

**BC Coroners Service Child Death Review Panel
A Review of Young Driver Deaths
2004-2013**



**REPORT TO THE CHIEF CORONER OF BRITISH
COLUMBIA**

February 2015

PREFACE

On June 24, 2014, the British Columbia Coroners Service (BCCS) held a child death review panel focused on youth driver deaths in British Columbia between 2004 and 2013.

Over this time period, 106 young people died while they were driving. The loss of these young people deeply affected their parents, brothers and sisters, extended family, friends and the greater community. The review of their lives and the vehicle crashes that resulted in their tragic deaths was crucial in helping the panel members identify actions that could prevent the future deaths of young drivers.

Panel support was provided by the BCCS Child Death Review Unit (CDRU). Adele Lambert, Will Speechley and Holli Ward compiled aggregate case reviews and a review of the research and statistics which formed the basis of the panel discussions.

Dr. Ian Pike and staff at the BC Injury Prevention Unit (BCIRPU) were instrumental in placing the findings from the case reviews in the context of existing literature and research, assisting in identifying additional research, identifying areas where provincial legislation may have contributed to observed trends and providing thoughtful interpretation of overall findings.

I would like to express my deepest appreciation to the members of this panel for their dedication towards keeping young drivers safe during those initial years of learning to drive. The process of sharing their expertise, participating in discussion and bringing the support of their respective organizations generated action oriented recommendations that I am confident will contribute to reducing deaths of young drivers.

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On behalf of the panel, I submit this report and recommendations around reducing the deaths of young drivers to the Chief Coroner of BC for consideration.



Michael Egilson
Chair, Child Death Review Panel

EXECUTIVE SUMMARY

For teens who obtain a driver's licence, driving provides new freedom and independence as part of a transition to adulthood. It is an exciting time for both the teen and their family. In addition to helping free parents from providing 'taxi service', driving independently opens new possibilities for young people, such as employment. Most teens navigate this transition to adulthood successfully; however, motor vehicle crashes are still the leading cause of death among teens. This report looks at how and why young drivers die, what is currently in place to try to keep them safe and finally, considers what more can be done to prevent these tragic deaths from happening.

106 young drivers died in crashes that occurred between 2004 and 2013. To further understand the issues related to young driver deaths and identify opportunities for prevention, this death review panel examined these deaths in aggregate. Additionally, the panel reviewed research literature and statistics related to young drivers and road safety. Panel members included professionals with expertise in Aboriginal health and child welfare, injury prevention, public health, medicine, law enforcement, education, child welfare, licensing and road safety.

The young drivers who died were primarily male youth who were 17 and 18 years old. Speed, impairment, lack of seatbelt use and inexperience were common contributing factors. Although most of the vehicles involved were cars, pick-up trucks, mini vans and sport utility vehicles (SUVs), some drivers were operating motorcycles and all-terrain vehicles (ATVs). A much greater proportion of youth operating motorcycles died.

Since the introduction of British Columbia's Graduated Licensing Program (GLP) in 1998, there has been a reduction in the number of young driver deaths; especially those within their first year of licensure. Nevertheless, motor vehicle crashes remain the leading cause of death for young people between the ages of 15 and 18. From 2004 to 2013, approximately 60% of youth between 16 and 18 years old had a driver's licence¹ in BC. During this 10 year period, approximately 10 of these young drivers were killed each year in a motor vehicle crash.

A number of approaches are currently used to support young drivers as they develop the complex skills needed to drive safely and defensively. In addition to these, the panel identified opportunities that could contribute to reducing young driver crashes and crash related fatalities. Specifically, a review of the GLP process, enhanced data collection related to young driver crashes and road safety, and a focus on reducing speed. Based on the panel review, the following recommendations are put forth to the Chief Coroner for consideration:

Recommendation 1: Review of the Graduated Licensing Program

That the Insurance Corporation of B.C. (ICBC) conduct a review of B.C.'s Graduated Licensing Program to identify potential opportunities to improve its effectiveness. The review should include a consultation with young drivers and the parents and guardians that support young drivers.

¹ This includes all licence types.

Recommendation 2: Enhanced Data Collection

The BC Coroners Service contribute to the knowledge base of young driver fatalities by obtaining and utilizing driver abstracts in all fatal crashes of young drivers as part of the BCCS investigation process; and

ICBC and its partner agencies contribute to the knowledge base of distracted driving of young drivers by reviewing and clarifying the criteria used to identify distracted driving in police-attended crashes and publically reporting out on distracted driving.

Recommendation 3: Reduce Speed Related Injury and Death

The Ministry of Transportation and Infrastructure ensure that road safety and injury prevention are the paramount criteria used in the course of monitoring and reviewing existing speed limits and setting new speed limits on BC's provincial road system; and

The Ministry of Justice conduct a pilot project of automated speed enforcement strategies such as "time and distance" and "speed on green" in areas identified as high risk for serious crashes.

YOUNG DRIVER FATALITIES

For a young person, the inherent risk of a crash while driving is often overshadowed by the excitement of obtaining their licence and becoming more independent. Driving safely and defensively to reduce the risk of a crash requires a complex set of skills that take years to develop. During this critical period of time, there are factors placing young drivers at a higher risk of a crash that may result in their death or a serious injury. Many British Columbians have experienced the tragic loss of a young driver who was part of their family or a friend. The following accounts underscore two of the most common factors contributing to the deaths of young drivers. They are composite accounts of the young driver deaths reviewed in this report.

SPEEDING

On an early evening in August, a 17 year old young man was driving a sports car on a stretch of highway. In the course of turning right at a set of lights, his vehicle hit gravel. It spun 180 degrees, flipped several times down a slope and came to rest on its roof in a shallow ditch. The 17 year old was ejected from the vehicle and found a few metres away. He died at the scene as a result of traumatic injuries to his head and chest.

Several drivers witnessed the crash and the events leading up to the crash and pulled over to assist before emergency personnel arrived on scene.

Witnesses indicated that shortly before the crash, they had seen the sports car weave through traffic at a rate well over the posted speed limit of 70 km/hr. As the car approached the set of lights, it suddenly crossed over two lanes of traffic, causing another driver to slam their brakes to avoid crashing. The sports car had tried to turn right without slowing down but at the last moment, its brakes were engaged.

When the coroner interviewed the teen's parents, his father explained that his son was three months into the Novice driver stage of the Graduated Licensing Program (GLP). His son had recently purchased a used sports car with money he had earned from his after school job. Before this, the 17 year old had driven the family van and had never been in a crash.

In the course of further investigation, the coroner learned that the teen had received a ticket for speeding a month before the crash, which was unknown to the teen's parents. Toxicological testing showed the 17 year old had not been using substances at the time of the crash.

DRIVING WHILE IMPAIRED

After leaving a party in the early morning hours, an 18 year old young man offered two friends a ride home in his parent's 4-door sedan. About 3 km from the party, people in an apartment were awakened by a loud bang. The crash was not witnessed.

When emergency personnel attended, they observed the driver's side of the vehicle had hit a hydro pole with enough force that it snapped the vehicle in half. All three young men were still in the vehicle with their seatbelts on. The driver's seat was pushed directly into the hydro pole. It was determined that both the driver and the backseat passenger had died instantly on impact. The front seat passenger was treated for minor injuries. Beer cans and half a bottle of whiskey were noted to be in the back seat.

During the coroner's investigation, toxicological analysis showed that the driver had consumed enough alcohol and marijuana to cause a high level of impairment. The surviving passenger said that he and the driver had shared a marijuana joint early in the evening and that he'd seen

the driver consume “a few beers” over the course of the evening. The passenger commented “when we decided to leave, he wasn’t stumbling or slurring his words. He told me it had been a couple of hours since he’d last had a beer.”

At the time of the crash, the driver had held a GLP Novice stage licence for seven months. The Novice stage restricts the driver from consumption of any alcohol (zero blood alcohol concentration) and from having more than one passenger in the vehicle. The teen’s driving record indicated he had previously received violation tickets on two separate occasions; one for speeding and another for having too many people in the car.

The teen’s parents told the coroner their son regularly used the family vehicle, especially on weekend evenings.

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PART 1: INTRODUCTION

For teens who obtain a driver's licence, driving provides new freedom and independence as part of a transition into adulthood. In addition to helping free parents from providing 'taxi service', being able to drive independently can open new possibilities for young people, including employment. Most teens navigate this transition to adulthood successfully; however, motor vehicle crashes are still the leading cause of death among teens. This report looks at how and why young drivers die, what is currently in place to try to keep them safe and finally considers what more can be done to prevent these types of tragic deaths in the future².

Losing a young driver to a vehicle crash has a profound effect on their families, friends and communities. Furthermore, these crashes sometimes take the lives or seriously injure passengers and other drivers. These losses are often compounded by the fact that the crash could have been prevented.

For young drivers, the risk of being killed or seriously injured in a motor vehicle crash during the period of time they are learning to drive is increased for a number of reasons. Driving safely and defensively requires learning a complex set of skills, many hours of driving experience and a level of maturity that demonstrates a responsible attitude about driving.

Additionally, vehicle safety and road hazards can impact a young driver's safety. Given these factors and the amount of risk associated with learning to drive, young driver safety is an ongoing priority. Between 2004 and 2013, approximately 60% of youth in BC between 16 and 18 years old had a driver's licence³.

To further understand what places young drivers at risk and identify opportunities to prevent future deaths, a death review panel was held in June 2014. The panel reviewed 106 young driver deaths⁴ that occurred between 2004 and 2013 as well as the research literature and statistics related to young drivers and road safety.

The young drivers who died were primarily male youth who were 17 and 18 years old. Speed, impairment, lack of seatbelt use and inexperience were common contributing factors. Although most of the vehicles involved were cars, pick-up trucks, mini vans and sports utility vehicles (SUVs), some drivers were operating a motorcycle and all-terrain vehicles (ATVs). A much greater proportion of youth operating motorcycles died.

DEATH REVIEW PANEL

A death review panel is mandated⁵ to review and analyse the facts and circumstances of deaths to provide the Chief Coroner with advice on medical, legal, social welfare and other matters concerning public health and safety, and the prevention of deaths. A death review panel can review one or more cases before, during or after a coroner's investigation, an inquest or a review by the BCCS Child Death Review Unit (CDRU), and regardless of any decision made by a coroner or member of the CDRU.

The Chief Coroner established a child death review panel to meet on specific occasions throughout the year to provide recommendations on the prevention of child and youth deaths.

² Other road users such as: other drivers, cyclists and pedestrians who were either injured or died in a vehicle crash involving a young driver were not included in this review.

³ This includes all licence types.

⁴ 106 young driver deaths were reviewed in aggregate.

⁵ Under the *Coroners Act*

This process is consistent with the child death review principles laid out by the Honourable Ted Hughes in his 2006 report⁶. The Chair of the CDRU was appointed chair of the child death review panel whose membership includes: a child death coroner, a CDRU coroner and professionals with expertise relating to children including: professionals with expertise in Aboriginal health and child welfare, injury prevention, public health, medicine, law enforcement, education, child welfare, licensing and road safety. In the course of reviewing the young driver deaths that occurred between 2004 and 2013, the panel reviewed:

- BCCS investigative findings;
- Academic and research literature;
- Information provided by panel members;
- Environmental, social and medical factors associated with the deaths;
- Possible patterns, trends or themes;
- The current state of related public policy and strategies; and
- Existing challenges.

Each panel member shared their professional perspective and collectively identified actions to prevent the deaths of young drivers.

LIMITATIONS AND CONFIDENTIALITY

Provisions under the *Coroners Act* and *Freedom of Information and Protection of Privacy Act* allow for the BCCS to disclose information to meet its legislative mandate and support the findings and recommendations generated by the review process. For the purposes of this report, information about these youth is presented in aggregate form. The BCCS is sensitive to the privacy of the youth and the families that we serve and proceeds with caution when reporting case review findings. In general, the statistical results are based on a limited number of cases and should be interpreted with caution given the potential for random variation.

⁶ BC Children and Youth Review, 2006

PART 2: TEEN DRIVER DEATHS

Comparing young driver death rates across jurisdictions is challenging due to variances in data collection and in variables such as licensing issuance, licensing restrictions, road safety and enforcement measures.

INTERNATIONAL

Information about driving and road safety, including young drivers, is collected and reported on by the World Health Organization (WHO) and its partner agencies, the Organization for Economic Co-operation and Development (OECD) and the United Nations (UN). The data used by these organizations is based on consultation with national stakeholders, non-governmental organizations and academics.

The WHO reports that (World Health Organization, 2013):

- Young male drivers (under the age of 25 years) are 3 times more likely to be killed than females
- 91% of the world's fatalities on roads happen in low and middle income countries.

