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Co-Occurring Mental Health and Substance Use Problems in Offenders: Implications for Risk Assessment

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We undertook a secondary data analysis to study issues relevant to co-occurring mental health and substance disorder in a combined sample of offenders ($N = 3,197$). Using the Personality Assessment Inventory, we compared the frequency of depressive, traumatic stress, and personality disorder symptom elevations across offenders with and without substance problems, identified the extent to which co-occurring problems were accompanied by risk factors for suicide and aggression, and tested for gender differences. Offenders with substance problems were more likely than others to have increased mental health problems and risk factors for suicide or aggression. Women with substance problems, compared with men, had higher depression, traumatic stress, and borderline features, in addition to lower antisocial features. The frequency with which suicide and aggression risk factors were associated with mental health problems was generally similar across men and women. Measurement issues relevant to co-occurring disorder and risk assessment are discussed.

Keywords: co-occurring disorder, substance abuse, risk assessment, personality assessment inventory, offenders

The assessment of co-occurring mental health and substance use disorders is a critical task in managing criminal offenders. Offenders have prevalence rates of alcohol and drug problems that are much higher than those found in the general population (Fazel, Bains, & Doll, 2006; Karberg & James, 2005). Their substance use is often tied to criminal offending and high-risk behavior (McClelland, Teplin, Abram, & Jacobs, 2002; Mumola & Karberg, 2006). Indeed, many consider addiction treatment an essential component

of offender rehabilitation and community re-entry (Chandler, Fletcher, & Volkow, 2009; Prendergast, 2009). Comprehensive evaluation of substance-involved offenders is complicated by their increased prevalence of mental health disorder (Abram, Teplin, & McClelland, 2003; James & Glaze, 2006). Offenders with co-occurring mental health and substance use disorders, compared with other offenders, tend to have increased functional impairment and re-arrest rates (Grella, Greenwell, Prendergast, Sacks, & Mel-

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nick, 2008; Hiller, Knight, & Simpson, 1996; McNeil, Binder, & Robinson, 2005). Offenders with co-occurring disorders also have worse treatment outcome compared with offenders with only mental health or substance problems (Messina, Burdon, Hagopian, & Pendergast, 2006).

The most prominent conceptual model of co-occurring disorder, the quadrants of care model (quadrant model; Figure 1), categorizes individuals based on the severity of mental health and substance problems (Center for Substance Abuse Treatment (CSAT), Substance Abuse and Mental Health Services Administration, Public Health Service, U.S. Department of Health and Human Services, 2005). Individuals with mild to moderate mental health and substance dependence problems are distinguished from those with severe impairment (i.e., Quadrant IV in the quadrant model) in these areas (Minkoff & Cline, 2004). Using the broadly defined co-occurring disorder category to identify offenders with mental illness and addiction is a useful starting point given the wide array of Axis I (e.g., Grant et al., 2004; Kessler, Chiu, Demler, Merikangas, & Walters, 2005) and Axis II (Skodol, Oldham, & Gallaher, 1999) conditions linked to alcohol and drug problems. The assessment of offenders within correctional settings, however, requires some degree of specificity regarding the nature of the mental health problems present and the implications these problems have for risk management (Andrews, Bonta, & Wormith, 2006). For example, offenders diagnosed with borderline personality disorder and addiction problems are likely to have increased rates of anxiety and mood symptoms compared with other offenders (Grella et al., 2008). Offenders with psychotic disorders are at

increased risk for violence (Douglas, Guy, & Hart, 2009), and the presence of co-occurring substance use and psychotic disorder tends to elevate the risk of violent offending (Wallace, Mullen, & Burgess, 2004).

Despite the importance of co-occurring disorder for offender risk management, the body of research relevant to this issue is marked by a number of limitations. First, many studies have been conducted on relatively small samples (e.g., Grella et al., 2008) or at a single facility (Hiller et al., 1996). These limitations highlight the need to extend the study of offender co-occurring disorder with large samples recruited from multiple facilities. Second, studies that have used large multisite samples provide only general descriptions, often based on screening measures, of offender mental health problems (James & Glaze, 2006; Karberg & James, 2005). Few studies have described the frequency of specific patterns of co-occurring disorders and the association of these patterns with risk factors for suicide and aggression, which are critical for offender management.

The Personality Assessment Inventory (PAI; Morey, 2007) is one instrument that can play an important role in the assessment of offender co-occurring disorder. Research with offender samples has demonstrated that PAI scores have strong psychometric properties (Drapalski, Youman, Stuewig, & Tangney, 2009; Edens & Ruiz, 2005) and are valid predictors of Axis I disorders (e.g., Edens & Ruiz, 2008; Rogers, Ustad, & Salekin, 1998),¹ institutional misconduct (Caperton, Edens, & Johnson, 2004; Edens & Ruiz, 2006; Walters, 2007), and recidivism (Boccaccini, Murrie, Hawes, Simpler, & Johnson, 2010; Salekin, 2008). The instrument also measures substance problems (Patry, Magaletta, Diamond, & Weinman, 2011; Ruiz, Dickinson, & Pincus, 2002) in addition to variables that are helpful for treatment planning, such as motivation, aggression, and suicidal ideation. Prior work has shown that Aggression (AGG) and Suicidal Ideation (SUI) scores are useful for risk assessment, as they have been linked with violent and suicidal behavior, respectively (Hopwood, Baker, & Morey, 2008; Wang et al., 1997). The strong empirical foundation of the instrument allows it to play an increasingly important role in forensic settings (Mullen & Edens, 2008).

