Attention-Deficit Hyperactive Disorder and substance use symptoms.

Ross Connolly, MSc, PhD Candidate
Memorial University of Newfoundland
December 13th, 2017.
ADHD

- Neurodevelopmental psychiatric disorder

- Defined by impairing levels of inattention, hyperactivity, and impulsivity that interferes with an individual’s functioning or development

- Three presentations of ADHD
  - Predominantly inattentive
  - Predominantly hyperactive-Impulsive
  - Combined
SYMPTOMS OF INATTENTION

- Fails to pay close attention to details
- Makes careless mistakes
- Difficulty sustaining attention in tasks
- Appears to not listen when spoken to directly
- Failure to follow through on instructions and failing to complete chores or duties in the work place
- Difficulty organizing tasks and activities
- Often loses things
- Easily distracted by extraneous stimuli
- Forgetful
SYMPTOMS OF HYPERACTIVITY AND IMPULSIVITY

- Fidgeting
- Restlessness
- Inability to quietly engage in leisure activities
- Unable to remain still for extended periods of time
- Excessive talking
- Difficulty waiting one’s turn
- Interrupt or intrude on others
ADULT ADHD

- DSM-5 (APA, 2013) includes diagnostic criteria that reflects adult ADHD
  - Symptoms persist beyond childhood
  - Symptom presentations change over time
MH COMORBIDITIES

- Associated mental health (MH) disorders
  - Mood disorders
  - Anxiety disorders
  - Learning disorders
  - Substance use disorders

(Biederman et al., 2002; Novik et al., 2006; Rucklidge, 2010)
COMORBID SUBSTANCE ABUSE AND ADHD

- Prevalence of substance use among those with ADHD is greater than their non-ADHD peers
  - Smoke more cigarettes
  - Consume more alcohol more frequently
  - Use drugs more frequently
- Self-medication
  - Neurotransmitter deficits
  - Relief from negative symptoms
- Self-regulation
  - Inhibitory control deficits
- Inability to self-manage behaviour or consider their behaviour in the context of past events or future consequences  
  (Michenbaum, 1977)
SUBSTANCE USE

- Nicotine, alcohol, and other drug use can induce sensations of euphoria and well-being, and are able to reduce symptoms of ADHD

- Benefits are generally outweighed by negative consequences

  - Physical health
  - Cognitive ability
  - Work and social life

(McKee, 2001)
NICOTINE

- Naturally derived from the tobacco plant
- Absorbed orally, inhaled intranasally, or smoked
- Binds to nicotinic acetylcholine receptor sites
  - Increases levels of acetylcholine
  - Increased cardiovascular and cortical arousal
- Individuals with ADHD use nicotine to cope with emotional and cognitive deficits
- Health consequences related to cancers and respiratory disease
ALCOHOL

• Depressant with addictive properties

• Produced by fermenting sugars

• 27% of adults with ADHD meet alcohol abuse criteria compared to over 19% among non-ADHD individuals (Hesson & Fowler, 2015; Wilens, 2011)

• Temporarily alleviates negative symptoms of ADHD

• Health consequences related to liver disease, cardiovascular issues, and cognitive decline
CANNABINOIDS

- Chemical compounds derived from the cannabis sativa or cannabis indica plants

- Tetrahydrocannabinol (THC) is the primary psychoactive compound in cannabis 
  (Aizpurua-Olaizola et al. 2016)

  - Binds to cannabinoid receptors throughout the nervous system

  - Calming effect and increased appetite

- Prevalence rate of approximately 15% for individuals with ADHD compared to 7% among non-ADHD individuals 
  (Hesson & Fowler, 2015; Loflin, Earleywine, De Leo, & Hobkirk, 2014)

- Temporary hallucinations, paranoia respiratory problems from long-term smoking
STIMULANTS

- Chemical compounds that cause increased energy and a heightened sense of alertness
  (King & Ellinwood, 2004)

- Activation of the CNS by blocking dopamine receptor sites and preventing reuptake
  - Increases extracellular levels of dopamine
    (Kish, 2009)

