Assessing Road Rage Victimization and Perpetration in the Ontario Adult Population

The Impact of Illicit Drug Use and Psychiatric Distress

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ABSTRACT

Background: To investigate the association among illicit drug use, psychiatric distress and road rage victimization and offending. Particular attention is given to the most serious forms of road rage behaviour.

Methods: The data are based on the 2002 CAMH Monitor and include a sample of 2,421 Ontario adults aged 18 and older. Logistic regression analyses were conducted with illicit drug use and psychiatric distress (GHQ) and demographic factors as independent variables.

Results: Past-year road rage victimization was reported by 42% of the sample and 31% reported any type of road rage offending. Approximately 5% were classified as respondents with serious road rage involvement. The logistic regression analyses revealed significant relationships between illicit drug use and road rage outcomes. Cannabis use was significantly associated with general road rage victimization and offending, while stimulant use substantially increased the likelihood of victimization and membership in the serious road rage classification. Psychiatric distress significantly increased the odds of both road rage victimization and serious road rage involvement.

Conclusion: These data reveal different indicators of road rage offending, victimization and serious involvement. Further work is needed to clarify the mechanisms associated with the relationship among stimulant use, psychiatric distress and serious road rage involvement.

MeSH terms: Automobile driving; marijuana and stimulant use; stress, psychological

La traduction du résumé se trouve à la fin de l'article.

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Aggression in human society is a major source of stress, injury and death.¹⁻⁷ It manifests in a variety of ways, and identifying factors that predict various forms of aggressive behaviours is important to the development of intervention and prevention initiatives. Road rage has recently been identified as an aggressive behaviour that poses a significant threat to drivers and other road users.⁸⁻¹⁰

There is a growing literature examining the characteristics of road rage victims and perpetrators.¹¹⁻¹⁴ Both groups tend to be younger and male compared to the general driving population. In Ontario, road rage is more common in large urban centres and among those with higher incomes and education levels.¹⁴ Recent evidence also suggests the presence of important subgroups of road rage victims and perpetrators. Specifically, research has identified and replicated five clusters of individuals with varying degrees and types of road rage involvement.^{12,14} Of particular interest was the observation that one group, which represented a relatively small proportion of respondents, accounted for nearly all incidents of the more severe forms of road rage.

Research assessing the association of road rage with other forms of problems has also begun to appear. Victims and perpetrators report higher levels of alcohol problems,¹⁵ illicit drug use¹² and higher levels of psychiatric problems.^{14,16} However, no effort has been made yet to estimate the impact of various behavioural factors such as illicit drug use and psychiatric distress on the likelihood of road rage outcomes. This paper addresses this gap, examining the association of demographic variables, substance use, and psychiatric distress on the likelihood of three road rage outcomes: victimization, perpetration, and serious road rage involvement. Serious road rage involvement is defined by membership in the cluster identified in earlier research^{12,14} as accounting for almost all instances of serious road rage.

METHODS

The data are taken from the 2002 cycle of the Centre for Addiction and Mental Health (CAMH) Monitor, a cross-sectional telephone survey of Ontario adults aged 18 years of age and older (N=2421). This survey generated response rates that ranged

from 55-61%, rates similar to recent Canadian household surveys.¹⁷

Four demographic indicators (sex, age, employment status, marital status) are included in the analyses. Sex, employment and marital status are dichotomous measures and an indicator variable is generated for age. Two illegal drug use items measuring past 12-month cannabis and stimulant use (a combined measure of past-year cocaine and ecstasy use) are used in these analyses.* These items were recoded into dichotomous measures (1, 0) reflecting any or no past 12-month use.

The 12-item version of the GHQ (General Health Questionnaire) is used as an indicator of psychiatric distress.^{18,19} This scale detects nonpsychotic psychiatric illness capturing psychological distress, anxiety and social functioning. The validity and reliability of this scale have been well established when used in general population samples.²⁰⁻²⁵ A binary scoring system for the GHQ with the standard cut point of three is used for classifying people as showing symptoms of psychiatric distress.^{18,26}

Road rage indicators are taken from a taxonomy of past 12-month road rage behaviour developed by Smart and Mann.¹⁰ Two sets of 4 indicators are used in these analyses. The first set is directed at experiences of road rage victimization and the second focusses on road rage offending. These indicators quantify the frequency of involvement in progressively more severe forms of road rage behaviour that range from basic expressions of anger and frustration (e.g., waving hands, gesturing, shouting) to physical intimidation (e.g., tailgating), verbal threats, physical injury, damage to other vehicles, and death. A similar set of road rage items have been developed and successfully tested in empirical studies of road rage in the US.^{8,27}

