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Validation of the Revised Problems Assessment for Substance Using Psychiatric Patients

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Abstract

This study assessed the factor structure, internal consistency, test-retest reliability, and construct validity of the Problems Assessment for Substance Using Psychiatric Patients (PASUPP; Carey, Roberts, Kivlahan, Carey, & Neal, 2004) with a sample of 278 men and women seeking outpatient dual-diagnosis treatment. All participants were diagnosed with a current AUD and schizophrenia and/or bipolar disorder. Initial confirmatory factor analysis did not support the 1-factor model for the 50-item measure found by Carey and colleagues. Instead, exploratory factor analysis yielded a shorter (27-item) scale with four distinct, yet related factors (Physical Problems, Aggression, Social and Financial Consequences, and Psychological Problems). The factor-based scales had good internal consistency ($\alpha = .77-.81$) and 1-week test-retest reliability ($r = .67-.73$). The revised PASUPP (PASUPP-R) was associated with measures of psychiatric symptoms/adjustment, substance use/dependence, and another measure of substance use problems, providing evidence for convergent validity. Subgroup comparisons suggested few demographic differences on the PASUPP-R, but differential patterns of problems endorsement emerged as a function of mental health and substance use diagnosis. Overall, this study provides preliminary evidence for the psychometric soundness of the PASUPP-R as a measure of problems experienced by persons with co-occurring psychiatric and substance use disorders.

Keywords

negative consequences of substance use; severe mental illness; substance abuse; dual diagnosis; factor analysis

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Contributors

Dr. Vincent conducted the data analysis and wrote the first draft of the manuscript. Dr. Bradizza designed the study and provided feedback on drafts of the manuscript. Dr. Carey provided feedback on drafts of the manuscript. Dr. Maisto, Dr. Stasiewicz, and Dr. Connors were Co-Investigators on the grant and assisted with the design of the study. Ms. Mercer supervised data collection for the study. All authors contributed to and have approved the final manuscript.

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Conflict of Interest

All authors declare that they have no conflicts of interest.

1. Introduction

Individuals with co-occurring psychiatric and substance use disorders experience multiple negative consequences related to their substance use, including more severe psychiatric symptoms (Carey, Carey, & Meisler, 1991), unstable housing and homelessness (Drake & Wallach, 1989; Drake, Osher, & Wallach, 1991), and problems related to money, infectious disease and family stress (Dixon, McNary, & Lehman, 1995; Rosenberg et al., 2001). Problems assessments developed for general samples of substance users (e.g., Drinker Inventory of Consequences [DrInC; Miller, Tonigan, & Longabaugh, 1995]) do not necessarily assess some of the unique consequences incurred by the severely mentally ill (SMI). Moreover, existing measures include problems due to substance use, such as missed days of work, that do not pertain to individuals with co-occurring disorders who are often unemployed. Therefore, a measure that can assess problems resulting from substance use among SMI individuals is needed.

1.1. Measures of Negative Consequences for Persons with Co-Occurring Disorders

In a review of the literature, we identified three self-report measures specifically developed to assess the negative consequences of substance use among persons with co-occurring disorders. Bender, Griffin, Gallop, and Weiss (2007) modified the Short Inventory of Problems (SIP), a 15-item reduced version of the DrInC, and administered it to a small ($N = 57$) outpatient sample with co-occurring substance use and bipolar disorder. In order to validate the SIP among persons with co-occurring disorders, Bender and colleagues conducted a principal components analysis (PCA) of the modified SIP items and used correlation analyses to examine test-retest stability and construct validity. Although they report promising psychometric properties for their brief measure, the study had several limitations. First, use of a mainly White (91%), highly educated (47% college graduates) sample limits the generalizability of their findings to persons with co-occurring disorders who are members of ethnic minorities or are less well-educated. Second, results for participants with bipolar disorder may not extend to individuals with other severe Axis I mental disorders, like schizophrenia. Thus, independent validation of the modified SIP measure using a larger, more heterogeneous sample seems warranted. Third, use of principal components analysis (PCA), rather than common factor analysis, is appropriate for data reduction, but problematic when a researcher's goal is to identify latent constructs derived from the correlations among measured variables (Fabrigar, Wegener, MacCallum, & Strahan, 1999).

More recently, Bennett, Nidecker, Strong Kinnaman, Li, & Bellack (2009) evaluated the psychometric properties of a shorter 36-item version of the 50-item Inventory of Drug Use Consequences (InDUC; Tonigan & Miller, 2002), called the InDUC-M, among 240 outpatients recruited from university and Veterans Administration mental health clinics. All participants had a diagnosis of current cocaine dependence or cocaine dependence in remission. To develop the InDUC-M, Bennett and colleagues dropped items that they considered not applicable (e.g., employment) or too abstract or future-oriented for SMI individuals. The InDUC-M subscales, for both lifetime and recent (i.e., past 3 months) timeframes, had moderate to excellent reliability ($\alpha = .68$ to $.89$). Lifetime total InDUC-M scores were associated with past 30-day substance use, but not recent distress/problems due to drug and alcohol use. Recent InDUC-M scores were related to measures of recent distress/problems due to drug and alcohol use. A 15-item SIP-M also was formed and included items strongly associated with the InDUC-M. While the InDUC-M and SIP-M appeared to perform well among SMI individuals with cocaine use disorders, given the major modifications to the InDUC, further psychometric work, such as common factor analysis and assessment of predictive validity, is warranted.

