meet DSM-IV criteria for either current cocaine dependence (DEP) or remission (REM). Cocaine was the primary substance of abuse for all participants, although those who reported the use of other drugs were not excluded from the study. Exclusion criteria were mental retardation, a documented history of seizure disorder, or head trauma with loss of consciousness. The sample was 62.9% male, 79.2% African-American, with a mean age of 43.17 years ($SD = 7.23$) and a mean number of years of education of 11.91 ($SD = 2.20$). Participants fell into one of four groups: SZDEP ($n = 72$), SZREM ($n = 48$), ADDEP ($n = 65$), or ADREM ($n = 55$).

2.2 Measures

2.2.1 Diagnosis and symptom assessment—Psychiatric diagnoses and substance use disorder diagnoses were confirmed using the Structured Clinical Interview for DSM-IV (SCID-P; First, Spitzer, Gibbon, & Williams, 1995). The Positive and Negative Syndrome Scale (PANSS; Kay, Fiszbein, & Opler, 1987) was used to evaluate psychiatric symptomatology.

2.2.2 Drug Use Assessments—The Addiction Severity Index (ASI) (McLellan et al., 1992) was used to assess drug use frequency and severity. The ASI is a semi-structured clinical interview that is probably the most widely used instrument in the field (e.g., Carroll, Power, Bryant, & Rounsaville, 1993; McLellan et al., 1992). Only the drug, alcohol, family/social, and legal sections of the ASI were administered for the present study, as they are the most reliable sections for this population (Carey, Cocco, & Correia, 1997; Hodgins and El-Guebaly, 1992). Scoring was based on composites, which have been shown to have better psychometric properties than the original scoring procedures (Alterman et al., 1994; McDermott, Alterman, Brown, & Zaballero, 1996). As part of the ASI administration, the Time Line Follow-back (TLFB; Sobell & Sobell, 1992) method was used as needed to help participants reconstruct their drug use on a day-to-day basis using a calendar for the last 30 days. The TLFB has been shown to have reliability and validity (see L.C. Sobell & M.B. Sobell, 1992, for a review). Carey (1997) has reported comparable results for psychiatric patients with psychotic disorders.

2.2.3 Assessment of stages and processes of change—The measures used to assess the stage and processes of change were modified versions of originals designed to evaluate behavior change in individuals with various addictive behaviors (i.e., smoking and alcohol use), and are based on the Transtheoretical Model. The measures used in the present study are shortened versions of the originals and specific for illegal drug use, and have been used successfully in previous studies assessing problem drug use (Belding, Iguchi, Lamb, & Lakin, 1995; Tsoh, 1995). The measures are all designed to be read on an 6th-grade reading level, and therefore suitable for use with a mentally ill population. The wording was also made more specific than the originals. For example, “illegal drug use” was expanded to “illegal drug use, such as marijuana, cocaine, or heroin.” To further ease the comprehension of the measures, the instructions and individual items were read aloud to participants, as opposed to when they are used with non-mentally ill people who often read and complete the instruments themselves. Additional specific changes in certain measures are detailed below.

2.2.3.1 The University of Rhode Island Change Assessment - Maryland (URICA-M): The URICA-M was used to assess participants’ stage of change. The original URICA is a 32-item self-report questionnaire, which employs a 5-point Likert scale asking respondents to rate their degree of agreement (or disagreement) with each item (DiClemente & Hughes, 1990). Each item refers to a “problem” that the patient identifies. Research has supported the use of a brief version (24-items) of the URICA with an alcoholism treatment population, and comparable versions that have also been used successfully with various drug-abusing populations (Tsoh, 1995; Belding et al., 1995). The URICA-M is a modified version of the URICA that consists of 24 items and is designed to suit the needs of people with SMI, including: (1) reading each item aloud to accommodate participants who cannot read or do not have eyeglasses; (2) modifying the language to make it simpler and easier to understand for participants with cognitive deficits; (3) defining the “problem” referred to in each item as “illegal drug use”; and (4) including only 24 items. Like the URICA, the URICA-M includes four subscales: Precontemplation, Contemplation, Action, and Maintenance (DiClemente & Prochaska, 1998). Precontemplation items tap a person’s unwillingness to change a problem behavior or their ignorance regarding the problem. Contemplation items assess whether the person is seriously considering change and/or considering the pros and cons of not changing. Action items assess whether the individual is engaging in change. Maintenance items assess the degree

that change is integrated into a person's life (DiClemente & Prochaska, 1998). In addition, a single readiness to change score is calculated by subtracting the Precontemplation score from the sum of the Contemplation, Action, and Maintenance scores. The readiness score can range from -2.00 to 14.00, with higher scores representing greater motivation to change. Factor analytic research has validated this single continuous readiness score (Carbonari, DiClemente, & Zweben, 1994).

