GAMBLING RESEARCH REVEALS

ALBERTA GAMBLING RESEARCH INSTITUTE

Swiss Museum Exhibit an Intriguing Knowledge Translation Strategy

In January, 2014 Institute Research Director Dr. Nady el-Guebaly and Dr. Rob Williams travelled to Neuchâtel Switzerland to present research findings at the conference "Excessive Gambling: Prevention and Harm Reduction." While there, el-Guebaly and other attendees were treated to a fascinating exhibit titled "Argent, Jeux et Enjeux" which was on display at a local museum (Musée d'Art et d'Histoire). "Loosely translated, [the title] means 'Money, Gambling and Challenges,' and it sounds far better in French," said el-Guebaly. He explained that the exhibit rooms had been arranged into a variety of themes by a multi-stakeholder organizing committee[1].
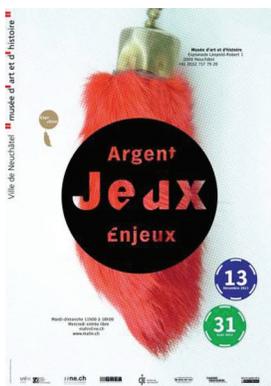
The exhibit depicted aspects of the science and art of gambling. Specific themes included: "Players" – gambling as depicted in movies, literature, and popular culture; Providers / Industry – historical lottery objects and advertisements; Social Benefits and Gambling Problems – an interactive exhibit which displayed options for what might happen if differing percentages of gambling revenues were dedicated to the public good; Money and "Good Luck" Charms, and; Role of the State – a review of past and present gambling-related legislation.

"Sprinkled throughout the exhibit rooms were statements that began with 'Research says!'" noted el-Guebaly. As an academic keenly aware of the challenges faced by researchers when translating knowledge for dissemination to the general public,

CRITICAL ISSUES IN GAMBLING RESEARCH 2015

Conference 2015 to Take Place March 27-28 in Banff, Alberta

Mark your calendars and plan to attend Institute *Conference 2015: Critical Issues in Gambling Research* on Friday, March 27th and Saturday, March 28th at the Banff Centre in Banff, Alberta. The program for this event is being organized by University of Lethbridge Research Coordinator Dr. Rob Williams and is sure to be of interest to gambling researchers, government regulators, health care professionals, industry representatives and others. Areas of particular focus will include under-researched topics in gambling research as well as the positive impacts of gambling. Watch for conference registration details and the preliminary conference agenda to be posted on the Institute web site within the next few months.

The primary aim of the Alberta Gambling Research Institute, a consortium of the Universities of Alberta, Calgary, and Lethbridge, is to support academic research related to gambling.

MISSION

To facilitate evidence-based broad research that informs gambling public policy and educates Albertans and the wider audience about the effects of gambling.

he found this approach particularly appealing. As is turned out, el-Guebaly wasn't the only conference attendee who was extremely impressed with the exhibit. Inspired by the Neuchâtel experience, Dr. Henrietta Bowden-Jones of the NHS National Problem Gambling Clinic in London, England secured a grant from the Wellcome Trust to translate the Swiss experience with the new title *"Gambling, Neuroscience and the Arts."* The British exhibit is being coordinated by committee and is expected to be unveiled on the grounds of the Trust in London in 2015. Dr. el-Guebaly believes that it would be an extremely worthwhile undertaking to build upon the Swiss and British experiences and develop a similar partnership wth Canada's research and arts communities. He envisions that it may involve an interprovincial effort with Alberta bringing to bear its own unique contributions. "After all," says el-Guebaly, "The ultimate goal [of the initiative] would be to share information about gambling with the public through an accessible, multimedia exhibition."

1 The exhibit reportedly took three years to develop and was funded by a group of stakeholders. It was displayed for nine months and included a series of public lectures and debates moderated by a media personality as well as opportunities for visits by schoolchildren of all ages.

SPOTLIGHT ON ALBERTAN RESEARCH DURING SECOND DAY OF APRIL 2014 CONFERENCE

A new wrinkle at the Institute's April 2014 conference involved devoting virtually the entire second day of the event (Saturday, April 5, 2014) to profiling gambling research by Albertan investigators[1]. In order to provide adequate time for the presenters and to accommodate the varying interests of attendees, separate Psycho-Biological and Socio-Economic-Policy research streams were offered as part of the morning program. Afternoon sessions related to the theme "Revelations Arising from the AGRI Longitudinal Study" by researchers involved in that initiative.