Specific to young drivers between 15 and 24 years old, the OECD reports (Organization for Economic Co-operation and Development, 2006):

- Over 8,500 die in the 30 OECD countries every year
- Death rates are approximately double that of older drivers
- Males are 3 times more likely to die than females.

CANADA

Young drivers between 16 and 24 years old are overrepresented as victims of fatalities and serious injuries involving vehicle crashes (Transport Canada, 2011). Specifically, 13% of licensed drivers in Canada are between the ages of 16 to 24 years old but this group accounts for 24% of driving fatalities and 26% of serious injuries (Transport Canada 2011).

Specific to young drivers between 16 and 19 years old (Traffic Injury Research Foundation, 2013):

- From 2000 to 2010, there has been a decrease in the number of driver fatalities from a rate of 10.3 in 2000 to 7.3 per 100,000 in 2010;
- All Canadian provinces and territories have a GLP for new drivers of any age. The most common minimum age in which a person is eligible to apply for a licence is age 16 years old.

BRITISH COLUMBIA (BC)

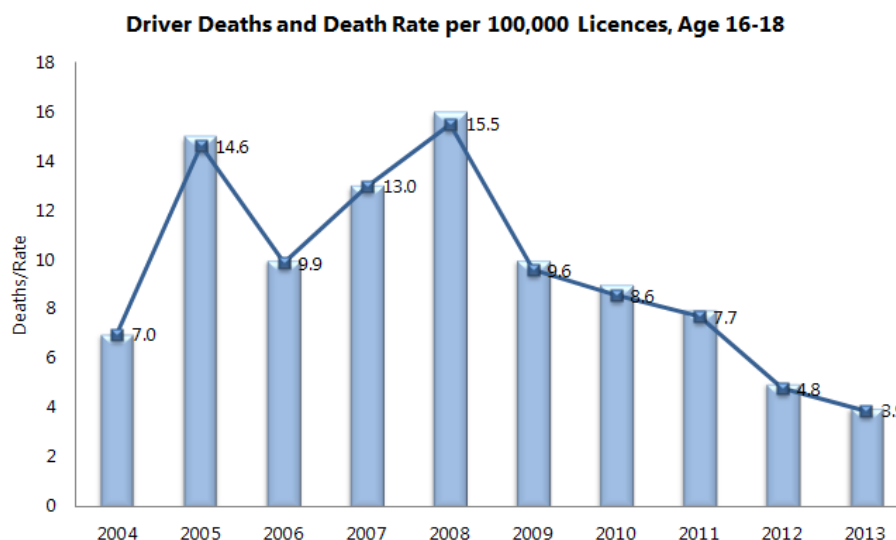
Between 2004 and 2013, there were on average, 103,000 youth between the ages of 16 and 18 years old who were active licensed drivers⁷ of which fewer than 150 were for motorcycles. This age group accounted for approximately 3% of the driver's licences in BC, and 5% of all driver fatalities between 2009 and 2013⁸.

⁷ Based on statistics provided by ICBC, 2014

⁸ Based on statistics provided by ICBC and BCCS, 2014

There has been a decrease in the rate of youth driver deaths, especially since 2008 (figure 1). This is consistent with the decreases in numbers of injury hospitalizations for occupants of passenger vehicles⁹ and motorcyclists between 15 and 19 years old over the same period of time (BC Injury Research and Prevention Unit, Injury Data Online Tool (iDOT), 2014).

Figure 1:



Source: BC Coroners Service

BC CORONER SERVICE CASE REVIEW FINDINGS

This section presents an aggregate case overview of the demographics and circumstances of the deaths 106 young drivers who died between 2004 and 2013.

Findings from the case review are presented in conjunction with what is known from the current national and international research literature on young drivers.

BC's graduated licence program (GLP) for all new drivers is referenced throughout this area of the report. This program is described in greater detail in Part 3 of this document.

A. THE YOUNG DRIVER

The young drivers who died were primarily male youth who were 17 and 18 years old with a valid Novice passenger vehicle licence. Some were driving contrary to one or more of their licence restrictions at the time of their fatal crash. Additionally, some of these drivers also had a history of receiving one or more violation tickets for unsafe driving practices.

AGE

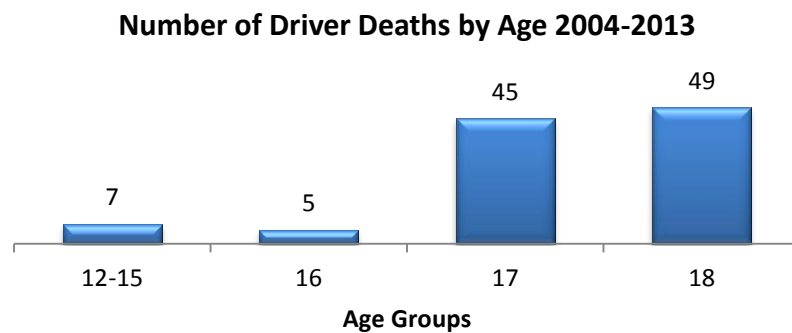
The majority of the driver deaths in this review occurred in older youth between 17 and 18 years old (n=94, 89%) (figure 2). This age group was more likely to be driving with a Novice or full licence, which have limited or no restrictions, respectively.

⁹ This includes both drivers and passengers in passenger vehicles.

Overall, the young drivers who died ranged in age from 12 to 18 years old. Licensed 16 year olds were driving with a Learners licence, with a number of imposed restrictions. Drivers younger than 16 years old were unlicensed. These findings are consistent with those found by the Traffic Injury Research Foundation of Canada (TIRF) looking at driver fatalities of 16 to 19 year olds from 2000 and 2010 (2013).

Research has shown that young drivers, who are generally less experienced than older drivers, are at greater risk for being involved in a crash (Mayhew, Simpson, Singhal and Desmond, 2006). Driving safely and defensively requires learning a complex set of skills, many hours of driving experience and a level of maturity that demonstrates a responsible attitude about driving. This all needs to happen during a period of time when the adolescent brain is still developing functions that will contribute to establishing lifelong safe driving habits such as: planning, impulse control, reasoning and perception (Organisation for Economic Co-Operation and Development (OECD), 2006; Traffic Injury Research Foundation, n.d.). Put another way, younger drivers are at stage of maturity where they are likelier to engage in risk taking or thrill seeking behaviours and be more influenced by their peers, and they are also less experienced with using judgement, making decisions and perceiving hazards while driving (Mayhew, et.al, 2006).

Figure 2:



Source: BC Coroners Service

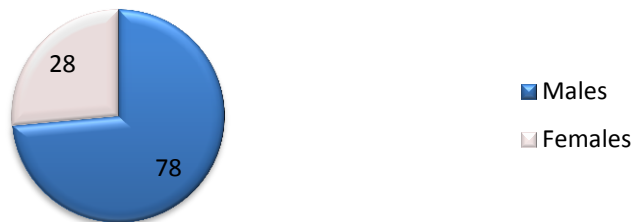
SEX

The majority of the young drivers who died were males (74%, n=78). Twenty-six (n=28) percent of the drivers who died were female (see figure 3). These findings are consistent with the research which found that young men are overrepresented in driver fatalities of youth between 16 to 19 years old (Traffic Injury Research Foundation, 2013).

Young male drivers are more likely to overestimate driving skill, hazard recognition and underestimate potential causes of a crash than young female drivers.

Figure 3:

**Number of Driver Deaths by Sex
2004 to 2013**



Source: BC Coroners Service

A review of young driver data (ages 15 to 19 years old) from the U.S. based National Highway Traffic Safety Administration (NHTSA) also found that males appear to be at higher risk of fatal crashes; however, this risk is not homogenous across all ages (Swedler, Bowman and Baker, 2012). For example, 17 year old male drivers were more likely to be involved in a fatal crash at night compared to 16 year old males, which is likely due to GLP restrictions. Research has also suggested that male drivers are more likely than their female counterparts to overestimate driving skill and hazard recognition, and underestimate the potential consequences of a crash (Rodes and Pivik, 2011; OECD, 2006).

LICENCE STATUS

At the time of their death, most of the young drivers held a valid licence; however, some of the youth were not complying with the restrictions of their licence type.

At the time of their deaths, the licence status of the drivers was noted to be as follows:

- 68 Novice stage passenger vehicle licences;
- 14 Learners stage passenger vehicle licenses;
- 4 Class 5 full passenger vehicle licenses;
- 3 Learners stage motorcycle licence; and
- 2 Class 6 full motorcycle licences.

Nineteen (18%) of the youth were driving without a valid licence at the time of the crash. Fifteen of these drivers did not have a licence and 4 of these drivers had a licence that was invalid. Licences were considered to be invalid if the driver was driving with the wrong class licence (e.g. a driver with a Class 7 licence who is driving a motorcycle) or driving while prohibited.

Research findings focused on unlicensed drivers¹⁰ indicate that there is an increased risk of crashing compared to licensed drivers which may be due to factors such as driving without supervision and limited driving practice (Traffic Injury Research Foundation (TIRF), *The Issues-Unlicensed Driving*, n.d.). Further, research indicates that unlicensed drivers are more likely to be driving an older passenger vehicle that may be unsafe (TIRF, *The Issues-Unlicensed*

¹⁰ Unlicensed drivers include those drivers who had a licence that was then invalid because it was suspended, revoked, inappropriate, expired or cancelled or drivers who have never obtained a licence (Traffic Injury Research Foundation, *The Issues-Unlicensed Driving*, n.d.)

Driving, n.d.). Research indicates that unlicensed drivers are likelier to be males who take risks such as speeding and alcohol use, and do not use a helmet or a seatbelt (TIRF, *The Issues-Unlicensed Driving*, n.d.).

DRIVING CONTRARY TO GLP LEARNER AND NOVICE RESTRICTIONS

GLP driving restrictions are intended to reduce risks that could lead to death or serious injury in young drivers. As mentioned in Part 3 of this report, driving restrictions are imposed in the Learner and Novice stages of the GLP.

If drivers with Learner or Novice stage licences drive contrary to the restrictions of their licence type, they could receive fines or penalty points that are recorded on their driving record. Thirty-four (32%) of the drivers were driving contrary to one or more of their licence restrictions at the time of the crash. In addition to driving contrary to licence restrictions, it is also possible that a driver was driving with an invalid Learner or Novice stage licence.

Of the drivers known to have a Learner's licence:

- 11 were driving with no supervisor;
- 10 consumed alcohol;
- 3 were driving during restricted hours; and
- 2 had more than one passenger (other than a supervisor) in the vehicle.

Of those drivers known to have a Novice licence:

- 18 consumed alcohol; and
- 7 were driving with too many passengers (who were not family members and without a supervisor).

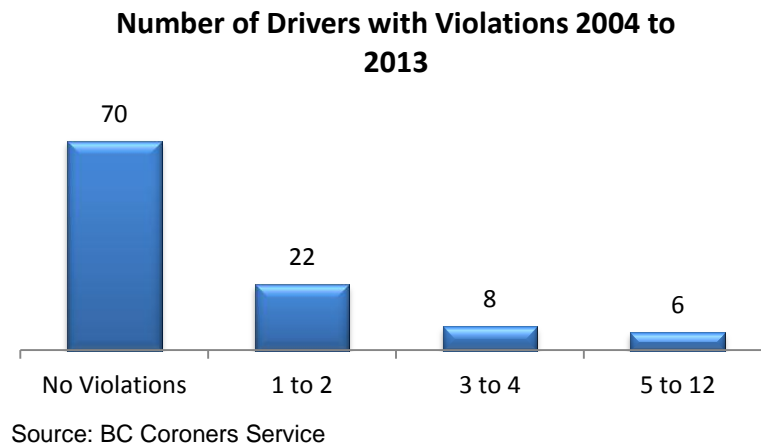
Research indicates that non-compliance with GLP restrictions may increase the risk of a crash (Mayhew, et.al, 2006). For the GLP program to be fully effective, young drivers need to follow the restrictions imposed as these are in place to reduce the crash risk. To this end, opportunities to encourage parents to reinforce compliance with the GLP restrictions and to engage young drivers in a dialogue about the purpose to these restrictions should be considered.

PENALTIES FOR UNSAFE DRIVING

In addition to penalties for driving contrary to GLP restrictions (as discussed in the previous section), drivers with a Learners or Novice stage licence are also subject to the unsafe driving penalties that may be imposed on drivers with full licences. These include receiving a warning letter, probation or prohibition from driving. All drivers may be subject to penalties for unsafe driving (i.e. speeding) and impaired driving.