2.2.3.2 Other TTM Measures: The Decisional Balance Scale (DBS; Velicer, DiClemente, Prochaska, & Brandenburg, 1985) was used to evaluate attitudes about the pros (DB Pros) and cons (DB Cons) of drug use. In the present study, a modified version of the DBS was used that consisted of 22 items (modified from the original 31-item version), with several items added to address special circumstances relevant to individuals with serious mental illness ("Using drugs has a bad effect on my medications", "Using drugs makes my mental illness worse"). Alpha coefficients for DB Pros and DB Cons of the revised measure have reached .92 (Hagedorn, 2000).

The Process of Change Scale (POC; DiClemente et al., 1996; Rothfleisch, Wright, & DiClemente, 1997; Tsoh, 1995) was used to assess the cognitive and behavioral processes subjects use to reduce drug use. Subjects are asked to rate the frequency with which they use specific change processes on a 5-point Likert scale (1 = Never to 5 = Repeatedly). In the present study, a revised version of the POC with 22 items was used (shortened from the original 40-item scale). The POC contains two subscales: Experiential processes (POC Experiential) and Behavioral processes (POC Behavioral). These subscales have been found to have good reliability and validity among samples of smokers (Perz, DiClemente, & Carbonari, 1996; Prochaska, Velicer, DiClemente, & Fava, 1988) and alcohol abusers (Freyer et al., 2006).

The Temptation to Use Drugs Scale (TU) and Abstinence Self-Efficacy (SE) Scale (DiClemente, Carbonari, Montgomery, & Hughes, 1994) were used to assess the degree to which subjects feel "tempted" to use drugs in different situations and the degree to which they feel "confident" in their ability to abstain from drug use in the same situations. For the present study, 12-item versions of both measures were used (shortened from the original 20-item versions); ratings were made using 5-point Likert scales (1 = not at all tempted; 5 = extremely tempted). Subscale scores for temptation and self-efficacy are computed for four subscales with 3 items each: Negative Affect, Social/Positive Influences, Physical and Other Concerns, and Withdrawal and Urges. Psychometric properties of these measures are strong across varied addictive behaviors (DiClemente, Fairhurst, & Piotrowski, 1995).

The Cartoon Stage of Change Measure (C-SOC; Wells, Calsyn, Clark, & Jackson, 1998) was included as an additional measure of stage of and readiness to change. The C-SOC utilizes cartoon pictures rather than text for people with reading or cognitive deficits. It includes a series of four panel cartoons depicting different attitudes or intentions about using substances. The scale includes pictures of a gender and ethnically neutral character participating in either illicit drug use behaviors or abstaining behaviors. Respondents then indicate whether each panel is "like me now" or "not like me now", as well as which panel is "most like me". There are three cartoons for each stage of change, permitting calculation of stage scores and a continuous readiness to change score analogous to the URICA. The C-SOC readiness score is calculated as follows: (Action + Maintenance) - (Contemplation + Precontemplation; Clark, Wells, Peterson, Jackson, & Stanton 2006). The possible range of the C-SOC readiness to change score (C-SOC READINESS) is -6.00 to 6.00. Research with cocaine abusing individuals has found that the C-SOC is generally reliable (Clark et al., 2006), and that it is sensitive to change (Wells et al., 1998). In our work using the C-SOC with people with SMI (Kinnaman, Bellack, Brown, & Yang, 2007) we found that the C-SOC readiness score was related to increased treatment utilization and decreased substance use. The C-SOC was

included to examine convergent validity of the TTM measures in a sample of individuals with co-occurring SMI and SUD.

2.3 Procedures

All procedures were approved by the University of Maryland School of Medicine Institutional Review Board. Participants were recruited from outpatient mental health clinics affiliated with the Division of Community Psychiatry at the University of Maryland, the Veterans Administration Medical Center, and a clinic for homeless individuals in Baltimore, Maryland in Baltimore, Maryland. Data for the present study were gathered during the baseline, 6-month, and 12-month assessments. The baseline assessment involved a 4-hour assessment battery across two separate days; the assessments at the 6- and 12-month time-points took approximately 1–2 hours to complete.

