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EXECUTIVE DYSFUNCTION AS A RISK MARKER FOR SUBSTANCE ABUSE: THE ROLE OF IMPULSIVE PERSONALITY TRAITS

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Introduction

• Substance abusers have deficits in executive functioning
  -- These deficits have been correlated with impulsivity
• Individuals with a family history of substance abuse may also have similar, albeit more subtle, deficits
• The Iowa Gambling Task is a measure sensitive to these deficits in substance abusers (Bechara et al., 2001; 2002)

-- May be more sensitive to executive dysfunction than Wisconsin Card Sorting Test (Bechara et al., 2001)

Objectives

1. To replicate previous findings (Bechara et al., 2001) showing that a measure of decision-making -- the Iowa Gambling Task -- is a sensitive measure of executive dysfunction in substance abusers
2. To further evaluate various aspects of executive cognitive function in recently-detoxified substance dependent individuals (SDI) as compared to non-SDI
3. To determine the effects of family history of substance use disorders on executive function in substance abusers and comparisons
4. To examine impulsivity as a covariate of the relationship between family history and executive function in SDI and non-SDI

Methods

PARTICIPANTS
• Substance Dependent Individuals (SDI; n = 38) in inpatient treatment for alcohol and/or stimulant dependence
  • Abstinent for ≥15 days
    FH+ (n = 20)
    FH- (n = 18)
• Comparison (NC; n = 30)
• Community-dwelling
  FH+ (n = 12)
  FH- (n = 18)

Neuropsychological Assessment Battery

Wisconsin Card Sorting Test (WCST; Heaton et al., 1993)
Trailmaking Test-B (TMT-B; Reitan & Wolfson, 1986)
Digit Span from the WAIS-III (Wechsler, 1997)
Stroop Color Word Test (Stroop; Hepp et al., 1996)
Iowa Gambling Task (IGT; Bechara et al., 1994)
Beck Depression Inventory (BDI-II; Beck et al., 1996)
UPPS Impulsive Behavior Scales (UPPS; Whiteside, SP & Lynam, DR, 2003)

Results

Table 1: The Relationship of UPPS Subscales to Neuropsychological Test Performance

<table>
<thead>
<tr>
<th>Test</th>
<th>Urgency (Lack of Premeditation)</th>
<th>(Lack of)</th>
<th>Sensation Seeking</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMT-A</td>
<td>.18</td>
<td>.25*</td>
<td>.23</td>
</tr>
<tr>
<td>TMT-B</td>
<td>.37**</td>
<td>.13</td>
<td>.21</td>
</tr>
<tr>
<td>SCWT-W</td>
<td>-.37**</td>
<td>.06</td>
<td>.16</td>
</tr>
<tr>
<td>SCWT-C</td>
<td>-.40**</td>
<td>.11</td>
<td>.16</td>
</tr>
<tr>
<td>SCWT-CW</td>
<td>-.47**</td>
<td>.07</td>
<td>.11</td>
</tr>
<tr>
<td>SCWT-Int</td>
<td>-.27**</td>
<td>.05</td>
<td>-.02</td>
</tr>
<tr>
<td>WCST-TotErr</td>
<td>.25*</td>
<td>.12</td>
<td>.17</td>
</tr>
<tr>
<td>WCST-PerErr</td>
<td>.24</td>
<td>.11</td>
<td>.16</td>
</tr>
<tr>
<td>WCST NonPerErr</td>
<td>.25*</td>
<td>.13</td>
<td>.16</td>
</tr>
<tr>
<td>Digits Forward</td>
<td>-.17</td>
<td>.07</td>
<td>.02</td>
</tr>
<tr>
<td>Digits Backward</td>
<td>-.24</td>
<td>.09</td>
<td>.10</td>
</tr>
<tr>
<td>IGT Net Score</td>
<td>-.21</td>
<td>-.24</td>
<td>-.05</td>
</tr>
</tbody>
</table>

-effects of covariates
• Age and education were nonsignificant covariates of the relationship between substance use disorders / FH status and executive functioning.
• BDI-II symptoms significantly reduced the main effect of FH on neuropsychological test performances
• Impulsivity (UPPS) did significantly affect the relationship btw. Substance abuse/FH on executive function
-- When “Urgency” (UPPS) scores were added as a covariate, the main effect of substance dependence was no longer significant

Summary / Conclusions

• SDI display an executive function deficit compared to comparison subjects
• FH confers a further decrement in performance on WCST in SDI but not comparison participants
  -- No FH effect on IGT
• FH effects may be differential – dorsolateral PFC but not ventromedial PFC
  -- DLPFC but not VMPFC function seems to be an important risk marker
• The relationship between substance dependence status and neuropsychological test performances was related to UPPS Urgency scores (impulsivity).
• Stroop and IGT performances support Bechara et al.’s concept of “motor” and “cognitive” impulsiveness, respectively
  -- SDI are impaired in multiple types of impulsiveness
• These types of impulsiveness may be conceptually related to UPPS Urgency
  -- Thinking before acting, not considering the consequences of one’s actions

References