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MEDICINE & DENTISTRY

ADHD Symptoms and Previous Diagnosis, Other Comorbidities and Driving: Population-Based Examination in a Canadian Sample

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Adult ADHD

- Attention Deficit Hyperactivity Disorder (ADHD): neurodevelopmental disorder that can persist into adolescence and adulthood.

- Initially ADHD viewed as a disease of childhood that declined or disappeared in adulthood.

- Research over past 30 years found ADHD to persist into adolescence and adulthood for 50% to 60% of childhood ADHD cases.

Comorbidities

ADHD found to co-occur with

- anxiety disorders in 25-35% of cases,
- mood disorders in 20% of cases, and
- oppositional defiant disorder (ODD) and conduct disorder (CD) in 25-50% of cases.

(Steele, Jensen & Quinn, 2006).

Other problems

- Higher crash rates (Barkley et al., 2006).
- CD, ODD or antisocial personality disorder, partially or fully explained driving-related outcomes (Vaa 2014).
- Mixed results drinking driving behaviours of ADHD adults.
- Some evidence for improved driving with ADHD meds, but simulator study found no differences among placebo, low or high dosed drivers on 15 out of 18 measures (Barkley et al., 2005).

Purpose

To explore the relationships among self-reported screening measures of ADHD, previous diagnosis, other psychiatric problems, and driving-related outcomes among a provincially representative sample of adults 18 years and older living in Ontario, Canada.

Caveats

We are using a screener, not comprehensive clinical examination.

Interpretation of findings needs to be mindful of this.

Methods: CAMH Monitor

- An ongoing cross-sectional telephone survey.
- Target population - non-institutionalized adults aged 18 and older residing in Ontario households for years 2011, 2012, 2013.
- Administered using computer-assisted telephone interviewing (CATI) by the Institute for Social Research at York University.

CAMH Monitor

- Sampling frame includes landline and cell phones.
- Sampling design: 2-stage probability selection procedure from a sampling from all active area codes and exchanges in Ontario.

Our previous work

- Analyses of 2-year dataset found **NO** statistically significant differences between those who screened positively or negatively for ADHD symptoms on self-reported driving:

  – after having two or more drinks in previous hour;
  – within an hour of using cannabis, marijuana or hash;
  – in a street race;
  – collision involvement as a driver in past year.

Our previous work

- As ADHD screening symptoms seemed to be catching a generalized psychopathology, we decided to analyze the final 3-year data by probable, possible and no ADHD.

Adult ADHD Self-Report Scale (ASRS) Screener (Kessler et al., 2007)

- 6-item checklist to assess ADHD symptoms based on DSM-IV criteria for ADHD, developed by WHO.
- Items scored: 0 ‘never’, 1 ‘rarely’, 2 ‘sometimes’, 3 ‘often’, and 4 ‘very often’ .
- Scores < 13 considered ADHD negative and scores > 14 considered ADHD positive.
- **Also asked if had been diagnosed with ADHD and took meds.**

Other comorbidities: Antisocial Behaviours (ASB)

- A 12-item, dichotomous scale from Mini-International Neuropsychiatric Interview – Antisocial Personality Disorder, provides short clinical screening tool to assess delinquencies (truancy, cheating/lying/stealing, bullying, hurting animals/people) before and after age 15 with score ≥ 3 positive screen.

Other comorbidities: Distress (GHQ)

- **General Health Questionnaire (GHQ)** - 12-item, 4-point widely used screening instrument for current psychiatric distress that captures depression/anxiety with score ≥ 3 positive screen.

Driving Questions

In the past 12 months,

Crashes: How often were you involved in an accident or collision involving any kind of damage or injury to you or another person or vehicle you were driving?

Street Racing: How any times have you driven a car, truck or SUV in a STREET RACE?

Mild aggression: How any times, have you shouted, cursed or made rude gestures at a driver or passenger…?

Serious aggression: How any times, have you threatened to hurt a driver or passenger in another vehicle or threatened to damage their vehicle?

Substance Use and Driving Questions

In the past 12 months,

Drinking & Driving: Have you driven a motor vehicle after having two or more drinks in the previous hour?