About one third of the drivers (n=36, 34%) had a history of one or more penalties (see figure 4)

Figure 4:



B. THE FATAL CRASH

Of the 106 fatal crashes, 91 of the youth were driving passenger vehicles, 13 were driving motorcycles and 2 were driving ATVs on a public roadway.

Over half of the crashes were single vehicle with the majority of these witnessed by someone (55%, n=58). Forty-five percent (n=48) were multi-vehicle crashes.



Overall, the majority of the crashes (71%, n=75) were witnessed either by a passenger in the vehicle or someone else (i.e. bystander, other driver).

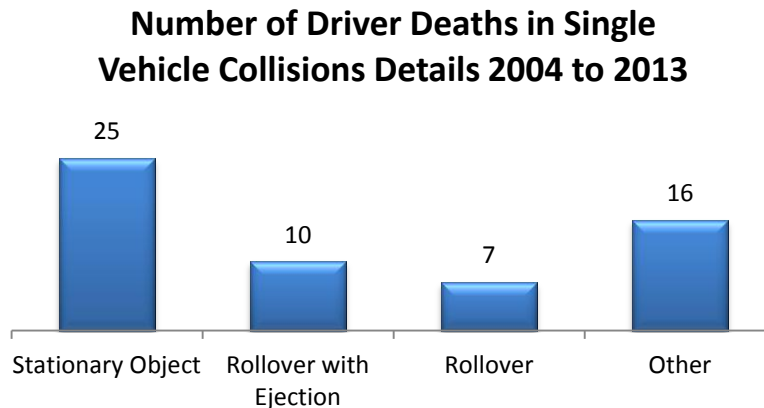
In 16% (n=17) of the crashes, one or more people died in addition to the youth driver (e.g. passengers in the youth driver's vehicle or the driver or passengers of another vehicle involved in the crash).

Of the single vehicle crashes, the most common crash involved the driver hitting a stationary object

The fatal driver crashes involving speed left the vehicles severely damaged and unrecognizable.

(i.e. hydro pole, tree) (43%, n=25) (see figure 5). Seventeen of these crashes involved a rollover (29%, n=17) (see figure 5). Other crashes involved things such as: hitting another type of object or entering water.

Figure 5:



Source: BC Coroners Service

C. FACTORS CONTRIBUTING TO FATAL CRASHES

Overall, these fatal crashes involved a combination of the factors presented as opposed to just a single one. Speed, impairment, lack of seatbelt use and inexperience were common contributing factors identified. It is important to note, however, that other contributing factors presented in this section may be underreported as a result of limitations with the ability to collect data.

SPEED

Speeding is a leading cause of death and serious injury in BC and is a common behaviour across all driver age groups, including young drivers. Between 2009 and 2013, the rate of speeding tickets issued to young drivers (16 to 18 years old) was 64.1 per 1,000 drivers in comparison to 64.9 per 1,000 drivers over the age of 18 years.

Due to the incidence of speeding behaviour and its potential consequences, enforcement measures are used to target those who speed. In BC, RoadSafetyBC has identified excessive speed (driving greater than 40 km/hr over the speed limit) as one of the top high risk driving behaviours to target.

Driving at higher speed increases a driver's risk of being involved in a fatal crash. While driving at high speed, a driver must observe, interpret and respond to what is happening on the road at a faster rate. If the driver is overwhelmed by a complex driving environment, they may not recognize or respond to hazards (Engstrom, Johansson and Ostlund, 2005). Even when a driver is able to drive in a complex environment at a higher speed, if the brakes are applied, a much greater distance is required to stop in comparison to applying the brakes at a lower rate of speed (Navon, 2003). Higher speeds also make it more difficult for a driver to negotiate curves and manoeuvre around road hazards in addition to making it more difficult for other drivers to avoid a speeding vehicle.

If a crash occurs at high speed, the vehicle's ability to protect the driver and passenger or other road users from death or serious injury is decreased (Ferguson, 2013). The risk of fatality for drivers and passengers who are wearing seatbelts is greatly increased at speeds over 50 km in side impact crashes and at speeds over 70 km in frontal crashes (Howard, Cameron, Langford, 2008; Richards and Cuerden, 2009).

The risks associated with speeding may be compounded by factors that include but are not limited to: weather conditions, distractions, impairment and fatigue (Scott-Parker, Watson, King and Hyde, 2014).

Where speed was identified as a contributing factor in the young driver deaths, most of the vehicles had sustained severe damage.



Speed was identified as a contributing factor by the coroner in 30 (28%) of the young driver deaths. Of the 90 cases where a police traffic analyst report was available for review¹¹:

- 12 drivers were speeding in excess of 40 km over the posted speed limit;
- 8 drivers were driving too fast for the road conditions;
- 7 drivers were either going the speed limit or driving under it; and
- Speed could not be determined in 39 of the crashes.

ALCOHOL AND SUBSTANCE USE

Alcohol and drug impairment while driving is a leading cause of death and serious injury in young drivers.

Compared to older drivers, young drivers not only have a higher risk of crashing when sober, but also, for all blood alcohol content (BAC), their relative risk of crashing is higher (i.e. compared to the risk when the BAC equals 0) (Peck, Gebers, Voas and Romano, 2008; Christoforou, Karlaftis, Yannis, 2013). This is possibly due to inexperience both with driving and with drinking, and the increased impulsivity and risk-taking behaviour associated with youth (Christoforou, et.al, 2013). In terms of drug use, there are a wide variety of illegal, prescription, and over-the-counter drugs that impair driving performance. Next to alcohol, marijuana has been reported as the most commonly detected recreational drug in fatal motor vehicle crashes (Asbridge, Poulin and Donato, 2005; Beasley and Beirness, 2011). With respect to driving while under the influence of marijuana, research suggests the risk of crashing is approximately double compared to driving sober (Asbridge, Hayden and Cartwright, 2012).

Impaired driving is a serious issue on its own; however, like other road safety factors contributing to young driver fatalities, it may be associated with speed. Research suggests that young drivers who crash while impaired are also more likely to be speeding (Scott-Parker, Watson, King and Hyde, 2014; Williams, West and Shults 2012). In addition to speeding, impaired young drivers are more likely to engage in other risky driving behaviours (e.g. 'tailgating' by driving too close to the vehicle in front) (Scott-Parker, et.al, 2014).

Substance use was noted as a contributing factor in the coroner's report in 43% (n=46) of the deaths. Toxicology analysis was completed on 102 of the youth and one or more substances were detected in just over half (56%, n=58) of these youth:

- 22 (22%) consumed alcohol. Of these youth, 20 had an alcohol blood level that exceeded .08;
- 16 (16%) consumed drugs;
- 20 (20%) consumed a combination of drugs and alcohol.

The most common drugs detected were: marijuana (n=28), cocaine (n=10) and amphetamine/MDMA/ecstasy (n=6). Drug use results were not mutually exclusive and some results were noted as either being recent use, past use or unknown when use occurred.

RoadSafetyBC has identified impaired driving as a priority high risk driving behaviour to target because of the serious risks and possible consequences of having impaired drivers on the road.

¹¹ The categories are not mutually exclusive.

Although driving after any alcohol consumption is prohibited for both Learner and Novice GLP stages, some young drivers disregard it. Between 2009 and 2013, the rate of tickets issued for alcohol impaired¹² driving to young drivers (16 to 18 years old) was 8.8 per 1,000 drivers in comparison to 9.1 per 1,000 drivers over the age of 18 years.

The Canadian Centre on Substance Abuse (2011) reviewed a number of provincial surveys and found that 14% to 21% of grade 12 respondents admitted to driving within an hour of having taken drugs. The McCreary Centre's 2013 *BC Adolescent Health Survey* was completed by 30,000 students living in BC in grades 7 to 12 and found that 3% of students reported driving after using alcohol or marijuana (Smith, Stewart, Poon, Peled, Saewyc and McCreary Centre Society, 2014).

SEATBELT USE

A properly worn seatbelt can reduce the risk of serious injury and death.

Ninety-one of the youth were driving in a vehicle where a seatbelt could have been worn (15 youth were operating a motorcycle or ATV where a seatbelt would not have been a factor).

Of these 91 youth, 66% (n=60) were properly wearing a seatbelt. Four percent (n=4) of the youth were wearing a seatbelt improperly and 24% (n=22) were not wearing a seatbelt. In 5% of these cases (n=5) it was unknown if the youth was wearing a seatbelt at the time of the crash.

Wearing a seatbelt properly can reduce the risk of serious injury or death.

Based on Transport Canada's (2010) survey of seatbelt use in Canada between 2009 and 2010, seatbelt use in BC was 96.9%, which was higher than the overall Canadian use of 95.3%. This suggests an overrepresentation of non-seatbelt wearers in the fatal crashes reviewed by the panel.

DRIVER EXPERIENCE

To drive safely and defensively, a driver has to learn a complex set of skills acquired through knowledge, development and experience (Shope and Bingham, 2008). Examples include: recognition of possible hazards and essential vehicle manoeuvring.

An inexperienced driver may be deficient in skills such as: anticipating hazards, controlling a vehicle during a skid, and reacting quickly (Mayhew, Simpson, Singhal, Desmond, 2006). Inexperienced drivers may also commit unintentional driving errors such as: not yielding to traffic, failing to check the rear view mirror and underestimating an oncoming vehicle's speed (Mayhew, et.al, 2006).

Young drivers require a minimum of 60 hours of driving experience before applying for a motor cycle or car licence.

Driving inexperience was noted in the coroner's report as a contributing factor in 21% (n= 22) of the cases.

¹² Alcohol contraventions include 24 hour, 12 hour and immediate roadside program.

Driving experience is difficult to identify as there is no uniform measurement used. At the time of the crash, the length of time a youth had been licensed was known in some cases; however, the number of driving hours completed by any of the youth was unknown. It is known that 51 of the young drivers had their licence for a year or less and 18 youth had their licence for over a year.

One measure that may be used to acquire driving experience is a driving course. In BC, drivers may opt to take an ICBC-approved driver training course at their own cost. This course is administered by various driving schools across the province. The course focuses on skills for safe driving, road test preparation and developing a responsible attitude when driving. Its primary purpose is to prepare drivers for the skills and knowledge based Class 7 road test. The learning requirements are based on industry¹³ and educational best practices. In each year between 2008 and 2013, 9% of Class 7 road test applicants completed this course.

The number of youth who took any type of driving lesson(s) other than the ICBC-approved course is unknown. Research findings on the effectiveness of driver training in the reduction of young driver crashes appear to indicate that driving lessons alone are not effective in reducing crashes and, in some cases, may lead young drivers to be overconfident in their skill levels (Committee on Injury, Violence and Poison Prevention and Committee on Adolescence, 2006). It is suggested that driver experience, supplemented with driving lessons can encourage safe driving among young drivers (Committee on Injury, Violence and Poison Prevention and Committee on Adolescence, 2006).

The GLP course was last evaluated in 2006 at which time it was found that drivers who had taken an ICBC-approved driver training course had a 26% higher crash rate during their first year at the Novice stage (Wiggins, 2006). A possible explanation for this finding was that drivers who completed the course during the Learners stage were offered a time incentive meaning they could obtain their Novice stage licence sooner. In 2007, the time incentive at the Learners stage was removed and transferred to the Novice stage. Since this time, the course has not been re-evaluated.

DISTRACTION

In this review of young driver deaths, cell phone use was noted by the coroner as a contributing factor in 1 death.

Distracted driving is an emerging issue that requires further exploration to fully understand its impacts in relation to young drivers.

Research suggests distractions greatly increase the risk of young drivers crashing because they are still learning the complex skills required to develop the same level of reflexive driving that experienced drivers have generally developed (Klauer, Guo, Simons-Morton, Ouimet, Lee and Dingus, 2014; Mayhew, Robertson, Brown and Vanlaar, 2013).

Distraction occurs when a driver's attention is averted to something other than the task of driving (Mayhew, et.al, 2013). Distractions can range from minimal to significant and cause impairment of a person's ability to focus on their driving (Mayhew, et.al, 2013). Sources of distraction within the vehicle include other passengers, and behaviours like eating and the use of electronic devices; distractions outside of the vehicle include billboards and road signs (Mayhew, et.al, 2013).

¹³ Industry in this context includes driving schools that offer Class 5 instructor training and driving schools that offer the 32 hour ICBC-approved course.