These road rage indicators were used to create three dichotomous, dependent variables. The first two are: any past-year road rage victimization (N=1008), and any past-year road rage offending (N=758). The third dependent variable, "serious road rage involvement" (N=101), was generated from a hierarchical agglomerative clustering procedure that was used to develop a

TABLE I
Demographic Characteristics (Unweighted)

	Total Sample (N=2421) % yes	Any Road Rage Victimization (N=1008) % yes	Any Road Rage Offending (N=758) % yes	Serious Road Rage Involvement (N=101) % yes
Gender (male=1)	45	48	52	56
Age (years)				
18-34	28	33	40	40
35-54	42	46	46	46
55+	30	21	15	14
Employed (full-time=1)	52	58	62	62
Marital status (married=1)	57	57	56	43
12-month cannabis use (yes=1)	11	15	19	23
12-month stimulant use (yes=1)	2	2	3	10
Psychiatric distress (GHQ 3+ =1)	13	15	15	24

typology of road rage behaviour.¹² One cluster was represented by respondents who reported elevated involvement in all forms of road rage and was the only cluster to report significant participation and victimization in the two most serious forms of road rage: attempting to damage another's car and attempting to hurt others.

The descriptive statistics presented in Table I are not weighted; however the logistic regression analyses are weighted to account for sampling and post-stratification adjustments and are considered representative for the population surveyed.¹⁷

RESULTS

The demographic characteristics of each sample are presented in Table I. Over half of the males report road rage offending (52%) or serious involvement (56%) while a greater proportion of females (52%) report victimization. Fewer respondents in the oldest age category (55+) report any road rage victimization, offending or serious road rage involvement. The majority of respondents are employed and fewer married respondents indicate serious road rage involvement.

Table I also describes drug use and psychiatric distress. A greater proportion of individuals included in the 'serious road rage involvement' group report positive scores on each of these items in comparison to the other groups. Of particular note, roughly one quarter (23%) indicate past 12-month cannabis use and GHQ scores indicative of psychiatric distress (24%).

Table II presents a series of hierarchical logistic regression models. The results are reported in odds ratios (ORs) that examine the impact of the demographic, drug use,

and psychiatric distress variables on the three road rage outcomes.

Model 1 in Table II presents indicators of road rage victimization. The logistic regression analysis reveals that road rage victimization is significantly associated with age, drug use and psychiatric distress. The odds of experiencing these types of road rage increase as age decreases. Respondents who report past-year cannabis use and stimulant use have greater odds of experiencing forms of road rage victimization and those with psychiatric distress are 1.3 times as likely to report victimization in comparison to those with lower GHQ scores.

In Model II, age, employment status and cannabis use are found to significantly predict road rage perpetration. Younger respondents are significantly more likely to report this behaviour than those in the reference category. Specifically, those 18-34 years of age are 3 times as likely, and the 35-54 year olds are 2.5 times as likely, to report road rage perpetration in comparison to the reference category. Respondents employed full-time have greater odds of road rage perpetration (OR=1.32, $p<0.05$) and finally, individuals who used cannabis in the past 12 months are twice as likely to report offending than non-users.

Model III illustrates the results for serious road rage involvement. Gender, employment, marital status, stimulant use and psychiatric distress emerge as significant predictors of serious road rage involvement. The odds of reporting serious road rage involvement are greater for males (OR=1.55; $p<0.05$) and respondents employed full-time (OR=2.12; $p<0.01$). Married respondents are significantly less likely to report this degree of road rage involvement. Past-year stimulant use is a

* Preliminary analyses using individual measures of cocaine and ecstasy use revealed a high degree of correlation among these variables and produced extreme estimates and very wide confidence intervals.