A key drawback of the InDUC, SIP, and other existing measures of substance-related problems is their limited content validity. Dropping irrelevant items and simplifying the language/reading level of substance use problems measures may not go far enough. Because existing problems measures were not originally developed for SMI individuals, the items may not capture the unique problems resulting from substance use by individuals with mental illness, such as problems with money management or medication non-compliance (Carey, Roberts, Kivlahan, Carey, & Neal, 2004).

To address the need for a measure of the negative consequences of substance use among persons with co-occurring disorders, Carey et al. (2004) developed a 50-item questionnaire, the Problems Assessment for Substance Using Psychiatric Patients (PASUPP). In developing their measure, Carey and colleagues generated items from prior measures, focus groups with dually-diagnosed individuals, the research literature, and feedback from psychiatric outpatients. Thus, the measure included unique items pertaining to the lives of individuals with co-occurring disorders, such as items on violence/victimization (e.g., *Did you get robbed or attacked when drunk or high?*), sex (e.g., *Did you trade sex for money or drugs?*), and exacerbation of psychiatric symptoms (e.g., *Did you become more paranoid than usual?*). They also excluded items that were indicative of dependence or addiction to reduce conceptual overlap. The preliminary 54-item measure was administered to a sample of 239 individuals receiving psychiatric treatment (92% outpatients) at a Veterans Affairs (VA) hospital (66%) and a large medical center (34%). The sample consisted of mostly male (90%), White (61%), veterans (65%), with a mean age of 46 years ($SD = 8.1$). Participants were determined eligible for the study if their medical record indicated that they met criteria for an Axis I psychiatric disorder (based on *DSM-IV* criteria) and a current *DSM-IV* substance use disorder. Participants' primary mental health diagnoses were schizophrenia-spectrum disorder (38%), mood disorder (40%), or PTSD (18%). Their primary substance use disorder was alcohol abuse/dependence (56%) and drug abuse/dependence (44%). Item reduction, common factor analysis and further psychometric analyses of the remaining 50 items indicated that the PASUPP was an internally consistent, unidimensional scale with adequate construct validity. However, reproducing a factor structure in an independent data set is necessary to definitively determine the number of factors (Loehlin, 2004). Moreover, the fairly homogeneous (e.g., mostly male, two-thirds veterans) sample used for initial scale development raises questions about the generalizability of the findings to a more diverse sample of individuals with co-occurring disorders. A unidimensional 50-item scale may be of limited value to researchers who prefer shorter, multidimensional scales that identify the types of problems experienced by substance-using psychiatric patients. A unidimensional scale also may be less useful to clinicians seeking to identify specific problem areas experienced by SMI clients and provide them with personalized feedback (Carey et al., 2004).

1.2. The Current Study

The goals of the current study were to (a) test whether the unidimensional factor structure of the PASUPP would be found in a more heterogeneous sample of individuals with co-occurring psychiatric and substance use disorders, (b) determine the factor structure if a unidimensional factor structure failed to emerge, and (c) assess the preliminary psychometrics of the PASUPP scale. For the current study, the PASUPP was administered to a sample of 278 individuals dually-diagnosed with severe mental illness and an alcohol use disorder (AUD). First, using confirmatory factor analysis (CFA), we evaluated the unidimensionality of the factor structure of the PASUPP. Second, we conducted item analyses and exploratory factor analysis (EFA) to determine the optimal factor structure of the PASUPP for this sample. Next, we examined the internal consistency reliability and test-retest stability of the PASUPP scale. Finally, we examined the convergent and discriminant

validity of the PASUPP. As such, the current study is intended to determine the factor structure of the PASUPP in an independent sample; however, this study cannot be considered a replication of Carey and colleagues' original study due to methodological differences between the two studies.

2. Method

2.1. Participants

Participants were 278 men and women seeking outpatient dual-diagnosis treatment from a publicly-funded community mental health treatment clinic. The clinic consists of an interdisciplinary team that provides both pharmacological and psychosocial interventions. Prospective participants were recruited during their orientation to the dual-diagnosis treatment program, generally prior to seeing a therapist. At the clinic, participants received both individual and group-based treatment that incorporated cognitive-behavioral and 12-step principles. The sample was 54% female and 46% male, with a mean age of 39.40 years ($SD = 8.35$; *Range*: 18-60) and a mean of 11.64 years of education ($SD = 1.86$). Nearly two-thirds (65%) of participants were African-American, 27% Caucasian, 4% Hispanic, 3% Native American, and 1% other ethnicities. Nearly all participants were single (97%), unemployed (98%), and low income (85% reported annual incomes <\$10,000 USD). During the past year, 64% of participants reported receiving public assistance, with equivalent numbers reporting receipt of disability income (17%) and illegal (e.g., selling drugs, prostitution; 17%) income. At baseline, 41% lived in supervised settings (e.g., group home, halfway house) and 59% in unsupervised settings (e.g., apartment, private home).