Although there are numerous potential causes of distraction while driving, the term 'distracted driving' is often considered synonymous with use of handheld electronic devices while driving. Media and public surveys report increases in this type of distracted driving. In BC, RoadSafetyBC has identified distracted driving (use of handheld electronic devices while driving) as a top high risk driving behaviour to target. In a *Road Safety Monitor* (RSM) poll conducted in 2011 by the Traffic Injury Research Foundation (TIRF), 36.3% of all Canadian drivers admitted to using their cell phones while behind the wheel in the 7 days previous, up from 20.5% in 2001 (Marcoux, Vanlaar and Robertson, 2012). Research suggests cell phone use is especially problematic for young drivers because of their driving inexperience and susceptibility to distractions (Mayhew, Robertson, Brown and Vanlaar, 2013).

In BC, amendments were made to BC's *Motor Vehicle Act* in 2010 prohibiting the use of handheld electronic devices while driving. The use of all electronic devices is also a restriction imposed for both Learner and Novice GLP stages; however, like substance use, some young drivers disregard it. Between 2010 and 2013, the rate of tickets issued for distracted driving to young drivers (16 to 18 years old) was 4.39 per 1,000 drivers in comparison to 12.74 per 1,000 drivers over the age of 18 years¹⁴.

Another distraction noted in research is the presence of passengers. Research suggests that teen passengers pose a distraction because of their interactions with the young driver (Traffic Injury Research Foundation, Passenger, n.d.). This may be in the form of conversation or by contributing to an environment that promotes riskier and more aggressive driving, particularly among young male drivers (Curry, Mirman, Kallan, Winston, Durbin, 2011; Traffic Injury Research Foundation, Passengers, n.d.).

BC's GLP imposes passenger restrictions which are intended to reduce the risk of passenger distraction (refer to part 3). Thirty-six percent (n=38) of the youth who died had one or more passengers in their vehicle¹⁵, although distractions related to passenger presence were not noted as a contributing factor in any of these deaths.

A possible reason that distracted driving was not identified in more of the deaths may have been that it is difficult to determine unless the actions of the driver at the time of the accident were witnessed. This limitation makes it difficult to gather accurate information about the overall prevalence and types of driver distractions that may have contributed to the death of a driver. Collecting data through routine road safety enforcement and non-fatal crashes would provide a more accurate picture of the prevalence and types of driver distractions that place young drivers at risk.

FATIGUE

A driver who is fatigued may be overly tired or irritated which impacts their ability to safely operate a vehicle.

Being overly tired or drowsy may cause a person to drive without full awareness (Traffic Injury Research Foundation, Fatigue, n.d.). As a result, the driver may make driving errors (i.e. braking in time, staying on the road) they would not otherwise make (Traffic Injury Research Foundation, Fatigue, n.d.). An irritated driver may be 'overloaded'; feeling mentally overwhelmed which may result in aggressive driving behaviour or multi-tasking which takes

¹⁴ 2009 data was unavailable as prohibition of electronic device use was legislated in November 2009.

¹⁵ It is possible a passenger could have been a GLP supervisor.

away from being fully aware of the task of driving (Traffic Injury Research Foundation, Fatigue, n.d.).

Fatigue was noted as a contributing factor in 2% (n=2) of the deaths.

Research indicates that young drivers, particularly males, are one of the most at risk groups for driving while in a fatigued state (Traffic Injury Research Foundation, Fatigue, n.d.). Typical reasons for a young driver to experience fatigue include not making sleep a priority and undergoing a decrease in alertness due to changes during puberty (Traffic Injury Research Foundation, Fatigue, n.d.). Reasons young drivers may drive while fatigued include peer approval, perceiving the risk as minimal and overestimating their ability to drive in this state (Fernandes, Hatfield and Job Soames, 2010).

HELMET USE

Fifteen (14%) of the youth were operating a motorcycle or ATV. Most of these drivers (73%, n=11) were wearing a helmet. Four (27%) drivers were either not wearing a helmet or not properly wearing one.

Helmet use is widely understood to decrease the risk of death or serious brain injury in motorcycle or ATV riders (Vanlaar, Marcoux and Robertson, 2009, Liu, Ivers, Norton, Boufous, Blows and Lo, 2008). All Canadian provinces have helmet laws requiring a helmet to be worn while operating a motorcycle. In early 2014, BC law was introduced requiring ATV drivers to wear a helmet. In BC, motorcycle operators and passengers are required by law to wear a helmet that meets a specific safety standard and displays certification.

STREET RACING

The prevalence of street racing in young drivers is not clearly identified in research. Street racing is a dangerous activity and is a criminal code offence.

Two (2%) of the drivers had been street racing prior to their crash. In one case, the driver was riding a motorcycle and racing on a rural road. The other case involved two vehicles racing on a city street. Neither of these cases involved high performance vehicles.

POLICE PURSUIT

In BC, police pursuits are regulated under the *Motor Vehicle Act*, Emergency Vehicle Driving Regulation.

Police had been either following or pursuing 4% (n=4) of the youth prior to the crash occurring. Some of the vehicles driven were reported stolen. The outcomes of any investigations related to police actions were not noted in the coroners' files.

Research focused on the effects of police pursuit of young drivers appears to be very limited. However, research looking at active attempts of young drivers to avoid police enforcement indicates these drivers do so when they are generally engaging in risky driving behaviours such as speeding or driving while impaired (Scott-Parker, Watson, King and Hyde, 2014). An example of avoidance includes attempts to drive around areas known to have police enforcement such as a roadside check.

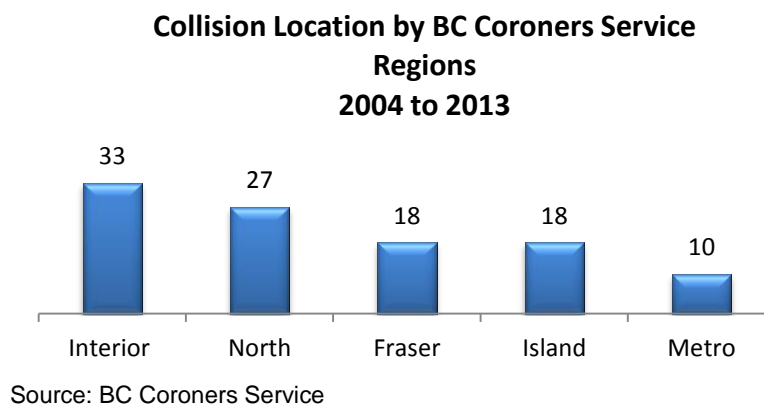
D. WHERE CRASHES OCCURRED

The majority of the crashes (97%, n=103) occurred on asphalt road surfaces. This includes, highway, municipal, residential and rural areas. In 3% (n=3) of the crashes, the road surface was noted to be gravel or dirt.

Of the 52 crashes where the number and type of lanes were noted in the coroner's file, the majority (79%, n=41) occurred on a 2 lane undivided roadway where there is one lane going in each direction, with no barriers to separate them. Eight percent (n=4) occurred on a 4 lane undivided where two lanes each go in either direction and there are no separation barriers. Eight percent (n=4) occurred on a 4 lane divided roadway where two lanes each go in either direction and there are separation barriers (i.e. cement). Six percent (n=3) occurred on a 3 lane undivided roadway where two lanes are going in one direction and only one lane is going the opposite direction, with no separation barriers. Twenty one percent (n=11) of these crashes occurred at an intersection exchange.

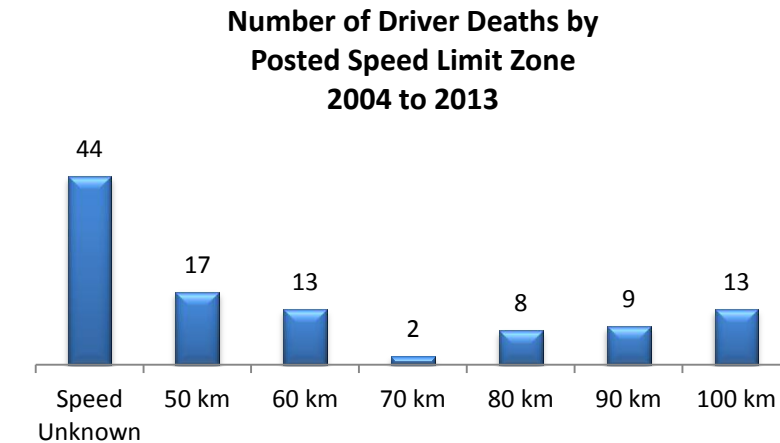
With respect to crash location, 33% (n=33) of the deaths occurred in the Interior region of BC (as defined by the BCCS regional areas-see Appendix 1) (figure 6). Eight percent (n=9) of the crashes occurred in an area outside where the youth was residing. For example, a youth living on Vancouver Island has a crash in Surrey.

Figure 6:



In 62 of the crashes, the speed limit was noted in the coroner's file (see figure 7). Where the speed limit was noted, just over a quarter of the crashes occurred in a speed zone of 50 km (27%, n=17). Another quarter (24%, n=15) of these 62 crashes occurred in intermediate speed zones of 60 or 70 km. Almost half of the 62 crashes (48%, n=30) occurred on a high speed road of 80 to 100 km. Evidence from other jurisdictions indicates that higher speed limits usually result in higher numbers of crashes resulting in serious injury or death (Richter, Berman, Friedman, Ben-David, 2006; Letty and van Schagen, 2006).

Figure 7:



Source: BC Coroners Service

E. WHEN CRASHES OCCURRED

Most of these fatal crashes happened in the summer or fall months.

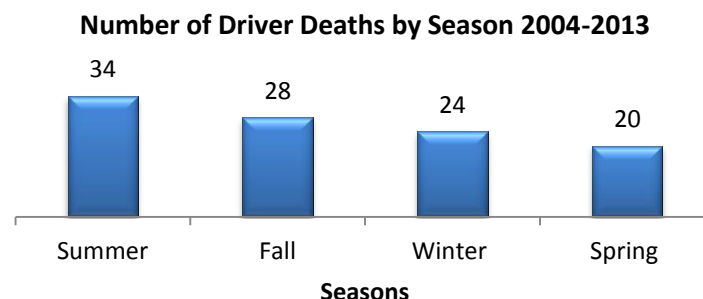
SEASONS AND WEATHER

Summer was when young driver deaths most frequently occurred with the fewest deaths occurring in the spring (see figure 8).

Summer months often see an increase in vacation related road travel to recreational destinations/events, likely resulting in an increase of drivers on the road, more time spent travelling on roads and at increasing distances. Additionally, motorcycle use has a seasonal component, with greater popularity during fair weather.

Rain, ice and snow can also increase the risk a crash will occur. If a driver is speeding in these conditions, the risk of a crash is further increased. As previously mentioned in the section on speeding, driving too fast for road conditions was noted as a factor in 8 of the young driver deaths.

Figure 8:



Source: BC Coroners Service

Apart from driving too fast for weather conditions, weather or road conditions were noted as factors related to the cause of the crash in 27% (n=29) of the young driver deaths. The most

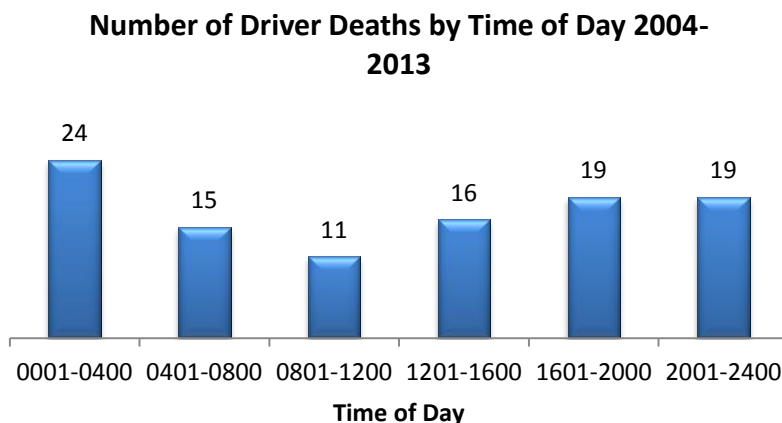
noted road conditions included: ice, snow, frost and wet. Fog, gusty winds and heavy rainfall were also noted. With less experience than older drivers, young drivers are likelier to overestimate their ability to drive in certain types of weather and/or drive too fast for the road conditions (Gonzales, Dickinson, DiGuseppi and Lowenstein, 2005).

TIME OF DAY

Driving at night poses an increased risk of crashing in young drivers. Young drivers have less experience driving at night and the darkness may make it difficult to identify hazards. Additionally, night driving is often associated with one or more other factors such as: fatigue, the presence of passengers (which may pose a distraction), impairment and speeding (Williams, et.al, 2012).

