

GAMBLING RESEARCH



New Institute Gambling Research Chair Dr. Dan McGrath Keen to Disentangle the Nature of the Relationship Between Tobacco Dependence and Gambling Behaviour

Dr. Dan McGrath was appointed as the Alberta Gambling Research Institute Chair in Gambling Research at the University of Calgary in 2014. He provided the following interview answers to questions about his current research program:



You recently received your Ph.D. from Dalhousie University in Halifax, Nova Scotia. Did your dissertation topic involve a gambling research component? What was your inspiration for this investigation?

I completed a PhD in Experimental Psychology from Dalhousie University in 2013. During my time at Dalhousie, I worked under the supervision of Dr. Sean Barrett in the Substance Use and

Addictions Lab. Sean has a very strong research focus on tobacco dependence and related co-morbid addictive behaviour. My dissertation work¹ examined the relationship between tobacco dependence and problem gambling. Specifically, I was interested in the acute influence of nicotine administration on gambling-related craving and behaviour. To me, this was a particularly interesting relationship that had received surprisingly little focus in the literature. Most research to that point was epidemiologically focused and highlighted substantial co-morbidity between smoking and gambling. Moreover, a growing body of literature from animal work as well as human studies suggests that nicotine may serve to further enhance other reinforced behaviour. For my dissertation research, I wanted to test whether the potential reinforcement enhancing effects of nicotine could also influence real-world reinforced behaviour, specifically video lottery terminal (VLT) gambling. This work was conducted in the gambling laboratory in the Department of Psychology at Dalhousie. The lab

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.

itself is decorated to look like a bar environment (i.e., bar colours, bottles of liquor, etc.) and contains authentic VLT machines that are connected to the Atlantic Lottery system. It provides a very realistic gambling experience and one that is similar to other VLT venues located in Nova Scotia. My laboratory experiments consisted of providing acutely administered nicotine (vs. placebo) to community-recruited gamblers who smoke and asking them to gamble on a VLT. Other measures such as craving, mood, heart rate were also recorded. I predicted that nicotine would influence gambling craving and behaviour to a

greater extent than placebo; however, by in large this turned out to not be the case. I plan on continuing to examine aspects of this relationship including the influence of tobacco

withdrawal symptoms on other addictive behaviour in individuals who are dually addicted. In addition to my dissertation research, I also had the opportunity to work with some other truly inspiring researchers while at Dalhousie including people like Sherry Stewart, Simon Sherry and Ray Klein. Dr. Stewart is one of world's most prolific addictions researchers and I had the pleasure of working with her on a number of projects. Some of the research I conducted under her supervision on motives for gambling serves as the basis for one aspect of my research program today. The training and mentorship I received from all of these individuals has been instrumental in the success I have had in my research career.

Last year you were appointed the Institute's Chair in Gambling Research @ the University of Calgary in the Department of Psychology... what was it about the position that caught your attention?

I was teaching at Mount Allison University in New Brunswick when I became aware of the AGRI Chair position at the University of Calgary. When I first read the job advertisement I was both surprised and excited about the prospect of applying for the position. The requirements for the position seemed to be tailored to my research interests

"I have been fascinated not only by problematic gambling, but also the relationship between gambling and other addictive behaviours."

and training. The gambling research community in Canada is still small enough that you become aware of what types of research are being conducted in other jurisdictions. I have always felt that Alberta, in large part due to the efforts of AGRI, is truly at the forefront of gambling research in Canada. The expertise and support for gambling research here is second to none. Being a junior scholar, the prospect of working with and learning from people like David Hodgins, Nady el-Guebaly, Rob Williams, and Garry Smith among others was especially enticing. Having the ability to interact with such a strong team of researchers can only serve to benefit my career going forward. In addition to AGRI's support, having the opportunity to work at the University of Calgary was also a strong draw for me. U of C has really established itself as a pioneering research institution and along with the Faculty of Arts and the Department of Psychology has provided me the tools that I need to succeed in this role.

Can you tell us a little about your current gambling research areas of interest?

There are a number of gambling-related research topics that I am interested in. Currently, most of my research focuses on three areas: behavioral pharmacology involving nicotine and alcohol drug challenge designs paired with gambling; motives for why people gamble; and implicit cognition and attentional bias in gamblers. My additional areas of interest include personality characteristics and gambling, sex differences, and behavioural analysis of gambling. In studying these topics, I have used a number of different research designs including secondary data analysis, survey research, and laboratory experiments.