Participants were eligible if they (a) met *DSM-IV* criteria for a current (i.e., past 12 months) AUD and a current (i.e., past 30 days) schizophrenia-spectrum and/or bipolar disorder, (b) scored at least 24 on the Mini-Mental State Exam (MMSE; Folstein, Folstein, & McHugh, 1975) to ensure adequate cognitive functioning for study participation, and (c) had lived at their current address for at least six months or could provide the name and contact information for two persons who would function as locators (i.e., stability criteria). Figure 1 presents a study participant flow diagram using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) criteria (Egger, Juni, & Bartlett, 1986; Von Elm, Altman, Egger, Pocock, Gotsche, & Vandenbroucke, 2008). Of 519 individuals assessed for eligibility, 224 (43%) were ineligible for the study because they did not meet the inclusion criteria: 199 did not meet *DSM-IV* diagnostic criteria, 20 did not meet the MMSE criteria, and five did not meet the stability criteria. Therefore, 295 (57%) met all study eligibility criteria. A small number of those eligible either refused to participate prior to the baseline interview ($n = 1$) or did not attend the baseline interview ($n = 16$) despite repeated scheduling attempts. Thus, a total of 278 participants completed the baseline interview. Both the diagnostic screening research interview and baseline research interview were conducted in person at the Research Institute on Addictions (i.e., off-site from the treatment clinic).

Regarding comorbid mental disorders, 12% met criteria for schizophrenia, 56% for bipolar disorder, and 32% for schizoaffective disorder. On average, participants had been treated 8.19 ($SD = 13.42$; $Mdn = 4.00$) previous times for psychiatric problems (in an inpatient, residential or day, or outpatient setting). Nearly all (97%) met criteria for current alcohol dependence, while 3% ($n = 9$) met criteria for current alcohol abuse. The sample had high rates of current drug use disorders (i.e., met *DSM-IV* criteria for abuse or dependence): 76% cocaine, 46% marijuana, 23% opiate, 16% sedatives or hypnotics, and 9% amphetamines. Overall, 86% of participants met criteria for one or more drug abuse or dependence diagnoses. Participants had been treated an average of 14.04 ($SD = 14.06$, $Mdn = 10.00$)

previous times due to substance use (in detox, inpatient, residential or day, halfway house or group home, or outpatient setting).

2.2. Procedure

The current study was part of a larger study (Bradizza, Maisto, Vincent, Stasiewicz, Connors, & Mercer, 2009) examining predictors of relapse to alcohol and drug use among individuals with severe mental illness and an AUD. Individuals were approached during the first two weeks following treatment entry to alcohol and drug use. This study was approved by the University at Buffalo's Institutional Review Board. Most of the data for this report were derived from the diagnostic and baseline research interviews conducted prior to initiation of treatment. At the start of every research interview, a breath test was administered to ensure that the participants' blood alcohol level (BAL) was zero. If a participant had a positive BAL, the research interview was rescheduled. Participants were assured that their responses would be kept confidential, would not be discussed with treatment staff, and would not affect their treatment status.

At an initial diagnostic research interview, participants provided written informed consent and eligibility for study participation was determined. The diagnostic screening research interview included the Diagnostic Interview Schedule for *DSM-IV* (Robins, Cottler, Bucholz, & Compton, 1995), the MMSE, and the PASUPP. At the baseline research interview, held approximately one week later, participants completed a variety of questionnaires and interviews, including a second administration of the PASUPP. Many of these questionnaires (e.g., PASUPP, SADD, SDS) used a response timeframe of past 12 months. Since many SMI individuals have limited education and reading ability, trained research interviewers read all questionnaires and measures to participants and recorded their responses. Participants received store gift cards (\$15 USD at the diagnostic research interview and \$30 USD at the baseline research interview) as compensation for their time and effort.

2.3. Measures

2.3.1. Background questionnaire—This comprehensive questionnaire was used to obtain demographic characteristics, current status information (e.g., marital, employment, residential), and treatment history (e.g., number of psychiatric hospitalizations).

2.3.2. Mini-Mental State Exam—(MMSE; Folstein et al., 1975) is a 19-item measure of cognitive functioning used to screen participants in the current study for eligibility. A MMSE total score was computed by summing the items, with a maximum score of 30. Mean MMSE scores were 27.40 (SD = 1.88; Range: 22-30). Scores of 23 or less indicate the presence of cognitive impairment. The MMSE has demonstrated reliability and validity (Tombaugh & McIntyre, 1992).

2.3.3. The Diagnostic Interview Schedule-IV—(DIS-IV; Robins et al., 1995) is a structured diagnostic interview used to obtain current and lifetime *DSM-IV* Axis I diagnoses. The sections for alcohol use, substance use, depression, mania, and schizophrenia were administered by trained research interviewers.

2.3.4. The Structured Clinical Interview for the Positive and Negative Syndrome Scale—(SCI-PANSS; Kay, Opler, & Fiszbein, 1992) is a 30-item measure of both positive (i.e., productive) and negative (i.e., deficit) symptoms of schizophrenia. Each item is scored on a 7-point severity scale (1 = *Absent*, 7 = *Extreme*) and items are summed for scoring. We administered 18 items, including the 7 items that reflect Positive Symptoms (e.g., hallucinations, delusions, hostility) and the 7 items that tap Negative Symptoms (e.g.,

blunted affect, emotional withdrawal, stereotyped thinking). A second rater, blind to participant diagnosis, scored the PANSS for each participant from videotaped interviews of PANSS administration. Based on Shrout and Fleiss's formula (Shrout & Fleiss, 1979), interrater reliability for the positive (ICC = .84) and negative symptoms (ICC = .71) subscales was fair to good. Purnine, Carey, Maisto, and Carey (2000) found support for the validity of the positive and negative symptoms scales among outpatients with schizophrenia and mood disorders and a substance use disorder.