Despite early interest in complex configural interpretive approaches for multiscale instruments (e.g., PAI Violence Potential Index; Morey, 1996), recent work has highlighted the utility of more basic, additive interpretation grounded in individual scale elevations (Ben-Porath & Tellegen, 2008; Witt et al., 2010). Two-point elevations (e.g., 2-point code types) are a valuable extension of individual scale interpretation and offer a useful approach for clinical assessment. Morey (1996, 2007) published interpretive and empirical information for common two-scale elevations on the PAI. For example, 9% of the clinical normative sample exhibited profiles with the highest two-scale elevations comprising Drug Problems (DRG) and Alcohol Problems (ALC), whereas about 2% exhibited profiles with the highest elevations on Antisocial Features (ANT) and DRG (see Morey, 2007). These two-scale elevations are associated with substance abuse, impulsivity, and marked interpersonal difficulties (Morey, 1996). However, relatively little

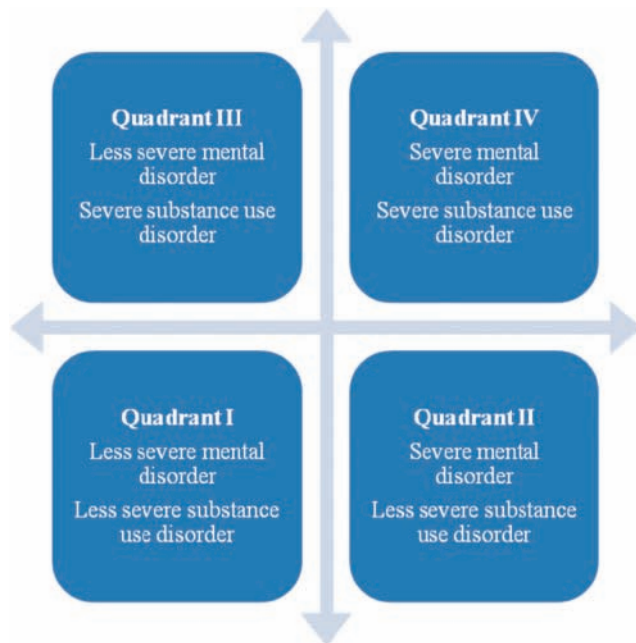


Figure 1. Quadrant model. Adapted with permission from *Substance Abuse Treatment for Persons With Co-Occurring Disorders: Treatment Improvement Protocol (TIP) 42* (DHHS Publication No. (SMA) 05-3992) by the Center for Substance Abuse Treatment (CSAT), Substance Abuse and Mental Health Services Administration, Public Health Service, U.S. Department of Health and Human Services, Rockville, MD. Copyright 2005 by Substance Abuse and Mental Health Services Administration.

¹ It has been our clinical experience that individuals with psychotic disorders often have attention and cognitive deficits that make it difficult for them to complete multiscale self-report questionnaires, such as the PAI.

research has extended Morey's (1996) work on multiscale elevations. This limitation is problematic, as co-occurring disorder is likely to produce elevations across multiple scales. Moreover, the clinical use of multiscale interpretation requires a strong empirical foundation, given the methodological limitations of this approach (Ben-Porath, 2003; Butcher, Graham, & Ben-Porath, 1995).

Although a variety of mental health problems are associated with substance use disorders (Grant et al., 2004; Kessler et al., 2005), recent conceptualizations suggest that specific patterns of co-occurring disorder emerge for theoretically coherent reasons (Volkow, 2001). Brady and Sinha (2005) postulated that symptoms of depression, traumatic stress, and disinhibitory behavior (e.g., attention deficits) might accompany substance use disorders at increased rates due to shared disruptions in the neurobiological circuits regulating distress and reward. Individuals with the aforementioned conditions experience chronic distress that they attempt to alleviate through substance use (e.g., Koob & Le Moal, 1997). Heavy and escalating substance use, however, dysregulates stress and reward circuits in the brain, worsening the very symptoms that promoted the use (see McCarty, Tomlinson, Anderson, Marlatt, & Brown, 2005, for a discussion of rebound effects). Although not explicitly discussed by Brady and Sinha (2005), it is likely that the disruption of an individual's ability to manage distress and reward-seeking behavior would increase personality tendencies, such as negative affect and disinhibition, that have been associated with violent and suicidal behavior (Conner & Duberstein, 2004; Conner, McCloskey, & Duberstein, 2008; Kennealy, Skeem, Walters, & Camp, 2010; Verona, Patrick, & Joiner, 2001). Recent findings support this possibility, as a history of violence has been associated with increased suicide risk in patients receiving addiction treatment (Ilgen et al., 2010). Despite the relevance of this issue for offender risk management, no studies (to our knowledge) have examined the relationship between aggression and suicide risk factors and specific patterns of co-occurring mental health and substance problems.

In the current study, we sought to evaluate the frequency of co-occurring mental health and substance problems in offenders and to examine the extent to which these problems are associated with risk factors for suicide and aggression. We performed a secondary data analysis by combining five data sets from previously independent studies in which the PAI was administered in correctional settings. The body of PAI work has progressed to the point at which empirical synthesis of existing studies is an attractive option for addressing specific research questions. Such synthesis is possible when studies are comparable, both conceptually and methodologically, and this synthesis increases confidence in the generalizability of the results (Lipsey & Wilson, 2001).

