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Substance Use, Mental Illness and Violence: The Co-occurrence of Problem Behaviors among Young Adults

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Abstract

A paucity of research exists in which the co-occurrence of substance use, mental illness and violence in young adults is examined. Concurrently, there is also a lack of research explicating the contribution of theoretically-based risk factors for these problematic outcomes in this population. This lack of both outcome and explanatory research equally affects the utility of theories and interventions for this population. This article utilizes a sample of N=633 21 year olds to examine the prevalence of 1) violence and substance use, 2) mental illness (i.e., mood and anxiety disorders) and substance use, and 3) the use of multiple substances and investigates the relationship between various social determinants and said outcomes. Overall, the prevalence rates for the comorbid conditions were low; although on average males have higher rates than do females. Individual attitudes, perceived opportunities, and recent stressful life events are associated with the co-occurrence of outcomes. Implications for behavioral health are explored.

Keywords

Co-morbidity; Mental Health; Risk Factors; Substance Use; Violence; Young Adults

Introduction

A surfeit of research exists examining the prevalence of substance use, mental illness, including mood and anxiety disorders, and violence in both children and adolescents in addition to antecedents affecting these outcomes.[1-4] While the study of these outcomes in both isolation and combination is well developed for children and adolescents,[5-7] the same cannot be said for the commensurate study of their co-occurrence for young adults.[8-11] This

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gap has implications for both the theoretical understanding and implementation of directed interventions for young adults exhibiting these negative outcomes. Accordingly, this paper utilizes a sample of N=633 21 year olds to: 1) examine the prevalence of the co-occurrence of substance use, mental illness (i.e., mood and anxiety disorders) and violence and document the different groupings of the outcomes; and 2) investigate the relationship between various theoretically-indicated social determinants and the co-occurrence of substance use, mood and anxiety disorders and violence.

Substance use, mental illness and violence

The nexus of substance use, mental illness and violence in both magnitude and effect, presents multiple difficulties for both clinicians and clients. Specifically, lifetime estimates indicate that almost a third of all persons with a mental disorder evince comorbid substance use.12 While the magnitude is broad, the consequences of substance use are equally problematic for persons with mental illness. Specifically, the social and treatment costs associated with comorbid substance use and mental illness remain high.13-15 Further, the combination of substance abuse and mental illness has been correlated with violence.16-18

The correlation between mental illness and violence remains one of the most contentiously debated subjects in mental health services and research. Comprehensive examinations of the topic do show a significant and positive association between mental illness and violence.16, 19 However, while the general public and mental health stakeholder groups may hold that those with severe mental illness, including schizophrenia, most often represent the strongest risk for violence,20, 21 empirical data indicate that those with affective disorders, substance use disorders, or personality disorders represent a higher risk for violence than those diagnosed with schizophrenia.22 Therefore, an improved understanding of factors associated with violence for those with mood and anxiety disorders, in addition to substance use problems, is necessary; particularly for young adults.

What appears unequivocal in this debate, however, is that those who receive inadequate treatment in the community are more likely to engage in violence17—and those who engage in violence, in turn manifest more persistent and complex clinical problems such as comorbid substance use and impairment of social functioning.23 This clustering of problems is likely to be associated with contemporaneous exposure to dangerous environments where violence and crime are commonplace. Consequently, violence often begets future violence, all of which appears to be inextricably related to complex mental health and substance use issues.24

This clustering of problems presents a dire picture for both clinicians and clients alike; this is perhaps best indicated by the trend for psychosocial interventions to address only one outcome at a time,25 which increases the risk of early treatment termination,26 which in turn has the potential to exacerbate negative outcomes. It is therefore imperative to gain a better understanding of not only the prevalence of comorbid outcomes for young adults, but also the correlates associated with said outcomes.

Social determinants

There is a wealth of information on theoretically-based risk factors related to the development of substance use, mental illness and violence. For example, models like the social development model,27 hypothesize that risk factors for social problems exist in multiple domains representing one's individual attributes, attitudes and opportunities, family or household structure and recent life events; empirical research supports the existence of these domain-based risk factors and their import in understanding the development of social problems.10, 27-30

The causes of these unitary outcomes indicate far reaching phenomena that affect people's lives in complex ways that likely mitigate the effectiveness of prevention and intervention efforts and hinder overall wellbeing. However, the negative consequences of comorbid, as opposed to unitary outcomes, and their antecedents are likely to be more intractable. Therefore, it is imperative that research continue to develop a better understanding of the relationship between risk factors and negative outcomes, including the co-occurrence of substance use, mental illness and violence in hopes of forestalling these negative outcomes. Next, we briefly review findings from prior research regarding risk factors included in the current research.

