

2007

Executive dysfunction as a risk marker for substance abuse: The role of impulsive personality traits

Sara L. Dolan
Brown University

Antoine Bechara
University of Iowa

Peter E. Nathan
University of Iowa

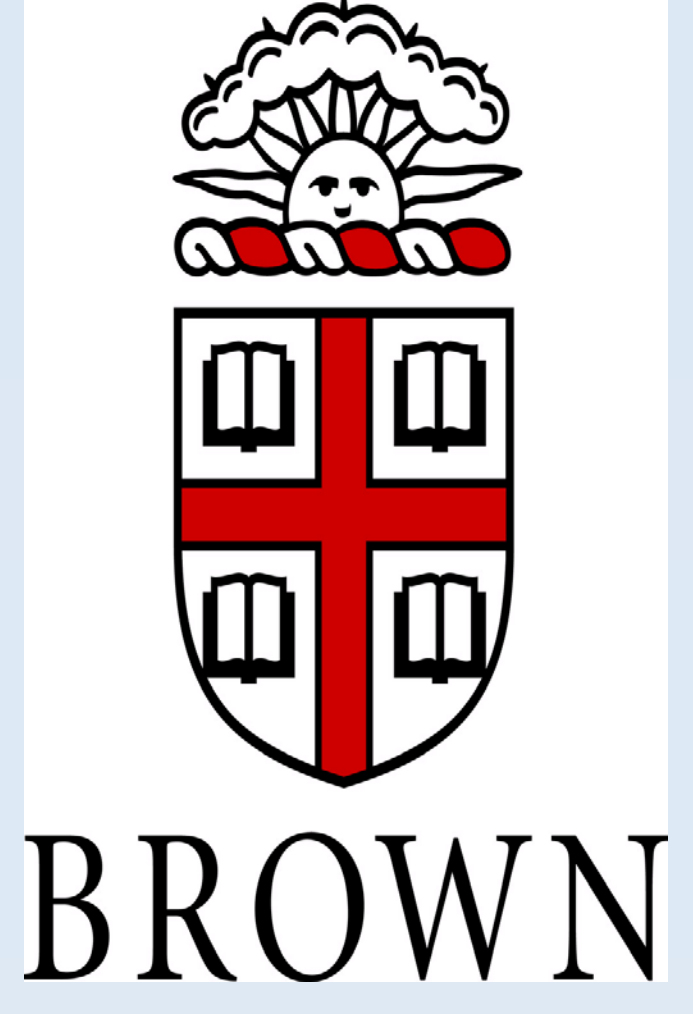
Follow this and additional works at: <http://digitalcommons.wustl.edu/guzeposter2007>

 Part of the [Medicine and Health Sciences Commons](#)

Recommended Citation

Dolan, Sara L.; Bechara, Antoine; and Nathan, Peter E., "Executive dysfunction as a risk marker for substance abuse: The role of impulsive personality traits" (2007). *Posters*. Paper 24 Samuel B. Guze Symposium on Alcoholism.
<http://digitalcommons.wustl.edu/guzeposter2007/24>

This Poster is brought to you for free and open access by the 2007: Alcohol Use Across the Lifespan at Digital Commons@Becker. It has been accepted for inclusion in Posters by an authorized administrator of Digital Commons@Becker. For more information, please contact engeszer@wustl.edu.