The first objective in this study was to examine the frequency of four specific patterns of co-occurring mental health and substance problems and to evaluate the extent to which these co-occurring problems were associated with risk factors for suicide and aggression. The mental health problems examined here were selected based on the work of Brady and Sinha (2005). Studies have found high rates of depression, disinhibitory pathology (i.e., antisocial personality disorder), and trauma history in offender samples (Ditton, 1999; Fazel & Danesh, 2002; James & Glaze, 2006). Given the dysregulated brain circuitry these conditions are thought to share with substance use disorders (Brady & Sinha, 2005), we predicted that offenders with addiction problems would exhibit

increased rates of clinically significant depressive and antisocial personality disorder symptoms compared with offenders without substance use problems. The high rates of physical and sexual abuse (Ditton, 1999) in offenders also led us to expect increased rates of symptoms related to trauma, specifically posttraumatic stress disorder (PTSD) and borderline personality disorder symptoms (see Herman, 1997), in offenders with substance problems. We further predicted that there would be an increased prevalence of risk factors for suicide and aggression in offenders with co-occurring problems compared with other offenders. We tested the generalizability of our results by evaluating whether offenders with co-occurring problems differed from other offenders on screening interview responses and criminal history variables (age at first offense, total number of convictions for violent offenses) associated with risk behavior (see Monahan et al., 2001).

The second objective was to identify differences across men and women in the frequency with which the aforementioned co-occurring problems were associated with suicide and aggression risk factors. Men are incarcerated at a much higher rate than women (Sabol, West, & Cooper, 2010), but female offenders may be more psychologically impaired than male offenders. Female offenders tend to exhibit greater levels of mental health impairment compared with nonincarcerated women (Jordan, Schlenger, Fairbank, & Caddell, 1996) and incarcerated men (James & Glaze, 2006; Teplin, Abram, McClelland, Dulcan, & Mericle, 2002), with researchers reporting pronounced differences in mood and trauma-related disorders (Drapalski et al., 2009; Zlotnick et al., 2008). Such differences may be partly attributable to the increased rates of prior sexual and physical trauma in female offenders (Ditton, 1999; Messina et al., 2006). As such, we predicted that women would exhibit higher levels of mood and trauma-related symptoms than men. However, the implication these differences have for risk management is unclear. Some research has found no significant differences in the suicidal behavior of men and women with substance use disorders (e.g., Preuss et al., 2003), but prior work has also highlighted the importance of gender issues in the treatment of co-occurring disorder (e.g., Hien, Cohen, Miele, Litt, & Capstick, 2004). Male and female offenders with co-occurring problems may exhibit differences in the frequency of suicide and aggression risk factors that in turn bear implications for risk management. On the basis of empirical work (e.g., Preuss et al., 2003) and the putative dysregulation (presumably invariant across sex) of brain circuitry associated with co-occurring disorder (Brady & Sinha, 2005), we did not expect differences in risk factors across men and women with substance problems, despite the presence of such differences in other populations (American Psychiatric Association, 2000).

Method

Participants

Participants were drawn from the following studies:

Sample 1 (Douglas, Guy, Edens, Boer, & Hamilton, 2007) contained 286 male offenders evaluated for placement in the federal Correctional Service of Canada. This sample had an average age of 35 years ($SD = 11$). Most participants were White (74%), with the remainder being of Aboriginal (17%) or other racial/ethnic backgrounds. The average years of completed educa-

tion was 10 ($SD = 2$). Half of the sample was single, 35% were married or common-law married and the remainder (15%) was separated, divorced, or widowed. Approximately 80% of these offenders were incarcerated for violent or sexual offenses, and most had prior convictions.

Sample 2 (Edens & Ruiz, 2005) was collected during the development of the PAI Interpretive Report for Correctional Settings (PAI-CS). The sample ($n = 1,189$) included offenders housed in state (New Jersey, Texas, Washington) correctional facilities of varying security levels (low, medium, and maximum). Sixty-eight percent of the sample was male, and participants had an average age of 34 years ($SD = 9$). Forty-five percent of the sample was African American, and the rest were White non-Hispanic (35%), Hispanic (8%), or other. Most of the participants were single (57%), with the remainder being married (16%), divorced (10%), or other. No consistent information on the index offense was available across the subsamples comprising the PAI-CS normative sample, although 8% were sex offenders.

Sample 3 (Poythress et al., 2010) contained offenders ($n = 1,577$; 84% male) recruited from state prisons or residential (correctional) drug treatment facilities. Offenders were included if they were White or African American, not taking medications for active psychotic symptoms, and without marked intellectual impairment. Participants had an average age of 35 years ($SD = 7$). Twenty-eight percent had not completed high school, 47% had a high school diploma or General Equivalency Degree (GED), and 22% had completed education beyond high school. Sixty percent of the sample was White, 33% were African American, and 7% were of Hispanic heritage. Information on index offenses was not available for this sample.