2.3.5. The Brief Symptom Inventory—(BSI; Derogatis, 1993) is a widely-used 53-item measure of psychological symptoms in the past week. Participants rated each item ("How much were you distressed by...feeling no interest in things") on a 5-point scale (0 = *Not at all*, 4 = *Extremely*). For this sample, the Global Severity Index (BSI-GSI; $\alpha = .97$) was used.

2.3.6. The Short Alcohol Dependence Data Questionnaire—(SADD; Davidson & Raistrick, 1986) is a 15-item measure of alcohol dependence. At baseline, participants completed the SADD in reference to the past 12 months. The SADD has demonstrated good internal reliability (Raistrick, Dunbar, & Davidson, 1983) and concurrent validity (Davidson & Raistrick, 1986). For this sample, the SADD had good internal consistency ($\alpha = .88$). The mean SADD score was 22.55 ($SD = 9.54$), indicating high levels of dependence.

2.3.7. The Severity of Drug Dependence Questionnaire—(SDS; Gossop, Darke, Griffiths, et al., 1995) is a five-item measure of the psychological components of drug dependence. At the baseline research interview, participants completed the SDS in reference to the past 12 months. The SDS has demonstrated high internal consistency ($\alpha = .85$ for this sample) and good test-retest reliability (Gossop et al., 1995; Gossop, Best, Marsden, & Strang, 1997). The mean SDS score was 9.77 ($SD = 4.34$), indicating high levels of psychological dependence on drugs.

2.3.8. The Timeline Follow-Back—(TLFB; Sobell & Sobell, 1996) is a calendar-based retrospective recall interview of daily substance use, shown to be reliable and valid among psychiatric outpatients (Carey, 1997). At the baseline research interview, the TLFB was used to assess participants' alcohol and drug use in the previous 60 days. All TLFB variables were adjusted for time the participant spent in a controlled environment (i.e., jail, hospital). For alcohol use, number of heavy drinking days (defined as ≥ 4 drinks/day for women and ≥ 5 drinks/day for men) was used. For drug use, number of cocaine use days and number of marijuana use days were used.

2.3.9. Problems Assessment for Substance Using Psychiatric Patients—(PASUPP; Carey et al., 2004) is a 50-item measure of negative consequences resulting from substance use among persons with co-occurring psychiatric and substance use disorders. Participants are instructed "Here are some things that happen to people who drink alcohol or use other drugs". At the baseline research interview, participants reported on negative consequences in the last 12 months. Items reflect both events (e.g., "lose your housing") and states (e.g., "get irritated and angry at people"). Events comprise the first 30 items and participants rate event frequency on a 4-point scale ranging from 1 = *Not at all* to 4 = *Many times*. States comprise the last 20 items and participants rate their intensity on a 4-point scale ranging from 1 = *Not at all* to 4 = *A lot*. For consistency with Carey et al.'s (2004) scoring, PASUPP items were recoded to 0 = *Not at all* to 3 = *Many times/A lot* prior to analyses. The unidimensional, 50-item PASUPP has shown good internal consistency and construct validity among persons with co-occurring disorders (Carey et al., 2004).

2.3.10. Drinker Inventory of Consequences—(DrInC; Miller et al., 1995) is a 50-item measure of negative consequences of alcohol abuse. Since a high proportion of study participants had a current drug use disorder, items were re-worded to reflect problems due to *drinking or drug use*. DrInC items form five factor-based scales: Interpersonal (e.g., My family or friends have worried or complained about my drinking or drug use), Physical (e.g., I have been sick and vomited after drinking or using drugs), Social Responsibility (e.g., I have missed days of work or school because of my drinking or drug use), Impulse Control (e.g., I have taken foolish risks when I have been drinking or using drugs), and Intrapersonal (e.g., I have felt bad about myself because of my drinking or drug use). At the baseline research interview, participants reported on negative consequences during the past 12 months on a 4-point scale ranging from 0 = *Never* to 3 = *Daily or almost daily*. Scale scores were derived by summing appropriate items. For the current sample, DrInC scales had good internal consistency ($\alpha = .76 - .88$).

3. Results

3.1. Initial Confirmatory Factor Analysis

Based on *a priori* knowledge of the number of factors (i.e., one), an initial confirmatory factor analysis (CFA) was specified with one latent factor and all 50 PASUPP items as indicators. CFA analyses were conducted using Mplus version 5.1 (Muthén & Muthén, 2007) with polychoric correlations¹ and weighted least squares mean and variance-adjusted estimation (WLSMV). We used Full Information Maximum Likelihood (FIML) for missing data. Following Hu and Bentler's (1999) recommendations, we report the root-mean-square error of approximation (RMSEA; $< .06$ is good fit), and the comparative fit index (CFI; $\geq .95$ is good fit). In addition, Yu and Muthén (2001) suggest that a weighted root mean square residual (WRMR) $< .90$ indicates good fit. Fit for the one-factor model was poor: $\chi^2 = 867.84$, $df = 146$, $p < .001$; RMSEA = .13, CFI = .63, WRMR = 1.87. The poor fit of the one-factor model indicated that a multidimensional structure may better represent the data. In order to determine the factor structure of the PASUPP items for this sample, preliminary item analyses and EFA were conducted.