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

Sara L. Dolan¹, Antoine Bechara², Peter E. Nathan³

¹Brown University Center for Alcohol and Addiction Studies Providence, RI;; ²Department of Neurology, University of Iowa College of Medicine Iowa City, IA; ³University of Iowa Department of Psychology and College of Public Health, Iowa City, IA



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)

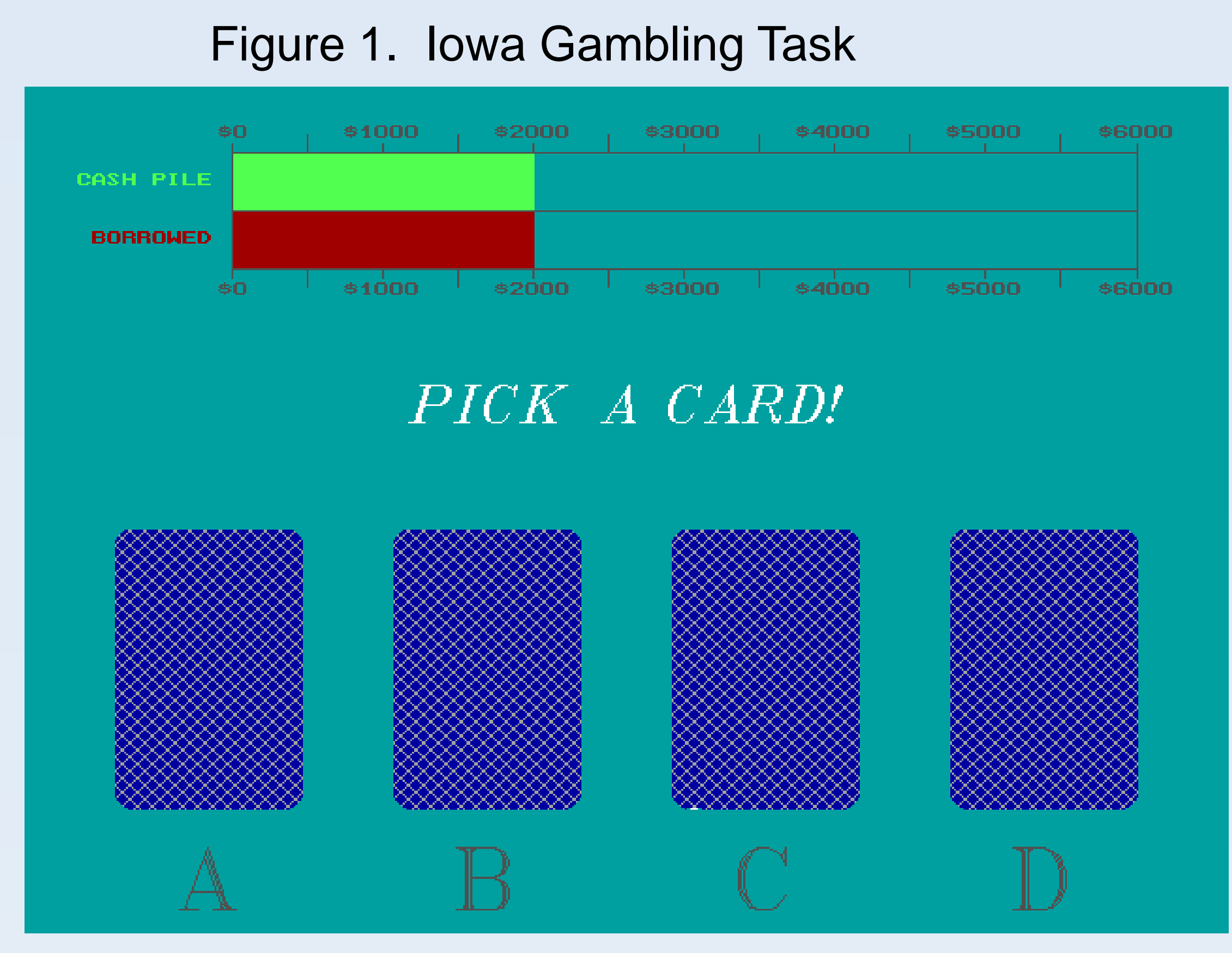


Figure 1. Iowa Gambling Task

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

Results

Table 1
Effect of Family History Status on the Comparison of Substance Dependent and Comparison Participants on Neuropsychological Task Performance