Doctoral or master's level staff completed all clinical interviews (SCID and PANSS). Interviewers were trained on these measures and completed reliability ratings on cases from ongoing studies in our research laboratory. The inter-rater reliability (kappa) for the SCID-P diagnoses (psychiatric and substance abuse/dependence) was greater than 0.80, while the reliabilities (intraclass correlations) for the PANSS ranged from 0.63 to 0.93, with a mean of 0.82. To prevent rater drift, all interviewers received bi-monthly supervision during which randomly selected videotapes of clinical assessments from ongoing studies were viewed and consensus ratings obtained. Subjects with uncertain diagnoses were considered ineligible to participate.

Several procedures were employed to increase the validity of self-reports of substance use including: (1) the use of urinalysis at the time of the interview, (2) accessing data from medical records and case managers prior to the interview (so inconsistent patient reports can be questioned), and (3) assuring the subject of the confidentiality of his/her responses (a Federal Certificate of Confidentiality was obtained for the study), and that information would not affect eligibility for services. Urine was analyzed for traces of cocaine, heroin, and/or marijuana using the Syva RapidTest (formerly called Accusign) which provides results on site within 5-minutes.

3.0 Results

3.1 Reliability of the TTM Measures and Subscales

3.1.1 Reliability in the total sample—We examined reliability for the five measures associated with the TTM - Stage of Change (URICA-M), Self-Efficacy (SE), Temptation to Use (TU), Processes of Change (POC), and Decisional Balance (DB) - by calculating internal consistency reliability (Cronbach's alpha) for the total measures and subscales of the URICA, DB, and POC. The measures showed high internal consistency (Table 1). All subscales had good to excellent reliability (i.e., .72 or higher), with the exception of the Maintenance subscale of the URICA-M, which had moderate reliability.

3.1.2 Reliability in diagnostic and substance use groups—Participants were classified according to primary psychiatric diagnosis and drug use status, yielding four diagnostic groups: schizophrenia/dependent (SZDEP), schizophrenia/remitted (SZREM), affective/dependence (ADDEP), and affective/remitted (ADREM). Cronbach's alphas for all measures and subscales of the URICA, DB, and POC were calculated for all groups (Table 1).

Alphas of .80 or higher were found for DB Pros, DB Cons, SE total, and TU total, indicating excellent internal consistency for these measures. Group means showed a consistent and expected pattern, with the drug dependent groups having higher mean scores on the TU and lower mean scores on SE than the remitted groups.¹ The Experimental and Behavioral

subscales from the POC scale showed moderate to excellent reliability across the four groups; the affective disorder groups had lower reliability on POC Experimental than the schizophrenia groups. Alphas for the subscales of the URICA-M showed moderate to very good reliability among the SZDEP, SZREM, and ADDEP groups. The ADREM group showed low reliability; only the Action subscale had acceptable reliability in this group. This suggests that the URICA-M works better in the schizophrenia and dependent groups than the affective remitted group.

3.1.3 Classification by drug use status—Participants were separated by drug use status [i.e., remitted (REM) or dependent (DEP)], and Cronbach's alphas were calculated for measures and all subscales. Alphas were good to excellent for both subgroups (i.e., .77 to .93) for SE total, TU total, DB Pro, DB Cons, POC Experiential, and POC Behavioral. The group means again showed a consistent and expected pattern: the REM group showed higher means for SE subscales and lower means for TU subscales than the DEP group. While reliability of the URICA-M was acceptable in both groups, alphas for the REM group (i.e. .63 to .73) were lower than the DEP group (i.e. .69 to .83), a pattern that is similar to what was found in the four-group analysis.

3.1.4 Classification by primary psychiatric diagnosis—Participants were divided by primary psychiatric diagnosis [schizophrenia (SZ) or affective disorder (AD)] and alphas were recalculated. Reliability for the measures and subscales ranged from moderate to excellent. Alphas for the URICA-M subscales were lower in the AD group than the SZ group.