Antisocial attitudes and opportunities

Prior research indicates a significant relationship between various measures of sensation seeking and consequent substance abuse31–34 and violence.30 Individuals with high indices of sensation seeking also score highly on levels of impulsivity and novelty seeking behaviors,35 which are correlated with antisocial and other nonconformist behaviors. The positing of a theoretical link between opportunity structures (e.g., structural inducements and social acceptability of opportunities) and an increased risk for negative outcomes has also found empirical support.30, 36

Household history of antisocial behavior

Interaction with antisocial family members or peers correlates with one's own involvement in antisocial behaviors, including substance use and violence, for both adolescents and young adults.29, 30, 36 Additionally, there is a hypothesized relationship between one's antisocial attitudes and opportunities for antisocial involvement and consequent attachment or commitment to antisocial others27. For adults, this attachment or exposure to antisocial others is not limited to immediate family, but also may encompass a broad social network including extended family, friends, roommates and co-workers. These social networks, which often become conflicted when imbued with crime, alcohol or drugs and mental illness,37–39 have the potential to strengthen antisocial attitudes and opportunities thus increasing the probability of negative outcomes.

Recent life events

Stressful life events are thought to affect adult substance use,40, 41 violence30 and mental illness42–44 through both cumulative and contemporary effects.45, 46 While the importance of examining exposure to stressful life events cannot be understated, much of the current research has emphasized responses to, or outcomes associated with, stressful events, including substance use, violence and mental illness.

In sum, despite the increased knowledge of the causes and consequences of substance use, mental illness and violence in isolation, there is still much knowledge to glean regarding the co-occurrence of these outcomes, particularly in young adults. Risk factors like those just reviewed provide a coherent theoretical model27 with which to assess negative outcomes throughout one's developmental life-course and also represent an opportunity to expand upon previous empirical and theoretical work.10, 29, 30, 36 The present paper examines these relationships using multivariable analyses of a sample of N=633 community-based 21 year olds.

Methodology

Sample

This study utilizes data collected from the Seattle Social Development Project (SSDP), an ongoing longitudinal study with the goal of identifying risk and protective factors for

delinquency and drug use. The study started in 1985 with an eligible sample of fifth graders (N = 919, 87% of the fifth grade) enrolled in 18 Seattle elementary schools. Of those, 808 students and their parents consented to participate in the longitudinal study and were included in the final sample. Specific details of the study design and methodology have been presented elsewhere.47 As an initial step in improving the empirical and theoretical understanding of these outcomes for young adults the current analyses are restricted to data collected when the participants were 21 years old. Of the 633 respondents included in these analyses, 54.0% (n=340) were non-White1 and 50.2% (n=318) were male. The current sample of 21 year olds represents a close approximation to the original sample of fifth grade students with regards to both race (54% of the original sample were non-White) and sex (51% of the original sample were male).

Measures

This study examined various combinations of the co-occurrence of substance use, mental illness (i.e., mood and anxiety disorders) and violence. Independent variables were chosen for analysis based on social development theory27 in addition to prior clinical and epidemiological studies of risk factors related to outcomes for young adults10, 11, 30, 36, 48 and in order to control variability in the likelihood of reporting the co-occurrence of problems that may be associated with sociodemographic characteristics, attitudes, behaviors and other relevant life events.

Dependent variables: Co-occurrence

Substance use was measured by taking the score of the participant's responses to one or more of the following four items: Think back over the last month, have you 1) had 5 or more drinks in a row of any type of alcoholic beverage such as beer, wine, wine coolers, whiskey, gin, or other liquor? 2) smoked marijuana? Or have you 3) used crack in the past year? 4) used other forms of cocaine in the past year? 5) used other drugs in the past year, including amphetamines, sedatives, narcotics, etc? Respondents indicating any binge drinking or marijuana use in the past month or any cocaine or other drug use in the past year were coded as 1 and compared to those indicating no alcohol or drug use.