Where time of day was noted (104 cases) (see figure 9), 60% of the crashes (n=62) occurred in the late afternoon and into the late evening and early morning hours (4 p.m. to 4 a.m.). The highest number (n=24) of these crashes were in the early morning hours between midnight and 4 a.m. Although it is unknown if illumination was a contributing factor, 15% (n=16) of the youth were driving on a dark road with no lighting.

Figure 9:



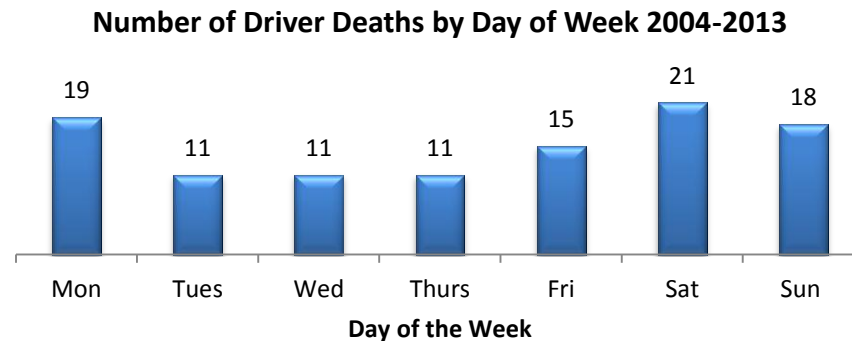
Source: BC Coroners Service

The GLP Learner stage restricts drivers from driving between midnight and 5 a.m. At the Novice stage, there are no restrictions on the time of day a driver can drive. While the Novice stage driver can drive at night, there is a 1 passenger (immediate family exempt) limit restriction imposed unless there is supervisor of 25+ years old present.

DAY OF THE WEEK

The number of crashes varied throughout the week with the fewest crashes occurring mid-week (see figure 10). There were 39 crashes that occurred over the weekend between Saturday and Sunday and 67 that occurred across the weekdays between Monday and Friday.

Figure 10:



Source: BC Coroners Service

Research indicates that the risk of a crash is increased on weekends across all age groups of drivers but especially for young drivers, on Fridays and Saturdays in particular, especially at night (Organisation for Economic Co-operation and Development, 2006). The research suggests this may be due to weekend evenings being a particularly social time for young drivers with a higher likelihood they are driving with passengers and possibly using alcohol and/or substances (Organisation for Economic Co-operation and Development, 2006). The OECD sample size was much larger than this review which may account for the variation in findings.

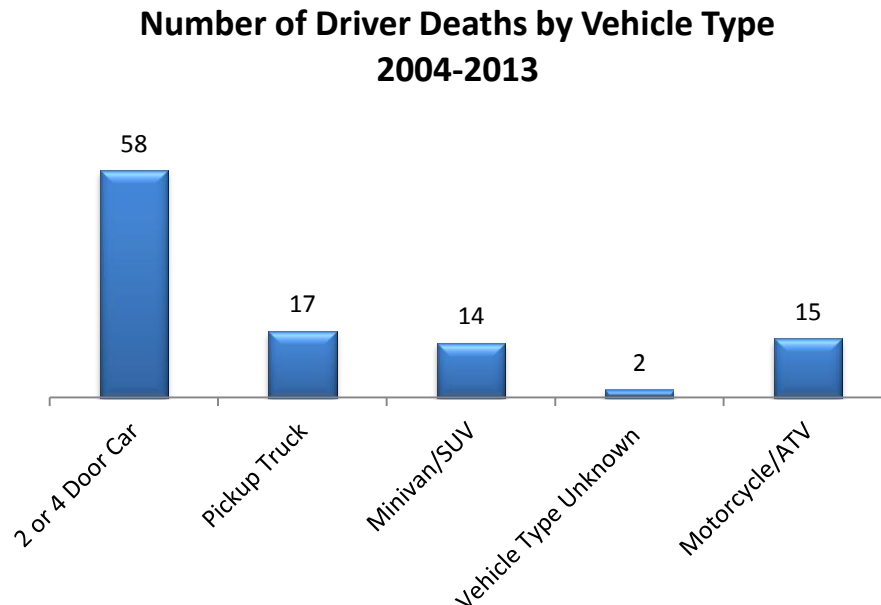
F. VEHICLES INVOLVED IN FATAL CRASHES

The majority of the drivers were driving either 2 or 4 doors cars. Fewer motorcycles and ATVs were driven; however, these generally have a higher crash risk because they offer less stability and less safety features compared to vehicles.

Research indicates that young drivers are likelier than older drivers to be driving small vehicles with fewer safety features, placing them at greater risk of serious injury or death (Insurance Institute for Highway Safety, 2014).

In this review, over half of the young drivers (58%, n=58) were driving either 2 or 4 door cars (see figure 11).

Figure 11:



Source: BC Coroners Service

Depending on the age of a vehicle, lack of safety features could be a concern. For example, older vehicles are less likely to have safety features such as: electronic stability control and side airbags (Insurance Institute for Highway Safety, 2014). Where the age of the vehicle was known (n=99) approximately half of the vehicles were less than 10 years old and half more than 10 years old.

No defects were found on 56% (n=59) of the 106 vehicles. In 9% (n=10) of cases, a vehicle inspection was not completed and in 22% (n=23) cases, it was unknown whether a vehicle inspection was completed. Eleven percent (n=12) of vehicles were noted to have defects including such things as tires, rust and brake malfunction. Of 28 crashes where airbag use was documented, 23 of the vehicles had airbags deploy and 5 vehicles did not have airbags deploy. Four vehicles were not equipped with airbags.

The Insurance Institute for Highway Safety (IIHS) is a U.S. based independent, non-profit scientific and educational organization focused on reducing deaths, injuries and property damage as a result of vehicle crashes. To mitigate the risks associated with a young driver driving an unsafe vehicle, IIHS suggests:

- Young drivers should avoid high horsepower vehicles because this can tempt a young driver to drive beyond their limits;
- Midsize or larger size vehicles are a better choice compared to driving a small or mini vehicle as these offer the driver greater protection in the event of a crash;
- A vehicle equipped with electronic stability control (ESC) will help drivers maintain vehicle control on curves and slippery roads; and
- Ideally, vehicles driven by young drivers should have good safety ratings.

It should be noted that the risk of a rollover is higher in SUV's and pickup trucks than in cars (IIHS, 2014). A rollover is when a vehicle tips onto its side or roof during a crash which can sometimes cause partial or full ejection of the occupants and increase the likelihood of serious injury or death (IIHS, 2014). The IIHS (2013) reports that rollovers in the U.S. occur in about 2% of all vehicle crashes. Additionally, the size and weight of a vehicle influences the outcome of a crash. If a larger and/or heavier vehicle collides with a smaller and/or lighter vehicle, the smaller/lighter vehicle will be impacted by greater force (IIHS, 2009).

Twelve of the young drivers were operating a motorcycle and three were operating an ATV. The ATV driver deaths in this review occurred on a public roadway and involved another vehicle.

Motorcyclists are at higher risk for being involved in a crash causing death or serious injury compared to drivers of a passenger vehicle (Vanlaar, Marcoux and Robertson, 2009). Motorcycles are not enclosed the way a passenger vehicle is and do not have safety features that a vehicle has such as: airbags, seatbelts (Vanlaar, et.al, 2009). Furthermore, in events that require emergency braking, motorcycles are less stable than passenger vehicles (Insurance Institute for Highway Safety (IIHS), 2013). Other drivers may also find it difficult to see a motorcycle on the roadway (Vanlaar,et.al, 2009).

To drive an ATV on a public roadway in BC, the driver must hold a valid BC licence (either a Class 5/6 full licence or a Class 7/8 GLP licence) and the ATV must be licenced and insured. One of the drivers had a class 7 licence and the other two had no licence. None of the ATV's were licenced and insured for use on public roadways. The IIHS (2013) notes that many ATVs have the ability to reach highway speeds and have low pressure tires that are not intended to be used on paved surfaces. There are also ATV models that are more likely to roll over (IIHS, 2013). The IIHS (2013) indicates that despite this, many ATV fatalities occur on roads.

PART 3: CURRENT STRATEGIES TO INCREASE ROAD SAFETY FOR YOUNG DRIVERS

There are a number of initiatives used to promote young driver safety in BC. The most notable of these strategies is the Graduated Licensing Program (GLP) which is intended to help new drivers develop the skills and attitudes to become safe and competent drivers. Related to the GLP are resources to support parents and guardians in guiding young people through the licensing process. Additionally broader road safety strategies and road safety enforcement contribute to the safety of young drivers.

A. GRADUATED LICENCING PROGRAM IN BC

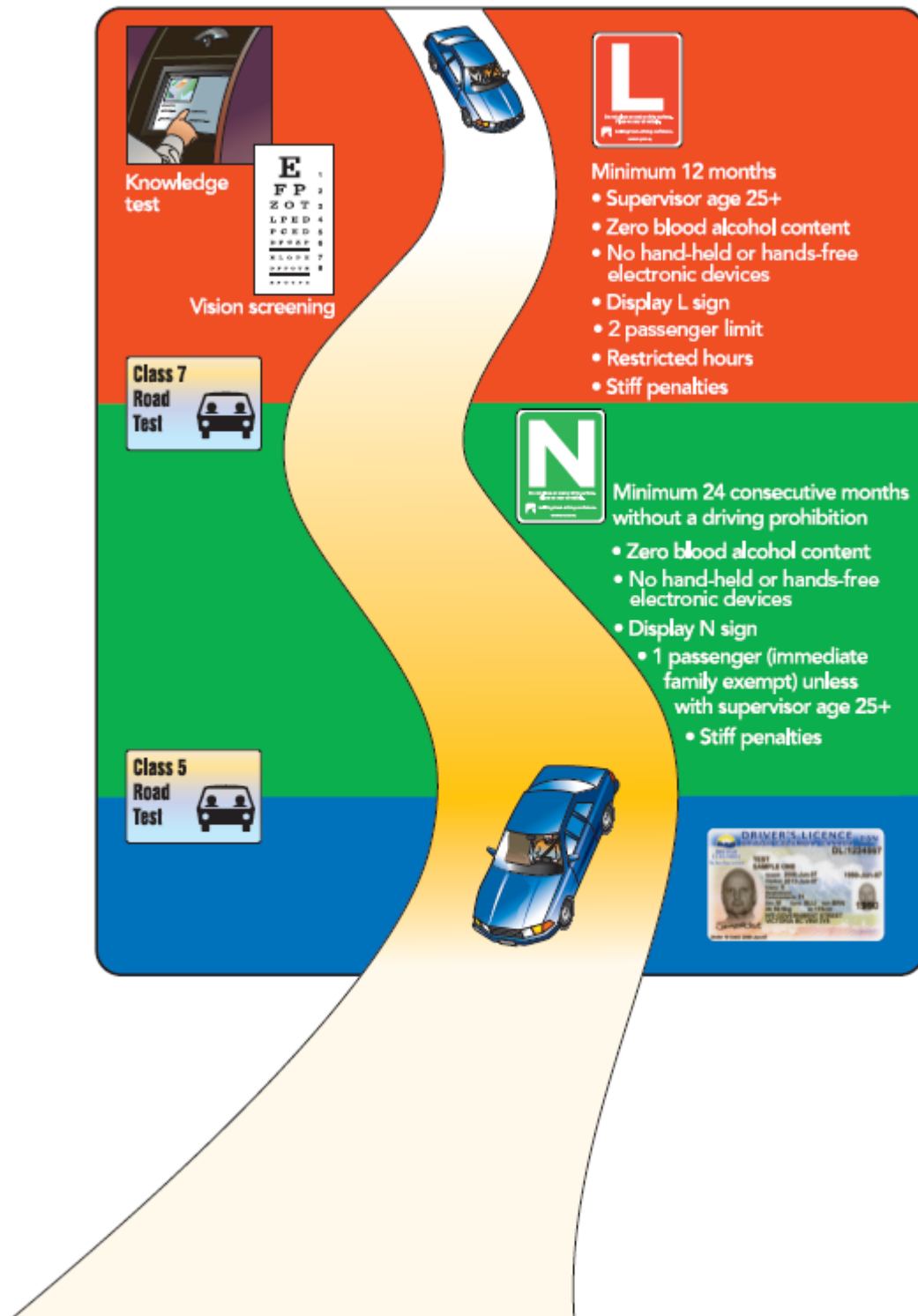
BC's GLP greatly contributes to reducing the risks associated with death and serious injury in new drivers, which is its overall purpose. To this end, it supports young and new drivers during their most vulnerable driving years. Young drivers are learning complex skills and developing attitudes and approaches that will impact how they drive and interact with other road users (e.g. pedestrians, cyclists, other drivers).

