RELATIONSHIP OF COGNITIVE ABILITY TO THE DEVELOPMENTAL COURSE OF ANTISOCIAL BEHAVIOR IN SUBSTANCE-DEPENDENT PATIENTS

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Abstract


1. The present study examined cognitive differences among three groups of abstinent substance-dependent patients and a control group of non-drug users. The patient groups were defined according to their DSM III-R substance dependence diagnosis(es): heroin, cocaine, or dual alcohol and cocaine dependence.

2. In the initial analysis, which compared the four subject groups on scores from the Shipley Institute of Living Scale, no significant differences were found. However, the groups did vary on the number of Antisocial Personality Disorder (ASPD) behaviors.

3. Another set of analyses was conducted to examine the relationship between ASPD and SILS scores. Analyses of the effects of ASPD (+/-) across all of the patients revealed lower SILS scores in the ASPD-positive group. Additional analyses examined the developmental course of the ASPD effect by contrasting 1) patient groups characterized by childhood Conduct Disorder (CD) combined with adult ASPD vs. 2) childhood CD which did not continue into adulthood as ASPD vs. 3) adults who did not report childhood CD but who met other ASPD behavioral criteria as adults, vs. 4) subjects who had neither childhood CD nor adult ASPD.

4. In this analysis, it was found that patients who met diagnostic criteria for childhood Conduct Disorder, but whose antisocial behaviors resolved after age 15, had equivalent SILS scores to those patients with no childhood CD or adult ASPD. A decrement in SILS scores was only found in those patients whose antisocial behaviors persisted into adulthood.

5. ASPD adults who did not report childhood CD behaviors had normal SILS scores compared to Controls.

Key Words: alcoholism, antisocial personality, cognitive ability, conduct disorder, drug dependency.

Abbreviations: Addiction Severity Index (ASI), antisocial personality disorder (ASPD), conceptual quotient (CQ), conduct disorder (CD), Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA), Shipley Institute of Living Scale (SILS).
Introduction

Research that provides better understanding of the etiology of alcoholism has the potential to enhance both primary and secondary prevention efforts directed at this important individual and societal problem. Much of the recent research focusing on the etiology of substance abuse has used family history of alcohol information as the key for defining high and low risk groups. More specifically, a substantial effort has been directed towards examining cognitive differences between the children of substance-dependent fathers and the children of healthy fathers, based on the conjoint premise that cognitive dysfunction is heritable and that it is a factor by which substance abuse is fostered (Hesselbrock et al., 1991). Parsons (1994) has proposed cognitive dysfunction as an explanation of impairments on neuropsychological tests in substance-dependent samples. Others (Giancola et al., 1996b; Harden and Pihl, 1995; Schaeffer et al., 1984) have proposed the same for samples considered to be “at-risk” for substance dependence. Many studies have found differences between at-risk subjects and low-risk control groups on tests of vocabulary (Knop, 1985), attention (Tarter et al., 1989), planning and nonverbal conceptualization (Drejer et al., 1985; Knop, 1985) abstracting/problem-solving (Schaeffer et al., 1984), and visuospatial skills (Whipple et al., 1987).

Perhaps the most important limitation of this literature is the failure to control or adequately account for complicating factors such as co-morbid psychiatric diagnoses. One highly relevant (Boyle et al., 1992; Robins, 1966) but often neglected factor in this literature is the co-morbid diagnosis of childhood Conduct Disorder and its continuation into adulthood as Antisocial Personality Disorder. It has been proposed that antisocial behavior may mark a developmental deficit in information processing that subserves behavioral regulation (Hogan, 1999). It is possible that this deficit may manifest in estimates of cognitive ability on neuropsychological tests. Such a mechanism is thought to operate in conjunction with environmental factors (Moffitt, 1993b) and would not be expected to covary with substance dependence unless the specific cognitive deficit jointly predicted both ASPD and addiction. While it is possible that a single biological factor underlies both ASPD and substance dependence, some evidence suggests otherwise. Recent findings supports the hypothesis that cognitive deficits related to antisocial behavior mark an increased risk to substance dependence through involvement in antisocial activities and culture, rather than there being a direct relationship between cognitive factors and addiction (Cadoret et al., 1995).