Sample 4 (Ruiz, Peters, Sanchez, & Bates, 2009) consisted of 140 (73% male) incarcerated offenders receiving substance use treatment within a county detention facility in a large metropolitan area (Hillsborough County, Florida). These offenders had some form of substance involvement, and most had been court-ordered to undergo treatment. The average age of the sample was 36 years ($SD = 11$). Inclusion criteria were voluntary participation, English language proficiency, and an absence of severe intellectual or psychiatric impairment. The racial/ethnic background of the sample was 47% African American, 44% White, 6% Hispanic, and 3% Asian, Native American, or other. Most participants were single (53%) or divorced/separated (24%), with the remainder married (10%) or of unknown marital status (13%). The majority of the offenders were charged with drug (72%), property (29%), or traffic (11%) offenses; relatively few had also been charged with violent (11%), prostitution (3%), or sexual (2%) offenses.

Sample 5 (Nikolova, 2009) participants ($n = 96$; 51% male) were recruited as part of a larger study that was validating a new assessment instrument. These offenders were incarcerated, with sentences of 2 years or less, in one of two correctional facilities in British Columbia, Canada. Offenders were included in the study if they were between the ages of 19 and 50, able to communicate in English, and not exhibiting acute psychotic symptoms. The average age of the group was 33 years ($SD = 8$). Most (56%) participants did not complete high school, but 28% had a high school diploma/GED, and the remainder had completed some postsecondary education. Approximately 70% of the participants were White, with the remaining of Aboriginal (17%), East Indian (5%), African (3%), or Asian (1%) heritage.

Combined sample was the consolidation of previously independent data sets, which resulted in an overall sample of 3,288. The combined sample had a mean age of 32 years ($SD = 8.3$) and was 78% male. The racial/ethnic composition of the combined sample was 53% White, 36% African American, and 7% Hispanic; the remainder was of other racial/ethnic backgrounds. Although exact comparisons are difficult to make because of differences in the information reported across correctional systems (Public Safety Canada Portfolio Corrections Statistics Committee, 2008; Sabol et al., 2010), the combined sample is similar to Canadian and U.S. offender populations with respect to age and proportion of White offenders. Nevertheless, the combined sample had an overrepresentation of women (22% vs. 6.6%). Approximately 30% of the combined sample was recruited from addiction treatment programs; this rate is consistent with trends in U.S. state and federal facilities (Mumola, 1999).

Materials

The following instruments were used:

Personality Assessment Inventory (PAI; Morey, 2007). The PAI is a 344-item multiscale self-report inventory that contains validity, clinical, and treatment scales. Reading ability required for the individual scales ranges from fourth to sixth grade (Schinka & Borum, 1993). The scales analyzed here were those most relevant to our hypotheses, namely, Alcohol Problems (ALC), Drug Problems (DRG), Depression (DEP), Anxiety-Traumatic Stress (ARD-T), Borderline Features (BOR), Antisocial Features (ANT), Suicidal Ideation (SUI), and Aggression (AGG). Psychometric evaluation of the scale scores was conducted with available item-level data sets (all except Sample 1). Average internal consistency reliabilities derived from Sample 2 to Sample 5 were ALC $\alpha = .89$ (range .77-.94), DRG $\alpha = .85$ (range .71-.90), DEP $\alpha = .85$ (range .76-.90), ARD-T $\alpha = .87$ (range .84-.90), BOR $\alpha = .87$ (range .81-.90), ANT $\alpha = .80$ (range .72-.85), SUI $\alpha = .85$ (range .78 to .90), and AGG $\alpha = .86$ (range .70 to .91).

Mental Health Screening Form-III (MHSF-III; Carroll & McGinley, 2001). The MHSF-III is an 18-item screening interview designed to assess mental health problems in individuals with substance use disorders. The items cover treatment history, symptoms of mental illness (e.g., depression, anxiety), and past suicidal or aggressive behavior. The MHSF-III was administered as part of routine clinical procedures and therefore did not allow for the evaluation of interrater reliability. The total score has good internal consistency and test-retest reliability and is a valid indicator of psychiatric disorder in offenders (Carroll & McGinley, 2001; Sacks et al., 2007).

Procedures

Data sets were obtained from researchers who administered the PAI either within an independent research project (Samples 1, 3, 4, and 5) or as part of standard clinical procedures (Sample 2). Relevant institutional-review-board approved protocols for the independent research projects and informed consent were obtained. The PAI was administered using standard procedures and was typically included within a battery of instruments. Each project used exclusion criteria to screen out participants who were not likely to provide valid data. Exclusion criteria common to all

studies included lack of fluency in English, acute psychosis, and markedly limited intellectual functioning. Criminal history information (e.g., age at first offense, number of lifetime convictions for violent offenses) was collected for Sample 2. Participants in Sample 4 were administered the MHSF-III by counselors during intake procedures for an in-jail addiction treatment program. Counselors were licensed, or license eligible, and had completed standardized MHSF-III training.

Data collected for the PAI-CS were obtained from archival files of offenders who completed the PAI as part of routine clinical procedures in their respective correctional institutions. Data were deidentified prior to analysis, and the releasing agencies approved the protocol. Although no uniform exclusion criteria were used, clinicians administering the PAI screened offenders, generally by means of clinical observation and record review, for a lack of English language proficiency, acute mental health impairment, and intellectual limitations.

