Accident Analysis and Prevention 82 (2015) 101–111

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

Effects of introducing an administrative .05% blood alcohol concentration limit on law enforcement patterns and alcohol-related collisions in Canada

Étienne Blais[a,b,*], François Bellavance[b,c], Alexandra Marcil[b,c], Laurent Carnis[d]

[a] School of Criminology, Université de Montréal, Montréal, Québec, Canada
[b] Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation (CIRRELT), Montréal, Québec, Canada
[c] HEC Montréal, Montréal, Québec, Canada
[d] The French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR), France

ARTICLE INFO

Article history:
Received 28 October 2014
Received in revised form 29 April 2015
Accepted 30 April 2015
Available online 9 June 2015

Keywords:
Driving while impaired
.05% BAC laws
Fatally injured drivers
Law enforcement
Longitudinal data
Canada

ABSTRACT

Except for Quebec, all Canadian provinces have introduced administrative laws to lower the permitted blood alcohol concentration (BAC) to .05% or .04% for driving—or having the care of—a motor vehicle. Using linear mixed effects models for longitudinal data, this study evaluates the effect of administrative BAC laws on fatal alcohol related crashes and law enforcement patterns in Canada from 1987 to 2010. Results reveal a significant decrease of 3.7% (95% C.I.: 0.9–6.5%) in fatally injured drivers with a BAC level equal or greater than .05% following the introduction of these laws. Reductions were also observed for fatally injured drivers with BAC levels greater that .08% and .15%. The introduction of administrative BAC laws led neither to significant changes in the rate of driving while impaired (DWI) incidents reported by police officers nor in the probability of being charged for DWI under the Criminal Code.

1. Introduction

In 2010, 2541 persons died in a motor vehicle crash in Canada and 11,338 were seriously injured. Alcohol was involved in 38.7% and 18.9% of these crashes respectively (Traffic Injury Research Foundation, 2013). In Canada, as in many other countries (e.g. United States, France, Spain), driving while impaired by alcohol (DWI) is one of the leading causes of motor vehicle injury (Chamberlain and Solomon, 2002; Perreault, 2013).

Lowering the legal blood alcohol concentration (BAC) limit for the operation of motor vehicles is one of the strategies that has been implemented in several jurisdictions to reduce alcohol-related traffic injuries (Mann et al., 2001; Fell and Voas, 2006). In Canada, there are two sanction regimes: one is criminal and the other is administrative. Provisions found in the Criminal Code are in force in all provinces. Provinces are not allowed to reform or amend the Criminal Code but they are allowed to introduce administrative laws. Driving with a BAC level between .05% and .08% is an infringement on some provincial administrative laws. Except for the province of Quebec, all other Canadian provinces have "administrative" BAC laws that forbid driving—or having the care of—a motor vehicle at (or above) alcohol levels of .04% or .05%. Although no criminal offense is created by an infraction of this law, drivers may be issued a temporary licence suspension and a fine.

Some experts have recently claimed that Canada is lagging behind other countries in its fight against impaired driving by maintaining a .08% BAC limit in its Criminal Code (Chamberlain and Solomon, 2002; Paciocco, 2002; Fell and Voas, 2006). Despite the presence of these administrative measures, Chamberlain and Solomon (2002) stress that the "introduction of a .05% Criminal Code BAC limit is an essential element of any meaningful reform of Canada's federal impaired driving laws" (p. iii2). Precisely because the provincial laws are only administrative in nature, they do not create an offense and, therefore, do not carry severe penalties. A criminal charge is viewed as a far more serious matter than a provincial charge, let alone a temporary administrative sanction. A criminal offense, in contrast, would lead to a fine, a substantial driving prohibition and a permanent criminal record. Having two sanction regimes at their disposal, police officers may be more inclined to issue administrative sanctions. According to a sample of police officers surveyed in Canada, laying charges for DWI under the Criminal Code involves time-consuming tasks, such as taking the driver to the police station for an additional breath test (with an

* Corresponding author at: School of Criminology – Université de Montréal, 3150, rue Jean-Brillant (room C-4132), Montréal, Québec, Canada. Tel.: +1 514 343 7328.
E-mail address: Etienne.blais@umontreal.ca (É. Blais).

http://dx.doi.org/10.1016/j.aap.2015.04.038
0001-4575/

accredited breathalyser) and filling out several forms (Jonah et al., 1999). Favouring the administrative regime over the criminal could lessen the deterrent power of sanctions (see Solomon and Chamberlan (2002) for an extensive review of arguments for a .05% BAC limit under the Criminal Code).

In general, evidence suggests that lowering the BAC limit to .05% or lower is effective in preventing alcohol-related traffic injuries (Fell and Voas, 2006; Mann et al., 2001). Table 1 reports the main findings of studies that have examined the effect of lowering the legal BAC limit to .05% or less. Based on different methodological

Table 1
Summary of studies assessing the introduction of .05% or lower legal BAC limit.