Early work (Gorenstein, 1982; Pontius and Ruttinger, 1976) examining a link between cognitive impairment and antisocial behavior can been criticized in that they used samples that may not best represent diagnoses of CD or ASPD (Kandel and Freed, 1989; Moffitt, 1993a), such as psychopathic prison inmates or juvenile delinquents. However, more recent studies of well-defined samples of adolescents and young adults have found cognitive deficits associated with both CD (Moffitt, 1993b;
Moffit and Henry, 1989) and ASPD (Gillen and Hesselbrock, 1992) that discriminate these groups from normal controls. Many of these studies have focused on decrements in executive functioning, an index of frontal lobe functioning, as the most consistent and reliable impairments in these groups. Electrophysiological studies have further implicated impairment of the frontal-lobe (Bauer, 1997; Bauer and Hesselbrock, 1993; Bauer et al., 1994; O’Connor et al., 1994) in association with both CD and ASPD. The convergence of evidence across studies suggests the prefrontal cortex as a possible locus of developmental impairment for youth and adults exhibiting antisocial behavior.

 Previous work has linked impairments in verbal abstraction ability to diagnosis of ASPD in subjects without substance-related disorders (Gillen and Hesselbrock, 1992; Stevens et al., submitted). In the current study, it was desired to see whether a similar effect would be found in a sample of substance-dependent inpatients, and also whether this relationship would exist regardless of possible effects secondary to substance dependence (i.e., type of substance, duration or use, or period of abstinence). It was hypothesized that antisocial behavior would have a stronger predictive relationship to cognitive ability than family history or substance use characteristics.

 Methods

 Subjects

 Participants in the current study included 77 male and 45 female substance-dependent patients who were part of a larger study investigating electroencephalographic changes during abstinence. Patient participants were enrolled in long-term residential treatment programs located in the Hartford, Connecticut region. A control group of 17 male and 8 female participants was recruited from through advertisements at inner city churches and newspapers. Control subjects had no diagnosis of substance abuse or dependence. All participants reported English as their primary language. All patients signed informed consent agreements approved by the medical school’s Institutional Review Board.

 Patient Population

 Potential participants were excluded if they were more than 6 months or less than 1 month abstinent from alcohol or other drugs of abuse. Abstinence was confirmed through urinalysis. They were also excluded if they possessed a lifetime history of neurologic, hepatic or cardiovascular disorders, HIV infection, significant head injury, bipolar disorder or schizophrenia. Eligible participants could not currently be taking psychoactive medications such as methadone, anticonvulsants, or antidepressants. Patients were also excluded if they possessed uncorrected visual impairments.
Assessment Instruments

Evaluations took place at the University of Connecticut Health Center. Two semistructured psychiatric interviews were administered – the Semi-Structured Assessment for the Genetics of Alcoholism (Ducholz et al., 1994) and the Addiction Severity Index (McLellan et al., 1980). The SSAGA diagnostic interview instrument provided Axis I and II DSM III-R (American Psychiatric Association, 1987) diagnoses of substance dependence and Axis I and Axis II psychopathology. The SSAGA has been shown to have good reliability and validity (Hesselbrock et al., 1999). The Addiction Severity Index is a widely used instrument that details substance use history and quantifies severity. Cognitive ability was estimated by the Shipley Institute of Living Scale (Shipley, 1940). Although the SILS has recognized limitations (Harnish et al., 1994) in its norms for older and non-Caucasian persons, it has been widely used in studies of substance dependence, principally because of its brevity and ease of administration. The SILS provides an estimate of general verbal ability though assessment of vocabulary knowledge and of abstraction ability through assessment of associative thinking and problem-solving. The test provides age-corrected t-scores for Vocabulary, Abstract and Total. It also provides the Conceptual Quotient, which is a measure of abstraction ability that controls for premorbid general verbal ability. During this evaluation, subjects also completed the Michigan Alcoholism Screening Test (Selzer, 1971), Drug Abuse Screening Test (Skinner, 1982), Beck Depression Inventory (Beck, 1961), and State-Trait Anxiety Inventory (Spielberger, 1983). These latter two measures were employed to control for possible confounds on cognitive ability related to differential psychiatric status.