- Stimulants have an oppositional effect on those with ADHD

- Stimulant use can be an indicator of potential ADHD
PHARMACOTHERAPY

- Pharmacotherapy treatment using psychostimulant medications is the mainstay of therapy for ADHD (Silver, 2000)
  - Methylphenidate (Ritalin)
  - Dextroamphetamine (Adderall)
  - Enhanced attention, better academic performance, and improvements in working memory (Adler, Cohen, 2004)
  - Reduces psychomotor activity, decreases aggression, and decreases disruptive behaviour (Sadock & Sadock, 2000)
  - Side-effects and potential for abuse and misuse
PSYCHOTHERAPY

• Cognitive Behavioural Therapy (CBT)

  • Involves training clients in cognitive and behavioural skills to address ADHD symptoms (Knouse, Teller, & Brooks, 2017)

  • Includes skills training in:

    • organization
    • planning
    • time management
    • cognitive reappraisal strategies
    • mindfulness
SELF-MANAGEMENT

• Defined as a high-level executive control process, whereby individuals regulate their own behaviour through a process of negative feedback.

• Behaviour is regulated by three independent processes.

• Self-management provides a framework for one to formulate and evaluate goals, and is successful because it provides a course of action to reach those goals.

- Self-monitoring
- Self-evaluation
- Self-reinforcement
STUDY 1
PROBABILITIES OF ADHD AND RELATED SUBSTANCE USE

- Estimate the prevalence and probabilities of smoking, binge drinking, and drug use as it relates to ADHD in a nationwide Canadian sample
PURPOSE

• Examine whether the frequency of smoking, alcohol binge drinking, and illegal or non-prescribed substance use increases with a diagnosis of ADHD
HYPOTHESES

• Hypothesis 1: Increased levels of smoking will be observed more frequently among individuals who report an ADHD diagnosis than among individuals without an ADHD diagnosis.

• Hypothesis 2: Increased levels of alcohol binge drinking will be observed more frequently among individuals who report an ADHD diagnosis than among individuals without an ADHD diagnosis.

• Hypothesis 3: Substance use will be observed more among individuals who report an ADHD diagnosis than among individuals who did not report an ADHD diagnosis.
RESEARCH DESIGN

- Public Use data from the 2012 Canadian Community Health Survey (CCHS; Statistics Canada, 2013)

- Focus of the research was on adults

  - Age categories “15 to 19 years” and individuals aged 65 years and older were not included in the analyses

  - 16 569 respondents included in the study
RESEARCH DESIGN

• Relative Risk Ratio’s
  • Hierarchical multinomial logistic regression was used to explore whether or not a diagnosis of ADHD predicted cigarette smoking and binge drinking

• Odds Ratio
  • Hierarchical binary logistic regression was used to explore whether or not a diagnosis of ADHD predicted drug use
RESEARCH DESIGN

• ADHD was assessed as a predictor in Block 1

• Demographic covariates (age, sex, race, marital status, household income, education, and province of residence) were assessed in Block 2

• Mental health covariates were assessed in Block 3
RESULTS

• Type of Smoker

• ADHD predicted daily smoking in Block 1, and after the inclusion of demographic variables in Block 2

• ADHD no longer predicted daily smoking with the inclusion of mental health variables in Block 3
RESULTS

• Alcohol Binge Drinking

• ADHD was a significant predictor of the “More than once a week” binge drinking category in Block 1, and after the inclusion of demographic variables in Block 2

• The predictive relationship of ADHD and the “More than once a week” category was reduced, but persisted with the inclusion of MH covariates in Block 3

• 243% more likely to report binge drinking more than once a week than to report binge drinking only once a month
RESULTS

• Substance Use
  
• ADHD predicted non-prescribed medication and illicit substance use when substance use was regressed onto ADHD in Block 1
  
• ADHD remained a significant predictor of illicit substance use with the inclusion of demographics covariates in Block 2
  
• ADHD remained a significant predictor of substance use with the inclusion of MH covariates in Block 3
  
• 93% more likely to report substance use than to report no substance use
DISCUSSION

• Individuals self-reporting a diagnosis of ADHD have a greater likelihood of engaging in alcohol binge-drinking behaviours and are more likely to engage in illegal or non-prescribed substance use.