Mental illness was assessed via self-report at age 21 using a modified version of the Diagnostic Interview Schedule (DIS).49 Participants were assessed for the presence of 1) depression, 2) generalized anxiety disorder, and 3) dysthymic disorder.

Depression was assessed via the following: 1) Depressed moods over the past year for at least two weeks, 2) Lost interest in work, hobbies or everyday activities, 3) Changes in weight or appetite, 4) Sleep-related difficulties, 5) Moving or talking slowly, 6) Lack of energy, 7) Feelings of worthlessness or guilt, 8) Difficulties with concentration, and 9) Suicidal thoughts. The diagnostic classification of "depression" was met if participants gave a response of "yes definitely" or "yes sometimes" to either having depressed moods (criterion 1) or losing interest in work or hobbies (criterion 2) and reported more than four of the criteria listed above (criteria 3 through 9) nearly every day within the same two week period.

Generalized anxiety disorder was assessed via the following: 1) Have you felt worried and anxious for a month or more in the last year? During that period, have you worried: 2) about things that are unlikely to happen? 3) a great deal about things that are not really serious? 4) about different things at the same time? and when you're worried and anxious, have you been 5) easily tired, 6) restless, 7) keyed up or on edge, 8) irritable, or had 9) muscle aches,

[1]Three respondents had a missing value for race.

10) sleep problems or 11) trouble focusing? The diagnostic classification of "generalized anxiety disorder" was met if participants gave a response of "yes definitely" or "yes sometimes" to being worried or anxious for more than five months in the past year (criterion 1) and listed three or more of the above criteria (criteria two through six).

Dysthymic disorder was assessed via the following: In the past two years, have you felt 1) depressed or sad most days, even if you felt okay sometimes? 2) moody or irritable most days? 3) Has there been a period when, for two months or more, you did not feel depressed (sad, moody, or irritable) most days? 4) When you felt (depressed, sad, moody or irritable) was your appetite less than normal, appetite more than normal, or did you have trouble falling asleep, staying asleep, waking too early, sleeping too much, general fatigue, worthlessness, low self-confidence, problems concentrating, problems with decision-making, and feelings of hopelessness? The diagnostic classification of "dysthymic disorder" was met if participants gave a response of "yes definitely" or "yes sometimes" to being depressed or sad (criterion 1) or moody or irritable (criterion 2) for two or more months and listed more than one of the above criteria during that time (criteria three and four).

Violence was measured by comparing respondents answering in the affirmative to any of the following six questions to those answering no to all six: In the past year did you 1) hit someone with the idea of seriously hurting them? 2) beat up someone so badly they probably needed a doctor? 3) hit your parents other than in jest or play? 4) threaten someone with a weapon? 5) use a weapon or force to get money or things from people? or 6) carry a handgun?

Independent variables: Sociodemographic characteristics

All models included controls for sex and race; as there was no variation in age it was not included in the models. For the multivariable regression models, males were coded 1 with females serving as the reference group and non-Whites were coded 1 and compared to Whites.

Independent variables: Social determinants

Rebelliousness was measured using the mean score of three-items indicating the respondent's noncompliant attitudes toward societal norms ($\alpha = 0.77$). This measure consisted of the following items: 1) I do the opposite of what people tell me, just to get them mad, 2) I ignore rules that get in my way and 3) I like to see how much I can get away with. Response categories for these items were: Almost always; Fairly often; Sometimes; Seldom; or Almost never.

Sensation seeking was assessed using the mean score of two-items measuring the respondent's attitudes toward sensation seeking activities. Items used in this scale included: During the past year, how many times have you: 1) done something dangerous because someone dared you to do it? and 2) done crazy things even if they are a little dangerous? Response categories for these items were: Never; I've done it, but not in the past year; Less than once a month; Two or three times a month; Once a week or more.

Perceived antisocial rewards for delinquent behaviors were assessed by a five-item scale, ($\alpha = 0.76$). Examples of the items used in this scale included: What are the chances you would be seen as cool 1) if you took something worth $50? 2) if you carried a handgun? or 3) if you beat up or helped to beat up somebody up? Each item was measured using response categories of 0-20% (no or little chance); 21-40% (little chance); 61-80% (pretty good chance); or 81-100% (very good chance).