3.1.5 Six- and twelve-month assessments—All TTM measures were re-administered at the 6- and 12-month time-points of the parent study. These data were analyzed in order to examine the stability of the measures over the year-long study period (Table 2). Overall, 78% (n=186) of the sample was assessed at each follow-up point. Cronbach's alphas for all measures and subscales showed little change in the total sample, ranging from moderate (i.e., .67 on URICA-M Maintenance at baseline) to excellent (i.e., .93 on SE at 12-month and TU at 6- and 12-months). Means of all measures and subscales showed consistency over time, and reflected a pattern that would be expected of a substance abusing sample working on behavior change. Means for URICA-M Contemplation and URICA-M Action were higher than those for URICA-M Precontemplation and URICA-M Maintenance. Subjects endorsed more DB Cons than DB Pros, POC Behavioral items were endorsed somewhat more than POC Experiential items, and SE scores were higher than TU scores. This pattern occurred at each of the time-points. These results suggest that people with co-occurring SMI and SUD can respond to the TTM measures consistently over time.

3.2 Validity of the TTM Measures and Subscales

3.2.1 Correlations between URICA-M Readiness score and TTM measures in the total sample—In order to examine convergent and construct validity of the TTM measures, we conducted correlations of the TTM measures with the total Readiness score (READINESS) from the URICA-M (Table 3). READINESS was positively correlated with POC Experiential, POC Behavioral, and DB Cons. READINESS was also positively correlated with TU and C-SOC READINESS; however the low value of these correlations suggests that these measures are only marginally related. In addition, correlations between READINESS and the TTM measures were examined at the 6- and 12-month time-points to examine validity over time (Table 4). The relationship between READINESS and TU (which was weak at baseline) was the only association that was not repeated at the 6- and 12-month assessments. POC Experiential, POC Behavioral, DB Cons, and C-SOC READINESS all showed high correlations with READINESS at the follow-up. Relationships among READINESS and the

¹Means and standard deviations for all analyses are available upon request from the first author.

TTM measures indicate good construct validity of the measures in this sample, as well as their consistency over time. The positive relationship between URICA READINESS and C-SOC READINESS suggests good convergent validity of the measures.

3.2.2 Correlations between URICA-M Readiness and TTM measures within diagnostic and substance use groups

Next, we examined the correlations between READINESS and the TTM measures within diagnostic [schizophrenia (SZ) or affective disorder (AD)] and substance use [dependent (DEP) and remitted (REM)] groups (Table 3). While patterns were similar to findings with the total sample, there were several differences. POC Experiential and POC Behavioral were positively correlated with READINESS in all groups; POC Behavioral showed the strongest relationship with READINESS in the DEP group. Likewise, DB cons were more strongly associated with READINESS in the DEP group than the REM group. Across groups, READINESS was positively correlated with DB Cons, similar to the total sample. This pattern suggests that respondents with current cocaine dependence were aware of the negative consequences of their drug use, and were engaging in change behaviors. Regardless of diagnosis or substance dependence status, respondents who were most ready to change endorsed more “cons” of using than those who were less ready to change.

Lastly, DB Pros were associated with READINESS in the AD group, although only marginally. READINESS showed small but significant positive correlations with TU in the AD, DEP, and REM groups (as occurred in the overall sample), but this relationship was not found in the SZ group.

3.2.3 Correlations between URICA-M subscales and other measures in the total sample

Finally, we correlated the subscales from the URICA-M with the subscales from all of the other TTM measures at baseline, to examine if the different URICA-M stages of change were associated with expected patterns of responding on the other measures. Overall, a consistent pattern of relationships emerged among the URICA-M stages of change and the TTM subscales (Table 5). Significant negative correlations were found between URICA-M Precontemplation and both POC Behavioral and POC Experiential, as well as between DB cons, and SE. URICA-M Precontemplation was also negatively correlated with C-SOC READINESS. As expected, there were positive correlations among the remaining subscales of the URICA-M and most other measures. URICA-M Contemplation was positively correlated with POC Behavioral, POC Experiential, and DB Cons, showing that people begin using the processes of change and see the negative impact of drug use early in the change process when they are first contemplating change. URICA-M Action was positively correlated with DB Cons and both POC subscales. As expected, the correlation between URICA-M Action and POC Behavioral was greater than the correlation between URICA-M Contemplation and POC Behavioral. Conversely, the correlation between URICA-M Action and POC Experiential was less than the correlation between URICA-M Contemplation and POC Experiential. This is consistent with past research that shows an increase in POC Experiential at the beginning of the process of intentional behavior change, with a switch to more behavioral process use as the person moves through the stages (DiClemente et al., 1991). URICA-M Action was also positively correlated with the SE (showing an increase in confidence in those who endorsed items associated with taking action to decrease drug use), and with C-SOC READINESS. As expected, URICA-M Action was negatively (albeit weakly) correlated with the TU, indicating that the action stage may be associated with lower temptation to use drugs. The URICA-M Maintenance scale was positively correlated with TU, POC Experiential, and DB Cons, and weakly associated with DB Pros, and SE. These correlations suggest that those who endorse URICA-M Maintenance items are struggling with the temptation to use and see the harmful effects of using drugs. They also may focus on the positives of using somewhat, and have low confidence in their ability to remain abstinent.