Cannabis use & Driving : Have you driven a motor vehicle within an hour of using cannabis, marijuana or hash?

Socio-Demographic Questions

Age: 18-24, 25-44, 45-64, 65+

Sex: Male, Female

Education: less than high school - university

Employment: full-time, part-time, other

Statistical Analysis

- Aggregated data by:
  - - ADHD current symptoms/ no previous diagnosis
  - - ADHD current symptoms / previous diagnosis
  - +ADHD current symptoms /no previous diagnosis
  - +ADHD current symptoms / previous diagnosis
- Chi-square tests were used for analyses

ADHD Symptom Screener Status

- Total sample = 5818
- Using Kessler's cut-point of ≥ 14 = +ADHD
- **3.5%** **(**203) screened positive for ADHD symptoms

- 94.4% - ADHD screen / no previous diagnosis
- 2.1% - ADHD screen / previous diagnosis
- 2.9% + ADHD screen / no previous diagnosis
- 0.6% + ADHD screen / previous diagnosis

Demographics

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / prev. diag
Gender				
Female	51.7%	33.3%	59.1%	43.8%
Male	48.3%	66.7%	40.9%	56.3%
Total n	5496	120	171	32

Overall Chi-Square = 20.589, $p < .001$
>% M –ADHD +diagnosis, $p < .001$

Demographics

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Age				
18-24	11.1%	34.2%	23.5%	31.3%
25-44	34.7%	45.8%	38.8%	50.0%
44-64	36.0%	17.5%	34.1%	18.8%
64+	18.2%	2.5%	3.5%	0%
Total n	5399	120	170	32

Chi-Square = 143.040, $p < .001$;
young > diagnosed

Demographics

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Education				
< hgh schl	9.3%	15.7%	14.5%	45.5%
Hgh schl	19.8%	31.4%	20.6%	9.1%
Some post	36.7%	38.8%	39.4%	33.3%
Uni degree	34.2%	14.0%	25.5%	12.1%
Total n	5458	121	165	33

Chi-Square = 85.591, $p < .001$; control > uni degree

Demographics

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Employm't				
Full-time	49.8%	45.0%	41.4%	15.2%
Part-time	9.7%	8.3%	16.0%	21.2%
Other	40.4%	46.7%	42.6%	63.6%
Total n	5476	120	169	33

Chi-Square = 27.202, $p < .001$; +ADHD+diag < fulltime than all other groups

Ever treated with medication for ADHD

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Meds use				
No	100%	28.3%	100%	3.0%
Yes	0	71.7%	0	97.0%
Total n	5495	120	170	33

Chi-Square = 4542.928, $p < .001$

Currently treated with medication for ADHD

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Meds use				
No	100%	92.5%	100%	66.7%
Yes	0	7.5%	0	33.3%
Total n	0	120	0	33

Chi-Square = 15.201, $p < .001$

GHQ score distress

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
GHQ				
No	88.0%	75.8%	45.9%	45.5%
Yes ≥ 3	12.0%	24.2%	54.1%	54.5%
Total n	5495	120	170	33

Chi-Square = 307.047, $p < .001$
-ADHD-diag < +GHQ cf others
-ADHD+diag < +GHQ cf +ADHD-diag, and cf +ADHD+diag

i.e. if no current +ADHD lower % +GHQ

Antisocial behaviour (ASB) screen

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
ASB				
No	99.8%	90.7%	96.9%	62.1%
Yes ≥ 3	0.2%	9.3%	3.1%	37.9%
Total n	5364	107	163	29

Chi-Square = 776.647, $p < .001$
All groups significantly different from each other
i.e. if previous diag > % with ASB

Past 12 months driven vehicle after ≥ 2 drinks in previous hour

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Drink-drive				
No	95.0%	93.3%	97.1%	90.9%
Yes	5.0%	6.7%	2.9%	9.1%
Total n	5493	120	170	33

Chi-Square = 3.390, p = .335

Past 12 months driven vehicle within hour of using cannabis, marijuana

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Can-driv				
No	98.3%	91.6%	97.6%	97.0%
Yes	1.7%	8.4%	2.4%	3.0%
Total n	5465	119	170	33

Chi-Square = 29.944, $p < .001$; control < all groups; -ADHD+diag > +ADHD-diag

Past 12 months driven vehicle in street race

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Race				
No	99.4%	100%	98.2%	100%
Yes	0.6%	0	1.8%	0
Total n	5488	120	170	33

Chi-Square = 9.841, p =.235

Past 12 months shouted, cursed or made rude gestures at driver or passenger?