3.2. Item analyses

First, we performed item analyses, including examining item distributions, inter-item correlations and item-to-total correlations, to determine whether any poorly performing items could be dropped. Item endorsements (i.e., any non-zero rating) ranged from 16-99% for the last 12 months. We decided to eliminate item 27 (Because of your drinking or drug use, did you get arrested for driving while intoxicated or high?), which was endorsed by 16% of participants, due to its low frequency of endorsement and corresponding severe skew (skew = 2.99, S.E. skew = .15). After item 27 was dropped, item endorsements ranged from 34-99%. Skewness coefficients for the remaining items ranged from $|.05$ to $1.83|$ (S.E. skew = .15), indicating nonsevere skew. The highest correlation between a pair of items was .71. These two items (Because of your drinking or drug use, did you have sex with someone you wish you hadn't? and Because of your drinking or drug use, did you trade sex for money or drugs?) were considered non-redundant in content; therefore, no items were dropped based on inter-item correlations. Similarly, no item-to-total correlations were $\leq .20$ (Floyd & Widaman, 1995), so no items were dropped based on item-to-total correlations. In sum, one item was eliminated in item analyses, leaving 49 items for EFA.

¹Because the PASUPP items use a 4-point ordinal (i.e., ordered categories) scale, polychoric correlations, rather than Pearson correlations, were used in factor analysis. When items have fewer than five response categories, estimation methods appropriate for categorical data should be used (Wirth & Edwards, 2007).

3.3. Exploratory Factor Analysis

In an EFA, we used an optimal approach involving multiple strategies (e.g., Cattell's scree test, parallel analysis) to determine the correct number of factors and compared a range of solutions (Fabrigar et al., 1999). First, we used Cattell's (1966) scree test. For the 49 items remaining after item reduction, the scree test suggested retaining at least four, possibly five, factors. We also used parallel analysis (PA; O'Connor, 2000; Horn, 1965), a highly accurate method for determining the number of factors (Russell, 2002; Hoyle & Duvall, 2004). In PA, the number of raw data eigenvalues that exceed random data eigenvalues indicates the number of factors to retain. Using a common factor analysis approach, parallel analysis indicated a six-factor solution. However, two of the factors had raw data eigenvalues that were very close in value to the random data eigenvalues, which suggested four major factors and two minor factors. Based on the scree and PA results, we compared solutions ranging from four to six factors.

EFA was conducted using Mplus version 5.1 (Muthén & Muthén, 2007) with polychoric correlations, geomin rotation, and weighted least squares mean and variance-adjusted estimation (WLSMV). FIML was used for missing data. Advantages of Mplus 5.1 for EFA include (1) oblique rotations like quartimin or geomin, which typically perform better than promax (Browne, 2001), (2) tests of model fit, (3) missing data estimation (e.g., FIML), (4) ability to include correlated residuals, and (5) provision of modification indices (L. K. Muthén, personal communication, October 10, 2008). For EFA with categorical data, Mplus reports the root-mean-square error of approximation (RMSEA; $< .06$ is good fit), the comparative fit index (CFI; $\geq .95$ is good fit), and the standardized root mean square residual (SRMR; $< .08$ indicates good fit). Examination of factor loadings indicated that 18 items cross-loaded ($\geq .30$) on two or more factors. We carefully examined the content of the cross-loading items and determined that they were not essential for maintaining the conceptual meaning of the factors. Consistent with a goal of simple structure, we deleted 18 cross-loading items and 2 items that failed to load on any factor. Two more items (Because of your drinking or drug use, did you trade sex for money or drugs? and Because of your drinking or drug use, did you have sex with someone you wish you hadn't?) were dropped because they were the only two items that loaded on a factor; therefore, this factor was dropped based on too few indicator items. A total of 22 items were dropped. Again, results did not support the unidimensional structure found for the original PASUPP. Instead, a 27-item, four-factor solution was chosen based on both statistical criteria and interpretability. This final model fit the data well: $\chi^2 = 532.12$, $df = 249$, $p < .001$; RMSEA = .06, CFI = .97, SRMR = .05. Table 1 presents all factor loadings and extracted communalities for the 27 items of the newly developed PASUPP-R (revised). Salient (i.e., highest loadings on a factor) loadings are shown in bold face. All items loaded $\geq .30$ on one of the four factors. No cross-loadings were above .30. Factor 1 (8 items; e.g., Because of your drinking or drug use, did you get sick or vomit?) was labeled Physical Problems. Factor 2 (4 items; e.g., Because of your drinking or drug use, did you cause injury to someone else?) was labeled Aggression. Factor 3 (7 items; e.g., Because of your drinking or drug use, did you spend money on alcohol or drugs that you needed for other things?) was labeled Social and Financial Consequences. Factor 4 (8 items; e.g., Because of your drinking or drug use, did you become more paranoid than usual?) was labeled Psychological Problems.

3.4. Reliability of the PASUPP-R

Descriptive statistics and factor correlations for the PASUPP-R subscales are presented in Table 2. Cronbach's alphas indicated that the internal consistency for the PASUPP-R subscales was very good. Factor intercorrelations ranged from $+.29$ to $+.49$ (all $ps < .001$). Test-retest correlations for the four factor-based PASUPP-R subscales ranged from $+.67$ to

+ .73 (all $ps < .001$) indicating adequate stability over a short time interval ($M = 1$ week; range = 1 to 14 days for 94% of participants).