Authors, jurisdiction and measures	Research design	Main findings
Vingilis et al. (1988) Ontario, Canada Administrative .05% BAC law (178) introduced on December 17th, 1981. 12-h license suspension	Interrupted time series of monthly fatal collisions in Ontario Control period: January 1979 to November 1981 Treatment period: December 1981 to December 1982 Control series: Saskatchewan and Manitoba	Short-term decrease—from 59% to 32%—in the proportion of drivers with a positive BAC Control series did not display significant decrease for the period under study (p-values are not reported)
Smith (1988) Queensland, Austrlia Administrative .05% BAC law introduced on December 1st1982	Before-and-after comparisons (chi-square test with correction for discontinuity) for the January 1980 to December 1985 period Control series: proportion of alcohol-related crashes in Western Australia Treatment series: proportion of alcohol-related crashes in Queensland	Queensland vs. Western Australia (nighttime collisions): 5% decrease in fatal crashes 8% decrease in crashes leading to hospitalization 6.6% decrease in crashes not leading to hospitalization (p-values are not reported)
Brook and Zaal (1992) Canberra, Australia Administrative .05% BAC law introduced on January 1st, 1991	Before-and-after comparison: Logit analyses of the proportion of drivers with a positive BAC per 10,000 sobriety tests for the 1990–1991 period Control period: 1990 (n = 12 months) Treatment period: 1991 (n = 12 months)	25% decrease in drivers with BAC ≥.10% ($p < 0.01$) 90% decrease in drivers with BAC between .05 and .08% 26% decrease in drivers with BAC >.08%
Kloeden and McLean (1994) Adelaide, South Australia Administrative .05% BAC law introduced on July 1st, 1991	Before-and-after comparisons of positive BAC among drivers (road side survey) collected on 20 sites Control period: February 14th to May 21st, 1991 Intervention period: August 8th 1991 to April 14th 1992. Another survey was also conducted in 1993	In comparison to 1993: 14.1% decrease in the % of drivers with a positive BAC ($p < 0.05$) 32.7% decrease in the % of drivers with a BAC ≥.05% ($p < 0.05$) 38.2% decrease in the % of drivers with a BAC ≥.08% ($p < 0.05$)
(Norstrom and Laurell 1997; see also Norstrom, 1997) Sweden Legal limit of .02% introduced to the criminal code on July 1st 1990	Interrupted time series with ARIMA modeling (control for alcohol and fuel sales) of crashes and alcohol-related crashes Control period: July 1987 to June 1990 Treatment period: July 1990 to June 1996	9.7% decrease in fatal crashes ($p < 0.05$) 11% decrease in single-vehicle crashes with injuries ($p < 0.05$) 7.5% decrease in crashes with injuries (n.s)
(Hentridge et al., 1997; see also Homel, 1994) New-South-Wales, Australia Administrative .05% BAC law introduced on December 15th 1980	Interrupted time series (log-linear model with Poisson Distribution) of crashes on a daily basis. Control for day of the week, road demand, economic conditions, mass media campaigns and sobriety checkpoints Control period: January 1st 1976 to December 14th 1980 Treatment period: December 15th 1980 to December 31st 1992	7% decrease in crashes with light injuries ($p < 0.01$) 8% decrease in fatal crashes ($p = 0.04$) 11% reductions in nighttime crashes with severe injuries No decrease in crashes with light injuries between 9am and 15pm on school days
Henstridge et al. (1997) Queensland, Australia Administrative .05% BAC law introduced on December 1st, 1982	Analyses are the same as for New-South-Wales Control period: January 1st 1980 to November 30th, 1982 Treatment period: December 1st 1982 to December 31st 1992	14% decrease in crashes with severe injuries ($p < 0.01$) 18% decrease in fatal crashes ($p = 0.02$)
Borschos (2000) Sweden Legal limit of .02% introduced to the criminal code on July 1st 1990	Interrupted time series analyses with ARIMA modeling of monthly data of crashes. Control for alcohol consumption and fuel sales Control period: January 1986 to June 1990 Treatment period: July 1990 to December 1997	12% decrease in crashes with severe injuries ($p < 0.01$) 10% decrease in fatal crashes ($p < 0.05$)
Bernhoft and Behrensdorff (2003) Denmark Legal BAC limit was lowered from .08% to .05% on March 1st 1998	Before-and-after comparisons based on drivers' drinking habits (chi-square). A survey was conducted among the Danish population aged 18–74 years old Control period: October–December 1997 (n = 2873) Treatment period: October–December 1998 (n = 1,409)	4% increase (from 37% to 41%) in drivers that would not allow any alcohol 2 h before driving ($p < 0.001$) 9% increase (from 71% to 80%) in the level of drivers that would not allow any alcohol or restrict themselves to only one drink 2 h before driving (p-value not reported)
Desabriya et al. (2007) Japan Reform of the Road Traffic Act in June 2002: .03% BAC law with increased demerit points and fines. Bar owners and passengers can be held responsible if someone is arrested for drinking-and-driving	Before-and-after comparisons done by computing a relative-risk (RR) of being involved in alcohol-related crashes (drivers with BAC ≥.03%) Control period: January 1998 to May 2002 Treatment period: June 2002 to December 2005 Control series: total crashes	64% decrease in alcohol-related crashes among 16–19 year-old drivers ($p < 0.05$) 50% decrease in alcohol-related crashes involving male drivers ($p < 0.05$) 52% decrease in alcohol-related crashes involving female drivers ($p < 0.05$) 1% increase in the total of crashes ($p > 0.05$)
Nagata et al. (2008) Japan Reform of the Road Traffic Act in June 2002: .03% BAC law with increased demerit points and fines. Bar owners and passengers can be held responsible if someone is arrested for drinking-and-driving	Segmented regression analyses with monthly data on traffic fatalities per km (n=84). Control for trend and monthly variations Control period: January 1998 to May 2002 Treatment period: June 2002 to December 2004	20%, 23% and 32% decreases in the constant of fatal traffic injuries, severe traffic injuries and alcohol-related traffic injuries ($p < 0.05$ in all cases) 4% decrease in the constant of fatal traffic injuries ($p = 0.06$), severe injuries ($p = 0.05$) and total collisions ($p < 0.01$) (Only changes in the constant of series are presented)