Neuropsychological Test	Substance Dependent		Comparison		One-Way ANCOVA	
	FH+ (n = 20)	FH- (n = 18)	FH+ (n = 12)	FH- (n = 18)	F	p-value
WCST (Raw Scores)						
Total Errors	11.99 ± 2.44	20.16 ± 4.35	14.28 ± 3.39	11.78 ± 2.67	2.17	0.10 ^{df}
Perseverative Errors	6.32 ± 1.35	10.33 ± 1.54	8.19 ± 1.88	6.53 ± 1.46	1.71	0.18 ^f
Non-Perseverative Errors	5.67 ± 1.20	9.83 ± 1.37	6.10 ± 1.67	5.25 ± 1.30	2.43	0.07 ^{df}
# Categories Completed	5.06 ± 0.21	5.44 ± 0.24	5.62 ± 0.30	5.91 ± 0.09	1.63	0.19 ^f
TMT-B (Time to complete in seconds)	52.89 ± 4.61	64.86 ± 5.25	49.59 ± 6.40	50.26 ± 5.02	1.57	0.21
Digit Span (Number of Digits Achieved)						
Forward	6.92 ± 0.29	6.20 ± 0.33	7.71 ± 0.40	7.14 ± 0.32	2.48	0.07 ^b
Backward	4.63 ± 0.31	4.49 ± 0.39	4.82 ± 0.47	5.55 ± 0.37	1.48	0.23
Difference (Forward - Backward)	2.29 ± 0.37	1.71 ± 0.42	2.90 ± 0.52	1.59 ± 0.41	1.91	0.14 ⁱ
Stroop (T-Scores)						
Word	47.18 ± 1.68	44.86 ± 1.92	55.85 ± 2.34	51.40 ± 1.84	2.48	0.07 ^b
Color	46.07 ± 1.57	45.04 ± 1.79	53.17 ± 2.18	50.88 ± 1.71	2.97	0.04 ^{bc}
Color-Word	49.36 ± 2.00	45.93 ± 2.28	56.65 ± 2.78	52.35 ± 2.18	2.53	0.07 ^b
Interference	51.57 ± 1.50	48.60 ± 1.71	52.51 ± 2.07	50.03 ± 1.64	0.97	0.41
Iowa Gambling Task						
Net Score ((C+D)-(A+B))	-2.18 ± 7.29	-2.02 ± 8.31	22.86 ± 10.13	24.86 ± 7.95	2.41	0.08 ^{ce}
Block 3	10.23 ± 0.99	10.95 ± 1.13	13.23 ± 1.37	13.59 ± 1.08	1.77	0.16 ^c
Block 4	10.59 ± 1.20	10.83 ± 1.37	14.02 ± 1.67	15.39 ± 1.31	2.47	0.07 ^{ab}
Block 5	10.41 ± 1.19	9.84 ± 1.35	14.97 ± 1.65	14.40 ± 1.30	2.58	0.06 ^{ab}