Antisocial opportunities were created by summing the scores of two categorical items: During the past year, have you been asked to: 1) sell drugs? and 2) buy or sell stolen goods? Response categories for these items were yes or no.

Household history of antisocial behavior was measured with the following three items: During the past three years (36 months), did you live with anyone who: 1) was convicted of a crime other than traffic violations? 2) in your judgment, was an alcoholic or problem drinker (while you were living with them)? and 3) in your judgment, was addicted to drugs or had a drug abuse problem (while you were living with them)? Respondents indicating living with anyone with the above behaviors were coded as 1 and compared to those indicating not living with anyone exhibiting those behaviors.

Victimization over the past year was assessed by six items: During the past year: 1) did someone take something directly from you using force, such as by mugging, or threat? 2) did someone try to rob you by using force or threatening to hurt you? 3) (Other than the incidents already mentioned), were you beaten up, attacked, or hit with something? 4) was something of yours worth more that $50 stolen? 5) did you see someone get shot or stabbed? or 6) were you knifed, shot at, or attacked with some weapon? Respondents reporting any victimization were compared to those reporting no victimization.

Stressful life events were measured by summing fifteen categorical items that referred to events during the past year. Examples of items used in this scale were: Thinking about the past 12 months, did any of the following happen to you? 1) Have you suffered a serious accident or illness? 2) Did a close friend die? 3) Has a family or household member has a serious accident or illness? 4) Has a family or household member died? 5) Did you get fired from your job? or 6) Has the household had serious money problems? Responses for these items were yes and no. Responses to the fifteen categorical items were summed and scores ranged from 0 to 11.

Methods of analysis

The present study examined the relative impact of demographic and social development covariates in addition to recent life events on the likelihood of reporting the co-occurrence of 1) violence and substance use, 2) mental illness and substance use, and 3) the use of two or more substances at age 21. Various analytic strategies were employed to explore the three outcomes of interest. Univariate and bivariate statistics were utilized to indicate both the prevalence of and statistical associations between the various comorbid combinations and related social determinants. Multinomial logit analysis was used to examine the association between demographic, attitudinal and familial characteristics in addition to recent life events and the likelihood of reporting various comorbid conditions. Odds ratios (OR) express the likelihood of being in each comorbid category compared to those with 1) no substance use, violence or mental health problems; and those with 2) only unitary substance use. Odds ratios for independent variables measured on a continuous scale or ranking indicate the likelihood of change in the event per unit change in the predictor. Covariates were dichotomized if warranted by their distribution or nonlinear association with the outcomes. 50 All analyses were conducted using SAS 9.1.

Results

Bivariate

Fifty percent of the participants (n=314) reported no involvement with substance use or violent behavior in addition to not meeting criteria for one of the three mental illnesses; 18.3% (n=116) reported only unitary substance use; 8.7% (n=55) reported both violence and substance use; 10.6% (n=67) reported both mental illness and substance use; finally, 12.8%

(n=81) reported using multiple substances. Table 1 presents the profile of participants' characteristics by each of the comorbid conditions and those with only unitary substance use, with chi-square tests of significance. Due to the number of comparisons, a Bonferroni adjustment was included that reduced the level of statistical significance to $p<0.001$. Males were more likely than females to engage in a majority of the outcomes; also, increased perceptions of antisocial rewards and opportunities for antisocial involvement discriminated between many of the outcomes. Finally, those with co-occurring mental illness and substance use were more likely to also report stressful life events than those with unitary substance use.

Multivariable models

Multivariable associations were tested using multinomial logit regression. Tables 2 and 3 present models assessing the effects of the social determinants on type of comorbid outcome with no corresponding problems and unitary substance use as the two comparison groups, respectively.

Differences between multivariable models, and thus the comparison groups, were present. Specifically, when those with comorbid problems were compared to those with no indication of substance use, mental illness or violence, significant effects were found in the attitudes and opportunities domain (i.e., rebelliousness, sensation seeking, antisocial opportunities and antisocial rewards), whereas most of these same effects were rendered non-significant when the comparison group consisted of those with unitary substance use. The two exceptions to this were the significant and positive effect for antisocial rewards, which significantly differentiated between those with comorbid substance use and violence and the significant and positive effect for rebelliousness, which significantly differentiated between those with comorbid mental illness and substance use when compared to both those with no problematic outcomes and those with only unitary substance use. Sex differences were also found between the two comparison groups. Specifically, females were significantly more likely than males to report the comorbid occurrence of substance use and mental illness when compared to those with unitary substance use; no corresponding finding was present when the comparison group consisted of those with no problems.