To reduce error variance associated with careless and atypical responding, we removed participants with elevated ($\geq 80T$) inconsistency (ICN) or infrequency (INF) validity scores. The use of two (of four) of the primary PAI validity scales and a cut score of 80T (as opposed to 70T) represents a conservative approach for removing cases. We limited the number of cases excluded in recognition of findings that validity scales often capture clinically relevant variance (Ben-Porath, 2003; Morey et al., 2002; Piedmont, McCrae, Riemann, & Angleitner, 2000). Ninety-one cases were removed due to elevated ICN or INF scores, leaving a final sample of 3,197. Mean scores for the PAI validity scales in the remaining sample were as follows: ICN = 53T ($SD = 9$), INF = 55T ($SD = 10$), Negative Impression Management (NIM) = 57T ($SD = 14$), and Positive Impression Management (PIM) = 45T ($SD = 13$).

Results

Participants with elevated ($\geq 70 T$) ALC, DRG, or ALC and DRG scores were categorized as having a substance use problem. ALC and DRG elevations are valid indicators of substance use disorder (e.g., Ruiz et al., 2002) and the 70T cutoff is recommended by Morey (1996). Thirty-two percent of the sample had clinically significant alcohol problems (ALC $\geq 70T$), 67% had clinically significant drug problems (DRG $\geq 70T$), and 27% had elevations in both domains. Seventy percent ($n = 2,247$) of the sample was identified as having a substance problem. The decision to combine ALC and DRG elevations was made in light of the well-established diagnostic link between alcohol and drug problems (American Psychiatric Association, 2000), and their moderate correlation (ALC/DRG $r = .39$, $p < .001$) in this sample. After the smallest sample was collapsed with the other Canadian sample,² the prevalence of these elevations across the sites ranged from 60% to 85%.

Consistent with interpretive guidelines (Morey, 1996, 2007), scale scores equal to or greater than 70T were categorized as clinically significant. The frequencies of clinically significant symptom elevations of DEP, ARD-T, ANT, and BOR were calculated. As is evident in Table 1, these elevations were common within the sample, ranging from 15% (DEP) to 40% (ANT). We also categorized offenders into one of the quadrant model categories on the basis of the presence (or absence) of symptom eleva-

tions on the mental health (DEP, ARD-T, ANT, BOR) and substance (ALC, DRG) scales (e.g., Quadrant IV = DRG $\geq 70T$ and DEP $\geq 70T$). Twenty percent of the sample was categorized into Quadrant I, 9% Quadrant II, 23% in Quadrant III, and 46% in Quadrant IV.

Table 1 also presents the prevalence rates and corresponding odds ratios (OR) for the planned comparisons between offenders with and without substance problems. In line with our first prediction, offenders with substance problems exhibited statistically greater odds of having clinically significant depressive, traumatic stress, and personality disorder (antisocial, borderline) features than did offenders without such problems. We then compared the frequency with which each of the symptoms elevations was accompanied by increased suicide risk (e.g., DEP $\geq 70T$ and SUI $\geq 70T$). Offenders with substance problems had significantly increased odds of mental health symptom elevations accompanied by SUI elevations compared with offenders without substance problems (Table 1). Lastly, we compared the extent to which symptom elevations were present with a risk factor for aggression. Table 1 reveals that offenders with substance problems, compared with other offenders, were more likely to have AGG elevations accompanying depression, traumatic stress, and personality disorder features. Ranges from the sites are also reported in Table 1.

To test whether the observed findings generalized across different methods, we analyzed MHSF-III interview data (available for most of Sample 4, $n = 118$). We compared the frequency of positive endorsements on the MHSF-III questions assessing depression (Item 6a) and traumatic stress (Item 7). We also compared the frequency of positive depression or traumatic stress accompanied by prior suicide attempt (Item 6b) or past aggressive behavior resulting in harm or property destruction (Item 9). The latter two risk items were combined, given their low endorsement rates (e.g., Item 6b = 25%; Item 9 = 36%) and moderate correlation ($r = .37$, $p < .01$). Compared with offenders without substance problems, those with substance problems had significantly higher odds of clinically significant depressive symptoms and a trend ($p = .06$) toward greater traumatic stress symptoms (Table 1). Offenders with substance problems were also more likely to endorse depressive and traumatic stress symptoms accompanied by past suicidal or aggressive behavior.

We conducted a further test of the generalizability of our findings by examining select criminal history variables across Sample 1 offenders with and without co-occurring mental health and substance problems. The criminal history variables were age at first offense and total number of convictions for violent nonsexual offending (e.g., assault, battery, murder). Participants were again identified as having co-occurring problems by means of the PAI. In light of the general consistency across earlier findings and the small cell sizes afforded by Sample 1, we created a general co-occurring group based on the four mental health problems of interest here. Independent sample t tests revealed that offenders with co-occurring disorder ($n = 64$), compared with offenders without co-occurring disorder ($n = 217$), were significantly

² In order to increase the stability of the data points, we combined Samples 1 and 5. Sample 5 was the smallest sample and was collected in a region similar to that in which Sample 1 was collected. The ranges presented in Tables 1 and 2 were based on four, not five, different samples.