"Psycho-Biological Research Stream" by Dr. Marcia Spetch

Eight researchers from Alberta discussed their research on the psychology and neuroscience of gambling behavior. Several important themes emerged from the presentations:

- Gambling is a type of decision making; therefore understanding the cognitive and neural mechanisms of decision making is important for understanding gambling behavior and the development of gambling problems.

- Neuroscience approaches, including animal models, behavior analysis, genetic analysis, and brain imaging provide important knowledge that can contribute to understanding gambling behavior, guiding the development of theory-driven treatment protocols, and helping to set gambling policies.

- There is significant overlap between gambling and common mental health conditions such as depression, which has implications for both etiological and treatment-related research.

- Neuroscience approaches can offer insights into psychopathology, including problem gambling, and can help to identify mechanistic links between social/environmental factors and gambling decisions or pathologies.

- Neuroscience research provides the potential to better understand factors that contribute to individual differences in gambling behavior. This is important because understanding gambling subtypes and individual differences is critical for developing more effective personalized treatments for gambling and may provide valuable tools for the early detection of people who are at risk for gambling.

Dr. Marcia Spetch from the University of Alberta presented on *"The Role of Memory Distortions in Risky Choice."* She presented an overview of recent findings from her research group suggesting that distortions in memory for recent outcomes can influence people's risky choices. Their research has revealed that when people learn the outcomes of their choices through repeated experience in a simulated gambling task, the most extreme outcomes in the decision context disproportionately influence their risky choice behavior. They have also shown that people are more likely to remember the most extreme outcomes and that people over-estimate the frequency of these extreme outcomes; these biases in memory correlate with risky choice tendencies. In a recent study, they showed that presenting a reminder of the winning outcome increased risky choice. She proposed that these memory biases could affect choice in real world gambling, and in particular in games in which the odds are not known.

Dr. Craig Chapman from the University of Alberta presented on *"The Deciding Hand: How an Analysis of Human Reach Movements Reveal Choice Biases."* The key to understanding human gambling behaviour is understanding human decision making. Often, however, the science of decision making is restricted only to an analysis of what

decisions people make. This approach overlooks the very important component of how people execute their decision. In his talk, Dr. Chapman showed that an analysis of the physical reach movements people make to indicate a decision can reveal subtle and important aspects of decision making that would have been invisible using conventional research methods.

Dr. David Euston from the University of Lethbridge presented on *"Role of the Medial Prefrontal Cortex in Problem Gambling – Insights from a Rodent Model."* Damage to the medial prefrontal cortex (mPFC) often leads to problems related to addiction, such as impulsivity and insensitivity to future consequences. To learn more about the functions of this region, Dr. Euston and his collaborators studied the effects of mPFC lesions in rats on decision making processes related to behavioral addiction. They developed a version of the N-arm bandit task, which involved choosing between three rewarded locations whose payout varied over time. They found that damage to mPFC made rats much more likely to perseverate on choices and much less sensitive to outcomes. By fitting the data to a reinforcement learning model, they further showed that mPFC-lesioned animals were slower to adjust their internal representation of reward value when contingencies changed.   They are currently also developing a new rat version of the Iowa Gambling Task to provide another test of the functional role of the medial prefrontal cortex.

Dr. Katherine J. Aitchison from the University of Alberta presented on *"Genetics as a Tool for Research in Addictions."* Twin studies of pathological gambling estimate a heritability of 50% (that is 50% of the variance in presentation is attributable to genetic factors). Interestingly, there is evidence of a 20% genetic overlap with alcohol addiction and there is also significant overlap with depression

Dr. Aaron Gruber from the University of Lethbridge presented on *"Neural Mechanisms of Loss-Driven Response Switching During a Competitive Task."* He noted that most people are risk averse in financial decisions but that problem gamblers are less likely to avoid choices leading to large losses in the Iowa Gambling Task and other choice games. Moreover, both humans and animals tend to avoid repeating choices that lead to disappointing outcomes such as losing to an opponent. He has recently developed a version of the competitive 'rock-paper-scissors' game to examine the neural mechanisms of this behaviour in rodents. He presented his surprising finding that it is the motor region of the striatum (the putamen in primates) that drives response switches on trials immediately following losses. Furthermore, the response switching depends on D2 dopamine receptor inactivation in this region of striatum. These data indicate that brain structures normally associated with the motor system play an important role in the rapid adaptation of choice following reinforcement. This opens the door to the idea that we can develop behavioral programs for the treatment or prevention of problem gambling in at-risk populations through computer games or physical activities.