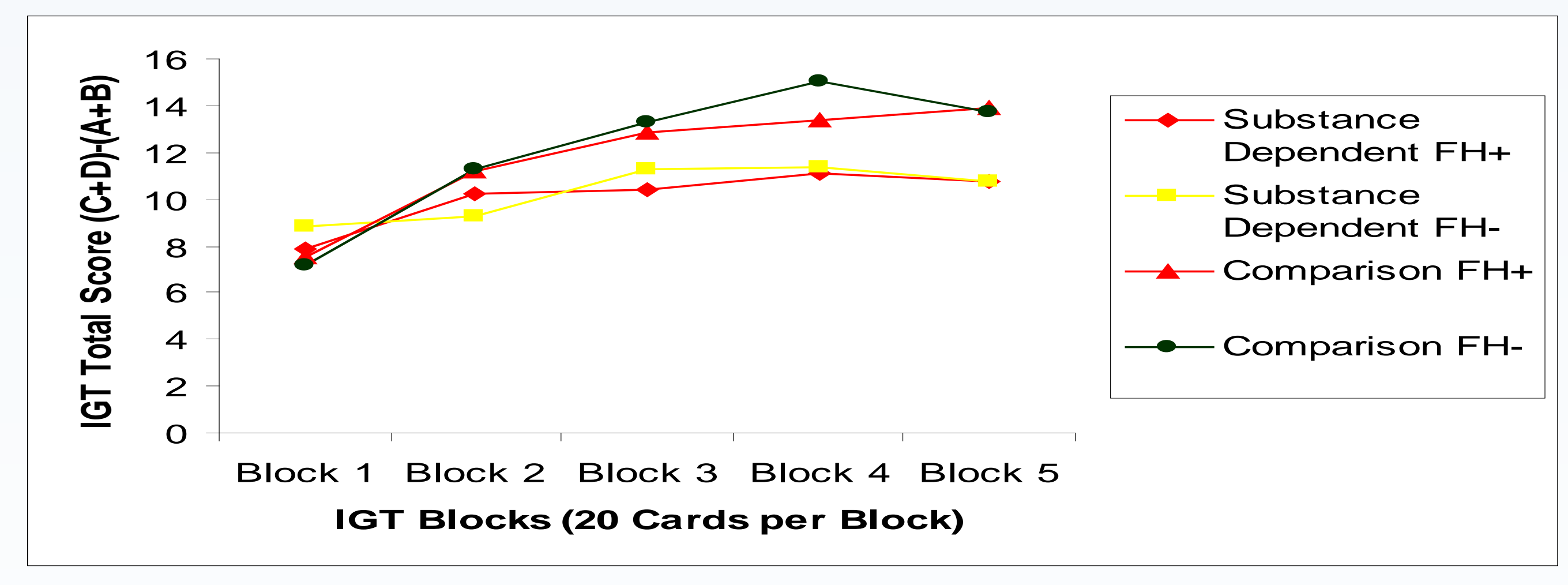


Table 2. The Relationship of UPPS Subscales to Neuropsychological Test Performance.

	Urgency	(Lack of) Premeditation	(Lack of) Perseverance	Sensation Seeking
TMT-A	.18	-.25*	.23	-.34**
TMT-B	.37**	.13	.21	-.14
SCWT-W	-.37**	.06	-.16	.14
SCWT-C	-.40***	-.11	-.16	.06
SCWT-CW	-.47***	-.07	-.11	.01
SCWT-Int	-.27*	-.05	-.02	.01
WCST-TotErr	.25*	.12	.17	-.02
WCST-PerErr	.24	.11	.16	-.04
WCST NonPerErr	.25*	.13	.16	.00
Digits Forward	-.17	.07	.02	.19
Digits Backward	-.24	.09	.10	.17
IGT Net Score	-.21	-.24	-.05	-.14

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

Bechara, A. et al (1994). *Cognition*, 50, 7-15.

Bechara, A. et al (2001). *Neuropsychologia*, 39(4):376-89.

Bechara, A. et al (2002) *Neuropsychologia*, 40, 1690-1705.

Heaton, R. et al. (1993) Wisconsin Card Sorting Test Manual: Revised and expanded. Odessa: Beck, A. et al (1996). San Antonio, TX: The Psychological Corporation. Psychological Assessment Resources, Inc.

Hepp, H. et al (1996). *Schizophrenia Research*, 22, 187-195

Reitan, R. & Wolfson, D. (1986). In Wedding, D. & Horton, A.M. (Eds.), *The neuropsychology handbook: Behavioral and clinical perspectives*. (pp. 134-160).

Wechsler, D. (1997). *Wechsler Adult Intelligence Scale-Third Edition. Administration and scoring manual*. The Psychological Corporation: San Antonio, TX.

Whiteside, S. P. & Lynam, D. R. (2003). *Experimental & Clinical Psychopharmacology*, 11, 210-217.