The effects of other covariates were consistent across comparison groups. Significant predictors of violence and substance use included: being male and perceiving antisocial rewards (as was mentioned earlier). For the co-occurring conditions of mental illness and substance use there was a significant and positive association with stressful life events and rebelliousness (as was mentioned earlier). For the use of multiple substances, there was also a significant and positive effect for stressful life events across the two reference groups.

Discussion

This study both builds upon and advances prior investigations of substance use, mental illness and violence in young adults by focusing on the co-occurrence of these outcomes. In addition to documenting co-occurrence of these conditions, this study also examines the link between various theoretically-defined social determinants and the likelihood of reporting co-occurring problems for 21 year olds.

The first facet of this study was to report the co-occurrence of substance use, mental illness and violence among a community-based population of young adults. Overall, these data indicate that the prevalence of identified comorbid conditions was relatively low. Specifically, 8.7% of participants reported both violence and substance use, 10.6% reported both mental illness (i.e., depression, dysthymia and generalized anxiety disorders) and substance use and 12.8% reported using two or more substances. These findings vary from

prior studies of substance use, mental illness and violence among young adults.[8, 51] However, differences between this study, which included a community-based sample, and prior studies in measurement and sampling make overall comparisons difficult.

Regarding measurement, previous studies assessing comorbid outcomes in young adult samples (i.e., with mean age ranging between 20 and 26) have included a more diverse array of mental disorders. For example, Gil and colleagues,[8] in addition to assessing the three diagnoses included in the current research also measured the following mental disorders: social phobia, panic disorder, posttraumatic stress disorder, attention-deficit disorder, hyperactivity disorder, combined attention-deficit/hyperactivity disorder, and antisocial personality disorder. The inclusion of these other disorders likely increased the prevalence of comorbid conditions. Also, the current study's sampling strategy differed from the sampling strategies employed by other studies. For example, both Gil and colleagues[8] and Abram and Teplin[51] included only males in their studies. Further, Abram and Teplin stratified their sample to include a sufficient number of persons previously accused of serious crimes (i.e., felonies). These are but a few examples of why the prevalence of comorbid conditions obtained in the current study may differ from estimates obtained in previous studies.

The second facet of this study investigated domain-specific social determinants using theoretical constructs from the social development model to assess associations with the co-occurrence of outcomes. To this end, bivariate analyses with a Bonferroni adjustment, where the reference group consisted of those with unitary substance use, indicated that the co-occurrence of violence and substance use was associated with antisocial rewards and opportunities in addition to rebelliousness. Those reporting mental illness and substance use along with persons reporting polysubstance use were more likely to report opportunities for antisocial involvement and those with combined mental illness and substance use were more likely to report recent stressful life events.

Multivariable analyses confirmed the bivariate findings when the reference group was unitary substance use; however, when persons with the co-occurring outcomes were compared to those with no substance use, mental illness or violence there were other significant factors that differentiated between the groups (i.e., sensation seeking and opportunities for antisocial involvement). Factors that remained consistent irrespective of the comparison group were: sex, antisocial rewards and stressful life events.

When considering the results of the multivariable analyses presented above, it is important to note that even though the co-occurrence and different combinations of substance use, mental illness and violence are considered dependent variables in these models, the data structure is cross-sectional, which allowed for the examination of contemporary events, but not causal relationships. Rather, these outcomes show statistical associations--which may be consistent with a given causal formulation, but do not provide definitive evidence for it. Thus, the terms "prediction" and "predictors" and "effects" refer to statistical analytic techniques, and should not be interpreted to mean knowledge of an event prior to its actual occurrence based upon observation of causal antecedents.