Data Analysis

Participants were divided into four groups. These included a control group of subjects without substance dependence diagnoses (n=25) and three other groups of subjects classified according to their DSM III-R (American Psychiatric Association, 1987) subtype of substance dependence: cocaine (n=37), alcohol and cocaine (n=47), or heroin (n=38). Of note, 8 of the 38 heroin patients (21%) were dually-dependent on heroin and cocaine.

Demographic information (age, gender and years of education) was compared across all groups (Table 1). Other variables, including Beck Depression Inventory score, ASP and CD symptom counts and diagnoses, months of abstinence, and duration of substance use, were compared across patient groups (Table 2). Chi-square analyses were utilized to test for differences in categorical measures: paternal alcoholism, gender, race, and diagnosis. ANOVA was used to test for differences in continuous measures: age, education, BDI depression score, ASP symptom counts, months of abstinence, and duration of substance use.
Next, the Verbal, Abstract and Total raw scores from the SILS were converted into age-corrected t-scores in order to control for the influence of age on estimates of cognitive function. Two other dependent measures were calculated: the difference of Vocabulary and Abstraction t-scores, and the Conceptual Quotient. Both scores served as estimates of abstraction ability that controlled for premorbid verbal ability (i.e., Vocabulary). Zachary (1986) recommends caution computing CQ scores when Vocabulary ability is questionably low; therefore CQ scores for subjects with Vocabulary raw scores less than 23 were not calculated. As a result, there were a total of 29 missing values for CQ; the corresponding analyses for CQ utilized n=118 subjects.

Scores for the substance-dependent participants were compared to the control group by univariate analysis of covariance (ANCOVA) using years of education as the covariate. Planned analyses examined the contribution of specific substance use and personality variables to the group differences. These analyses included correlations, additional ANOVAs, and logistic regression.

Results

Sample Characteristics

There was a significant difference among the patient groups and controls for education, F(3, 143) = 16.997, p < .001. Additional correlation analysis shows that years of education was significantly correlated (p < .001) with SILS Vocabulary (r = .623), Abstraction (r = .532), and Total (r = .606) t-scores. Given the known linear association of education and scores on language-based cognitive tests like the SILS, these findings indicated a need to control for education differences in subsequent analyses comparing substance dependent patients' SILS scores with the normal control group. Means and standard deviations for age, education and gender are displayed in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Characteristics of Study Groups</th>
<th>Normal (n=25)</th>
<th>Heroin (n=38)</th>
<th>Cocaine (n=37)</th>
<th>Alcohol/Cocaine (n=47)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject age – Mean (SD)</td>
<td>34.4 (6.53)</td>
<td>33.5 (6.30)</td>
<td>32.9 (5.77)</td>
<td>33.7 (5.47)</td>
<td>ns</td>
</tr>
<tr>
<td>Years education – Mean (SD)</td>
<td>14.4 (1.96)</td>
<td>12.2 (1.55)</td>
<td>11.8 (1.82)</td>
<td>11.8 (1.20)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>% Male</td>
<td>68.0</td>
<td>57.9</td>
<td>65.8</td>
<td>62.5</td>
<td>ns</td>
</tr>
</tbody>
</table>

*Significant differences were tested using one-way ANOVA for continuous measures and X² for categorical measures.
Comparison of patient groups revealed no significant differences for number of months abstinent, number of years of abuse, Beck Depression Inventory score, numbers of antisocial behavior symptoms in childhood or adulthood, or diagnoses of CD or ASPD (Table 2). The number of ASPD symptoms was significant at a trend level, $F(2, 118) = 2.711, p = .071$. Alcohol/Cocaine-dependent patients had slightly more ASPD symptoms compared to other substance-dependent groups.