TABLE II

Odds Ratios for Logistic Regression Predicting Three Outcomes of Road Rage Behaviour

	Road Rage Victimization Model I		Road Rage Perpetration Model II		Serious Road Rage Involvement Model III	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Gender (male=1)	1.12	(0.94, 1.35)	1.20	(0.99, 1.46)	1.55*	(1.00, 2.40)
Age (55+ =1)	***		***		NS	
18-34	1.95	(1.51, 2.52)	3.23	(2.41, 4.31)	1.41	(0.69, 2.87)
35-54	1.93	(1.50, 2.47)	2.55	(1.91, 3.39)	1.76	(0.87, 3.51)
Employed (full-time=1)	1.16	(0.95, 1.42)	1.32*	(1.07, 1.63)	2.12**	(1.28, 3.51)
Marital status (married=1)	1.11	(0.91, 1.35)	0.99	(0.80, 1.22)	0.55*	(0.35, 0.87)
12-month cannabis use (yes=1)	1.44*	(1.08, 1.93)	2.01***	(1.50, 2.69)	1.17	(0.64, 2.13)
12-month stimulant use (yes=1)	1.93*	(1.11, 3.36)	1.38	(0.86, 2.22)	4.00***	(2.34, 6.83)
Psychiatric distress (GHQ 3+ =1)	1.34*	(1.03, 1.76)	1.13	(0.86, 1.50)	1.89*	(1.12, 3.20)
* p<0.05 ** p<0.01 ***p<0.001						

particularly strong indicator of serious road rage involvement as those reporting use are 4 times as likely as non-users to be classified in this group. Last, those with a GHQ score of 3+ are almost twice as likely to be classified in the serious road rage category than those with scores less than 3.

DISCUSSION

Understanding factors that may influence the likelihood of road rage is an important step in reducing harmful outcomes associated with this behaviour. This study has begun to fill this gap in the literature. Although much of the road rage literature suggests angry and aggressive drivers are more likely to be men, the current study finds gender to be a significant factor associated with membership in only the most serious classification of road ragers. To the extent that individuals working full-time may be more frequent drivers, the increased likelihood of road rage perpetration and membership in the most serious classification of road ragers may reflect increased exposure to and opportunity for road rage behaviour. Older individuals are less likely to experience road rage as either a victim or perpetrator. However it is not clear whether this observation reflects the effects of maturation, or perhaps a cohort or generational effect.

These results reinforce the literature illustrating links between illicit drug use and various forms of aggression and violence.^{6,28-34} Membership in the most serious classification of road ragers for respondents who reported stimulant use, even after demographic factors like age and gender are controlled, may not be surprising given the mood-altering properties of stimulant drugs, and is consistent with previous work.^{7,12} The question remains, however,

as to whether the pharmacological properties of these substances are the main determinant of their relationship with road rage involvement.

The present results suggest that symptoms of psychiatric distress may serve as both an outcome and cause of road rage behaviour. Individuals with elevated levels of psychiatric distress were significantly more likely to report being the victim of a road rage incident. Since exposure to threat and violence may have long-lasting psychological consequences, one mechanism for this observation could be that the psychiatric distress is an outcome of road rage victimization.³⁵⁻³⁸ Alternatively, it is also possible that individuals experiencing higher levels of psychological distress may somehow attract more attention from perpetrators, perhaps related to their driving behaviour.

Further, the current study reinforces clinical research suggesting the presence of Intermittent Explosive Disorder (IED) in aggressive drivers.^{39,40} Individuals with symptoms of psychiatric distress were more likely to report serious road rage involvement. This outcome includes the most serious forms of this behaviour (physical threats and violence) which may meet the requirements of IED.

There are some limitations to this research. These data are based on self-reports and thus, the outcome of primary interest, road rage victimization and perpetration, is not observed directly. However, self-report data have been found to be reliable and valid measures of such behaviours as alcohol and drug use, and driving.^{41,42} A second concern is the cross-sectional nature of these data, which precludes any firm conclusions of causation. A third concern relates to the restricted sample size, particularly in the case of the serious road

rage involvement group. Nevertheless, while these results should be treated with some caution, these analyses begin to fill a gap in existing literature.

The findings presented in this paper amplify and extend findings from previous research on the involvement of psychiatric distress, alcohol problems and drug use in road rage.^{12,14,15} This research strengthens these findings by controlling for potential confounding effects of demographic factors. It is of particular interest to see the links between illicit drug use, victimization and serious road rage involvement, and between psychiatric distress and victimization. However, while these links support some of the potential causal pathways discussed previously, other mechanisms for the associations observed here cannot yet be ruled out. More research is needed to clarify the reasons for the significant relationships with serious road rage involvement seen for psychiatric distress and stimulant use.