Also, while our measures of mental illness have been used in previous research,[10] they remain broad assessments of only three potential outcomes (depression, dysthymia, generalized anxiety disorder). Therefore, the data required a focus on these disorders as opposed to a broader focus that included, for example, diagnoses of schizophrenia or bipolar disorder, both of which have been shown to relate to violence and substance use.[18, 19, 39, 52] Also, we are unable to comment on how these findings may have differed with the inclusion of a covariate assessing antisocial personality disorder. A better understanding of

this disorder as it relates to substance use and violence is both theoretically and empirically relevant, particularly when assessing outcomes for young adults. Next, the base rate of the co-occurring outcomes was relatively low when compared to prior studies. This necessitated a reduced number of theoretical covariates in each of the models; however, the covariates were chosen based on prior research.30 Next, the low base rate of the outcomes affected our ability to examine in detail sex and race differences in both the independent and dependent variables. Finally, the study relied on self-report. This may have led to an underestimation of the true incidence of the outcomes.

Even with these limitations, the results of this study illustrate the complex lives of young adults dealing with the co-occurrence of various combinations of substance use, mental illness and violence. Specifically, persons with these comorbid outcomes, compared to those with no indication of substance use, mental illness or violence or those with only unitary substance use, must navigate a broad array of individual and contextual complexities. Future theoretical and practice research has the challenge of disentangling these intricately related events. For example, does the combination of substance use and mental illness create stressful events, or is the causal relationship reversed? Or are both directional paths plausible, and if so, what are the implications for intervention?

Implications for Behavioral Health

Findings from this study highlight practice challenges related to the remediation of co-occurring problem behaviors in young adults. First, many of the social determinants implicated in these comorbid outcomes have also been identified as relevant in childhood and adolescence.3, 7, 29, 36, 47, 53 This provides evidence for the import of early risk screening and subsequent intervention to reduce the likelihood of one developing more serious problems, including comorbid conditions, later in life.54

If the early remediation of unitary problems is unsuccessful or treatment is not initiated until comorbid problems are present, then interventions designed to address comorbid problems are required. This includes the opening of funding streams that support the concurrent treatment of various combinations of substance use, mental illness and violence, not simply piecemeal approaches attempting to diagnosis and treat unitary problems. Treatment models may need to incorporate seamless strategies between inpatient and outpatient or mandated and voluntary services. For example, the call to address the co-occurrence of mental illness and substance use has become a paramount need in both the criminal and juvenile justice systems.55, 56 Effectiveness in the remediation of co-morbid problems is an important outcome to assess when evaluating overall treatment cost. This is particularly relevant as rates of treatment failure remain high when those with comorbid problems are provided services that neglect to examine the nexus of all relevant conditions, including antecedents and consequences.

Future work, including longitudinal analyses, is needed to assess the predictability of the associations identified in this paper. Further, because the present sample was confined to a specific geographic region, additional research is needed to see if these findings are applicable to young adults in other areas; particularly those drawn from community-based samples as was the case with the current research.

This study suggests that among young adults with co-occurring conditions, efforts to address and modify various individual and social risk factors should be a cardinal aspect in program development and treatment planning. It is apparent from this study, and previous research, that co-occurring conditions are complex phenomena requiring equally detailed and well-formulated interventions. In providing a comprehensive analysis of the relationships

between social determinants and co-occurring conditions, this study contributes to the existing knowledge base and promotes the development, testing and implementation of evidence-based treatment programs for difficult to treat comorbid outcomes for young adults.

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Table 1

Profile of sample by type of outcome: Demographics, attitudes, family history and recent life events (N=319)

	Percent with characteristic, by outcome				Chi-square tests					
	1. UNITARY SUBSTANCE USE (n=116)	2. VIOLENCE AND SUBSTANCE USE (n=55)	3. MENTAL ILLNESS AND SUSBTANCE USE (n=67)	4. USE OF MULTIPLE SUBSTANCES (n=81)	1 vs. 2	1 vs. 3	1 vs. 4	2 vs. 3	2 vs. 4	3 vs. 4
Demographic characteristics										
Male	51.72	90.91	40.30	67.90	*			*		*
Non-white	38.79	60.00	49.25	39.51						
Antisocial attitudes and opportunities										
Rebelliousness (above median)	45.69	76.36	61.19	60.49	*					
Sensation seeking (above median)	52.59	70.91	67.16	69.14						
Antisocial rewards (above median)	44.83	80.00	41.79	49.38	*			*	*	
Opportunities for antisocial involvement	18.97	65.45	41.79	33.33	*	*	*		*	
Household history										
Recent household history of antisocial behavior	43.97	58.18	52.24	45.68						
Recent life events										
Victimization	27.59	54.55	37.31	35.80	*					
Stressful life events	31.90	54.55	59.70	48.15		*				