3.5. Construct Validity of the PASUPP-R

To investigate the construct validity of the PASUPP-R, we examined the bivariate associations between the PASUPP-R factors and psychometrically-sound measures of (1) psychiatric symptoms/adjustment, (2) substance use/dependence, (3) substance use problems, and (4) cognitive functioning. We tested several hypotheses regarding convergent and discriminant validity. Consistent with previous research (e.g., Carey et al., 2004), we expected that measures of adjustment and psychiatric status would be moderately related to negative consequences, because the use of substances among psychiatric patients has implications for their psychiatric functioning (cf. Drake, Wallach, Alverson, & Mueser, 2002). We also hypothesized that measures of substance use and dependence would be significantly associated with PASUPP-R scores. Substance use and substance-related problems have been shown to be distinct, yet related constructs; therefore, moderate associations seem warranted. We expected fairly strong associations between an existing measure of substance use problems (DrInC) and PASUPP-R scores, particularly between similar DrInC and PASUPP-R scales (e.g., physical problems). Lastly, we hypothesized that a measure of cognitive functioning would be unrelated to the negative consequences of substance use among individuals with co-occurring disorders (i.e., discriminant validity). Table 3 presents preliminary evidence for the convergent and discriminant validity of the PASUPP-R.

3.5.1. Evidence for convergent validity—As predicted, PASUPP-R scores were moderately related to a global measure of psychiatric symptom severity (BSI-GSI), with correlations ranging from +.12 ($p < .06$) to +.46 ($p < .001$). These correlations indicate that individuals who self-reported greater psychiatric symptom severity reported more frequent problems due to their alcohol and drug use. PASUPP-R scores were largely unrelated to interviewer-rated symptoms of schizophrenia (PANSS), with the exception of individuals with more positive symptoms of schizophrenia reporting more frequent psychological problems ($r = .23$, $p < .001$) and more frequent problems related to aggression ($r = .13$, $p < .05$). Also as predicted, greater alcohol dependence (SADD) during the past 12 months was moderately related to more frequent problems of all types ($r = +.20$ to +.54, $p < .001$). Similarly, greater drug dependence (SDS) during the past 12 months showed positive associations with problems ($r = +.15$, $p < .05$ to +.52, $p < .001$). Greater substance use in the past 60 days (TLFB) was only selectively associated with participants' reports of problems during the past 12 months (e.g., participants with more heavy drinking days reported more aggression problems). As expected, the majority of correlations between the PASUPP-R and DrInC scales at baseline were moderate to strong and in the expected direction ($r = +.16$ to +.69, all $ps < .01$). Overall, these correlations provide evidence for the convergent validity of the PASUPP-R as a measure of substance-related problems.

3.5.2. Evidence for discriminant validity—As hypothesized, PASUPP-R scores were not associated with participants' cognitive functioning (MMSE), $r = -.10$ to +.05, *ns*. These results provide some preliminary evidence for the discriminant validity of the PASUPP-R.

3.5.3. PASUPP-R across demographic subgroups—We compared the PASUPP-R scale scores² across demographic subgroups, including age, education, gender, and ethnicity (White vs. non-White), using an adjusted alpha (.01) to minimize the risk of Type 1 error.

²Due to skew, PASUPP-R Social and Financial Consequences and Psychological Problems were square-root transformed prior to analyses. However, untransformed means and standard deviations are reported, where applicable.

Older age was weakly associated with less frequent problems related to aggression ($r = -.18, p < .01$). Years of education were unrelated to PASUPP-R scores. Based on independent samples t-tests, there were no significant gender or ethnic differences in PASUPP-R scores (all $ps > .01$).

3.5.4. PASUPP-R across diagnostic subgroups—In exploratory analyses, we also examined whether PASUPP-R scores varied as a function of mental health and substance use diagnosis, again using an adjusted alpha (.01). There were no significant differences in PASUPP-R scores as a function of whether or not the participant was diagnosed with bipolar disorder, in addition to an AUD. However, social and financial consequences differentiated individuals with positive diagnoses for both an AUD *and* schizophrenia ($M = 14.12, SD = 4.74$) versus those diagnosed with an AUD, but not schizophrenia ($M = 12.38, SD = 5.14$), $t(276) = -3.02, p < .01$. Similarly, participants diagnosed with both alcohol use *and* schizophrenia disorders ($M = 18.96, SD = 4.31$) versus those diagnosed with an AUD, but not schizophrenia ($M = 16.66, SD = 4.39$) reported more frequent psychological problems, $t(276) = -4.79, p < .001$. With regard to comorbid alcohol and drug use disorders, participants with positive diagnoses for both alcohol *and* cocaine use disorders ($M = 13.81, SD = 4.56$) reported more frequent social and financial problems on the PASUPP-R than did participants diagnosed with an AUD but no cocaine use disorder ($M = 11.03, SD = 5.85$), $t(276) = -3.64, p < .001$. Participants with positive diagnoses for both alcohol *and* marijuana disorders ($M = 6.05, SD = 3.06$) reported more frequent problems related to aggression on the PASUPP-R than did participants diagnosed with an AUD but no marijuana use disorder ($M = 5.00, SD = 3.15$), $t(276) = -2.80, p < .01$.

4. Discussion

The purpose of this study was to perform a psychometric evaluation of the original PASUPP using an independent sample of SMI individuals diagnosed with a substance use disorder. The single-factor structure of the original PASUPP was not found for the current sample; instead, a 4-factor structure was identified. The four correlated factors were labeled Physical Problems, Aggression, Social and Financial Consequences, and Psychological Problems. These factors possess face validity as major categories of problems experienced by SMI individuals who abuse substances.