• Light to moderate binge drinking was not associated with MH symptoms, while more extreme levels of binge drinking are associated with an increased prevalence of poor MH.

• Co-occurring MH disorders may play a significant role in the relationship between smoking and ADHD.
STUDY 2
SELF-MANAGEMENT AS A MEDIATING VARIABLE BETWEEN SYMPTOMS OF ADHD AND SUBSTANCE USE

• Investigate whether self-management has potential as a treatment to reduce symptoms of co-occurring ADHD and substance use
UNIVERSITY STUDENTS

- University students are at an increased risk for psychological issues and substance abuse
  - Independent decision making
  - Establish new peer groups
  - Manage unstructured social and academic environments
  - Increased academic rigour of higher education
ADHD STUDENTS

• Particularly vulnerable due to poor time-management, organization, and planning
  (Weyandt & DuPaul, 2009)

• Simultaneous loss of structure and support from parents and educators
  (Eddy, Canu, Broman-Fulks, & Michael, 2015)

• Increased risk of academic failure
  • Lower grade point averages
  • More likely to be on academic probation
  • Less likely to complete their program
RESEARCH QUESTIONS

- Is self-management related to ADHD symptoms, nicotine use, alcohol use, and drug use?

- Is self-management a mediating variable in the relationships between ADHD symptoms and nicotine dependence, alcohol use, and drug use?
HYPOTHESES

- Hypothesis 1: Higher levels of ADHD symptoms would be positively related with higher levels of nicotine use, alcohol use, and drug use

- Hypothesis 2: It is predicted that self-management will be negatively related to ADHD, nicotine use, alcohol use, and drug use

- Hypothesis 3: Relationships between ADHD and nicotine use, alcohol use, and substance use will be mediated by self-management
RESEARCH DESIGN

- 141 Undergraduate students
- 6 measure questionnaire packet
  - Demographics
  - ADHD
    - Conners Adult ADHD Rating Scale – Self-Report: Short Version (CAARS-S:S; Conners, Erhardt, & Sparrow, 1999)
  - Self-management
    - Self-Control and Self-Management Scale (SCMS; Mezo, 2009)
- 3 substance use measures
  - Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991)
  - Michigan Alcoholism Screening Test (MAST; Selzer, 1975)
  - Drug Abuse Screening Test (DAST-20; Skinner, 1982)
CORRELATION RESULTS

- ADHD was positively related to nicotine dependence, alcohol use, and drug use.
- Self-Management was negatively related to ADHD.
- Self-Management was negatively related to nicotine dependence, alcohol use, and drug use.
MEDIATION ANALYSES

- Examine the mediating effects of self-management between ADHD and nicotine dependence, alcohol use, and drug use
MEDIATION RESULTS

- Self-Management was a significant mediator between ADHD and drug use.
- Self-Management was not a significant mediator between ADHD and nicotine dependence or alcohol use.
STUDY 2 DISCUSSION

• Why didn’t self-management mediate ADHD and nicotine dependence?

• Student norms
  • Skewed distribution of male and female students
  • Undergrads smoke less compared with the general population
    • 13% versus 23%
      (Kwan, Faulkner, Arbour-Nicitopoulos, & Cairney, 2013; Statistics Canada, 2015)
STUDY 2 DISCUSSION

• Why didn’t self-management mediate ADHD and alcohol use?

• Student norms
  
  • Undergrads consume greater volumes of alcohol more frequently compared to the general population
  
  • Alcohol binge drinking is a normalized and regularly occurring behaviour
    
    • 60% consume more than five alcoholic drinks in a single occasion over a two week period (Kwan et al., 2013)
CONCLUSION

- ADHD is related to increased levels of smoking, alcohol binge drinking, and other drug use
CONCLUSION

• Self-management has potential as an effective behavioural intervention to reduce substance use related to ADHD symptoms
Thank you!