Furthermore, as indicated by high POC Experiential, they are using coping skills that have been seen in other studies as most beneficial in the earlier stages of change. These findings are consistent with research that shows this URICA Maintenance as an indicator of “struggling to maintain abstinence” as opposed to total remission (DiClemente, Schlundt, & Gemell, 2004; Finnell, 2003).

4.0 Discussion

The results of the present study provide support for the use of measures associated with the Transtheoretical Model (TTM) in people with co-occurring SMI and SUDs. All of the TTM measures and subscales showed good reliability in the total sample at three time-points over a one-year period. When reanalyzed within diagnostic and substance use groups, all measures and subscales continued to show good reliability, with the exception of the URICA-M, which performed less well, particularly in the affective disorder/remitted group. However, mean scores on the URICA-M in both affective disorder groups show a logical pattern (i.e., low mean for Precontemplation, higher means for Contemplation and Action, low mean for Maintenance) indicating the struggle to attain or maintain abstinence. This pattern was similar in the schizophrenia groups. In addition, the TTM measures showed good validity in the total sample, demonstrating expected patterns among stages, processes of change, and markers of change. However, validity of these measures was not as strong when individuals with affective disorders in remission for cocaine dependence were analyzed as a discrete group.

The poor performance of the URICA-M in the affective disorder/remitted group may be attributable to the nature of depression and its relationship with cocaine use and remission. People with affective disorders may use cocaine to elevate mood; in contrast, cocaine dependence often will lead to a worsening of depression. If people with affective disorders stop using cocaine in order to lessen depressive symptoms, but find that their symptoms of depression do not change, they might feel ambivalent about their change; this ambivalence could be reflected in their URICA-M responses. Several studies have found that substance using, depressed patients are more successful at abstaining from drugs during treatment, but may have worse outcomes soon after treatment, than non-depressed patients (Hasin et al., 2002; McCay et al., 2002). In effect, depression may be a strong motivator to quit using, but this motivation may wear down if depression persists. While the affective disorder/remission participants in the present study were not necessarily in treatment, they were in early full remission from cocaine and therefore might be experiencing a similar process as individuals in treatment. Further research is needed to provide a fuller understanding of these differences.

The pattern of relationships that emerged among the measures is consistent with previous research (Carbonari & DiClemente, 2000; DiClemente, Prochaska, Fairhurst, Velicer, Valasquez & Rossi, 1991; Perz, DiClemente, Carbonari, 1996) and supports the validity of the TTM measures in people with co-occurring SMI and SUDs. Participants in the earliest stage of change (URICA-M Precontemplation) did not endorse other dimensions of change (e.g., pros, cons, self-efficacy), whereas those in later stages of change (Contemplation, Action, Maintenance) did. It was also evident that people begin using the processes of change and see the negative impact of drug use early in their change process (during Contemplation). These relationships have been seen in other samples of substance abusers (Freyer et al., 2006; Perz, DiClemente, & Carbonari, 1996; Prochaska, Velicer, DiClemente, & Fava, 1988; Schumann et al., 2005). The greater use of experiential process of change in the early stages of change, and the greater use of behavioral processes in later stages, replicates findings from other studies with non-SMI samples (Perz, DiClemente, & Carbonari, 1996). Analyses involving the Maintenance scale of the URICA-M were also consistent with past research that shows this scale as an indicator of “struggling to maintain abstinence” as opposed to total remission (DiClemente, 2003; DiClemente, Schlundt & Gemmell, 2004). For example, Maintenance

scores were related to greater temptation to use, seeing both the pros and cons of drug use, lower self-efficacy to stay abstinent, and coping skills commonly used among those just beginning behavior change. As with other groups of substance abusers, people with co-occurring SMI and SUDs at the “maintenance level” of change should not be considered problem-free in regards to their drug use. In fact, these individuals still appear to be working hard at maintaining abstinence.