Table 2

<table>
<thead>
<tr>
<th></th>
<th>Heroin (n=38)</th>
<th>Cocaine (n=37)</th>
<th>Alcohol/Cocaine (n=47)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number months abstinent</td>
<td>3.3 (1.12)</td>
<td>3.2 (1.28)</td>
<td>2.9 (1.30)</td>
</tr>
<tr>
<td>Years using drug</td>
<td>11.4 (7.00)</td>
<td>10.7 (5.12)</td>
<td>12.5 (5.15)</td>
</tr>
<tr>
<td>BDI score</td>
<td>9.7 (5.72)</td>
<td>8.9 (6.23)</td>
<td>10.0 (6.81)</td>
</tr>
<tr>
<td>Number CD symptoms</td>
<td>3.1 (3.04)</td>
<td>2.3 (2.12)</td>
<td>2.7 (2.30)</td>
</tr>
<tr>
<td>Number ASPD symptoms</td>
<td>4.0 (3.71)</td>
<td>3.3 (3.62)</td>
<td>5.1 (3.46)</td>
</tr>
<tr>
<td>% ASPD diagnosis</td>
<td>31.6</td>
<td>34.3</td>
<td>42.6</td>
</tr>
<tr>
<td>% CD diagnosis in childhood</td>
<td>44.7</td>
<td>43.2</td>
<td>44.7</td>
</tr>
<tr>
<td>% Paternal substance history</td>
<td>64.7</td>
<td>65.6</td>
<td>68.4</td>
</tr>
</tbody>
</table>

Significant differences were tested using one-way ANOVA for continuous measures and $\chi^2$ for categorical measures.

In an ANCOVA controlling for education effects, SILS mean t-scores did not differ among substance-dependent groups and normal controls. There were no main effects of group on Vocabulary t-score, $F(3, 142) = 2.207$, ns. Abstract t-score, $F(3, 142) = 1.464$, ns, Total t-score, $F(3, 142) = 1.974$, ns, the difference between Vocabulary and Abstract t-scores, $F(3, 142) = .897$, ns, or the Conceptual Quotient, $F(3, 113) = .907$, ns. Although not presented in Table 2, there were no differences in SES among the patient groups.

Analyses of Factors Influencing Cognitive Ability

The authors then examined factors that might affect scores on cognitive tests for substance-dependent patients using bivariate Pearson correlations and logistic regression. The authors examined the groups of substance-dependent patients (excluding the normal control group). There was no relationship between SILS t-scores and paternal history of substance-dependence, months of abstinence, total years of
substance use or Beck Depression Inventory depression score. However, relationships between SILS t-scores and number of childhood CD (Vocabulary t-score, $r = -0.206$, and Abstraction t-score, $r = -0.215$) and adult ASPD symptoms (Vocabulary t-score, $r = -0.203$, $p < .05$) were significant. Individual logistic regression analyses showed significant relationships between ASPD diagnosis and SILS t-scores. However, when Abstraction level was controlled either through analysis of the mean difference of Vocabulary and Abstraction, or through examination of the Conceptual Quotient score, neither showed significant relationships with antisocial diagnosis. The B-coefficients, odds-ratios (and 95% confidence interval) and significance level results of each of the logistic regression analyses are displayed in Table 3.