GLPs allow young drivers to gain the skills and experience needed to become safe drivers by providing them with a formal period of learning that includes imposed restrictions (Vanlaar, Mayhew, Marcoux, Wets, Brijs and Shope, 2009).

GLPs have generally been shown to reduce the crash risk of young drivers (Fell, Jones, Romano, Voas, 2011; Masten, Foss and Marshall, 2001, Wiggins, 2006).

BC's Graduated Licensing Program reduces crashes

In BC, to obtain a vehicle or motorcycle licence, a new driver of any age is required to enter the GLP. The GLP is administered by the Insurance Corporation of BC (ICBC). It has two stages (a Learners and a Novice) that a driver must complete before becoming eligible to be fully licensed. The initial Learner stage is a 12 month period that once completed, makes the driver eligible to graduate to the Novice stage. The following Novice stage is for a 24 month period and after successful completion, the driver is eligible to graduate to a full licence. Individuals are only required to complete the GLP one time, allowing full-privilege BC licence holders (e.g. class 5 passenger vehicle) to access a secondary licence (e.g. class 6L motorcycle) through a more streamlined process.



Source: Insurance Corporation of BC (ICBC)

PASSENGER VEHICLE GLP

The current GLP for passenger vehicles has two stages; the Class 7 Learner (7L) stage followed with the Class 7 Novice (7N) stage.

At the Learner stage, the minimum entry age is 16 years old and the minimum exit age is 17 years old. Parents must provide consent for youth under age 19 years.

A driver at the Learner stage must:

- Not consume alcohol (zero BAC)
- Display an L sign
- Not drive between midnight and 5 a.m.
- Not use handheld or hands free electronic devices; and
- Have a maximum of 2 passengers, including a supervisor. The supervisor must be 25 years of age or older and hold a valid class 1-5 licence.

To move into the Novice stage, the driver must pass a Class 7 road test and have held a Class 7L for 12 months. At the Novice Stage, the minimum entry age is 17 years old and the minimum exit age is 18 years and 6 months old, if the driver successfully completed a GLP approved driver education course and remained at-fault crash free and violation free during the first 18 months of the Novice stage.

A driver at the Novice stage must:

- Not consume alcohol
- Display an N sign
- Not use handheld or hands free electronic devices
- Have a maximum of 1 passenger unless accompanied by a supervisor who is 25 years old or older with a valid class 1-5 licence (immediate family are allowed with no supervisor).

To graduate from the GLP, the Novice stage driver must successfully pass a Class 5 road test and have held a Class 7N for 24 consecutive months without a driving prohibition directly leading up to the road test. The amount of time required before being eligible to take the Class 5 road test may be reduced by 6 months if an ICBC approved driver education course is successfully completed in the Learner stage and the driver has no violation tickets or at-fault crashes during the first 18 months of the Novice stage. This driver education course is not mandatory and the driver may complete it at their own cost.

MOTORCYCLE GLP

The current GLP for new road users wanting to drive a motorcycle¹⁶ has two stages: a Class 8 Learners (8L) stage and a Class 8 Novice (8N) stage. New riders that already hold a full-privilege BC licence for another class of vehicle are licensed through a substantially streamlined process.

At the Learners stage, the minimum age for entry is 16 years old and the minimum exit age is 17 years old. Parental consent is required for youth under 19 years old.

¹⁶ Driving an ATV on a public road requires a motorcycle licence.

A driver at the Learner stage must:

- Always ride within the sight of a supervisor who is 25 years old or older with a valid Class 6 licence.
- Not consume alcohol
- Display an L
- Only driving between sunrise and sunset
- Not use handheld or hands free electronic devices
- Not carry passengers
- Not exceed 60 km/h.
- After passing a motorcycle skills test (a minimum of 30 days after obtaining a learners license), the 60 km/h speed restriction is removed and a supervisor is no longer required.

Before moving to the Novice stage, the driver must successfully pass a motorcycle skills test (MST) and Class 8 road test and have held a Class 8L for 12 months. At the Novice stage, the minimum age of entry is 17 years old and the minimum exit age is 18 years and 6 months if the driver successfully completed a GLP approved driver education course and remained at-fault crash free and violation free during the first 18 months of the Novice stage.

A driver at the Novice stage must:

- Not consume alcohol
- Display an N
- Not use handheld or hands free electronic devices

To graduate from the GLP, the Novice driver must successfully pass a Class 6 road test and have held a Class 8N for 24 consecutive months without a driving prohibition directly leading up to the road test. The amount of time required before being eligible to take the Class 6 road test may be reduced by 6 months if an ICBC approved driver education course is successfully completed in the Learner stage and driver has no violation tickets or at-fault crashes during the first 18 months of the Novice stage. This driver education course is not mandatory and the driver may complete it at their own cost.

The GLP for both vehicles and motorcycles was initially introduced through a phased process between 1998 and 2000. Since this time; modifications to enhance its effectiveness have been made. In 2003, the vehicle GLP was lengthened from 2 to 3 years and a Novice stage passenger restriction and a demonstrated safe driving requirement were imposed. In 2010, an electronic device (i.e. cell phone use) restriction was imposed for both GLPs.

B. PARENTAL¹⁷ INFLUENCE

Parents play an integral role in the development of a young person's driving skills and behaviours. At the point where a youth is ready to apply for a licence, parental input into this process starts with consent for their son or daughter to obtain a GLP licence which includes a commitment to ensure their new driver receives a minimum of 60 hours of on-road practice. Once a young driver obtains a Learners licence, they will likely be using a parent's vehicle to learn to drive. Parents are in a position to set additional restrictions to the ones already imposed by the GLP process. Additionally, parents have the ability to reinforce the GLP restrictions.

Research indicates that long before a young person is eligible to drive; they are influenced by their parents' attitudes and actions relative to driving (Morrish, Kennedy and Groff, 2011). Research also suggests that generally, parents recognize there are risks associated with a young person driving and they are concerned about their son or daughter driving in risky situations (Williams, Leaf, Simons-Morton, Hartos, 2006). Often times, parents show a willingness to be involved in reducing these risks (Williams, et.al, 2006).

Teens are watching and listening:

Young driver behaviours are greatly influenced by parents' attitudes about driving and actions when driving.

Related to the GLP are a number of resources to help support parents and guardians guide young people through the licensing process. These include ICBC new driver study guides which contain sample driving sessions that parents can work through with their young driver (i.e. Tune Up for Drivers/Riders) as well as family contracts to help establish safe and responsible vehicle use.

C. ROAD SAFETY

Young driver safety is also addressed within broader initiatives of road safety and road safety enforcement.

ROAD SAFETY STRATEGIES

Road safety strategies are high level plans that are generally initiated and led by either a government or a partner agency. They are time sensitive and articulate overall goals, approaches to achieve these goals and a measurement process to determine if and when the goals are met.

All of these strategies focus on the primary goal of reducing risks that lead to death and serious injury for all people using the roads. This includes pedestrians, cyclists, drivers and passengers. Generally, road safety includes factors such as: behaviours exhibited while using the road, vehicle safety, road maintenance, speed limits, traffic engineering and enforcement.

Young driver safety is a road safety priority internationally, nationally and provincially.

INTERNATIONALLY

A Decade of Action for Road Safety 2011-2020 is an initiative focused on improvements to road safety, vehicles, driver behaviour and emergency services. The World Health Organization

¹⁷ The terms 'parental' and 'parents' are intended to include parents and guardians responsible for the well-being of a young person.

(WHO) has taken the lead advocate role and is working with stakeholder nations to gather and share best practices for prevention and reduction of risks and share information with the public.

CANADA

Canada's 5 year road safety strategy (2011-2015) is focused on public awareness and commitment to road safety; improving cooperation, communication and collaboration among stakeholders; improving enforcement; and supporting research and evaluation through improvements to road safety information.

It was developed by a national non-profit organization, the Canadian Council of Motor Transport Administrators (CCMTA). The CCMTA is comprised of representatives from federal, provincial and territorial governments and uses a consultative process to collect information and make decisions about matters such as: licensing, registration and control of motor vehicle transportation and highway safety.

BRITISH COLUMBIA (BC)

The *British Columbia Road Safety Strategy 2015 and Beyond* is a provincial initiative focused on targeting areas of concern, implementing a governance structure for road safety, enhancing road safety research, improving communication with British Columbians and partner agencies, and sustaining and increasing engagement with local communities and First Nations to encourage and support road safety initiatives at the local level.

This strategy is based on the following guiding principles:

- Adopt a Safe System Approach that is focused on factors contributing to protecting all road users, including ensuring the speeds on roadways are safe.
- Collaborate among stakeholders involved in the road traffic system and in the prevention of serious injuries and fatalities and collectively focus on results to achieve declines in serious injuries and fatalities.
- Sustain existing successful initiatives while focusing on new areas or issues that are identified as requiring attention through analysis of motor vehicle crash trends and stakeholder consultations.
- Encourage new ideas and best practices towards increasing road safety.

RoadSafetyBC is the lead agency of this strategy. Stakeholders from the insurance sector, crown corporations, enforcement agencies, research, health and local governments are involved in developing a framework for action to achieve the overall vision that BC will have the safest roads in North America and ultimately, have zero fatalities and serious injuries.

ROAD INFRASTRUCTURE AND TRAFFIC ENGINEERING

An important factor in reducing the risk of crashes is the safety performance of a roadway. Road infrastructure and traffic engineering relates to highways, freeways, roads and streets and takes into account variables such as location (i.e. rural areas), speed limits, lighting, intersections, stop lights, maintenance and traffic patterns.

Jurisdictions identified as having the safest roads approach road safety from a "safe systems" perspective where speed limits are set and enforced based on the type of crashes that could occur and the potential injury to road users (Howard, Cameron et al. 2008). For example, speed limits are 30 km/h in areas where pedestrians or other vulnerable road users may be struck by motor vehicles, 50 km/h in intersections where side impacts may occur, 70 km/h on undivided

highways where head-on crashes may occur, and above 70 km/h on divided highways where a median or guard rail provides protection from head-on crashes (Tingval and Haworth 1999; Richter, Berman et al. 2006; United Nations Road Safety Collaboration 2008).

In BC, the Ministry of Transportation and Infrastructure (MoTI) is responsible for setting speed limits on provincial highways, including areas within municipal boundaries. Each municipality is responsible for setting speeding limits within its municipal boundaries. Federally, Transport Canada promotes safe, secure, efficient and environmentally responsible transportation system within Canada.

In October 2013, the MoTI completed a review focused on rural highway speed and safety and made recommendations to enhance safety in relation to winter tire requirements and use, wildlife hazards and the management of slow moving vehicles that can cause aggressive driving or driver frustration (Ministry of Transportation and Infrastructure, 2014).

In 2014, speed limits on a number of highways throughout BC were increased. The maximum speed limit on some BC highways is now 120 km per hour. The MoTI website TranBC explains that the traffic engineers who set the speed limits on BC's provincial road system take into account the following factors:

- Local land use indicating the driving environment;
- Road classification;
- Highway geometry (i.e. how much sight distance is available to stop in time for an object ahead);
- Shoulder width, number of intersections and highway entrances;
- A highway's history including the number and types of incidents; and
- Traffic volume, and types of vehicles and other road users (i.e. cyclists, pedestrians).

The last broad review of speed limits in BC was completed in 2003. This 2003 review was limited to an engineering review and did not include consultation with law enforcement or assessment of public information (Parker, et.al, 2003). Road safety, injury prevention and public health agencies all have important evidence based perspectives to contribute in the course of monitoring and reviewing existing speed limits and setting new speed limits on BC with respect to road safety and the prevention of serious injuries and fatalities.

ROAD SAFETY ENFORCEMENT

The enforcement of road safety in BC is shared by a number of authorities including government, partner agencies and law enforcement. Each of these authorities has a specific mandate to address various aspects of road safety including: vehicle safety, road users (i.e. pedestrians, cyclists, and vehicles) and speed limits. Additionally, federal and provincial legislation and regulations provide law enforcement with the authority to enforce penalties associated with road user behaviours that may increase the risk of a crash.

LEGISLATION AND REGULATION

Road safety is addressed both in federal and provincial legislation. The *Criminal Code of Canada* addresses issues such as the dangerous operation of motor vehicles and impaired driving.

The *Motor Vehicle Act* is provincial legislation that oversees the registration, licensing and operations of motor vehicles in BC. This includes issues such as speeding, seatbelt use, roadside prohibitions, licensing and licence suspensions and rules of the road. Additional acts and regulations relating to motor vehicles include but are not limited to the: *Offence Act*, *Judicial Review Procedures Act*, *Civil Forfeiture Act* and *Insurance (vehicle) Act*.