Table 1
Prevalence Rates Across Offenders With and Without Substance Use Disorder

Clinically significant elevations	Total		No substance use disorder		Substance use disorder		Odds ratio [95% CI]
	%	Range	%	Range	%	Range	
PAI^a							
Depression	15.3	11–30	6.1	0–7	19.0	16–35	3.6 [2.7, 4.8]*
Traumatic stress	29.1	21–44	13.6	9–18	35.4	28–51	3.5 [2.8, 4.3]*
Borderline features	31.4	21–43	8.9	3–14	40.4	29–50	6.9 [5.4, 8.9]*
Antisocial features	40.5	31–54	17.7	11–27	49.7	32–61	4.6 [3.8, 5.6]*
Depression–suicidal	6.3	4–21	1.8	0–3	8.1	4–24	4.9 [2.9, 8.2]*
Traumatic stress–suicidal	7.4	4–21	1.7	0–2	9.7	6–24	6.3 [3.7, 10.7]*
Borderline–suicidal	7.9	4–21	1.7	0–2	10.4	5–25	6.9 [4.0, 11.6]*
Antisocial–suicidal	7.0	3–19	1.4	0–2	9.3	4–22	7.0 [3.9, 12.3]*
Depression–aggression	6.0	4–14	1.7	0–3	7.7	5–16	5.0 [2.9, 8.4]*
Traumatic stress–aggression	10.9	6–18	3.4	2–11	13.9	8–19	4.5 [3.1, 6.6]*
Borderline–aggression	14.4	8–21	4.2	2–7	18.5	11–23	5.1 [3.7, 7.2]*
Antisocial–aggression	16.0	8–23	5.9	2–12	20.0	11–26	4.0 [3.5, 5.4]*
MHSF–III^b							
Depression	52.5		21.1		58.6		5.3 [1.6, 17.1]*
Traumatic stress	40.7		21.1		44.4		3.0 [0.93, 9.7]†
Depression/traumatic stress & suicide attempt/aggression	40.7		15.8		45.5		4.4 [1.2, 16.3]*

Note. Mantel–Haenszel estimates were calculated for significance testing. CI = confidence interval; PAI = Personality Assessment Inventory; MHSF–III = Mental Health Screening Form–III.

^a $N = 3,197$; no substance use disorder (SUD) $n = 900$; SUD $n = 2,247$; 50 missing SUD data. ^b $n = 118$; no SUD $n = 19$; SUD $n = 99$.

† $p = .06$. * $p < .05$.

younger, $t(281) = 2.01, p = .03, d = 0.31$, at the time of their first offense ($M = 17.6$ years vs. $M = 20.4$ years) and had a significantly greater, $t(281) = -2.03, p = .04, d = 0.30$ number of convictions for violent offenses ($M = 2.7$ vs. $M = 1.9$). Nevertheless, when participants in Sample 1 were categorized according to the quadrant model (Quadrant I $n = 108$, Quadrant II $n = 31$, Quadrant III $n = 78$, Quadrant IV $n = 64$), fewer differences emerged. One-way analyses of variance comparing the quadrants across age at first offense, $F(3, 277) = 4.40, p < .01$, and lifetime convictions for violent offending, $F(3, 275) = 6.06, p < .01$, were significant, but conservative post hoc testing (Bonferroni) testing with the number of comparisons controlled revealed differences only between Quadrant I and Quadrant IV.

Table 2 presents the frequency of clinically significant symptom elevations, individually and accompanied by AGG and SUI elevations, of men and women with substance problems. Consistent with predictions, women exhibited higher odds of depressive, traumatic stress, and borderline personality disorder features than men, though these differences were of small ($OR < 2$) magnitude. Examination of the frequency of SUI elevations that accompanied specific symptom elevations revealed no significant sex differences (Table 2), a finding in line with our predictions. A similar set of analyses of the frequency of mental health symptom elevations accompanied by AGG elevations revealed no significant sex differences with respect to traumatic stress, borderline personality disorder features, and antisocial features. However, female offenders with substance problems, compared with male offenders, had significantly greater odds of depression accompanied by AGG elevations, though the magnitude of this difference was small. Ranges from the different sites are also reported in Table 2.

The combination of previously independent samples provides an opportunity to test for variables that could moderate or otherwise qualify the identified relationships. First, we tested whether the current findings emerged across the different samples (using the collapsed Canadian samples) when tested individually. The findings were generally consistent across the four sites for the mental health symptoms elevations (OR range 2.9–15.6), mental health–SUI elevations (OR range 2.3–10.0), and mental health–AGG elevations (OR range 2–7). Second, we tested whether excluding participants with PIM or NIM validity scale elevations would alter the results. The primary co-occurring risk factor analyses were repeated after 210 offenders with either NIM (≥ 927) or PIM (≥ 687) elevations were removed from the total sample. Similar findings emerged for the mental health symptom elevations (OR range 3.2–6.8), mental health–SUI elevations (OR range 5.2–8.2), and mental health–AGG elevations (OR range 3.6–5.2).