Table 3

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>OR</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>SILS Vocabulary</td>
<td>-0.0829</td>
<td>0.9204</td>
<td>0.8812 - 0.9614</td>
<td>&lt; .01</td>
</tr>
<tr>
<td>SILS Abstract</td>
<td>-0.0912</td>
<td>0.9129</td>
<td>0.8699 - 0.9580</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>SILS Total</td>
<td>-0.0910</td>
<td>0.9130</td>
<td>0.8724 - 0.9555</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>SILS V-A Difference</td>
<td>-0.0281</td>
<td>0.9723</td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>SILS Conceptual Quotient</td>
<td>-0.0086</td>
<td>0.9915</td>
<td>0.9588 - 1.0253</td>
<td>ns</td>
</tr>
</tbody>
</table>

*Conceptual Quotient scores were calculated using n=94 subjects.

These results were consistent with a two-way ANOVA examining SILS scores by gender and by diagnosis of ASPD. Three SILS T-scores were significantly different for ASPD versus non-ASPD patients; Vocabulary $F(1, 116) = 16.841, p < .001$, Abstract $F(1, 116) = 17.655, p < .001$, and Total $F(1, 116) = 20.246, p < .001$. There were no differences for ASPD diagnosis for V-A Difference, $F(1, 116) = 0.607$, ns or CQ, $F(1, 90) = 0.935$, ns. There were no SILS scores differences as a function of gender or the gender x ASPD interaction.

Further Analysis of the Relationship Between Conduct Disorder and Cognitive Ability

Because of the significant association of number of CD symptoms with SILS scores, we further examined this relationship. Using bivariate correlations with two-tailed tests of significance, we examined the relationship between SILS scores and severity of the aggressive, deceitfulness and theft, rules violations, and destructiveness subtypes of childhood conduct disorder for the subjects in the patient groups. It should be noted that the relationships found were in the negative direction (i.e., indicating that the higher the number of CD symptoms, the lower the adult SILS score). Consistent with earlier results, the three SILS t-scores were found to be correlated ($p < .01$) with number of aggression CD symptoms.
Abstract and Total scores, but not Verbal scores, were significantly correlated (p < .05) with rules violation symptoms. There was no significant relationship between CD symptom type and V-A Difference or Conceptual Quotient.

Relationship of Cognitive Ability and Continuity of Antisocial Behavior

Finally, we were interested in whether the continuity of antisocial behavior from childhood to adulthood would affect SILS t-scores. Therefore, the authors classified patients with regard to the CD diagnosis yielding 4 groups: 1) n=36 patients with no diagnosis of CD or ASPD, 2) n=10 patients who were diagnosed with CD, but whose reported antisocial behaviors resolved so that ASPD diagnostic criteria were not met, 3) n=44 patients with both CD and later diagnosis of ASPD, and 4) n=31 patients who had no diagnosis of CD as youth, but whose adult behavior met criteria for ASPD (Table 4). These latter patients do not technically qualify for a diagnosis of ASPD and should be considered a distinct group. Note, one subject did not have data for numbers of child and adult antisocial behaviors and diagnoses of CD and ASPD could not be determined.

<table>
<thead>
<tr>
<th>Cross-Tablulation of Subjects Who Meet Behavioral Criteria for Childhood Conduct Disorder and Adult Antisocial Personality Diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct Disorder -</td>
</tr>
<tr>
<td>Antisocial Personality Disorder -</td>
</tr>
<tr>
<td>Antisocial Personality Disorder +</td>
</tr>
</tbody>
</table>

In an ANCOVA controlling for years of education, there was a significant effect of group on Vocabulary t-score F(3, 116) = 4.156, p < .01, Abstract T-score F(3, 116) = 8.782, p < .01, and Total t-score, F(3, 116) = 4.793, p < .01, but not for V-A Difference, F(3, 116) = 0.187, ns, or Conceptual Quotient, F(3, 90) = 0.140, ns. Bonferroni post-hoc tests reveal that the significant difference in Vocabulary, Abstract, and Total scores is due to the difference (p < .01) between CD/ASPD+ and Antisocial Only patients. These results are displayed in Table 5.