ROAD SAFETY AUTHORITIES

The overarching authority of road safety and enforcement in BC is the Ministry of Justice which includes the Police Service Division and Road Safety BC. The Police Services Division is responsible for ensuring adequate and effective levels of police and law enforcement. RoadSafetyBC is the provincial lead agency responsible for road safety.

The Superintendent of Motor Vehicles (supported by RoadSafetyBC) is the administrative authority, appointed under the *Motor Vehicles Act*, which governs drivers in BC. The Superintendent works closely with partners to ensure the development and implementation of effective road safety policies. Currently, the top priorities of RoadSafetyBC include reducing or eliminating: drinking and driving; distracted driving; and excessive speeding.

Law enforcement agencies generally enforce road safety. A primary example are the police agencies who engage in road safety campaigning, messaging and programming related to road safety measures and consult on issues relating to road safety in partnership with other agencies such as ICBC and RoadSafetyBC. The RCMP and municipal police enforce violations under the *Motor Vehicle Act*.

In terms of speed enforcement, police in BC issue violation tickets that result in fines or penalty points. Higher fines and in some cases, vehicle impoundment can occur if a driver is excessively speeding. Police resources do not have the capacity to provide 24 hour speed enforcement, 7 days a week. Considering police officer safety, it may not be feasible to enforce speed in some areas that may be considered high risk for crashes (e.g. a roadway with no shoulder area). In addition to police enforcement, an automated intersection safety camera program is in place to manage drivers who run red lights at intersections. This type of enforcement is located at various intersections that have been identified as high risk locations for crashes. As a result of these enforcement measures, drivers are subject to receiving fines or penalties. Research focused on the effectiveness of both police and automated enforcement indicates both can have a deterrent effect on drivers (Tay, 2009).

In addition to the current speed enforcement measures used in BC, other forms of automated speed enforcement exist and are being used in other jurisdictions with positive results (Wilson, et.al, 2010; Thomas, Srinivasan, Decina and Staplin, 2008). Specific examples include, “time and distance” automated speed enforcement and “speed on green” automated enforcement.

“Time and distance” automated speed enforcement is measuring the average speed of a vehicle between two locations, usually a set number of kilometres apart. A camera takes a picture of the vehicle when it enters the speed enforcement area and again, as it leaves and the average speed between these points is calculated to determine if the driver was travelling significantly over the maximum posted speed limit.

“Speed on green” automated speed enforcement uses an automated intersection camera to manage drivers who are travelling significantly over the posted speed limit when entering an intersection on a green light. The photographic evidence is reviewed by enforcement and a ticket is issued to the registered vehicle owner.

ICBC partners with government to promote road safety and service delivery on behalf of the Superintendent of Motor Vehicles. Services include but are not limited to: licensing, driver training and testing, maintaining driving records and the application of penalty points.

Transport Canada governs the manufacture and importation of vehicles in Canada. This includes setting and enforcing of vehicle safety standards related brake systems, airbags etc.

GLP RESTRICTIONS

In addition to rules set out under the *Motor Vehicle Act* and its Regulations, and the other above named Acts that apply to all drivers, new drivers have a lower penalty point threshold than non-GLP drivers (who are more experienced) before being subject to the consequences of RoadSafety BC's Driver Improvement Program (DIP).

That could mean a warning letter, probation or prohibition from driving from a minimum of one month and up to a year, depending on the offence and the individual's driving record. Any driving prohibition as a Learner will extend the learner stage. A driving prohibition in the novice stage will result in the loss of any time accumulated and require an additional 24 consecutive prohibition-free months in the novice stage to be eligible to graduate from GLP once the licence has been reinstated.

The GLP imposes a zero tolerance restriction on alcohol consumption which carries a fine and 3 driver penalty points towards the DIP threshold as well as an immediate 12 hour licence suspension. GLP stage drivers are also subject to the same impaired driving penalties that all drivers are subject to.

New vehicle and motorcycle drivers are subject to lower penalty point thresholds than experienced drivers. **After 2 “average” violation tickets, a new driver may receive a 30 day driving prohibition.**

PART 4: SUPPORTING YOUNG DRIVERS GOING FORWARD: RECOMMENDATIONS

Motor vehicle crashes remain the leading cause of death in young people and continue to pose a significant risk of death for young drivers. A number of areas have been identified through the panel that can further strengthen young driver development and help prevent future crashes and young driver fatalities. Specifically:

- A review of the BC's GLP and other jurisdictional best practices;
- Enhanced data collection; and
- A focus on reducing speed which would further support young driver safety and help reduce crashes and fatalities.

The recommendations arising from the death review panel were developed in a manner that was:

- Collaborative;
- Attributable to the deaths being reviewed;
- Focused on identifying opportunities for improving public safety and prevention of future deaths;
- Targeted to specific parties;
- Realistically and reasonably implementable; and
- Measurable.

REVIEW OF THE GRADUATED LICENCE PROGRAM

Since BC's last GLP evaluation in 2006, further program changes have occurred including moving the driving course time incentive from the Learners stage to the Novice stage and the restriction of electronic devices in 2010.

For many parents or guardians, the GLP process is not something they had to complete before getting their licence. They may be unfamiliar with GLP stages and restrictions, skill development expectations and recommended hours of driving experience. Some parents and guardians may also be unsure of how to best support young drivers through the GLP process. ICBC has resources for parents to help them learn about the GLP process and what they can do to encourage and support new drivers to drive safely and responsibly.

Recommendation 1

By December 2017:

That ICBC complete a review of BC's Graduated Licencing Program (Class 7 & 8). The review should focus on three areas:

- A review of GLP and the higher risk Novice licence stage to determine if there are opportunities for improving the crash reduction benefits of the program, including a review of research-based new driver best practices from other jurisdictions;
- A review of how parents and guardians are engaged in the process of supporting young drivers. ICBC currently has a variety of educational materials and a family contract to

help guide parents and guardians in supporting young drivers learn competent and safe driving practices. Specifically, the review would focus on:

- Identification of the current approaches used to engage parents;
 - Determining the effectiveness of these approaches; and
 - Identifying any gaps within these approaches and addressing them
- Engage young drivers and soon- to-be drivers in a dialogue about the strengths of the GLP and how it could further support the learning and implementation of safe driving skills and practices, including the input of young people on how to reduce fatal crashes, reduce speeding, and ensure compliance with GLP restrictions.

ENHANCED DATA COLLECTION

The following areas emerged as priorities for enhanced data collection.

The first area involves obtaining driver abstracts in all BC Coroners Service investigations for teen drivers who die in a crash to better understand driving behaviour, driving history and the correlations to fatal crashes. The driver abstract is a history of the young person's driving record which can be helpful in understanding and determining possible contributing factors to the death.

Another area involves distracted driving. Distracted driving is an emerging issue that requires further exploration to fully understand its impacts in relation to young drivers. The more recent focus on distracted driving is due to the perceived common use of electronic devices.

Handheld electronic device use has become synonymous with the term 'distracted driving'. Media and public surveys report increases in this type of distracted driving, however, there are other types of distractions that can also increase the risk of a crash such as additional passengers, eating, billboards and electronics beyond handheld devices.

In a crash that results in a driver fatality, it is difficult to identify whether a driver was distracted when a crash is not witnessed or the type distraction is not obviously apparent. In this review of driver deaths between 2004 and 2013, cell phone use was noted as a contributing factor in one death.

It does not appear that reviewing fatal crashes provides accurate information about the overall prevalence and types of driver distractions that exist for young drivers. It would be beneficial to review and clarify the criteria used to identify distracted driving in police-attended crashes so the impact of distraction as a result of the use of electronic devices could be estimated. Collecting information through direct observation, surveys, and non-fatal crashes would help further our understanding the prevalence and rates of contribution to crashes.

Recommendation 2

By February 2016:

- The BC Coroners Service contribute to the knowledge base of young driver behaviour and road safety by obtaining and reviewing driver abstracts in all BCCS investigations of young driver fatal crashes.

- ICBC and its partner agencies contribute to the knowledge base of distracted driving of young drivers by:
 - Reviewing and clarifying the criteria used by law enforcement to identify distracted driving in police-attended crashes; and
 - Publicly reporting on distracted driving.

REDUCE SPEED RELATED INJURY AND DEATH

As identified in the body of this report, road safety infrastructure, traffic engineering and road safety enforcement are key components in reducing the number of serious injuries and fatalities due to vehicle crashes.

In BC, the setting of speed limits on provincial highways, including areas within municipal boundaries, is the responsibility of the Ministry of Transportation and Infrastructure (MoTI). The most recent speed review conducted by the Ministry of Transportation and Infrastructure (MoTI) was completed in October 2013 and focused on rural highway speed and safety. This review included technical analysis conducted by the MoTI's engineers and public consultation via online surveys and open houses throughout the province (MoTi, 2014). The last broad review of speed limits in BC was completed in 2003. This 2003 review was limited to an engineering review and did not include consultation with law enforcement or assessment of public information (Parker, et.al, 2003). To ensure an emphasis on serious injury and fatality prevention, professionals with road safety, injury prevention and public health expertise should be consulted on an ongoing basis in the course of monitoring and reviewing existing and proposed speed limits.

Enforcement is an essential element of road safety. In BC, the Ministry of Justice is responsible for speed enforcement. With the goal of reducing crash related serious injuries and fatalities, focusing on the most high risk crash areas needs to be the enforcement priority. Recognizing that police personnel do not have the capacity to provide 24 hour speed enforcement, 7 days a weeks there are automated speed control strategies that can assist in reducing the number of deaths and serious injuries. Although it is not possible to target automated speed enforcement to a particular age or driver's licence class, the driving practices of parents and other adults also influences the driving behaviour of new drivers.

Recommendation 3

By February 2016:

- The Ministry of Transportation and Infrastructure consult with road safety, injury prevention and public health agencies to ensure that road safety and injury prevention are the paramount criteria used in the course of monitoring and reviewing existing speed limits and setting new speed limits on BC provincial road system.
- The Ministry of Justice review the requirements for conducting a pilot project of automated speed enforcement measures, such as "time and distance" and/or "speed on green", in areas identified as high risk for crashes including those involving young drivers.

By February 2017

- The Ministry of Justice develops and implements a pilot automated speed enforcement project that would be:
 - For a specified period of time;
 - Located at a limited number of sites identified as having a high prevalence of speed related crashes; and
 - Evaluated to monitor whether these specific automated speed enforcement measures result in a reduction in the number and severity of crashes.

PART 5 RESOURCES AND REFERENCES

RESOURCES

ICBC

www.ICBC.com/

RoadSafetyBC

www.pssg.gov.bc.ca/osmv/

REFERENCES

- Asbridge, M., Hayden, J.A. and Cartwright, J.L. (2012). *Acute cannabis consumption and motor vehicle collision risk: systematic review of observational studies and meta-analysis*. BMJ, 344:e536 doi: 10.1136
- Asbridge, M., Poulin, C., & Donato, A. (2005). *Motor vehicle collision risk and driving under the influence of cannabis: Evidence from adolescents in Atlantic Canada*. Accident Analysis & Prevention, 37(6), 1025–1034.
- Baker, S.P., Chen, L-H. and Li, G. (February 2007). *Nationwide review of graduated driver licensing*. Prepared for AAA Foundation for Traffic Safety. Johns Hopkins Bloomberg School of Public Health, Centre for Injury Research and Policy.
- BC Injury Research and Prevention Unit, injury Data Online Tool (iDOT). Retrieved from, www.injuryresearch.bc.ca on November 11, 2014.
- Beasley, E. and Beirness, D. (2011). *Drug use by fatally injured drivers in Canada (2000-2008)*. Prepared for: Canadian Council of Motor Transport Administrators and Transport Canada. Canadian Centre on Substance Abuse.
- Canadian Centre on Substance Abuse (2011). *Cross Canada report on Student alcohol and drug use*. Retrieved on August 27, 2014 from, <http://www.ccsa.ca/Eng/topics/Monitoring-Trends/Student-Drug-Use/Pages/default.aspx>
- Christoforou, Z., Karlaftis, M.G. and Yannis, G. (2013). *Reaction times of young alcohol-impaired drivers*. Accident Analysis and Prevention, 61, p. 54-62.
- Committee on Injury, Violence and Poison Prevention and Committee on Adolescence (2006). *The teen driver*. Pediatrics, 118, 2570-2581.
- Curry, A.E., Mirman, J.H., Kallan, M.J., Winston, F.K. and Durbin, D.R. (2011). *Peer passengers: how do they affect teen crashes?* The Journal of Adolescent Health: Official Publication of the Society For Adolescent Medicine, Vol 50 (6), p. 588-594.
- Decina, L.E., Thomas, L., Srinivasan, R. and Staplin, L. (September 2007). *Automated enforcement: compendium of worldwide evaluations of results*. National Highway Traffic Safety Administration.