One aspect of your research program has involved research on the nature of the relationship between tobacco smoking, alcohol and gambling. You have found an astonishingly high association between PG and smoking behaviour². Why is this? Should researchers who are seeking problem gamblers to study also focus their attention on the recruitment of smokers?

I have been fascinated not only by problematic gambling, but also the relationship between gambling and other addictive behaviours. For instance, some prevalence estimates suggest that



as many as 60% of problem gamblers are tobacco dependent, this is more than three times the rates seen in the general population. It is quite evident that these two addictive behaviours commonly co-occur, yet gambling research often focuses solely on gambling. It is a very similar story with alcohol use and gambling. There are different theories for why these behaviours have such high rates of occurrence. For instance, it has been known for many years that consumption of alcohol and tobacco results in the release of neurotransmitters in the brain and of particular importance the release of dopamine in the brain's reward pathway. In a similar fashion, dopamine release has also been associated with problematic gambling. Recent neuroimaging studies indicate that greater gambling symptom severity is linked to increased levels of dopamine release during laboratory gambling. It is quite possible that these neurobiological factors influence co-morbid gambling, smoking, and drinking. Other potential underlying mechanisms influencing these relationships include conditioned learning (i.e., resulting from frequent pairing of all three behaviours) as well as shared personality characteristics such as forms of impulsivity, neuroticism, and sensation seeking. There is still much to learn regarding these associations and how each of these substances influence gambling and vice versa. When it comes to recruitment of gamblers, I think it's important that researchers acknowledge that these relationships exist and that gambling often does not occur in isolation. It is likely that problem

gamblers are a highly heterogeneous group. For instance, are there important differences between problem gamblers who smoke versus those don't? Does co-morbid tobacco dependence alter treatment approaches for gamblers who smoke? These are just some of the issues we have to be cognizant of when designing our experimental protocols.

Can you briefly explain the concept of craving? How might craving be similar or different between substances like nicotine or alcohol and an activity such as gambling?

Historically, craving has been a controversial topic in the addictions field. Theorists have long debated the utility of craving in understanding and treating addiction. To me, the conceptualization of craving that is most intuitive is the perspective advanced by researchers such as Dr. Stephen Tiffany where craving is seen as a subjective and conscious process of wanting to use drugs. In the alcohol and tobacco literature, there a number of very good scales to measure this process and in recent years several have also been developed for gambling. The study of craving in tobacco and alcohol has a longer history than gambling but there has been some interesting research comparing substance use craving with that seen in problem gamblers. It appears that the experience of craving felt by problem gamblers may be similar to that of other substance use. For instance, urges to use the drug or to gamble are a key determinant that often precipitates and leads to relapse. Interestingly, a research study conducted a few years back by AGRI-affiliated researchers compared craving between problem gamblers and alcoholics and found significantly stronger craving in their sample of gamblers. Moreover, their results also suggest that craving in gambling vs. drinking may also differ as a function of personality characteristics and affect. I have examined gambling craving in some of my own research using cue-reactivity paradigms whereby gamblers are shown gambling-related vs. neutral images and asked to provide subjective craving ratings. The effects of cues on craving ratings were certainly noticeable and consistently seen across problem gamblers. I think that while craving in gambling may differ in some ways with tobacco or alcohol, it does appear to be prominent feature across substance use and behavioural addictions.

An interesting finding from your laboratory study of the effects of nicotine on VLT gamblers³ was that nicotine did not augment craving for gambling. You suggest that VLT gambling already has a high incentive value which may not be further enhanced by nicotine. Was this finding unexpected? Would you speculate about nicotine's effects on other forms of gambling?

As I alluded to previously, in my dissertation research I predicted that acute nicotine administration would directly influence gambling behaviour and craving in gamblers who smoke. This turned out to not be the case. In thinking about potential reasons for these negative findings a couple of possibilities were raised. One feasible explanation was related to the form of nicotine used. More specifically, nicotine was delivered through inhalers and lozenges instead of cigarettes. We know that smoking a cigarette is a much more effective nicotine delivery method and that tobacco contains thousands of other chemicals that also play a role in tobacco dependence. It is possible that these results would change had tobacco been used instead of pure nicotine. Another possible explanation is that the incentive value of electronic gambling may not be enhanced by other substances. That is, gambling is such a strong reinforcing behaviour that others drugs might not affect it. However, this prospect requires further research. While it is difficult to speculate, it is possible that different forms of gambling may be affected by nicotine or alcohol in different ways. For instance, there could be a distinction between strategic (e.g., poker) vs. non-strategic (e.g., electronic gaming) gambling. Similarly, types of gambling where the outcome of play is delayed may also be affected differently. For instance, anecdotal reports suggest that smoking bans have dramatically led to dramatically reduced attendance at bingo halls. Ultimately, more empirical research is required to examine these possibilities.