(predicted to become the largest contributor to global burden of disease by 2030). The specific genetic factors involved are relatively unexplored; a promising candidate is CNR1, encoding the cannabinoid receptor 1, which appears to modulate behaviour across several substance use disorders. Next generation sequencing and genome-wide association studies (GWAS) have led to a sharp increase in publications in the genetics of addictions in the last decade, with interesting, some notable GWAS findings (e.g. of the ALDH2 gene and drinking behaviour) replicating previous candidate gene associations. The potential role for pharmacogenetics in optimising choice of treatment (personalized medicine) for gamblers - whether pharmacological or psychological - was then described. Drug-drug interactions should also be borne in mind, and how these may be moderated by genetic factors. A local study exploring the role of genetic factors interacting with cannabis and other factors in the genesis of psychosis was mentioned. The possibility of commencing studies in addictions more widely

by identifying at risk variants in Albertans on an anonymised population basis and of moving on to explore the role of genetic and epigenetic factors in addictions such as gambling was outlined.

Dr. Anthony Singhal from the University of Alberta presented on *"Neural Correlates of Emotion Regulation: Implications for Gambling."* He presented neuroimaging data from a large scale clinical trial with a population of adolescents suffering with mental health problems including mood disorders. The main results showed a pattern of dysregulation in the emotional-control circuits of the brains of the clinical population, compared to healthy controls. Implications for models of pathological gambling were raised.

Dr. Bradley Goodyear from the University of Calgary presented on *"Functional MRI of the Pathological Gambler: Insight into Mechanisms Underlying Decisions of Risk."* There is much we do not understand about how the brains of pathological gamblers process craving-induced stimuli and decisions of risk. Understanding where in the pathological gambler brain these cognitive processes differ from control subjects will greatly inform us as to what brain systems we might target therapeutically to combat this escalating problem in society. Our studies of pathological gamblers to date, using functional magnetic resonance imaging, demonstrate that prefrontal and parietal brain regions are hyper-activated during cue-induced craving stimuli, and brain regions associated with reward processing are also hyper-activated during decisions of

high risk. These preliminary studies suggest an underlying neurophysiological basis of pathological gambling. Future studies aim to further elucidate these mechanisms, in collaboration with AGRI investigators.
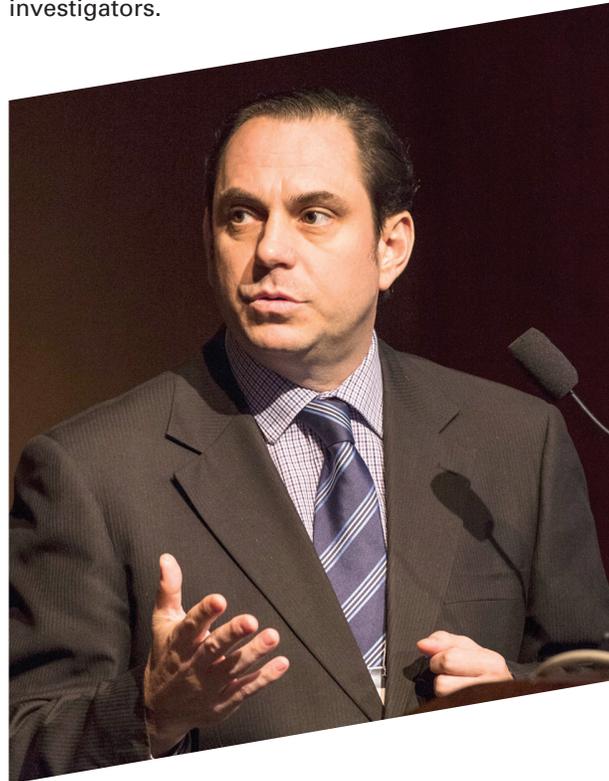
Dr. Darren Christensen from the University of Lethbridge presented on *"Pharmacological Treatments for Problem Gambling."* Psycho-social interventions are currently considered the best practice for the treatment of pathological and disordered gambling. These approaches use a tailoring process where the precise nature of the causes or precipitating triggers are identified by the therapist or program to focus the treatment action on specific issues. In contrast, pharmacological treatments are typically applied without defining these targets and in general the results from these interventions have been inconsistent. Further, numerous studies have shown the heterogeneity between pharmacological studies and more generally across the gambling population. He suggested that a better approach might be to tailor pharmacological interventions to specific gambling sub-types based on genetic factors, gambling phenomenologies, drug sensitivities, and gambling severities.