We also wished to rule out the possibility that the observed associations between co-occurring problems and suicide or aggression PAI risk factors were due to the shared variance attributable to psychopathology. To test this possibility, we calculated four sets of partial correlations between the PAI substance use scales (ALC, DRG) and the risk factor scales (SUI, AGG) after controlling for clinical scale scores. Zero order correlations between ALC and the risk scales were AGG $r = .28 (p < .001)$ and SUI $r = .25 (p < .001)$. Correlations between DRG and the risk scales were AGG $r = .32 (p < .001)$ and SUI $r = .30 (p < .001)$. When we controlled for clinical scales, partial correlations yielded significant associations between the substance use and risk scales in most cases. Exceptions to this general finding were that (a) DRG was no longer positively correlated with AGG ($r = -.06$) and SUI ($r =$

Table 2
Prevalence Rates on the Personality Assessment Inventory Across Male and Female Offenders With Substance Use Disorder

Clinically significant elevations	Women ^a		Men ^b		Odds ratio [95% CI]
	%	Range	%	Range	
Depression	25.9	21–43	16.9	13–32	0.58 [0.46, 0.73]*
Traumatic stress	45.7	40–63	32.0	21–45	0.56 [0.46, 0.68]*
Borderline features	47.2	36–63	38.2	26–45	0.69 [0.57, 0.84]*
Antisocial features	42.2	30–60	52.1	34–62	1.50 [1.2, 1.8]*
Depression–suicidal	7.7	4–20	8.3	5–28	1.10 [0.75, 1.5]
Traumatic stress–suicidal	10.3	6–20	9.5	6–28	0.92 [0.67, 1.3]
Borderline–suicidal	10.6	6–23	10.4	5–28	0.97 [0.71, 1.3]
Antisocial–suicidal	7.7	3–20	9.8	5–25	1.30 [0.91, 1.8]
Depression–aggression	9.9	7–17	7.1	4–17	0.69 [0.50, 0.97]*
Traumatic stress–aggression	15.4	10–26	13.5	7–17	0.85 [0.65, 1.1]
Borderline–aggression	18.5	13–31	18.4	13–23	0.99 [0.77, 1.3]
Antisocial–aggression	17.6	13–36	20.8	10–27	1.20 [0.96, 1.6]

Note. Mantel–Haenszel estimates were calculated for significance testing. Ranges reported for the different samples. CI = confidence interval (women coded as 0; men coded as 1); PAI = Personality Assessment Inventory.

^a $n = 545$. ^b $n = 1,695$; seven had missing data.

* $p < .05$.

–.01) after BOR was controlled and (b) DRG was no longer positively associated with AGG ($r = -.02$) after ANT was controlled.

Discussion

Secondary data analysis of a combined multisite offender sample found that co-occurring mental health and substance problems were highly prevalent and associated with risk factors for suicide and aggression. Offenders with substance problems were more likely than other offenders to display elevations across a range of mental health problems. Additionally, offenders with substance problems were more likely than others to have mental health problems associated with risk factors for suicide and aggression. Men and women exhibited differences in the frequency of co-occurring mental health and substance problems that were in line with predictions, but there were few gender differences in the frequency with which mental health symptom elevations were associated with suicide and aggression risk factors.

Co-Occurring Problems and Risk Factors

The finding that offenders with substance problems endorsed an increased frequency of mental health problems is consistent with results obtained in community (e.g., Grant et al., 2004) and offender (Abram et al., 2003; James & Glaze, 2006) samples. We found increased rates of symptom elevations across a broader range of conditions than had previously been reported (e.g., Fazel & Danesh, 2002), a finding which suggests that the gross categorizations offered by the quadrant model (Figure 1; CSAT, 2005) may have some clinical utility. In future effort, researchers may need to consider whether refined categorizations of mental illness (e.g., externalizing and internalizing) and substance use (e.g., stimulants vs. sedatives) improve the utility of the model. How-

ever, all of the symptom elevations identified here were associated with risk factors for suicide and aggression. The increased suicide risk was evident in self-reported suicidal tendencies (hopelessness, suicidal ideation) as well as an increased probability of a past suicide attempt obtained via structured interview (i.e., MHSF–III). Increased aggression risk was evident in higher aggressive tendencies (physical, verbal, attitudinal) in addition to reports, again obtained from the MHSF–III, of aggressive behavior. We also found that male offenders with co-occurring problems had criminal histories suggestive of increased violence potential. Ilgen et al. (2010) found a link between violence and suicide risk in a sample of patients with substance use disorder. The present findings extend such work in demonstrating that co-occurring problems further increase the association with risk factors for suicide and aggression. Our findings add to the growing body of evidence showing that co-occurring mental health and addiction problems are associated with a variety of negative outcomes, such as substance relapse and re-offending (Grella et al., 2008; McNiel et al., 2005; Messina et al., 2006). It is important to note that no differences were found between Sample 1 men identified as having co-occurring problems and those with only mental health or substance problems; the increased risk associated with co-occurring problems may not be evident in all areas of functioning.

Brady and Sinha (2005) theorized that many patterns of co-occurring mental health (depression, PTSD, and disinhibition) and substance use problems result from dysregulation (see Koob & Le Moal, 1997) in the brain circuitry that controls distress and reward. We suspected that such dysregulation would manifest itself in elevated negative emotionality (distress) and response disinhibition (reward), thereby producing increased risk for suicidal behavior, aggressive behavior, or both (Kennealy et al., 2010; Verona et al., 2001). The current results were consistent with this expectation. Although many factors increase individuals' risk for suicidal

and aggressive behavior (e.g., Connor et al., 2008; Monahan et al., 2001), offenders with mental health problems may have heightened risk behavior when they abuse alcohol or drugs. These results reinforce the importance of addiction and mental health treatment services for offender rehabilitation and community re-entry (Chandler et al., 2009; Prendergast, 2009); effective intervention may reduce the risk for violence and suicide.