A second aspect of your research has involved understanding the motives employed by gamblers for gambling⁴. Why is it important for researchers to understand gambling motives?

This is an area of research that has gained a lot of traction in recent years. At the most basic level, the study of gambling motives explores reasons why

people choose to gamble. With the introduction of the pathways model of problem gambling in the early 2000s, the importance of gambler subtypes has received more attention. Identifying motives provides further insight into the heterogeneity of gamblers. I have been involved in several studies exploring gambling motives. Most recently, I have been working with collaborators in Manitoba conducting validation studies on an extension of the commonly used Gambling Motives Questionnaire. I also have interests in the stability of gambling motives across time as well as the motives given for not gambling in individuals who don't gamble. The importance of gambling motives is now also being reflected in experimental research. For instance, in the past couple of years studies have been conducted examining the influence of motives on implicit cognition in gambling. I think that studying gambling motives in an experimental context will have important implications for clinical practice. Understanding the root causes of motivation may ultimately influence the choice and course of treatment for subtypes of problem gamblers.

Several years ago legislation changed to ban smoking in most Albertan gambling venues such as casinos and bars. At the time it was thought that gamblers frequenting non-smoking casino venues would move to those permitting smoking... are you aware of any studies that have examined this issue?

Every province and territory in Canada has enacted a form of legislation restricting smoking in public places such as casinos. The influence of smoking bans on gambling is a very interesting research topic; however, there has not been much empirical research conducted on the issue. In many ways, legislation that restricts or bans smoking in



gaming venues has altered the traditional gambling experience. In most gaming venues, gamblers no longer have the option to smoke while they gamble. This appears to have impacted overall gambling revenues, at least in the short term. For example, anecdotal reports indicate that attendance at bingo halls has decreased substantially following the enactment of a smoking ban in Alberta. In terms of hard data, most studies have been focused on the overall impact on economic indicators such as revenues. Research studies from Australia and the United States suggest sizeable decreases in casino revenue in the year following a smoking ban. The belief that smokers may have moved from non-smoking to smoking casinos has some merit. In the Alberta context, there are five First Nations casinos which are exempt from the smoking ban. It is conceivable that smokers may have migrated to one of these casinos; however, there is no empirical evidence that I am aware of that has examined this possibility. One recent study did examine potential migration following the introduction of a smoking ban in Illinois. Based on economic data that controlled for other influences, the researchers found that gamblers travelled across the border to Missouri where no such ban exists. It appears that gamblers are willing to expend considerable time and effort to be able to continue smoking while they gamble. Ultimately, research studies focused on this possibility, as well other impacts of smoking bans at the level of the individual are required.

Your final major area of gambling research interest concerns attentional biases among gamblers. You indicate that these biases can be studied by “eye tracking” gamblers. What exactly is eye tracking and what is the process for understanding it? What do you hope to find out from such an investigation?

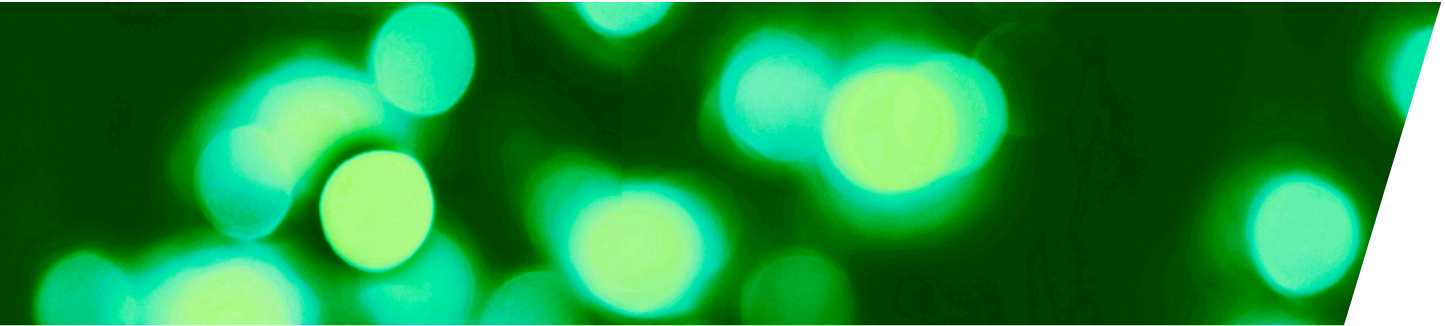
Investigating attentional biases in gambling is a very exciting new area of study for me. Essentially, an attentional bias occurs when a particular cue such as an image tends to grab a person's focus. Attentional biases have been studied in a number of areas of psychology such as depression, anxiety, and more recently drug use and addiction. The bias is believed to form through classical conditioning processes where stimuli associated with use of the drug develops incentive salience. For instance, one example I like to use for smoking would be the degree of attention devoted to a picture of an ashtray. To a non-smoker, an ashtray does not grab one's attention to the same extent as it would for a smoker.