"Socio-Economic Gambling Policy Research Stream"

"Basic Needs Theory and Gambling" – Dr. Gordon Walker, U. of Alberta

Dr. Walker provided an overview of the various needs-related theories from the leisure-behaviour realm and how they may be applicable to gambling motivations amongst mainstream gamblers and gamblers from different cultural backgrounds.

"Improving Problem Gambling Treatment - Using Client-Based Feedback in Practice" – Dr. William Hanson, U. of Alberta

In his presentation, Dr. Hanson brought to bear his background in health psychology and assessment to analyze what what we know about therapy in general and how it applies to gambling problems.

"The Impact of VLT Location on Problem Gamblers: Evidence from Individual Bankruptcy Filings" – Dr. Barry Scholnick, U. of Alberta

Dr. Scholnick described his progress to date in cross-referencing Albertan bankruptcy filings with data on Video Lottery Terminal (VLT) locations as provided by the Alberta Gaming and Liquor Commission (AGLC). According to Scholnick, "Bankruptcy filings are very very useful data because the day you do this you have to give the government a vast amount of information about your life and hidden there is information about whether you might have a gambling problem."

"Using a Public Health Lens to Examine Canadian Responsible Gambling Initiatives" – Dr. Cheryl Currie, U. of Lethbridge

In her presentation, Dr. Currie provided fascinating examples of various problem prevention strategies for that have been used successfully and not-so-successfully in public health settings.

Theme: "Revelations Arising from the AGRI Longitudinal Study"

In this series of presentations, Albertan researchers (Dr. Garry Smith, Dr. Don Schopflocher, Dr. David Hodgins & Dr. Rob Williams) presented findings emanating from longitudinal data collected as part of *Leisure, Lifestyle, Lifecycle Project (LLLP)*. The LLLP is a prospective, panel study of gambling behaviour that included four assessments of the same individuals over a five-year period. Topics covered during these sessions involved EGMs, the stability of gambling behaviours over time, and variables that best predict future problem gambling.

1 *Presentations from each of these sessions can be accessed from the Completed Conference Program 2014 web page.*

2014-15 Graduate Student Scholarship Recipients

The Institute is pleased to announce the following 2014-15 Scholarship and Research Allowance Award Recipients:

- **Sarah Farstad**
  (Clinical Psychology – PhD, Calgary)

- **Hyoun Soo (Andrew) Kim***
  (Clinical Psychology – PhD, Calgary)

- **Carrie Leonard**
  (Psychology – PhD, Lethbridge)

- **Leanne Quigley**
  (Clinical Psychology – PhD, Calgary)

- **Erin Mason***
  (Health Sciences – Masters, Lethbridge)

- **Jeffrey Pisklak***
  (Psychology -- Masters, Alberta)

- **Jennifer Prentice***
  (Psychology -- PhD, Calgary)

- **Jennifer Swan**
  (Psychology – PhD, Calgary)

- **Igor Yakovenko**
  (Clinical Psychology – PhD, Calgary)

- **Gabriel Yanicki**
  (Anthropology – PhD, Alberta)

Descriptions of individual gambling-related research areas for scholarship recipients will soon be available on the Institute web site. Asterisk (*) indicates students new to the scholarship program.

ALBERTA GAMBLING RESEARCH INSTITUTE

BOARD OF DIRECTORS

Dr. Seamus O'Shea, Chair
External Member

Dr. Lesley Brown
University of Lethbridge

Dr. Keith Dobson
University of Calgary

Alexander (Sandy) Dougall
External Member

Dr. Erin Gibbs van Brunschot
University of Calgary

Dr. Cam Wild
University of Alberta

Dr. Douglas West
University of Alberta

Dr. Robert Wood
University of Lethbridge

EXECUTIVE DIRECTOR

Vickii Williams
Email:
vickii.williams@ualberta.ca

RESEARCH DIRECTOR

Dr. Nady el-Guebaly
Email:
nady.el-guebaly@
albertahealthservices.ca

RESEARCH COORDINATORS

University of Alberta
Dr. Garry Smith
Email: garry.j.smith@ualberta.ca

University of Calgary
Dr. David Hodgins
Email: dhodgins@ucalgary.ca

University of Lethbridge
Dr. Robert Williams
Email: robert.williams@uleth.ca

INSTITUTE LIBRARIAN

Rhys Stevens
Email: rhys.stevens@uleth.ca

Please forward any comments or inquiries to:

**Email:
abgambling@ualberta.ca
Ph. 780-492-2856**

Rhys Stevens
Writer

Vickii Williams
Editor

North Design Group
Design/Layout

**Media Inquiries
Ph. 780-492-2856**