Results show that patients with antisocial behaviors across their lifetimes (i.e., patients with CD as children who currently meet criteria for ASPD) have the lowest t-scores on the SILS, even statistically controlling for differences in education level. The scores are equivalent for those patients with no CD/ASPD diagnosis, the CD-Only group, and ASPD-Only group. When one attempts to control for premorbid levels of verbal ability by holding Vocabulary ability constant, there are no significant
differences in abstraction for any group. It should be noted that the observed power of the analyses of V-A Difference and CQ were .09 and .11 respectively.

Table 5

<table>
<thead>
<tr>
<th></th>
<th>No Diagnosis (n=36)</th>
<th>CD Only (n=10)</th>
<th>CD/ASPD (n=44)</th>
<th>Antisocial Adult (n=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>SILS Vocabulary</td>
<td>44.7 (10.05)</td>
<td>47.0 (10.54)</td>
<td>37.5 (10.87)</td>
<td>46.0 (6.81)</td>
</tr>
<tr>
<td>SILS Abstract</td>
<td>50.5 (8.23)</td>
<td>53.4 (7.04)</td>
<td>45.3 (8.73)</td>
<td>52.4 (7.17)</td>
</tr>
<tr>
<td>SILS Total</td>
<td>50.1 (9.32)</td>
<td>51.2 (7.98)</td>
<td>41.1 (9.87)</td>
<td>50.4 (6.86)</td>
</tr>
<tr>
<td>SILS V-A Difference</td>
<td>47.6 (7.38)</td>
<td>50.5 (9.45)</td>
<td>41.1 (7.57)</td>
<td>49.6 (6.83)</td>
</tr>
<tr>
<td>SILS Conceptual Quotient&lt;sub&gt;a&lt;/sub&gt;</td>
<td>91.4 (12.67)</td>
<td>93.2 (15.50)</td>
<td>91.0 (14.50)</td>
<td>92.8 (13.24)</td>
</tr>
</tbody>
</table>

*Conceptual Quotient scores were calculated using n=95 subjects.

Discussion

Relationship to Previous Studies

The present results are consistent with previous studies (Gillen and Hesselbrock, 1992. Stevens et al., submitted). These studies examined the effects of ASPD in a large number of young adults, who had not yet attained diagnosable levels of substance dependence. It would appear from these studies that ASPD is capable of influencing cognitive function in the absence of comorbid substance abuse or dependence. From the present study, we might similarly conclude that for inpatients with diagnoses of substance abuse/dependence, that the presence of co-morbid ASPD is a more potent predictor of cognitive ability than possible deleterious effects on the nervous system due to substance use. These conclusions may or may not generalize to patients studied after briefer periods of abstinence or greater duration or severity of lifetime abuse. Also, it is important to acknowledge that while there was no statistical association found between duration and severity of substance use and cognitive test scores, this does not necessarily imply there is no relationship. Previous reviews (Parsons and Leber, 1981) have commented that such negative findings often reflect the heterogeneity of findings and large individual differences.
The diagnosis of ASPD was associated with poorer premorbid verbal ability. These results are also consistent with the literature that has noted a relationship between lower verbal ability estimates and diagnosable antisocial behavior (Frost et al., 1989). The equivalence of educational levels across the patient groups suggests that educational attainment does not contribute to the group difference. However, it is acknowledged that a measure of educational achievement would be superior to a measure of educational attainment in distinguishing the effects of education from those of personality and individual ability. Yet, achievement measures would probably also be correlated with personality and individual differences in learning ability.

Patients reporting antisocial behaviors persisting throughout their lifetimes had the lowest t-scores on the SILS. This finding that conduct problems which began early in development were related to SILS t-scores in adulthood suggests that cognitive development is a factor in these behaviors, or vice-versa, which is in accord with Moffitt’s (1993b) proposal. In contrast, patients who reported antisocial behaviors only during childhood exhibited comparatively normal adult SILS t-scores – that is, their scores were not significantly different from patients who never possessed childhood conduct disorder or adult ASPD. This suggests that these subjects may have had a developmental lag which normalized with continued maturation. This finding is relatively unique and important because it suggests that personality and cognitive ability on the SILS may have a similar, trait-like feature. It remains to be determined whether treatment or prevention that focus on antisocial behavior would result in improved SILS test performance and/or a reduced risk for substance dependence. Also, the present analyses were not able to empirically test whether the lower SILS estimates may be due to co-morbid diagnoses of learning disorder or attention deficit hyperactivity disorder, as this information was not collected in the protocol.

