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The Violence Proneness Scale of the DUSI-R Predicts Adverse Outcomes Associated with Substance Abuse

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Abstract

Accuracy of the Violence Proneness Scale (VPS) of the Drug Use Screening Inventory (DUSI-R)¹ was evaluated in 328 boys for predicting use of illegal drugs, DUI, selling drugs, sexually transmitted disease, car accident while under acute effects of drugs/alcohol, trading drugs for sex, injuries from a fight, and traumatic head injury. Boys were prospectively tracked from age 16 to 19 at which time these outcomes were documented in the interim period. The results demonstrated that the VPS score is a significant predictor of all outcomes. Prediction accuracy ranged between 62%-83%. These findings suggest that the VPS may be useful for identifying youths who are at high risk for using illicit drugs and commonly associated adverse outcomes.

Recent studies have shown that the psychological predisposition to the various categories of substance use disorder (SUD) can be scaled on an underlying dimension of externalizing behavior.^{2,3} Complementary research has also revealed that the score on a trait termed *neurobehavior disinhibition* in childhood is a significant predictor of SUD and a variety of related outcomes manifest by young adulthood.⁴⁻⁶ These findings align with a large literature documenting poor psychological self-regulation and concomitant propensity for antisocial behavior in youths at high risk for SUD.^{7,8} Practical assessment instruments have, however, not been developed and validated to detect youths who are at high risk for SUD and commonly associated outcomes.

One instrument that has shown promise for screening high risk youths is the revised *Drug Use Screening Inventory (DUSI-R)*.⁹ This self-administered questionnaire, consisting of 159 true/false items, quantifies severity of problems which frequently presage or are concurrent with substance abuse. Taking approximately 20 minutes to complete, the *DUSI-R* yields an overall problem density score along with scores quantifying severity from 0-100% on scales measuring substance abuse, behavior problems, psychiatric disturbance, medical problems, family dysfunction, work and school maladjustment, social skills deficiency, peer relationship problems, and maladaptive leisure and recreation activities. The problem density score discriminates SUD cases from controls with over 90% accuracy¹⁰ and predicts SUD outcome between age 16 and 19 with 84% accuracy.¹¹ Average internal reliability across scales is .73.¹² Additional scales have recently been empirically derived to screen for conduct,

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antisocial, depression, and anxiety disorders.¹³ The *DUSI-R* has been translated into several languages and shown to be appropriate for use in different cultures.¹⁴⁻¹⁹

One derived scale, the *Violence Proneness Scale (VPS)*, is a significant predictor of an aggressive event in adolescent boys up to 5-7 years later.¹ Because aggressive behavior commonly precedes substance abuse as well as a wide range of violent and non-violent behaviors, it is hypothesized that the *VPS* is an accurate predictor of illegal drug use and frequently concomitant outcomes.

Employing a prospective paradigm, this study determined whether the *VPS* administered at age 16 is an accurate predictor of substance abuse and concomitant violent and non-violent outcomes by age 19. Accordingly, the following outcomes were evaluated: 1) use of an illegal drug, 2) head injury resulting in loss of consciousness, 3) injury caused by fighting, 4) car accident while driving under the influence of alcohol or drugs, 5) sexually transmitted disease, 6) providing drugs for sex, 7) drug dealing, and, 8) having a car accident while under the acute effects of alcohol or drugs. Demonstrating that youths can be detected who subsequently evince these adverse outcomes affords the opportunity to implement efficient population screening and the target prevention interventions to high risk individuals.

METHOD

Subjects

The sample (N = 328 boys) had a mean age of 16.0 (SD = .48) years. They have been enrolled since age 10-12 in a longitudinal investigation that is directed at elucidating the etiology of substance use disorder and related outcomes. Because recruitment of girls began several years after the boys, the female sample at this juncture is too small to conduct prediction analyses. The boys were recruited through their biological fathers (probands) who either qualified for SUD consequent to use of an illegal drug (N = 169, 51.5%) or had no axis I psychiatric disorder (N = 159; 48.5%). Several procedures, including solicitation using random telephone calls conducted by a market research firm, advertisements in print media, public service announcements, and posters displayed in public locations, including substance abuse treatment settings were used to recruit the fathers. Their sons were required to be in good physical health, have no history of psychosis, have a full scale WISC-III-R IQ of 80 or higher, and have no history of neurological injury requiring hospitalization. Table 1 shows the comparisons of participants who were retained in the project until age 19 with individuals who were lost due to attrition. Full scale IQ was lower in subjects who attrited during the course of the study, although intelligence was in the normal range. Grade level, ethnicity, proportion of subjects living in single parent households, and family socioeconomic status at the time of the baseline evaluation were not different between attrited and retained subjects. Notably, 30-day frequency of substance use and the overall problem severity score of the *DUSI-R*, the instrument from which the predictor variable (*Violence Proneness Scale*) was derived, did not differ between retained and attrited subjects.