- Engström, J., Johansson, E., Östlund, J. (2005). Effects of visual and cognitive load in real and simulated motorway driving. *Transportation Research Part F*, 8, p. 97-120.
- Fell, J.C., Jones, K., Romano, E. and Voas, R. (2011). *An evaluation of graduated licensing effects on fatal crash involvements of young drivers in the United States*. Traffic Injury Prevention, 12, p. 423-431.
- Ferguson, S.A. (2013). *Speeding-related fatal crashes among teen drivers and opportunities for reducing the risks*. Governors Highway Association.
- Fernandes, R., Hatfield, J. and Job Soames, R.F. (2010). *A systematic review of the differential predictors for speeding, drinking-driving, driving while fatigued, and not wearing a seat-belt among young drivers*. Transportation Research, Part F., 13(3), p. 179-196.
- Gonzales, M.M., Dickinson, L.M., DiGuseppi, C. and Lowenstein, S.R.(2005). *Student drivers: a study of fatal motor vehicle crashes involving 16 year old drivers*. Annals of Emergency Medicine, Vol 45, no.2, p. 140-146.
- Howard, E.I., Cameron, J., Langford, et.al (2008). *Towards zero: ambitious road safety targets and the safe system approach*. Paris, France, Organization for Economic Co-operation and Development, International Transportation Forum.
- Insurance Corporation of British Columbia website:
<http://www.icbc.com/Pages/default.aspx>
- Insurance Institute for Highway Safety (2013). *Status Report: Hundreds dies in ATV crashes on public roads*. Vol 48, No 9. December. Retrieved on August 25, 2014 from,
<http://www.iihs.org/iihs/sr/statusreport/article/48/9/2>
- Insurance Institute for Highway Safety (2013). *Status Report: new research adds to the evidence that motorcycle ABS prevents crashes*. Vol 48, No 4. May. Retrieved on August 25, 2014 from, <http://www.iihs.org/iihs/sr/statusreport/article/48/4/2>
- Insurance Institute for Highway Safety (2014). *Status Report: safety rides shotgun. The best used vehicles for teen drivers*. Vol, 29, No 5. July. Retrieved on July 16, 2014 from,
<http://www.iihs.org/iihs/sr/statusreport/article/49/5/1>
- Insurance Institute for Highway Safety (2014). *Rollover Crashes: Q&A's*. March. Retrieved on November 12, 2014 from,
<http://www.iihs.org/iihs/topics/t/rollover-crashes/qanda>
- Insurance Institute for Highway Safety (2009). *New crash tests demonstrate the influence of vehicle size and weight on safety in crashes; results are relevant to fuel economy policies*. April. Retrieved on November 12, 2014 from,
<http://www.iihs.org/iihs/news/desktopnews/new-crash-tests-demonstrate-the-influence-of-vehicle-size-and-weight-on-safety-in-crashes-results-are-relevant-to-fuel-economy-policies>
- Klauer, S.G., Guo, F., Simons-Morton, B.G., Ouimet, M.C., Lee, S.E. and Dingus, T.A. (2014). *Distracted driving and risk of road crashes among novice and experienced drivers*. The New England Journal of Medicine, 370:1, p. 54 to 59.

- Lawpoolsri, S., Li, J. and Braver, E.R. (2007). *Do speeding tickets reduce the likelihood of receiving subsequent speeding tickets? a longitudinal study of violators in Maryland*. Traffic Injury Prevention, 8, p. 26 to 34.
- Liu, B.C., Ivers, R., Norton, R. Boufous, S., Blows, S. and Lo, S.K. (2008). *Helmets for preventing injury in motorcycle riders (review)*. Cochrane Database of Systematic Reviews, Issue 1, Art. No.: CD004333.
- Marcoux, K.D., Vanlaar, W.G.M. and Robertson, R.D. (February 2012). *The road safety monitor 2011, distracted driving trends*. Traffic Injury Research Foundation. Retrieved on July 3, 2014 from, http://www.tirf.ca/publications/publications_show.php?pub_id=276
- Masten, S.V., Foss, R.D. and Marshall, S.W. (2011). *Graduated driver licensing and fatal crashes involving 16 to 19 year olds*. Journal of American Medical Association, Vol 306, No. 10, 1098-1103.
- Mayhew, D.R., Simpson, H.M. and Singhal, D. (2005). *Best practices for graduated driver licensing in Canada*. Traffic Injury Research Foundation.
- Mayhew, D.R., Simpson, H.M., Singhal, D. and Desmond, K. (June 2006). *Reducing the crash risk for young drivers*. Traffic Injury Research Foundation.
- Mayhew, D., Robertson, R., Brown, S. and Vanlaar, W. (April 2013). *Driver distraction and hands-free texting while driving*. Traffic Injury Research Foundation.
- Morrish, J., Kennedy, P. and Groff, P. (2011). *Parental influence over teen risk-taking: A review of the literature*. SMARTRISK: Toronto, ON.
- Navon, D. (2003). The paradox of driving speed: two adverse effects on highway accident rate. *Accident Analysis and Prevention*, 35, p. 361-367.
- Nyland, D. and Miska, E. (2014) *Rural highway safety and speed review*. Ministry of Transportation and Infrastructure. Province of British Columbia. Retrieved on August 26, 2014 from, <http://www.gov.bc.ca/tran/>
- National Highway Traffic Safety Administration (2013). *Traffic safety facts, 2011*. Report no. DOT HS-811-754. Washington, D.C.: U.S. Department of Transportation.
- Organisation for Economic Co-operation and Development (October 2006). *Young drivers: the road to safety*. Policy Brief. OECD Observer.
- Organisation for Economic Co-operation and Development (2006). *Young drivers: the road to safety*. Transport Research Centre. European Conference of Ministers of Transport (ECMT). OECD Publishing. Retrieved on December 9, 2014 from, <http://www.internationaltransportforum.org/Pub/pdf/06YoungDrivers.pdf>
- Parker, M.R., Sung, H.-Y. and Dereniewski, L.J. (2003). *Review and analysis of posted speed limits and speed limit setting practices in British Columbia. Final Report*. Ministry of Transportation. Province of British Columbia. Retrieved on December 8, 2014 from, <http://www.gov.bc.ca/tran/>

- Peck, R.C., Gebers, M.A., Voas, R.B. and Romano, E. (2008). *The relationship between blood alcohol concentration (BAC), age, and crash risk*. Journal of Safety Research, 39, p. 311-319.
- Richter, E.D., Berman, T., Friedman, L. and Ben-David, G. (2006). *Speed, road injury, and public health*. Annual Reviews Public Health, 27, p. 125-152.
- Rodes, N. and Pivik, K. (2011). *Age and gender differences in risky driving: the roles of positive affect and risk perception*. Accident Analysis and Prevention, 43, p. 923-931.
- Russell, K.F., Vandermeer, B. and Hartling L. (2011). *Graduated driver licensing for reducing motor vehicle crashes among young drivers (review)*. Cochrane Database of Systematic Reviews, Issue 10, Art. No.: CD003300.
- Letty, A. and van Schagen, I. (2006). *Driving speed and the risk of road crashes: a review*. Accident Analysis and Prevention, Vol 38(2), March, p. 215-224.
- Scott-Parker, B., Watson, B., King, M.J. and Hyde, M. K. (2014). *"I drove after drinking alcohol" and other risky driving behaviours reported by young novice drivers*. Accident Analysis and Prevention, 70, p. 65-73.
- Shope, J.T. and Bingham, C.R. (2008). *Teen driving: motor-vehicle crashes and factors that contribute*. American Journal of Preventative Medicine, 35 (3S).
- Smith, A., Stewart, D., Poon, C., Peled, M., Saewyc, E. and McCreary Centre Society (2014). *from Hastings to Haida Gwaii: provincial results of the 2013 adolescent health survey*. Vancouver, BC: McCreary Centre Society.
- Swedler, D.I., Bowman, S.M. and Baker, S.P. (October 2012). *Gender and age differences among teen drivers in fatal crashes*. Center for Injury Research and Policy, Bloomberg School of Public Health, Johns Hopkins University, Vol 56, p. 97-106.
- Tay, R. (2009). *The effectiveness of automated and manned traffic enforcement*. International Journal of Sustainable Transportation, 3, p. 178 to 186.
- Thomas, L.J., Srinivasan, R., Decina, L. and Staplin, L. (2008). *Safety effects of automated speed enforcement programs, critical review of international literature*. Journal of the Transportation Research Board, No. 2078, p. 117-126.
- Traffic Injury Research Foundation (October 2013). *Trends among fatally injured teen drivers, 2000-2010*. Traffic Injury Research Foundation.
- Traffic Injury Research Foundation (n.d.) *Brain Development*. Young and New Driver Centre. Retrieved on December 9, 2014 from, http://yndrc.tirf.ca/downloads/YNDRC_Fact_Sheet_Brain_Development_2014.pdf
- Traffic Injury Research Foundation (n.d.) *Fatigue*. Young and New Driver Resource Centre. Retrieved on July 2, 2014 from, <http://yndrc.tirf.ca/issues/fatigue.php>

- Traffic Injury Research Foundation (n.d.) *Unlicensed driving*. Young and New Driver Resource Centre. Retrieved on July 2, 2014 from, http://www.yndrc.tirf.ca/issues/unlicensed_driving.php
- Traffic Injury Research Foundation (n.d.) *Passengers*. Young and New Driver Resource Centre. Retrieved on July 2, 2014 from, <http://yndrc.tirf.ca/issues/passengers.php>
- Traffic Injury Research Foundation (n.d.) *Speeding*. Young and New Driver Resource Centre. Retrieved on July 2, 2014 from, <http://www.yndrc.tirf.ca/issues/speeding.php>
- Transport Canada. *Road safety in Canada*. Retrieved on August 26, 2014 from, <http://www.tc.gc.ca/eng/motorvehiclesafety/tp-tp15145-1201.htm#s5>
- Transport Canada (March 2011). *Road safety in Canada, rethink road safety*. Government of Canada. TP 15145E.
- Transport Canada (2010). *Results of transport Canada's rural and urban surveys of seat belt use in Canada 2009-2010*. Fact Sheet. Road Safety and Motor Vehicle Regulation Directorate. TP 2436E.
- Vanlaar, W., Marcoux, K. and Robertson, R. (2008). *Road Safety Monitor, 2007, Excessive speeding*. Traffic Injury Research Foundation. September. Retrieved on December 8, 2014 from, http://www.tirf.ca/publications/PDF_publications/rsm_speeding-2007-final.pdf
- Vanlaar, W., Marcoux, K. and Robertson, R. (2009). *Road Safety Monitor, Motorcycles*. Traffic Injury Research Foundation, June. Retrieved on August 25, 2014 from, http://www.tirf.ca/publications/PDF_publications/rsm_2008_motorcyclists_final.pdf
- Vanlaar, W., Mayhew, D., Marcoux, K., Wets, G., Brijs, T. and Shope, J. (2009). *An evaluation of graduated driver licensing programs in North America using a meta-analytic approach*. Accident Analysis and Prevention, 41, p. 1104-1111.
- Williams, A.F., Leaf, W.A., Simons-Morton, B.G. and Hartos, J.L. (2006). *Parent's views of teen driving risks, the role of parents, and how they plan to manage risks*. Journal of Safety Research, 37, p. 221-226.
- Williams, A.F., West, B.A. and Shults, R.A. (2012). *Fatal crashes of 16 to 17 year old drivers involving alcohol, nighttime driving, and passengers*. Traffic Injury Prevention, 13:1-6.
- Wilson, C., Willis, C., Henrikz, J.K., Le Brocquel, R. and Bellamy, N. (2010) *Speed cameras for the prevention of road traffic injuries and deaths*. Cochrane Database of Systematic Reviews, Issue 11, Art. No.: CD004607.
- Wiggins, S. (2006). *Graduated licensing: year six evaluation report*. Insurance Corporation of BC Retrieved on August 18, 2014 from, <http://www.icbc.com/Pages/default.aspx>

Wiggins, S. (2004). *Graduated licensing program: interim evaluation report-year 3*. Insurance Corporation of BC Retrieved on June 5, 2014 from, <http://www.icbc.com/Pages/default.aspx>

World Health Organization (March 2013). *Road traffic injuries*. Fact Sheet No. 358.

APPENDIX 1: BC CORONERS SERVICE REGIONS