Differences in the samples and methods may explain differences in factor structure between the two studies. Carey et al.'s (2004) sample was older with a large proportion of veterans, and more homogeneous in terms of gender and ethnicity, all of which may have affected item endorsement. A higher employment rate and lower rates of substance use and severe psychiatric disorders among participants in the Carey et al. (2004) study also may have led to differential patterns of problems endorsement. Carey and her colleagues examined PASUPP items in reference to the past 3 months and lifetime, instead of the 12-month timeframe used here, which may have implications for how frequently problems were endorsed. Finally, differences between the two studies in statistical methods, such as determination of the number of factors (scree test in Carey et al. vs. scree test and PA in this study) and factor rotation (promax in Carey et al. vs. geomin in this study), may help explain differences in the findings. Although the current study does not represent a replication of Carey and colleagues' study, it does demonstrate a useful multidimensional structure to the PASUPP items.

The PASUPP-R is a modified, shortened version of the 50-item PASUPP (Carey et al., 2004). It is a psychometrically sound 27-item scale possessing good internal consistency, test-retest reliability, and demonstrated convergent and discriminant validity. As expected, PASUPP-R scores were moderately associated with a global measure of psychiatric

symptom severity (BSI) and two scales of the PASUPP-R, notably psychological problems and aggression, were associated with positive symptoms of schizophrenia (PANSS). However, PASUPP-R scores were unrelated to negative symptoms of schizophrenia (PANSS). This latter finding is consistent with past research indicating that schizophrenic individuals who have substance use disorders tend to report less severe negative symptoms (Kirkpatrick et al., 1996; Mueser et al., 1990; Salyers & Mueser, 2001). Support for the convergent validity of the PASUPP-R emerged in its consistent associations with both alcohol (SADD) and drug (SDS) dependence measures. Although it is surprising that the PASUPP-R showed few relations to participants' reports of recent substance use from the TLFB, given an expected association between substance use and problems, this finding may be at least partly attributable to differences in the timeframe used (past 12 months for the PASUPP-R versus past 60 days for the TLFB). Given that all participants were seeking outpatient treatment, recent substance use may have been unrepresentative of their use over the last year. As further evidence of convergent validity, the PASUPP-R showed strong, positive correlations with another measure of substance-related problems (DrInC). Non-significant associations with a measure of cognitive functioning (MMSE) provide preliminary support for discriminant validity.

The current study has several strengths. First, the sample included enough female participants to examine gender differences in problems endorsement. Second, the nature of the sample also permitted subgroup comparisons based on mental health and substance use diagnoses. For example, schizophrenic individuals reported more frequent social and financial problems and psychiatric problems than did individuals without schizophrenia. Although it may seem surprising that participants with a current marijuana use disorder, in addition to an AUD, reported more frequent problems related to aggression, this link has been reported in the research literature (cf. Moore & Stuart, 2005). Third, use of a 12-month reporting window is consistent with *DSM-IV* criteria (American Psychiatric Association, 1994) and is consistent with the chronic nature of problems in this population (Carey et al., 2004). One advantage of assessing problems over 12 months is that we were able to obtain a broader perspective on negative consequences than a 3-month period would allow. Carey and colleagues refined the original PASUPP by asking individuals with co-occurring disorders to provide feedback on the clarity of the instructions, items, and response options; the PASUPP-R reflects these efforts as well. A relatively short, multidimensional scale that identifies the types of problems experienced by substance-using psychiatric patients should prove useful to researchers as an outcome measure and to clinicians seeking to identify specific problem areas in order to assist clients with treatment planning and assessing progress towards treatment goals (Carey et al., 2004; Tiet, Finney, & Moos, 2008).

Some study limitations should be noted. First, evidence for discriminant validity of the PASUPP-R based on its association with a measure of cognitive functioning (MMSE) is weak, due to the restricted range of the MMSE in this sample. Second, certain negative consequences (e.g., trade sex for money or drugs, get arrested) with low base rates are not represented in the PASUPP-R. Development of a shorter version of the original 50-item PASUPP necessarily involves this type of trade-off in content sampling. However, treatment providers may wish to assess certain low base rate consequences separately given their practical clinical and health importance. Third, members of some ethnic groups, such as Hispanics and Asians, are underrepresented in our sample. Thus, it is important for future psychometric work on the PASUPP-R to include other ethnic groups. Replication of the PASUPP-R's factor structure with an independent sample and further psychometric investigation of the PASUPP-R are warranted. In particular, administration of the PASUPP-R to dually-diagnosed individuals who are not in treatment or individuals who are receiving a broader range of outpatient treatments is recommended. Nonetheless, the PASUPP-R has

promising psychometric properties as a clinically useful measure of problems resulting from substance use among SMI individuals who abuse alcohol and drugs.

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Figure 1. Participant flow diagram following Consolidated Standards of Reporting Trials (CONSORT) guidelines. DSM-IV = Diagnostic and Statistical Manual of Mental Disorders (4th ed.); MMSE = Mini-Mental State Examination.