There are a number of valid experimental tasks to measure attentional biases such as the addiction Stroop task and the visual probe task. However, these are indirect measures of implicit cognition whereas eye tracking technology is a direct measure. Essentially, eye trackers monitor movement of the eye and provide information such as where a person is looking on a computer screen, how quickly they attend to a particular image, and how long they look at it. In the gambling context, this technology has not been extensively used. There are many research questions that can be examined with eye tracking. For instance, the association between gambling severity, explicit craving, and attentional bias is not well understood; attentional bias as a function of gambling motives; and the influence of acute alcohol consumption on attentional bias for gambling are just a few questions I am interested in exploring. I hope that use of eye tracking technology will help us identify which variables are particularly relevant to attentional bias in gambling and lead to more refined treatments for problem gambling based on this information.

Do you have any concluding comments or final thoughts about the direction of gambling research?

I think that the future of gambling research is bright. It is a burgeoning field of study that has been growing quite rapidly over the past decade. The reclassification of gambling as behavioural addiction in the DSM-5 will only bring increased focus and attention on this serious disorder. Hopefully the future will also bring effective new psychological and pharmacological treatment options. I am very excited to be part of this field and to be the latest member of the AGRI research team.

- 1 McGrath, D. S. (2012). *The effects of nicotine on video lottery terminal gambling in regular gamblers who smoke (Doctoral dissertation)*. Retrieved from <http://hdl.handle.net/10222/15780>
- 2 McGrath, D. S., & Barrett, S. P. (2009). *The comorbidity of tobacco smoking and gambling: A review of the literature*. *Drug and Alcohol Review*, 28, 676-681. <http://dx.doi.org/10.1111/j.1465-3362.2009.00097.x>
- 3 McGrath, D. S., Barrett, S. P., Stewart, S. H., & Schmid, E. A. (2012). *The effects of acute doses of nicotine on video lottery terminal gambling in daily smokers*. *Psychopharmacology*, 220, 155-161. <http://dx.doi.org/10.1007/s00213-011-2465-3>
- 4 McGrath, D. S., Stewart, S. H., Klein, R. M., & Barrett, S. P. (2010). *Self-generated motives for gambling in two population-based samples of gamblers*. *International Gambling Studies*, 10(2), 117-138. <http://dx.doi.org/10.1080/14459795.2010.499915>



Institute Announces Major Research Grant Award Recipients 2014-15

The Institute is pleased to announce the following major research grants that were funded as part of the 2014-15 major grant application process:

- **Lottery Winners and Bankruptcy Filers**
– Dr. Barry Scholnick (U. of Alberta)

Lottery winning is a random event, thus evidence on the behavior of lottery winners provides a clean statistical test of how individuals respond to exogenous income shocks. This project will link the names and post codes of individual lottery winners with other individual level databases on various economic outcomes, in order to examine the impact of lottery winnings of different sizes. For example, we will match these lottery winner names and post codes with the names and post codes of individual bankruptcy filers, in order to test the hypothesis that winning the lottery reduces the chance of personal bankruptcy.

- **Examining the Psychometric Properties of a Test of Video Game Addiction**
– Dr. James Sanders (U. of Lethbridge)

This project will investigate the relationship between problem gambling and problematic video game use among adults in Canada.

- **Neural Mechanisms of Gambling**
– Dr. David R. Euston (U. of Lethbridge)

Impulsivity is an important pre-disposing factor leading to disordered gambling. This research studies the relationship between impulsivity and behavioral addiction in a rat model, with special emphasis on the role of the prefrontal cortex.