REFERENCES

1. Cohen M, Ansara D. Sexual assault and intimate partner violence. In: Stewart D, Cheung A, Ferris L, Hyman I, Cohen M, Williams J (Eds.), *Ontario Women's Health Status Report*. Toronto, ON: Ministry of Health and Long-Term Care, 2002;96-112.
2. Gartner R. Homicide in Canada. In: Ross J (Ed.), *Violence in Canada: Sociopolitical Perspectives*. Toronto, ON: Oxford University Press, 1995;186-222.
3. Pernanen K. Alcohol and crimes of violence. In: Kissin B, Begleiter H (Eds.), *The Biology of Alcoholism: Vol. 4 Social Aspects of Alcoholism*. New York, NY: Plenum Press, 1976.
4. Pernanen K. Theoretical aspects of the relationship between alcohol use and crime. In: Collins J, *Drinking and Crime*. New York, NY: Guilford Press, 1981.
5. Pernanen K. *Alcohol in Human Violence*. New York, NY: Guilford Press, 1991.
6. Pernanen K, Cousineau MM, Brochu S, Sun F. Proportions of crimes associated with alcohol and other drugs in Canada. Canadian Centre on Substance Abuse, 2002.

7. Smart R, Mann R, Tyson L. Drug and violence among Ontario students. *J Psychol Drugs* 1997;29(4):369-73.
8. James L, Nahl H. *Road Rage and Aggressive Driving*. Amherst, NY: Prometheus Books, 2002.
9. Smart R, Mann R. Is road rage a serious traffic problem? *J Traffic Medicine* 2002a;3:183-89.
10. Smart R, Mann R. Deaths and injuries from road rage: Cases in Canadian newspapers. *CMAJ* 2002b;167:761-62.
11. Asbridge M, Smart R, Mann R. The homogeneity of 'road rage': Examining the relationship between victimization and offending among violent and aggressive motorists. *Violence and Victims* 2003;18(5):517-31.
12. Butters J, Smart R, Mann R, Asbridge M. Illicit drug use, alcohol use and problem drinking among infrequent and frequent road ragers. *Drugs and Alcohol Dependence* In press.
13. Joint M. *Road Rage*. Washington, DC: AAA Foundation for Traffic Safety, 1995.
14. Smart R, Asbridge M, Mann R, Adlaf E. Psychiatric distress among road rage victims and perpetrators. *Can J Psychiatry* 2003;48:323-30.
15. Mann R, Smart R, Stoduto G, Adlaf E, Ialomiteanu A. Alcohol consumption and problems among road rage victims and perpetrators. *J Studies Alcohol* 2004;65:161-68.
16. Fong G, Frost D, Stansfeld S. Road rage: A psychiatric phenomenon? *Soc Psychiatr Epidemiol* 2002;36:277-86.
17. Adlaf E, Ialomiteanu A. *CAMH Monitor 2001: Technical Guide*. Toronto, ON: Centre for Addiction and Mental Health, 2002. [Available in PDF format].
18. Goldberg D. *The Detection of Psychiatric Illness by Questionnaire*. London, UK: Oxford University Press, 1972.
19. Goldberg D. *Manual of the General Health Questionnaire*. Windsor, UK: NFER Publishing Company, 1978.
20. Banks M. Validation of the General Health Questionnaire in a young community sample. *Psychol Med* 1983;13:349-53.
21. D'Arcy C, Siddique C. Psychological distress among Canadian adolescents. *Psychol Med* 1984;14:615-28.
22. Donath S. The validity of the 12-item General Health Questionnaire in Australia: A comparison between three scoring methods. *Aust N Z J Psychiatry* 2001;35:231-35.
23. Goldberg D, Hiller V. A scaled version of the General Health Questionnaire. *Psychol Med* 1979;9:139-45.
24. Hardy G, Shapiro D, Haynes C, Rick J. Validation of the General Health Questionnaire-12; using a sample of employees from England's health care services. *Psychol Assess* 1999;11:159-65.
25. Pevalin D. Multiple applications of the GHQ-12 in a general population sample: An investigation of long-term retest effects. *Soc Psychiatry Psychiatr Epidemiol* 2001;35:508-12.
26. Reijneveld S, Schene A. Higher prevalence of mental disorders in socio-economically deprived urban areas in the Netherlands: Community or personal disadvantage? *J Epidemiol Community Health* 1998;52:2-7.
27. Wells-Parker E, Ceminsky J, Hallberg V, Snow R, Dunaway G, Guiling S, et al. An exploratory study of the relationship between road rage and crash experience in a representative sample of US drivers. *Accid Anal Prev* 2000;34:271-78.
28. Goldstein P. Drugs and violence crime. In: Weiner N, Wolfgang M (Eds.), *Pathways to Criminal Violence*. London, UK: Sage, 1990;16-48.
29. Haynes P. Drug using offenders in South London: Trend and outcomes. *J Substance Abuse Treatment* 1998;15:449-56.
30. Inciardi J, Horowitz R, Pottiger A. *Street Kids, Street Drugs, Street Crime: An Examination of Drug Use and Serious Delinquency in Miami*. Belmont, CA: Wadsworth Publishing Company, 1993.
31. Mann R, Anglin L, Wilkins K, Vingilis E, Macdonald S. Mortality in a sample of convicted drinking drivers. *Addiction* 1993;88:643-47.
32. Parnanen K. The uses of 'disinhibition' in the explanation of alcohol-related behaviour. *Contemporary Drug Problems* 1997;24:703-29.
33. Wells S, Graham K, West P. Alcohol related aggression in the general population. *J Stud Alcohol* 2000;61:626-32.
34. Zhang L, Welte J, Wiczorek W. Youth gangs, drug use, and delinquency. *J Criminal Justice* 1999;27:101-9.
35. Blanchard E, Hickling E, Taylor A, Loos W, Gerardi R. Psychological morbidity associated with motor vehicle accidents. *Behav Res Ther* 1994;32:283-90.
36. Udwin O. Children's reaction to traumatic events. *J Child Psychol Psychiatry* 1993;34:115-27.
37. Breslau N. Epidemiological studies of trauma, posttraumatic stress disorder and other psychiatric disorders. *Can J Psychiatry* 2002;47:923-29.
38. Garnezy N, Rutter M. Acute reactions to stress. In: Rutter M, Hersov L (Eds.), *Child and Adolescent Psychiatry: Modern Approaches*. Oxford, UK: Blackwell, 1985;152-67.
39. Coccaro E. Intermittent explosive disorder. *Curr Psychiatry Rep* 2000;2:67-71.
40. Galovski T, Blanchard E. The effectiveness of a brief psychological intervention on court referred and self-referred aggressive drivers. *Behav Res Ther* 2002;40:1385-402.
41. Harrison L, Hughes A. The validity of self-report drug use and improving the accuracy of survey estimates. *National Institute on Drug Abuse Research Monograph* 1997; Series 167.
42. Wagenaar A, Knrok K, McGovern P, Williams T, Perry C. Effects of saliva test pipeline procedure on adolescent self-report alcohol use. *Addict* 1993;88:199-208.