Examining correlations between Readiness to change and the other TTM measures at the 6- and 12-month time-points of the parent study provided the opportunity to examine the relationships using a repeated-measures design. While construct and convergent validity on all measures were established at each time-point, there was some variability. For example, temptation to use was weakly related to readiness to change at baseline, but the two were not associated at later time-points. Pros of drug use and abstinence self-efficacy were also positively correlated with readiness to change at baseline, but not at the 6-month time-point. It is possible that those who completed the 6- and 12-month assessments may have received substance abuse treatment during the course of the study year, and treatment effects may have played a role in the changes in the relationships among the measures over time. However, the small correlations and small differences over time in those correlations suggests that this slight variability is inconsequential.

In examining the pattern of relationships among the TTM measures, two surprising findings emerged. First, there was a stronger association between behavioral processes, cons of drug use, and readiness to change in the cocaine dependent group than in the remitted group. It may be that individuals who are currently cocaine dependent need to engage in more behaviors to assist them in abstaining, and are also more cognizant of the negatives involved in active cocaine use, compared to those who have already quit. Second, there was a strong relationship between the pros of drug use and high readiness to change found in the affective disorders group. This is contrary to expectations that generally people with high readiness to change report fewer pros and more cons of drug use. It is possible that the depression, loneliness, fatigue, and low self-esteem usually associated with affective disorders may have played a role. Most of the “pros” assessed on the Decisional Balance Scale focus on using drugs to cope with unpleasant emotions or regulate affect; it is possible these items were more frequently endorsed in the affective disorder group because of the frequent experience of negative affect among people with affective disorders. Studies of people with different forms of SMI have found that while people with schizophrenia generally report relief of boredom and peer pressure and main reasons for their drug use, people with affect disorders are more likely to report drug use to lessen negative emotions (Gearon, Bellack, Rachbeisel, & Dixon, 2001). However, individuals with schizophrenia have also reported that a primary reason for using drugs is to reduce depression (Addington & Duchak, 1997; Dixon, Haas, Weiden, Sweeny & Frances, 1991). Nevertheless, it is possible that those with affective disorders perceive more positives aspects of drug use, even when they are ready to change.

There are some limitations to the present study. Some, but not all, participants were also in treatment. Scores on the TTM measures among the in-treatment participants may be different (elevated) in comparison to those not in treatment. Clearer differences in some of the TTM measures may be better seen in a sample that is more homogeneous in regards to treatment status. In addition, the primary substance of abuse in this sample was cocaine. It is possible that individuals who become dependent on cocaine are somehow different than those who become dependent on other substances (e.g. alcohol, heroin). As was seen with the affective disorders group in the present study, characteristics common in specific groups may lead to differential responding on these measures. Therefore, these results may not be generalizable to groups of individuals dependent on substances other than cocaine. Finally, it is possible that because these measures were read to participants to ensure their understanding, responses were

made in attempts to engender a positive impression upon assessors. However, the confidentiality of all information gathered was stressed to participants throughout the interviews. Furthermore, the fact that results were reliable overall suggests that this is likely not a major issue.

Findings from this study have some important implications. First, measures associated with the TTM are appropriate to use with people with co-occurring SMI and SUDs. Although those with affective disorders responded somewhat unsystematically on a number of subscales, it appears that individuals in this sample as a whole use a similar process of change as those without SMI when engaging in behavior change. Knowing that individuals diagnosed with SMI and SUD can respond to these measures reliably supports the use of the TTM measures by clinicians and researchers in determining where their patients are in the process of change and targeting motivational enhancement efforts. In addition, few studies have examined motivation or readiness to change in people with co-occurring disorders, in part because the utility of the TTM measures with this population was unclear. Findings from this study that these measures are reliable and valid in a large sample of people with co-occurring SMI and SUDs opens the door for additional research on the role of motivation in behavior change in this population.