- **Naltrexone-Imaging Study**
– Dr. Darren Christensen (U. of Lethbridge)

This study examines the effect of regular naltrexone dosing on disordered gamblers. Gamblers will also be scanned pre- and post-treatment where we will investigate the functional changes to tasks designed to engage brain region associated with gambling and addiction. These changes will be correlated with treatment outcomes and urge scores.

- **Family Study of Executive Functioning Deficits in Gambling Disorder**
– Dr. Vina Goghari (U. of Calgary)

Executive functioning deficits are found in individuals with gambling disorder and are conceptually related to the behavioural symptoms of the disorder. There is also evidence for genetic risk for gambling disorder. We will conduct a family study of individuals with gambling disorder, their siblings, and community controls to assess for genetic (i.e. familial vulnerability) and/or disease-specific effects.

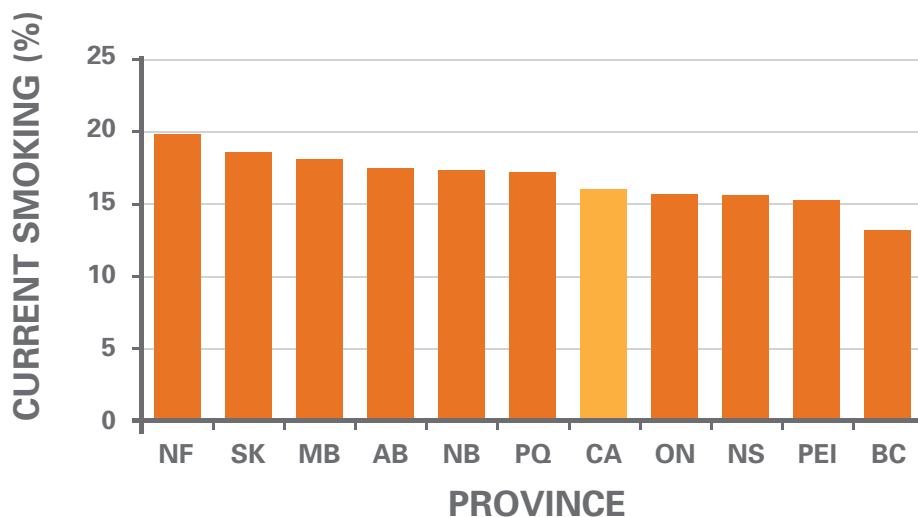
The Grant Opportunities web page provides additional information about all of the Institute's available research grant programs.

FACTS & FIGURES

Prevalence of Smoking in Canada

According to the Canadian Tobacco, Alcohol and Drugs Survey (CTADS), the overall smoking prevalence in 2013 was 15% (4.2 million smokers), unchanged from 2012 (16%, about 4.6 million smokers), but the lowest national smoking rate ever recorded. Eleven percent (11% or 3.1 million) reported smoking daily, while 4% (1.1 million) reported smoking occasionally. More males (16%) reported smoking than females (13%). Daily smokers smoked an average of 13.9 cigarettes per day, lower than the average cigarettes per day smoked in 2012 (15.0).

FIGURE 2.1: SMOKING PREVALENCE* BY PROVINCE, 2012



Source: Tobacco Use in Canada: Patterns and Trends, 2014 Edition

Prevalence of Alcohol Use in Canada

In 2013, 76% (representing 21.9 million) of Canadians reported drinking alcohol in the past year, unchanged from the rate reported in 2012 (78%). A higher percentage of males than females reported past-year alcohol use (81% or 11.5 million versus 71% or 10.4 million, respectively). Sixty percent (60% or 1.3 million) of youth aged 15 to 19, 83% (2.0 million) of young adults aged 20 to 24 and 77% (18.6 million) of adults aged 25 years and older reported past-year drinking.

Source:

The **Canadian Tobacco, Alcohol and Drugs Survey (CTADS)** is a biennial general population survey of tobacco, alcohol and illicit drug use among Canadians aged 15 years and older. The CTADS is conducted by Statistics Canada on behalf of Health Canada.

Reminder of April 10th Deadline for 2015-16 Scholarship Applications

The Institute would like to remind applicants for the 2015-16 Graduate Student Scholarships that this year's application deadline is

Friday, April 10, 2015 by 4:00 pm.

The Institute welcomes applications from both "new" scholarship applicants and "current" scholarship recipients. Complete program details are available from the Scholarships section on the Institute web site.

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