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RÉSUMÉ

Contexte : Pour étudier l'association entre l'utilisation illicite de drogue, la détresse psychiatrique et victimisation et offenser de fureur de route. Une attention particulière est donnée aux formes les plus sérieuses de comportement de fureur de route.

Méthodes : Les données sont basées sur le moniteur de 2002 CAMH et incluent un groupe de 2 421 adultes d'Ontario âgés de 18 ans et plus. Des analyses logistiques de régression ont été conduites avec l'utilisation illicite de drogue et la détresse psychiatrique (GHQ) et les facteurs démographiques en tant que variables indépendantes.

Résultats : Après la fureur de route d'année la victimisation a été rapportée de 42 % de l'échantillon et 31 % a rapporté n'importe quel type d'offenser de fureur de route. Approximativement 5 % ont été classifiés comme répondants avec la participation sérieuse de fureur de route. Les analyses logistiques de régression ont indiqué des rapports significatifs entre l'utilisation de drogue et les résultats illicites de fureur de route. L'utilisation de cannabis a été sensiblement associée à la victimisation générale de fureur de route et à offenser, alors que l'utilisation de stimulant augmentait sensiblement la probabilité de la victimisation et de l'adhésion dans la classification sérieuse de fureur de route. La détresse psychiatrique a augmenté de manière significative la chance de la victimisation de fureur de route et de la participation sérieuse de fureur de route.

Conclusion : Ces données indiquent différents indicateurs d'offenser de fureur de route, de victimisation et de participation sérieuse. Davantage de travail est nécessaire pour clarifier les mécanismes liés au rapport entre l'utilisation de stimulant, la détresse psychiatrique et la participation sérieuse de fureur de route.