Instrumentation

Predictor Variable (Age 16)—The *Violence Proneness Scale (VPS)* was derived from the adolescent version of the self-report revised *Drug Use Screening Inventory (DUSI-R)* as previously reported.¹ This 13-item scale, shown in Table 2, has very good internal consistency (Cronbach alpha = .81). A higher number of “yes” responses indicates a stronger proneness to violence.

Outcome Variables (Age 19)—The *Outcome Questionnaire*,²⁰ developed at the Center for Education and Drug Abuse Research (CEDAR), can be administered as either an interview

or completed as a selfreport. It consists of 88 questions pertaining to discrete events that occurred during the prior three years. In this study, a subset of items were selected which frequently occur concomitant to either use of illegal drugs or antisocial behavior. The questions, having the stem phrase "During the past 3 years. . .," required the respondent to answer either *yes* or *no*. The documented outcomes and their rate of occurrence since age 16 were: 1) used any type of illegal drug (22.6%); 2) sold or dealt illegal drugs (18.3%); 3) gave illegal drugs in exchange for sex (2.2%); 4) treated for injuries from a fight (5.7%), 5) injury to the head requiring hospitalization (10.4%); 6) acquiring a sexually transmitted disease (STD) (3.0%); 7) having a car accident while under the effects of alcohol or drugs (3.5%); and, 8) caught driving while under the influence of alcohol or drugs (0.5%). These outcomes are highly salient in a person's life, and because the period of recall is relatively brief, it can be concluded that validity of the responses was not threatened by memory failure. The cumulative endorsement rate in the sample was: 0 outcomes = 58.3%, one outcome = 24.8%, two outcomes = 8.7%, three outcomes = 4.8%, four outcomes = 3.0%, and, five or more outcomes 0.4%. The most frequent configuration of outcomes was using and selling illegal drugs, occurring in 7% of the sample.

Procedure

The boys provided written assent when they were 16 years old and the parents signed written informed consent as approved by the University of Pittsburgh Institutional Review Board. At age 19, the subjects provided written informed consent. In addition, the participants were apprised that all information collected from them was protected by a Certificate of Confidentiality issued to CEDAR from the National Institute on Drug Abuse. Prior to initiating the evaluation, the subjects underwent a breath alcohol test and urine drug screen. A positive result required rescheduling the person to ensure that the data were not confounded by biased reporting due to the acute effects of psychoactive substances on cognitive functioning. The subjects were debriefed and compensated \$150 and \$100 after conclusion of the initial (age 16) and follow-up (age 19) assessments.

Statistical Analysis

Logistic regression analysis was performed to determine whether the *VPS* predicted any of the eight outcomes. Next, a significant odds ratio prompted a receiver operating curve (ROC) analysis to assess whether the *VPS* is practical for identifying individuals who subsequently experienced one or more of the outcomes. Accordingly, sensitivity (true positive), specificity (true negative) and overall classification accuracy (area under the curve) were determined for the *VPS* on each outcome. Lastly, cut-off scores were derived, calibrated to 80% sensitivity, for use in prediction of each outcome.

RESULTS

Table 3 presents the results of the statistical analyses. As can be seen, the *VPS* is a significant predictor ($p < .001$) of head injury, driving under the influence, and drug dealing. Receiving treatment for injury after a fight, giving drugs for sex, and experiencing a car accident while under the effects of alcohol or drugs was predicted beyond the .01 significance level. The odds ratio for acquiring a sexually transmitted disease ($p < .02$) and use of an illegal drug in the prior 30 days ($p < .03$) was also significant.

Sensitivity of the *VPS* was highest for exchanging drugs for sex (83%) and having a car accident while under the effects of drugs or alcohol (80%). For the remaining six outcomes, sensitivity was good, ranging between 67% and 79%.

Whereas prediction of true positives is good, the *VPS* is less useful for predicting true negatives (specificity). With the exception of giving drugs for sex, which had a specificity of 96%, the specificity of the other seven outcomes ranged from 45-64%. Thus, with the exception of exchanging drugs for sex, the *VPS* appears to be useful for screening youths who subsequently manifest the adverse outcomes but is not accurate for identifying youths who will not evince these outcomes. Using the cut-off scores shown in Table 3, the overall accuracy of the *VPS* is in the good to very good range. It predicted with 82% accuracy which youths did or did not give drugs in exchange for sex within the three year follow-up period. Prediction accuracy ranged from 62-80% for the other outcomes.

DISCUSSION

The results of this study indicate that the *Violence Proneness Scale (VPS)* is potentially useful for detecting youths who are at high risk for a variety of adverse outcomes which commonly occur with substance use behavior. Whether the *VPS* is also useful for predicting SUD diagnosis remains to be investigated as the cohort is tracked into adulthood. Derived from the DUSI-R, which is administered and scored automatically using the computer administration format (<http://www.ecenterresearch.com>), the *VPS* thus appears to be a cost-efficient instrument for identifying high risk youths.