* Statistical Significance: p<.001 (Bonferroni adjustment)

Table 2

Multinomial logistic regression of characteristics associated with co-occurring behaviors (reference group: no problems; n=314)

	VIOLENCE AND SUBSTANCE USE (n=55)			MENTAL ILLNESS AND SUSBTANCE USE (n=67)			USE OF MULTIPLE SUBSTANCES (n=81)		
	OR	**(95% CI)**		**OR**	**(95% CI)**		**OR**	**(95% CI)**	
Demographic characteristics									
Male	5.04	(1.79 - 14.15)	**	0.56	(0.29 - 1.09)	†	1.87	(1.02 - 3.45)	*
Non-white	1.08	(0.50 - 2.30)		0.78	(0.42 - 1.45)		0.61	(0.34 - 1.08)	†
Antisocial attitudes and opportunities									
Rebelliousness	1.62	(1.01 - 2.61)	*	1.65	(1.05 - 2.59)	**	1.51	(1.01 - 2.28)	*
Sensation seeking	1.88	(1.27 - 2.77)	**	1.76	(1.22 - 2.53)	**	2.15	(1.54 - 3.00)	***
Antisocial rewards	2.18	(1.32 - 3.60)	**	0.85	(0.49 - 1.49)		0.84	(0.50 - 1.39)	
Opportunities for antisocial involvement	2.14	(1.24 - 3.69)	**	1.81	(1.07 - 3.03)	*	1.38	(0.83 - 2.29)	
Household history									
Recent household history of antisocial behavior	1.94	(0.91 - 4.11)	†	1.67	(0.89 - 3.13)		1.74	(0.96 - 3.16)	†
Recent life events									
Victimization	1.47	(0.70 - 3.11)		1.00	(0.52 - 1.92)		0.96	(0.52 - 1.77)	
Stressful life events	1.17	(0.98 - 1.39)	†	1.35	(1.16 - 1.57)	***	1.19	(1.03 - 1.37)	*

† Statistical significance: p<.10;

* p<0.05;

** p<0.01

Table 3

Multinomial logistic regression of characteristics associated with co-occurring behaviors (reference group: unitary substance use only; n=116)

	VIOLENCE AND SUBSTANCE USE (n=55)			MENTAL ILLNESS AND SUSBTANCE USE (n=67)			USE OF MULTIPLE SUBSTANCES (n=81)		
	OR	**(95% CI)**		**OR**	**(95% CI)**		**OR**	**(95% CI)**	
Demographic characteristics									
Male	4.56	(1.54 - 13.53)	**	0.40	(0.19 - 0.83)	*	1.43	(0.73 - 2.81)	
Non-white	1.61	(0.72 - 3.59)		1.37	(0.69 - 2.75)		1.05	(0.56 - 2.00)	
Antisocial attitudes and opportunities									
Rebelliousness	1.50	(0.88 - 2.57)		1.96	(1.19 - 3.24)	*	1.47	(0.92 - 2.35)	
Sensation seeking	1.18	(0.81 - 1.73)		1.09	(0.75 - 1.57)		1.31	(0.95 - 1.81)	†
Antisocial rewards	2.22	(1.31 - 3.78)	**	0.85	(0.47 - 1.56)		0.89	(0.52 - 1.53)	
Opportunities for antisocial involvement	1.64	(0.91 - 2.96)	†	1.54	(0.86 - 2.75)		1.16	(0.67 - 2.01)	
Household history									
Recent household history of antisocial behavior	1.12	(0.51 - 2.48)		0.67	(0.33 - 1.35)		0.83	(0.44 - 1.57)	
Recent life events									
Victimization	1.56	(0.70 - 3.45)		0.98	(0.48 - 2.02)		1.07	(0.55 - 2.08)	
Stressful life events	1.23	(1.01 - 1.48)	*	1.42	(1.19 - 1.70)	***	1.24	(1.05 - 1.46)	**

† Statistical significance: p<.10;

* p<0.05;

** p<0.01