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Table 1
Internal Consistency (Cronbach's Alphas) for TTM Measures and Subscales for Total Sample and Diagnostic Groups

Measure	Total (N = 240)	SZDEP (n = 72)	SZREM (n = 48)	ADDEP (n = 65)	ADREM (n = 55)
URICA – M					
Precontemplation	.73	.69	.72	.77	.36
Contemplation	.72	.72	.70	.71	.57
Action	.81	.80	.76	.86	.69
Maintenance	.67	.71	.68	.65	.57
Decisional Balance (DB)					
Pros	.85	.80	.81	.87	.89
Cons	.86	.87	.80	.86	.87
Processes of Change (POC)					
Experiential	.76	.79	.83	.67	.66
Behavioral	.83	.71	.86	.83	.77
Self-Efficacy (SE)	.91	.85	.91	.91	.94
Temptation to Use (TU)	.91	.86	.92	.90	.94

Table 2

Cronbach's Alphas of Measures in Total Sample at Baseline, 6-months and 12-months

Measure	Baseline (N = 240)	Timepoint 6-months (N = 186)	12-months (N = 186)
URICA – M			
Precontemplation	.73	.80	.79
Contemplation	.72	.73	.76
Action	.81	.79	.78
Maintenance	.67	.67	.70
Decisional Balance (DB)			
Pros	.85	.86	.87
Cons	.86	.87	.87
Processes of Change (POC)			
Experiential	.76	.81	.82
Behavioral	.83	.88	.87
Self-Efficacy (SE)	.91	.92	.93
Temptation to Use (TU)	.91	.93	.93

Table 3
Correlations of TTM Measures with URICA Readiness in the Total Sample and among Diagnostic and Substance Use Disorder Groups
(N = 240)

Measure	TOT	AD	Diagnostic Group SZ	DEP	REM
Temptation to Use (TU)	.15*	.22*	.12	.18*	.23*
POC Experiential	.48**	.50**	.41**	.52**	.42**
POC Behavioral	.39**	.36*	.33**	.47**	.20*
DB Pros	.08	.18*	-.01	.09	.06
DB Cons	.43**	.41**	.43**	.49**	.29**
Self-Efficacy (SE)	.10	-.06	.12	.08	.06
C-SOC READINESS	.19**	-.05	.25**	.10	.32**

* Correlation significant at the .05 level

** Correlation significant at the .01 level

Table 4

Correlations of TTM Measures with URICA READINESS at Baseline, 6-month, and 12-month Timepoints

Measure	Baseline (N = 240)	Timepoint 6-months (N = 186)	12-months (N = 186)
Temptation to Use (TU)	.15 [*]	.10	.10
POC Experiential	.48 ^{**}	.41 ^{**}	.46 ^{**}
POC Behavioral	.39 ^{**}	.29 ^{**}	.39 ^{**}
DB Pros	.08	-.05	-.01
DB Cons	.43 ^{**}	.43 ^{**}	.363 ^{**}
Self-Efficacy (SE)	.10	-.02	.11
C-SOC READINESS	.19 ^{**}	.23 ^{**}	.22 ^{**}

* Correlation significant at the .05 level

** Correlation significant at the .01 level

Table 5
Intercorrelations of TTM measures at Baseline in the Total Sample (N = 240)

Measure	1	2	3	4	5	6	7	8	9	10	11	12
1. POC - Experiential	--											
2. POC - Behavioral	.62**	--										
3. URICA Precontemplation	-.25**	-.30**										
4. URICA Contemplation	.41**	.33**	--									
5. URICA Action	.32**	.39**	-.37**	--								
6. URICA Maintenance	.38**	.09	-.31**	.48**	--							
7. URICA READINESS	.48**	.39**	-.10**	.48**	.18**	--						
8. Temptation to Use (TU)	.124	.39**	-.69**	.80**	.66**	.64**	--					
9. Self-Efficacy (SE)	.15*	-.20**	-.01	.12	-.14*	.39**	.15*	--				
10. DB Pros	.11	.45**	-.16*	.10	.25**	-.20**	.10	-.51**	--			
11. DB Cons	.51**	-.03	.05	.11	-.04	.19**	.08	.37**	-.30**	--		
12. C-SOC READINESS	.22	.39**	-.26**	.37**	.27**	.30**	.43**	.84**	.11	.23**	--	
		.48	-.19	.11	.36	-.10	.19**	-.40**	.36	-.18**	.12	--

* Correlation significant at the .05 level

** Correlation significant at the .01 level