Consistent with this is the difference of mean cognitive ability estimates between patients who showed antisocial behavior in both childhood and adulthood, and those patients who only met criteria for ASPD as adults. The SILS t-scores for these latter ASPD-only patients were indistinguishable from Controls. This finding supports the idea that adults diagnosed with co-morbid ASPD and substance dependence may in fact represent two distinct groups, possibly with different biological substrates – those with a primary ASPD diagnosis who have problem drinking, and those with primary substance dependence who acquire antisocial behaviors as a result. This distinction based on cognitive ability is consistent with several previously proposed typology systems (Cloninger, 1981; Jellinek, 1960).

Finally, our data showed a link between subtypes of retrospectively-diagnosed childhood conduct disorder and cognitive ability. Higher childhood aggression was associated with lower general cognitive ability. This finding is similar to findings using aggression scales and neuropsychological tests with preadolescent boys (Seguin et al., 1995), conduct-disordered females (Giancola et al., 1998), and boys at risk for substance dependence through a positive family history of alcoholism (Giancola et al., 1996a).
Interestingly, however, a negative relationship was also detected between the severity of the Rules Violation subtypes of childhood CD and Abstraction subtest scores, but not for the other subtests. This specific subtest deficit raises the intriguing possibility that rule-breaking behavior might reflect a specific, localized deficit in cognitive processing subserved by frontal brain areas. The broader association found between aggression and all three SILS subtests suggests, by contrast, that the neurological substrates of aggressive behavior may be more diffusely localized.

Limitations of the Current Study

While the current findings suggest avenues for future exploration of how cognitive ability relates to antisocial behavior and to various forms of substance dependence, the present study has several limitations. First, data were not available to examine the relationship of cognitive ability to factors like ADHD, perinatal complications, or learning disabilities. This limits the generalizability of the current findings. Second, the power of some analyses were limited by small sample size (e.g., comparing SILS scores by continuity of CD to ASPD). Perhaps the most important limitation is the use of only one measure of cognitive ability. The SILS lacks the specificity of a more rigorously selected battery of neuropsychological tests. Such a battery would permit consideration of how neurobehavioral aspects of antisocial behavior disorders may interact with the effects of various substances of abuse. Also, more specific tests would make more meaningful the lack of differences among persons with difference substances of dependence, as this suggests greater support for the relationship between antisocial behavior and cognition. The collection of such data in the future would be an interesting direction to pursue.

Conclusion

The present study demonstrated that the primary determinant of cognitive differences in 1-5 month abstinent, substance abusing patients was not substance abuse. The initial overall analysis of variance applied to SILS scores failed to reveal significant differences among the groups. Furthermore, correlational analyses failed to reveal an association between SILS scores and either years of substance use (i.e. dose-response) or months of abstinence (i.e., time-response). Instead, the present study demonstrated that ASPD, a personality disorder which frequently occurs in substance dependent patients (Hesselbrock et al., 1985), was reliably associated with cognitive ability. The association between antisocial personality disorder and cognitive impairment was shown via a comparison of ASPD-positive and ASPD-negative diagnosed groups. But more convincingly, the association was also demonstrable via correlations and logistic regressions that included measures of severity of ASP, CD/ASPD subtypes, and analyses of the effects of ASP progression versus remission. This finding for ASPD appears to be
related to premorbid ability, as analyses that controlled for general verbal (i.e., Vocabulary) ability showed no differences for abstraction for ASPD+ subjects.

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References


Cognitive ability and ASPD


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