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Mild agg				
No	58.8%	43.0%	43.1%	40.0%
Yes	41.2%	57.0%	56.9%	60.0%
Total n	5198	107	160	30

Chi-Square = 29.879, $p < .000$; control < all other groups; no other group differences

Past 12 months threatened to hurt driver or passenger in another vehicle or to damage their vehicle?

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Seriousagg				
No	99.1%	95.4%	97.5%	73.3%
Yes	0.6%	4.6%	2.5%	26.7%
Total n	5252	108	162	30

Chi-Square = 185.065, $p < .000$; control < all other groups; +ADHD+diag > all other groups

Crashed in Past 12 months

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Crash				
No	94.8%	94.2%	89.5%	97.0%
Yes	5.2%	5.8%	10.5%	3.0%
Total n	5494	120	171	33

Chi-Square = 9.841, $p < .020$; +ADHD-diag > control but no other differences

Ever arrested

Variables	- ADHD screen / no prev diag	- ADHD screen / prev diag	+ ADHD screen / no prev. diag	+ ADHD screen / + prev. diag
Arrested				
No	92.8%	72.3%	87.1%	54.4%
Yes	7.2%	27.7%	12.9%	45.5%
Total n	5480	119	170	33

Chi-Square = 136.91, $p < .001$; control < all other groups; +ADHD-diag < +diag groups

Conclusions

- First Canadian population-based study to estimate prevalence of adult positive ADHD screen at 3.5%.

- Greater percent of males previously diagnosed but no current symptoms. Suggest diagnosis may be for behavioural problems and not ADHD. Or symptoms reduced.

- Greater percent young diagnosed – could reflect diagnostic methods.

- Lower percent of persons with no current symptoms score positively for distress, suggesting the ADHD screener may be picking up general mental health problems.
- Higher percent of persons with previous diagnosis score positively for antisocial behaviours, suggesting that diagnosis may have been related to conduct disorder or other externalizing childhood problems.
- No group differences for drinking-driving and street racing.
- But significantly fewer in control reported driving after cannabis use, minor aggression and serious aggression.

- A higher percentage of +ADHD/no previous diagnosis group reported crash in previous 12 months. Could reflect sex difference and reflective of other psychological problems (e.g. distress).
- In summary, psychological problems as evidenced by current ADHD symptoms and/or previous diagnosis related to some negative driving behaviours and outcomes (cannabis use and driving, mild and serious aggression in driving), but hard to know whether actually due to ADHD or other problems, such as distress or antisocial behaviours.

Limitations – some small cell sizes, used screeners, self-report survey data.

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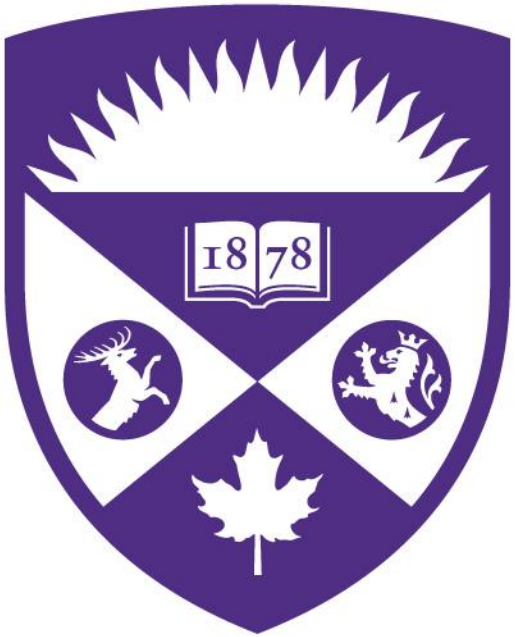

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