The present results bear important implications for psychological evaluations of offenders. First, clinicians assessing offenders with co-occurring disorders need to evaluate a broad spectrum of risk behaviors. In such evaluation, clinicians will need to go beyond general screening assessment to identify the complex interplay within the multitude of factors, such as addiction and violence history, that are present. The fact that all of the symptoms examined here were associated with increased risk to both self and others is informative because some disorders have not traditionally been linked to violence (e.g., depressive disorders). Although the field is moving towards increasing recognition of the importance of co-occurring mental health and substance use disorders (CSAT, 2005), the assessment for violence and suicide risk often occurs independent of each other. A growing amount of work is highlighting the implications of various PAI scale scores for risk assessment (e.g., Boccaccini et al., 2010; Walters, 2007). This work now appears especially relevant given the need to focus on multiple areas of risk behavior when evaluating criminal offenders. A second issue is that the observed frequency of clinically significant symptom elevations may require the use of higher cut scores than are recommended for general clinical use to identify those offenders most in need of treatment. Butcher et al. (1995) discussed the concept of well-defined code types as being those profiles with scale scores elevated beyond the standard error of measurement. This may be a useful approach when traditional cut scores (Morey, 1996) are not optimal. The standard error of measurement for most PAI scales is around $5T$ (Morey, 2007), so a cut score of $75T$ may be a reasonable alternative to standard cut scores in some correctional evaluations. Cut scores of $75T$ resulted in the following prevalence rates in the current sample: $ALC\ 75T = 26\%$, $DRG\ 75T = 59\%$, and $ALC\ 75T$ and $DRG\ 75T = 22\%$.

Differences Across Male and Female Offenders

Examination of offenders with substance problems revealed that women exhibited greater levels of depressive, PTSD, and borderline personality features than men. Women also exhibited lower levels of antisocial personality features. These results are broadly consistent with those reported in general and substance-involved offender samples (Drapalski et al., 2009; Zlotnick et al., 2008). Nevertheless, the present findings extend earlier work in showing few differences in the extent to which co-occurring problems were associated with risk factors for suicide and aggression. Preuss and colleagues (2003) observed that men and women with alcohol dependence displayed a similar likelihood of suicide attempt during a prospective 5-year study. In line with this finding, no significant differences were identified here across male and female substance-involved offenders in the rates with which depressive, PTSD, and personality disorder features co-occurred with PAI SUI elevations that indicated an increased risk for suicide. Generally similar findings were observed for aggression risk factors, with the

exception that a significant (but small in magnitude) difference was found across men and women with co-occurring depression and substance problems; women with co-occurring depression and substance problems had an increased frequency of the PAI aggression risk factor compared with men.

The observation that men and women with co-occurring problems had similar levels of high risk behavior is consistent with results found in noncorrectional settings, at least with respect to suicide risk (Preuss et al., 2003). Collectively, these findings raise the possibility that dysregulation caused by substance abuse (Brady & Sinha, 2005)—or perhaps reflecting risk for these problems—affects men and women similarly, at least with respect to high-risk behavior. Despite the similarities observed here, important gender differences have been found in many areas (trauma history, domestic situation) related to co-occurring disorder. These differences may be relevant to risk management and require further study (see Hien et al., 2004).

Conclusions

Offenders have high rates of alcohol and drug problems that are closely related to criminal offending (e.g., Fazel et al., 2006; Mumola & Karberg, 2006). Increasingly, it is recognized that effective management and rehabilitation of offenders will require clinicians to address addictive problems (Chandler et al., 2009; Prendergast, 2009). The present study adds to a growing body of work showing that offenders with substance problems are at increased susceptibility for mental health disorders and that those offenders with co-occurring mental health and substance problems are generally at the highest risk for adverse outcomes (Grella et al., 2008; McNeil et al., 2005; Messina et al., 2006). This observation is tempered by the fact that there may be some domains, shown here with criminal history, in which fewer differences emerge between those with co-occurring disorder and those with only a substance or mental health disorder.

The secondary data analysis of a combined sample derived from previously independent projects remedies many drawbacks of earlier work (see Lipsey & Wilson, 2001). Nevertheless, there are important limitations that warrant discussion. First, the samples analyzed in this study did not contain offenders with psychotic disorders. Psychotic disorders have been linked to violent and criminal offending (Douglas et al., 2009; Wallace et al., 2004), so the exclusion of offenders with these problems leaves an important gap in understanding. Second, the design of this study provided only concurrent and retrospective (postdictive) validation. Although past behavior is a strong predictor of future behavior in offenders (Gendreau, Goggin, & Law, 1997), concurrent and retrospective designs do not offer the same level of certainty as true prospective designs for clinical decision making (Weiner, 2003). In future work, researchers should strive to incorporate extended follow-up periods (e.g., Salekin, 2008) to improve the quality of evidence. Finally, our primary, although not exclusive, reliance on self-report scale elevations may have lowered the threshold for identifying clinically significant problems. PAI scale elevations are not synonymous with clinical diagnoses obtained from comprehensive psychological evaluation. For instance, the rates of clinically significant substance and mental health problems exceed those reported elsewhere (Fazel & Danesh, 2002; Fazel et al., 2006; James & Glaze, 2006), although exact comparisons are

difficult to make due to methodological differences across studies. Partial replication with the MHSF-III and criminal history variables adds confidence in the generalizability of our results, but the small number of participants with this additional data precluded a complete examination of this issue. In future work, the robustness of our findings would be clarified by incorporation of a wider range of variables than used here.

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