Table 1
Exploratory Factor Analysis (EFA) Loadings for the Items of the PASUPP-R

Item	Physical Problems		Social and Financial Consequences		Psychological Problems		h^2
	1	2	3	4			
1. Have arguments with a family member, spouse, or friends	-.03	.56	.22	.14			.49
3. Get into physical fights when under the influence	.03	.83	-.04	.04			.70
5. Have withdrawal symptoms (felt sick) when you stopped drinking or using drugs	.67	.04	.02	.14			.57
8. Miss appointments or fail to get to places on time	.08	.09	.67	-.03			.54
10. Lose your housing	.05	.07	.62	-.08			.40
11. Spend money on alcohol or drugs that you needed for other things	-.02	.01	.89	-.08			.72
12. Get sick or vomit	.70	-.04	.13	.02			.59
13. Have headaches	.58	-.04	.15	.08			.48
15. Become confused or disoriented	.48	.12	.02	.28			.48
16. Neglect responsibilities to family members, pets, or others that you take care of	.03	.08	.67	.12			.61
17. Pass out or have a blackout	.65	.12	-.10	-.03			.42

Item	Physical Problems 1	Aggression 2	Social and Financial Consequences 3	Psychological Problems 4	h^2
19. Cause injury to someone else	.03	.85	.03	-.01	.76
20. Damage property or break things	.12	.63	.10	-.04	.51
28. Get hospitalized after drinking or using drugs	.67	-.04	-.02	-.07	.39
29. Stop taking your prescribed medication	.51	.03	.12	.04	.38
30. Have a bad reaction from mixing medication with alcohol or drugs	.61	.10	-.05	-.07	.37
32. Notice a change in your personality that you didn't like	.05	.04	.28	.34	.33
35. Spend too much time alone	.27	-.06	.03	.39	.31
36. Have trouble sleeping, staying asleep, or nightmares	.21	-.01	-.11	.51	.31
38. Problems managing your money	.03	-.24	.81	.05	.66
39. Have restrictions placed on your income	-.03	-.07	.54	.05	.28
41. Lose friends	-.06	.13	.52	.26	.49
43. Become more depressed than usual	.19	-.11	.18	.60	.61
44. Become more paranoid than usual	-.10	-.03	.00	.89	.74
45. Have hallucinations,	-.02	.15	-.20	.76	.51

Item	Physical Problems 1	Aggression 2	Social and Financial Consequences 3	Psychological Problems 4	h^2
such as seeing or hearing things that weren't really there					
48. Become more bothered by thoughts of past events	.13	.01	.13	.52	.44
50. Have difficulty concentrating or paying attention	.23	.15	.06	.46	.47

Note. PASUPP-R = Problems Assessment for Substance Using Psychiatric Patients—Revised. Values represent geometrically rotated loadings from four-factor solution using weighted least squares mean and variance-adjusted estimation (WLSMV). Extracted item communalities (h^2) are shown in last column (computed as 1 – estimated residual variance).

Table 2

Internal Consistency, Scale Sums, Standard Deviations, and Intercorrelations Among PASUPP-R Factors

Scale	α	Scale sum (SD)	1	2	3	4
1. Physical problems (8 items)	.81	12.42 (5.71)	--	.38	.48	.47
2. Aggression (4 items)	.78	5.48 (3.14)		--	.34	.29
3. Social and financial consequences (7 items)	.80	13.13 (5.03)			--	.49
4. Psychological problems (8 items)	.77	17.66 (4.50)				--

Note. PASUPP-R = Problems Assessment for Substance Using Psychiatric Patients-Revised. All Pearson product-moment correlations were statistically significant ($p < .001$). Correlations were computed using raw (i.e., untransformed) scale scores.

Table 3
Convergent and Discriminant Validity Correlation Analyses

	PASUPP-R scores			
	Physical problems	Aggression	Social and financial consequences	Psychological problems
<i>Convergent validity measures</i>				
Psychiatric symptoms/Adjustment				
BSI-Global Severity Index	.30***	.23***	.12 [†]	.46***
PANSS positive symptoms	.03	.13*	-.10	.23***
PANSS negative symptoms	.02	.07	-.07	.01
Substance use/dependence				
SADD	.54***	.20***	.42***	.36***
SDS ^a	.16**	.15*	.52***	.35***
TLFB-Number of heavy drinking days ^b	.05	.14*	.06	.06
TLFB-Number of marijuana use days ^b	-.03	.15*	.05	-.11
TLFB-Number of cocaine use days ^b	-.05	.09	.15*	.11 [†]
Substance Use Problems				
DrInC physical	.53***	.28***	.57***	.46***
DrInC interpersonal	.33***	.38***	.62***	.45***
DrInC intrapersonal ^b	.30***	.16**	.56***	.47***
DrInC impulse control	.39***	.59***	.59***	.34***
DrInC social responsibility	.30***	.29***	.67***	.38***
DrInC total score	.43***	.41***	.69***	.48***
<i>Discriminant validity measure</i>				
Mini-mental score	-.10	-.03	.05	-.09

Note. Pearson product-moment correlations are presented. PASUPP-R = Problems Assessment for Substance Using Psychiatric Patients-Revised. BSI = Brief Symptom Inventory. PANSS = Positive and Negative Syndrome Scale. SADD = Short Alcohol Dependence Data Questionnaire. SDS = Severity of Drug Dependence Questionnaire. TLFB = Timeline Follow-Back. DrInC = Drinker Inventory of Consequences. Due to skew, PASUPP-R Social and Financial Consequences and Psychological Problems were square-root transformed prior to correlation analyses. $N = 254-278$ based on listwise deletion.

[†] $p < .07$.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

^a Due to skew, scores were square-root transformed prior to correlation analyses.

^b Due to skew, scores were log-transformed prior to correlation analyses.