To complete the Honors Project requirements, I plan to write a research paper appropriate for submission to an academic journal, present a poster at the Black Hills Research Symposium and NCUR (if funding allows), and give a presentation that will be open to the public.

During the Fall 2007 semester I did background research to select variables, make a data analysis plan, and write hypotheses. Next I used SYSTAT and SPSS to analyze the data and began interpreting the results. I submitted an abstract to the National Conference on Undergraduate Research (NCUR), which was accepted. Now I’m writing the first draft of my research paper and working on the poster.

2008 NCUR Abstract:

SEROTONIN TRANSPORTER GENOTYPE AND GENDER ARE ASSOCIATED WITH IOWA GAMBLING TASK PERFORMANCE: RESULTS FROM A NON-CLINICAL POPULATION

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The Iowa Gambling Task (IGT) models decision-making in which outcomes are initially uncertain. Various clinical populations exhibit poor IGT performance. In non-clinical populations, women perform worse than men. Poor IGT performance may be broken-down into three psychological components: attention to gains, attention to recent outcomes, and erratic choosing. Because the serotonin system innervates brain areas associated with decision-making, this study examined IGT performance and variation in (a) 5-HTTLPR, a widely-studied promoter region polymorphism in the serotonin transporter; and (b) TPH2, the serotonin rate-limiting enzyme expressed in neurons. College students (N=188, Caucasian) donated cheek cells for genotyping and completed the IGT. For each block of twenty cards (5 blocks total), IGT net scores were calculated by subtracting the number of disadvantageous choices from the number of advantageous choices. A repeated-measures ANOVA, with IGT net score as the dependent
variable, revealed a main effect for gender ($F = 4.25, p = .002$) and an interaction effect for 5-HTTLPR and gender ($F = 3.89, p = .004$). The interaction was strongest in the first block, where conditions are highly ambiguous. Men with at least one short allele (S/_) made fewer advantageous choices than men homozygous for the long allele (L/L). Women L/L carriers made fewer advantageous choices than S/_ carriers. A gender main effect was observed for recency ($F = 5.96, p = .02$), with women more likely to pay attention to recent outcomes. TPH2 was not associated with IGT performance. Results support evidence for gender differences in IGT performance. Furthermore, results support growing evidence that for men and women, 5-HTTLPR-variation is differentially associated with cognition.

Further Information:

Goal of the Present Study

To better understand decision-making in a non-clinical population, the present study examined variation in 5-HTTLPR and TPH2 in relation to (a) Iowa Gambling Task Performance (IGT) performance, and (b) the cognitive components of the Expectancy-Valence Model. To our knowledge, no study to date has investigated these relationships in a non-clinical population. We hypothesized that the presence of at least one short allele for 5-HTTLPR would be associated with inferior performance on the IGT. It was also expected that variation in intron 8 of TPH2 would be associated with IGT performance. We hypothesized that genotypes related to poor IGT performance would also be associated with decision-making deficits reflected in the cognitive parameters.

Methods
Participants

College students (N=200) participating in a larger study on impulsivity and health risk behaviors served as subjects. Participants were recruited using flyers and in-class presentations and were compensated $5 for their time. Informed consent was obtained from all subjects prior to participation.

Basic Study Protocol

Participants completed a self-report questionnaire; two computerized tasks, including the Iowa Gambling Task (IGT); and donated buccal cells for genotyping.

Iowa Gambling Task (IGT)

In the IGT, participants gain or lose money each time they choose a card from one of four decks. Two decks are disadvantageous and have large gains, and occasionally, large losses (net loss). The two advantageous decks have small gains and on occasion have small losses (net gain). During the task, participants choose a total of 100 cards over five 20-card blocks. For each block, therefore, a maximum of 20 advantageous choices is possible. By the final blocks, healthy individuals make more advantageous choices as they learn to delay immediate gratification in favor of long-term gains (Bechara, Tranel, & Damasio, 2000). For each block of twenty cards, IGT net scores were calculated by subtracting the number of disadvantageous choices from the number of advantageous choices. Gender was included as an independent variable due to previous reports of gender differences on IGT performance (Bolla, Eldreth, Matychik, & Cadet, 2004; Overman, 2004). Specifically, women have been shown to make fewer advantageous choices than men on the final blocks.

Expectancy-Valence Model
The Expectancy-Valence Model measures three psychological components underlying poor IGT performance: attention to gains (vs. attention to losses), attention to recent outcomes (vs. attention to past outcomes), and erratic choosing due to boredom, tiredness, etc. High values on the attention to gains parameter represent attention to gains while low values denote attention to losses. For the recency parameter, large values signify a strong recency effect in which participants tend to rapidly discount past outcomes. Participants with a small value were considering past outcomes when making their choices. High values on the consistency parameter indicate consistent choosing based on a preference for either advantageous or disadvantageous decks. Low values signify erratic choosing. For each participant the model fit index was estimated and each parameter was calculated. See Yechiam et al. (2005) for details on model construction.

**Statistical Analysis**

Repeated-measures ANOVAs were performed with gender and genotype as between subjects factors, stage (5 blocks of 20 cards) as a within subjects factor, and IGT net score as the dependent variable. Then ANOVAs were performed with gender and genotype as independent variables and cognitive parameter estimates as the dependent variable.

References in Progress


determinants and concomitants of deficient decision making in pathological gamblers. Drug and Alcohol Dependence, 84, 231–239.