One advantage of the *VPS* is that none of the items directly query the respondent about violence. Rather, the items primarily capture school maladjustment along with drug use and social deviancy of friends. Hence, it is difficult for the respondent to intentionally “game” the answers. Despite this advantage, several limitations of this study are noteworthy. In particular, the findings are confined to boys. Hence, the cutoff scores shown in Table 3 cannot be assumed to apply to adolescent girls. In addition, the sample was relatively small at age 19 ($N = 257$). Furthermore, an attrition bias, although not detected in this study, may nevertheless have skewed the results. These issues notwithstanding, the results point to the potential utility of the *VPS* for screening youths who are at high risk for outcomes that are injurious to the person and costly to society.

Another factor that could have potentially biased the results is inaccurate reporting on the *Outcome Questionnaire*. As noted previously, it is unlikely that validity of the results occurred from memory failure. However, the possibility cannot be discounted that some subjects intentionally provided erroneous information.

Caution must be exercised when advancing a prediction about clinical and legal outcomes in adolescents. Incorrectly classifying a youngster wastes intervention resources and can be stigmatizing. Consequently, it is recommended that the *VPS* should not be the only or even main source of information for determining the need for intervention. Rather, it is proposed that the *VPS*, in conjunction with the array of information obtained from the other DUSI-R scales,^{13,21} and other instruments such as the Attitudes Toward Guns and Violence Questionnaire,^{22,23} Conduct Disorder Rating Scale²⁴ and the Aggression Questionnaire^{25, 26} should alert the practitioner about risk for illegal drug use and commonly cooccurring adverse outcomes. An advantage of the *VPS* is that it is embedded in another inventory which quantifies severity of problems in multiple domains that are pertinent to prevention and treatment. It is also noteworthy that the *VPS* is the only instrument available that has been shown to be useful for predicting outcomes commonly associated with use of illegal drugs.

In summary, the *Violence Proneness Scale (VPS)* is a significant predictor of outcomes that commonly occur with substance use. Used in conjunction with other instruments, the *VPS* may be informative for detecting youths who need prevention interventions. However, it should be emphasized that by mid-adolescence, behavior patterns, especially deviance proneness, are

usually strongly consolidated; thus, interventions should ideally be directed to younger children. Notably, temperament disturbances in preschool children frequently presage conduct problems.²⁷ Accordingly, prevention of substance abuse should be directed at interventions in young children to promote development of prosocial behavior and potentiate psychological self-regulation.

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TABLE 1

Comparison of retained and attrited subjects at age 16

	Retained N = 257 M (SD)	Attrited N = 71 M (SD)	F	p
Family socioeconomic status	40.8 (14.03)	38.9 (13.28)	1.08	.30
WISC-III-R Full Scale IQ	110.7 (15.98)	104.7 (17.37)	7.62	.006
Grade in school	4.1 (1.07)	4.5 (1.17)	.31	.58
<i>Violence Proneness Scale</i> score (1-13)	4.45 (3.53)	4.81 (3.62)	.44	.51
30-day frequency of substance use				
• Alcohol	.42 (.79)	.51 (.82)	.48	.49
• Tobacco	.72 (1.39)	.94 (1.58)	1.01	.32
• Cannabis	.60 (1.15)	.57 (1.25)	.04	.85
DUSI-R overall problem density score (0-100%)	18.0 (12.39)	18.9 (13.29)	.21	.65
Ethnic composition	%	%	χ^2	p
• European American	76.3	73.2	.69	.71
• African American	19.8	23.9		
• Other	3.9	2.8		
Living in single parent household	12.5	14.1	.13	.71

TABLE 2
Items comprising the *Violence Proneness Scale**

-
- Did you dislike school?
 - Did you have trouble concentrating in school or when studying?
 - Were your grades below average?
 - Did you often feel sleepy in class?
 - Were you bored in school?
 - Were your grades in school worse than they used to be?
 - Have you been suspended?
 - Did any of your friends regularly use alcohol or drugs?
 - Have any of your friends been in trouble with the law?
 - Did your friends cut school a lot?
 - Have your friends brought drugs to parties?
 - Have your friends stolen any things from a store or damaged property on purpose?
 - Were you bothered by problems you were having with a friend?
-

* The timeframe is the past year.

TABLE 3
Prediction of outcomes (age 19) by the *Violence Proneness Scale (VPS)* score (age 16)

	OR	95% CI	Probability	Overall accuracy (%)	Sensitivity (%)	Specificity (%)	Effective cut-off score
Head injury	2.21	1.51-3.25	.001	72	77	56	5
Treated for injuries from a fight	2.21	1.30-3.78	.004	70	79	45	4
STD	1.81	1.12-2.93	.016	68	74	54	6
Gave drugs for sex	3.84	1.52-9.61	.004	82	83	96	8
DUI	2.25	1.43-3.56	<.001	73	75	55	5
Car accident while drug or alcohol in system	2.38	1.26-4.48	.007	76	80	64	5
Sold or dealt drugs	2.46	1.78-3.38	<.001	73	75	58	5
Illegal drug use in last 30 days	1.44	1.05-1.97	.022	.62	.67	.54	4